APPENDIX

Supplementary Table 1. Clinical probabilities						
Annual Probabilities *(if not stated otherwise)*	**Base case value**	**Low estimate**	**High estimate**	**Probability distribution**	**Occurrence**	**Source**
Perioperative complications (per event)						
Probability of perioperative death (TURP) (per event)	0.0012	0.0006	0.0019	Beta	One-time	(1)
Probability of TUR syndrome (per event)	0.0243	0.0193	0.0297	Beta	One-time	(2)
Probability of blood transfusion (TURP) (per event)	0.0482	0.0406	0.0564	Beta	One-time	(2)
Dizziness						
Probability of dizziness (PhTx)	0.0050	0.0034	0.0068	Beta	Ongoing	(3)
Gynecomastia						
Probability of gynecomastia (PhTx)	0.0050	0.0034	0.0068	Beta	Ongoing	(3)
Ejaculatory dysfunction					Ongoing	
Probability of ejaculatory dysfunction (PhTx)	0.0233	0.0196	0.0272	Beta	Ongoing	(3)
Probability of ejaculatory dysfunction (off treatment)	0.0063	0.0053	0.0073	Beta	Ongoing	(3, 4)
Probability of ejaculatory dysfunction (post-PUL)	Off Tx	Off Tx	Off Tx	Beta	Ongoing	(5)
Probability of ejaculatory dysfunction (post-WVTT, 0–3 m/4–12 m)	0.059/0.025	0.0263	0.1007	Beta	First year	(6)
Probability of ejaculatory dysfunction (post-TURP)	0.4907	0.405	0.579	Beta	First 2 years	(7)
Erectile dysfunction						
Probability of erectile dysfunction (PhTx)	0.0233	0.0196	0.0272	Beta	Ongoing	(3)
Probability of erectile dysfunction (off treatment)	0.0150	0.0127	0.0177	Beta	Ongoing	(3, 4)
Probability of erectile dysfunction (post-PUL)	Off Tx	Off Tx	Off Tx	Beta	Ongoing	(5)
Probability of erectile dysfunction (post-WVTT)	Off Tx	Off Tx	Off Tx	Beta	Ongoing	(6)
Probability of erectile dysfunction (post-TURP)	0.0357	0.0133	0.0658	Beta	First year	(8, 9)
Incontinence						
Probability of incontinence (PhTx)	0.0076	0.0055	0.0097	Beta	Ongoing	(3)
Probability of incontinence (off treatment)	0.0217	0.0157	0.0277	Beta	Ongoing	(3, 4)
Probability of incontinence (post-PUL, 0–3 m/4–12 m)	0.036/0.007	0.0117	0.0700	Beta	First year	(5)

Probability of incontinence (post-WVTT)	0.000	0.000	0.000	-		(6)
Probability of incontinence (post-TURP)	0.0325	0.0166	0.0525	Beta	First 2 years	(10, 11)
Acute urinary retention						
Probability of AUR (PhTx)	0.0055	0.0038	0.0074	Beta	Ongoing	(3)
Probability of AUR (off treatment)	0.0289	0.0199	0.0389	Beta	Ongoing	(3, 4)
Probability of AUR (post-PUL, 0–3 m)	0.0070	0.0002	0.0294	Beta	First 3m	(5)
Probability of AUR (post-WVTT, 0–3 m)	0.0370	0.0122	0.0731	Beta	First 3m	(6)
Probability of AUR (post-TURP)	0.0432	0.0275	0.0611	Beta	First 2 years	(10, 11)
Urethral stricture or bladder neck contracture related to surgery						
Probability of urethral stricture/bladder contracture (post-PUL)	0.008	0.0003	0.0333	Beta	First year	(12)
Probability of urethral stricture/bladder contracture (post-WVTT)	0.008	0.0003	0.0318	Beta	First year	(13)
Probability of urethral stricture/bladder contracture (post-TURP)	0.031	0.0236	0.0401	Beta	First 2 years	(14)
Dysuria/urgency/frequency						
Probability of dysuria, urgency, frequency (post-PUL 0–3 m/4–12 m)	0.414/0.033	0.3301	0.4943	Beta	First year	(5)
Probability of dysuria, urgency, frequency (post-WVTT, 0–3 m)	0.299	0.2201	0.3754	Beta	First 3m	(6)
Probability of dysuria, urgency, frequency (post- TURP, 0–3 m)	0.105	0.0839	0.1275	Beta	First 3m	(14)
Hematuria						
Probability of hematuria (post-PUL, 0–3 m/4–12 m)	0.257/0.007	0.1860	0.3328	Beta	First year	(5)
Probability of hematuria (post-WVTT, 0–3 m)	0.118	0.0703	0.1767		First 3m	(6)
Probability of hematuria (post-TURP, 0–3 m)	0.231	0.0725	0.1353	Beta	First 3m	(8, 11)
Urinary tract infection						
Probability of UTI (PhTx)	0.0005	0.0000	0.0010	Beta	Ongoing	(3)
Probability of UTI (off treatment)	0.0005	0.0000	0.0010	Beta	Ongoing	(3, 4)
Probability of UTI (post-PUL, 0–3 m)	0.029	0.0081	0.0603	Beta	First 3m	(5)
Probability of UTI (post-WVTT, 0–3 m)	0.047	0.0167	0.0819	Beta	First 3m	(6)

Probability of UTI (post-TURP, 0–3 m)	0.066	0.0484	0.0839	Beta	First 3m	(14)
Pelvic pain						
Probability of pelvic pain (post-PUL, 0–3 m/4–12 m)	0.179/0.014	0.1189	0.2439	Beta	First year	(5)
Probability of pelvic pain (post-WVTT, 0–3 m)	0.029	0.0084	0.0630	Beta	First 3m	(6)
Probability of pelvic pain (post-TURP, 0–3 m)	0.253	0.1960	0.3120	Beta	First 3m	(8, 9, 15)
Probability of discontinuation of PhTx due to adverse events	0.0345	0.0299	0.0392	Beta	Ongoing	(3)
Probability of having encrusted implant removal (post-PUL, 0–12 m)	0.0930	0.0505	0.1441	Beta	First year	(5, 12)

Note: Table displays annual (if not stated otherwise) clinical probabilities and event occurrence time frames. Probabilities were adjusted to reflect the 3-month cycle of the model. High and low estimates are 95% confidence intervals or reported ranges. AUR: acute urinary retention; BPH: benign prostate hyperplasia; m: months; PhTx: pharmacotherapy; PUL: prostatic urethral lift; TURP: transurethral resection of the prostate; UTI: urinary tract infection; WVTT: water vapor thermal therapy.

Supplementary Table 2. Utilities

Utilities	**Base case value**	**Low estimate**	**High estimate**	**Probability distribution**	**Utility Instrument**	**Source**
Utility of BPH/LUTS						
Utility of mild BPH/LUTS	0.99	0.90	1.00	Beta	HUI2	(16, 17)
Utility of moderate BPH/LUTS	0.90	0.81	0.95	Beta	HUI2	(16, 17)
Utility of severe BPH/LUTS	0.79	0.73	0.85	Beta	HUI2	(16, 17)
Utility of adverse events (applied as a disutility)						
Utility of acute urinary retention	0.82	0.50	1.00	Beta	SG	(18)
Utility of dizziness	0.91	0.88	0.94	Beta	SG	(19)
Utility of ejaculatory dysfunction	0.94	0.78	1.00	Beta	SG	(18)
Utility of erectile dysfunction	0.92	0.78	1.00	Beta	SG	(18)
Utility of gynecomastia	0.95	0.93	0.97	Beta		(20)
Utility of incontinence	0.80	0.50	0.98	Beta	SG	(18)
Utility of TUR syndrome	0.83	0.77	0.85	Beta	SG	(18)

Utility of bladder neck contracture and urethral stricture	0.94	0.78	1.00	Beta	SG	(18)
Utility of dysuria/urgency/frequency (for 10–12 episodes)	0.84	0.82	0.86	Beta	SG	(21)
Utility of urinary tract infection	0.93	0.77	0.99	Beta	SG	(18)
Utility of pelvic pain	Dysuria	Dysuria	Dysuria	Dysuria	Dysuria	Assumption
Utility of hematuria	Dysuria	Dysuria	Dysuria	Dysuria	Dysuria	Assumption
Utility of surgical interventions (applied as a disutility)						
Utility of WVTT procedure	0.99	0.95	1.00	Beta	–	Assumption
Utility of PUL procedure	0.99	0.95	1.00	Beta	–	Assumption
Utility of TURP procedure	0.95	0.82	1.00	Beta	SG	(18)
Time to resume usual activities						
Time to resume usual activities, days (PUL)	8.6	0.5	30	Gamma	–	(5)
Time to resume usual activities, days (WVTT)	5.5	0.2	20	Gamma	–	(6)
Time to resume usual activities, weeks (TURP)	4-6	4	6	Triangular	–	(22)

Note: High and low estimates are 95% confidence intervals or reported ranges. For temporary health states utilities were applied as disutility. BPH: benign prostate hyperplasia; LUTS: lower urinary track symptoms; PUL: prostatic urethral lift; TUR: transurethral resection syndrome; TURP: transurethral resection of the prostate; SG: standard gamble; HUI2: Health Utilities Index Mark 2; WVTT: water vapor thermal therapy.

Supplementary Table 3. Costs

Costs	Base case	Low estimate	High estimate	Comment/assumption	Source
Cost of interventions					
Cost of combination therapy (per 3 months)	$56	$42	$70	Dutasteride 0.5 mg & Tamsulosin 0.4 mg, once daily for 3 months	(23)
Cost of TURP (per procedure)	$5321	$5040	$5603		(24)
Cost of Rezum (per procedure)	$5233	$4548	$5918	Labor ($1004) and indirect costs ($1129) were assumed to be the same as for GL-PVP day surgery cases, and were obtained from Masucci et al. Consumables included patient supplies ($100) and single use delivery	(24)

				device ($3000±500), estimates were provided by clinical experts	
Cost of Urolift (per procedure)	$8133	$4348	$11 918	Labor ($1004) and hospital operating (overhead) costs ($1129) were assumed to be the same as for GL-PVP day surgery cases and were obtained from Masucci et al. Consumables included patient implants ($1200), estimates were provided by clinical experts. Costs were computed for 5 (±3) implants	(5, 24)
Cost of removal of encrusted implants	$2086	$1048	$3967	Converted from USD to CAD using purchasing power parity *https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm*	(25)
Cost of BPH-LUTS (per 3 months)	$108	$81	$135	Utilization volume (consultations, lab, diagnostics) assumed to be the same as reported in Black et al, unit costs were assigned from Ontario schedule of benefits	(26, 27)
Cost of adverse events					
Cost of acute urinary retention (per event)	$756	$567	$945		(28)
Cost of incontinence (per event)	$182	$137	$228		(28)
Cost of erectile dysfunction (per event)	$190	$143	$237	Visit to urologist, sildenafil (12 tablets for 3 months)	(23, 27)
Cost of ejaculatory dysfunction (per event)	$83	$63	$104	Visit to urologist	(23, 27)
Cost of gynecomastia (per event)	$83	$63	$104	Visit to urologist	(23, 27)
Cost of dizziness (per event)	$83	$63	$104	Visit to urologist	(23, 27)
Cost of TUR syndrome (per event)	$1877	$1408	$2347		(17)
Cost of blood transfusion (per unit)	$261	$196	$326	Assumed a transfusion of 1.5 units of red blood cells per event	(29)
Cost of bladder neck contracture/urethral stricture (per event)	$1893	$1420	$2366		(28)

Cost of hematuria (per event)	$83	$63	$104	Visit to urologist	(23, 27)
Cost of UTI (per event)	$137	$103	$171	Visit to urologist, urine analysis and culture, nitrofurantoin 100 mg twice daily for 14 days	(23, 27)
Cost of dysuria/urgency/frequency (per event)	$125	$94	$156	Visit to urologist, solifenacin 5 mg once daily for 3 months	(23, 27)
Cost of pelvic pain (per event)	$99	$74	$124	Visit to urologist, ibuprofen 400 mg twice daily for 14 days	(23, 27)

Note: Costs, rounded to the nearest dollar, are presented in 2020 CAD, and were inflated using consumer price index, where applicable. Perioperative cost of BPH procedures were obtained from Toronto Western Hospital. Cost of pharmacotherapy includes dispensing fee ($12.14) and 8% markup. Estimates for healthcare services utilization for adverse events were provided by clinical experts. High and low estimates are 95% confidence intervals where available, otherwise ±25% of base case inputs were used. For probabilistic sensitivity analysis costs were sampled from gamma distribution. BPH: benign prostate hyperplasia; CAD: Canadian dollars; PUL: prostatic urethral lift; TUR: transurethral resection syndrome; TURP: transurethral resection of the prostate; USD: United States dollars; UTI: urinary tract infection; WVTT: water vapor thermal therapy.

Supplementary Table 4A. Threshold analysis of WVTT and PUL costs

Strategy	Costs (2020 CAD)	QALYs	Incremental costs	Incremental QALYs	ICUR
Base case: Cost of WVTT procedure=$5223; Cost of the PUL procedure=$8133					
PhTx→WVTT→TURP or PhTx	$11 795	15.352	–	–	–
PhTx→PUL→TURP or PhTx	$13 582	15.291	$1787	-0.061	Dominated
WVTT→repeat WVTT or PhTx or TURP→TURP	$14 626	15.497	$2831	0.145	**$19 524**
PUL→repeat PUL or PhTx or TURP→TURP	$19 151	15.289	$4525	-0.208	Dominated
Cost of the WVTT procedure=$5223*1.25; Cost of the PUL procedure=$8133					
PhTx→WVTT→TURP or PhTx	$12,379	15.352	–	–	–
PhTx→PUL→TURP or PhTx	$13 582	15.291	$1203	-0.061	Dominated
WVTT→repeat WVTT or PhTx or TURP→TURP	$15 983	15.497	$3604	0.145	**$24 855**
PUL→repeat PUL or PhTx or TURP→TURP	$19 151	15.289	$3168	-0.208	Dominated
Cost of the WVTT procedure =$5223*2.0; Cost of the PUL procedure=$8133					
PhTx→PUL→TURP or PhTx	$13 582	15.291	–	–	-

PhTx→WVTT→TURP or PhTx	$14 131	15.352	$549	0.061	**$9000**
PUL→repeat PUL or PhTx or TURP→TURP	$19 151	15.289	$5020	-0.063	Dominated
WVTT→repeat WVTT or PhTx or TURP→TURP	$20 056	15.497	$5925	0.145	**$40 862**
Cost of the WVTT procedure=*$5223*2.5*; Cost of the PUL procedure=$8133					
PhTx→PUL→TURP or PhTx	$13 582	15.291	–	–	–
PhTx→WVTT→TURP or PhTx	$15 299	15.352	$1717	0.061	**$28 148**
PUL→repeat PUL or PhTx or TURP→TURP	$19 151	15.289	$3852	-0.063	Dominated
WVTT→repeat WVTT or PhTx or TURP→TURP	$22 771	15.497	$7472	0.145	**$51 531**
Cost of WVTT procedure=$5223; Cost of the PUL procedure=$8133*0.75					
PhTx→WVTT→TURP or PhTx	$11 795	15.352		-	-
PhTx→PUL→TURP or PhTx	$12 674	15.291	$879	-0.061	Dominated
WVTT→repeat WVTT or PhTx or TURP→TURP	$14 626	15.497	**$2831**	**0.145**	**$19 524**
PUL→repeat PUL or PhTx or TURP→TURP	$16 932	15.289	$2306	-0.208	Dominated
Cost of WVTT procedure=$5223; Cost of the PUL procedure=$8133*0.5					
PhTx→PUL→TURP or PhTx	$11 766	15.291	-	–	–
PhTx→WVTT→TURP or PhTx	$11 795	15.352	$29	0.061	**$475**
WVTT→repeat WVTT or PhTx or TURP→TURP	$14 626	15.497	$2831	0.145	**$19 524**
PUL→repeat PUL or PhTx or TURP→TURP	$14 713	15.289	$87	-0.208	Dominated

Note: Strategies are listed by increasing costs. Incremental costs and QALYs were computed relative to the previous less costly non-dominated strategy. CAD: Canadian dollars; ICUR: incremental cost-utility ratio; PhTx: pharmacotherapy; PUL: prostatic urethral lift; QALY: quality adjusted life year; TURP: transurethral resection of the prostate; WVTT: water vapor thermal therapy.

Supplementary Table 4B. Threshold analysis of WVTT and PUL effectiveness					
Strategy	**Costs (2020 CAD)**	**QALYs**	**Incremental costs**	**Incremental QALYs**	**ICUR**
Base case: Mean difference in IPSS, WVTT vs. TURP=4.2 (95% CI 2.1–6.2); PUL vs. TURP=6.3 (95% CI 4.6–8.0)					
PhTx→WVTT→TURP or PhTx	$11 795	15.352	–	–	–
PhTx→PUL→TURP or PhTx	$13 582	15.291	$1787	-0.061	Dominated
WVTT→repeat WVTT or PhTx or TURP→TURP	$14 626	15.497	$2831	0.145	**$19 524**
PUL→repeat PUL or PhTx or TURP→TURP	$19 151	15.289	$4525	-0.208	Dominated
SA: Mean difference in IPSS, WVTT vs. TURP=6.2; PUL vs. TURP=6.3 (95% CI 4.6–8.0)					

PhTx→WVTT→TURP or PhTx	$11 890	15.260	–	–	–
PhTx→PUL→TURP or PhTx	$13 582	15.291	$1692	0.031	**$54 581**
WVTT→repeat WVTT or PhTx or TURP→TURP	$15 180	15.310	$1598	0.019	**$84 105**
PUL→repeat PUL or PhTx or TURP→TURP	$19 151	15.289	$3971	-0.021	Dominated
SA: Mean difference in IPSS, PUL vs. TURP=6.3 (95% CI 4.6–8.0; PUL vs. TURP=4.6					
PhTx→WVTT→TURP or PhTx	$11 795	15.352	–		
PhTx→PUL→TURP or PhTx	$13 433	15.373	$1638	0.023	**$71 217**[*]
WVTT→repeat WVTT or PhTx or TURP→TURP	$14 626	15.497	$2831	0.145	**$19 524**
PUL→repeat PUL or PhTx or TURP→TURP	$18 428	15.472	$3802	-0.028	Dominated
SA: Mean difference in IPSS, PUL=WVTT					
PhTx→WVTT→TURP or PhTx	$11 795	15.352	–	–	–
PhTx→PUL→TURP or PhTx	$13 417	15.393	$1622	0.041	**$39 561**[*]
WVTT→repeat WVTT or PhTx or TURP→TURP	$14 626	15.497	$2831	0.145	**$19 524**
PUL→repeat PUL or PhTx or TURP→TURP	$18 333	15.504	$3707	0.004	$926 750
SA: Mean difference in IPSS, PUL=TURP					
PhTx→WVTT→TURP or PhTx	$11 795	15.352	–	–	–
PhTx→PUL→TURP or PhTx	$13 185	15.520	$1390	0.168	**$8274**
WVTT→repeat WVTT or PhTx or TURP→TURP	$14 626	15.497	$1441	-0.023	Dominated
PUL→repeat PUL or PhTx or TURP→TURP	$17 370	15.790	$4185	0.270	**$15 500**

Note: Strategies are listed by increasing costs. Incremental costs and QALYs were computed relative to the previous less costly non-dominated strategy. [*]Subject to extended dominance, a strategy is excluded since it has an incremental cost-effectiveness ratio greater than next intervention that is more effective. CAD: Canadian dollars; ICUR: incremental cost-utility ratio; PhTx: pharmacotherapy; PUL: prostatic urethral lift; QALY: quality adjusted life year; TURP: transurethral resection of the prostate; WVTT: water vapor thermal therapy.

Supplementary Table 4c. Threshold analysis of WVTT and PUL post-procedural symptom stability duration					
Strategy	**Costs (2020 CAD)**	**QALYs**	**Incremental costs**	**Incremental QALYs**	**ICUR**
Base case: Post-procedural symptom stability duration for WVTT 2 years (range 1–5); for PUL 4 years (range 2–5)					
PhTx→WVTT→TURP or PhTx	$11 795	15.352	–	–	–
PhTx→PUL→TURP or PhTx	$13 582	15.291	$1787	-0.061	Dominated
WVTT→repeat WVTT or PhTx or TURP→TURP	$14 626	15.497	$2831	0.145	**$19 524**
PUL→repeat PUL or PhTx or TURP→TURP	$19 151	15.289	$4525	-0.208	Dominated
SA: Post-procedural symptom stability duration for *WVTT* =1 year; for PUL 4 years (range 2–5)					
PhTx→WVTT→TURP or PhTx	$11 825	15.313	–	–	–
PhTx→PUL→TURP or PhTx	$13 582	15.291	$1757	-0.022	Dominated
WVTT→repeat WVTT or PhTx or TURP→TURP	$14 831	15.464	$3006	0.151	**$19 907**
PUL→repeat PUL or PhTx or TURP→TURP	$19 151	15.289	$4320	-0.175	Dominated
SA: Post-procedural symptom stability duration for WVTT 2 years (range 1–5); for PUL=5 years					
PhTx→WVTT→TURP or PhTx	$11 795	15.352			
PhTx→PUL→TURP or PhTx	$13 541	15.305	$1746	-0.047	Dominated
WVTT→repeat WVTT or PhTx or TURP→TURP	$14 626	15.497	$2831	0.145	**$19 524**
PUL→repeat PUL or PhTx or TURP→TURP	$18 985	15.303	$4359	-0.194	Dominated
SA: Post-procedural symptom stability duration for WVTT 2 years (range 1–5); for PUL=10 years					
PhTx→WVTT→TURP or PhTx	$11 795	15.352			
PhTx→PUL→TURP or PhTx	$13 407	15.342	$1612	-0.01	Dominated
WVTT→repeat WVTT or PhTx or TURP→TURP	$14 626	15.497	$2831	0.145	**$19 524**
PUL→repeat PUL or PhTx or TURP→TURP	$18 415	15.324	$3789	-0.173	Dominated

Note: Strategies are listed by increasing costs. Incremental costs and QALYs were computed relative to the previous less costly non-dominated strategy. CAD: Canadian dollars; ICUR: incremental cost-utility ratio; PhTx: pharmacotherapy; PUL: prostatic urethral lift; QALY: quality adjusted life year; TURP: transurethral resection of the prostate; WVTT: water vapor thermal therapy

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