

# The cost-effectiveness of active surveillance compared to radical prostatectomy for low risk localised prostate cancer



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## localised prostate cancer

**Low, Intermediate, High risk** (D'Amico risk classification system)

### **Radical prostatectomy (RP)**

- The most common treatment

### **Active surveillance (AS)**

- To avoid harms caused by radical treatments

## Cost effectiveness analysis

- Health care resources are limited
- Cost-effectiveness studies play a central role in decision making, by comparing the “alternative courses of action in terms of both their costs and consequences”
- Incremental cost-effectiveness ratio (ICER)

$$= \frac{\text{Cost (B)} - \text{Cost (A)}}{\text{Effectiveness (B)} - \text{Effectiveness (A)}}$$

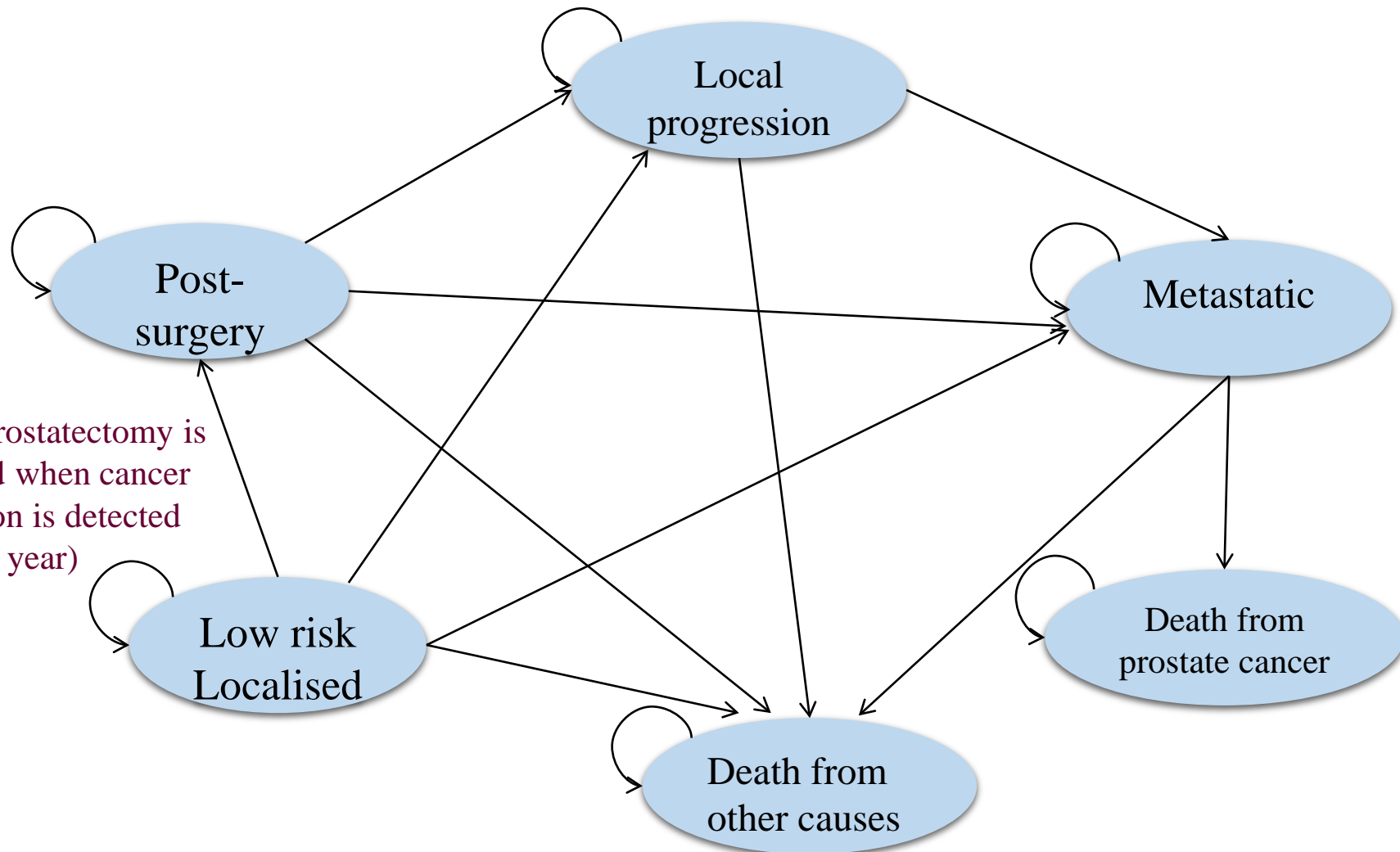
## Aims

- To compare the cost-effectiveness of active surveillance and radical prostatectomy for men diagnosed with low risk localised prostate cancer



- TreeAge Pro 2015
- Life-time Markov model
- Age at diagnosis: 45, 50, 55, 60, 65, 70 years
- Perspective of the Ministry of Health in New Zealand

## Influence diagram for active surveillance:



## Base-case

- Using costing data from the Midland prostate cancer study [1]
- Using 1.6% annual conversion rate from AS to RP [2-4]
- Using the quality of life of 0.89 for AS, 0.90 for RP [5]

## Scenario analyses

- Using costing data based on NZ guidance [6]
- Using 5% annual conversion rate from AS to RP
- Using the quality of life of 0.83 for AS, 0.80 for RP [7]

[1] Lawrenson R, Brown C, Obertova Z, Lao C, Conaglen H. The Midlands Prostate Cancer Study: Understanding the pathways of care for men with localised prostate cancer. Auckland, New Zealand; 2014.

[2] Bill-Axelsson A, Holmberg L, Filén F, Ruutu M, Garmo H, Busch C, Nordling S, Häggman M, Andersson SO, Bratell S *et al*: **Radical prostatectomy versus watchful waiting in localized prostate cancer: The Scandinavian prostate cancer group-4 randomized trial.** *Journal of the National Cancer Institute* 2008, **100**(16):1144-1154.

[3] Bill-Axelsson A, Holmberg L, Garmo H, Rider JR, Taari K, Busch C, Nordling S, Häggman M, Andersson S, Spångberg A *et al*: **Radical prostatectomy versus watchful waiting in early prostate cancer.** *New England Journal of Medicine* 2014, **370**(10):932-942.

[4] Cooperberg MR, Ramakrishna NR, Duff SB, *et al*. Primary treatments for clinically localised prostate cancer: A comprehensive lifetime cost-utility analysis. *BJU Int* 2013; **111**(3):437-450.

[5] Korfage IJ, Essink-Bot ML, Borsboom GJJM, *et al*. **Five-year follow-up of health-related quality of life after primary treatment of localized prostate cancer.** *International Journal of Cancer.* 2005; **116**: 291-96.

[6] Prostate Cancer Working Group and Ministry of Health. **Guidance on Using Active Surveillance to Manage Men with Low-risk Prostate Cancer.** (Wellington: Ministry of Health, 2015).

[7] Hayes JH, Ollendorf DA, Pearson SD, Barry MJ, Kantoff PW, Stewart ST, Bhatnagar V, Sweeney CJ, Stahl JE, McMahon PM: **Active surveillance compared with initial treatment for men with low-risk prostate cancer: A decision analysis.** *JAMA* 2010; **304**(21):2373-2380.



# Results: Life-time costs



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## Base-case results: Life-time costs per man

Age (years)	Active surveillance	Radical prostatectomy
45	\$23,396	\$22,316
50	\$21,115	\$20,991
55	\$18,484	\$19,612
60	\$15,461	\$18,254
65	\$11,998	\$16,972
70	\$7,976	\$15,821

The gap in life-time costs for men aged 55-70 years between AS and RP increases with age at diagnosis



# Results: Life-time costs



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## Scenario analysis: using costing inputs based on guidance

Age (years)	Active surveillance	Radical prostatectomy
45	\$23,491	\$21,162
50	\$21,229	\$19,831
55	\$18,618	\$18,457
60	\$15,622	\$17,095
65	\$12,210	\$15,810
70	\$8,231	\$14,668

# Results: Life-time costs



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## Scenario analysis: using a 5% annual conversion rate from AS to RP

Age (years)	Active surveillance		Base-case result: Active surveillance
45		\$28,028	\$23,396
50		\$25,948	\$21,115
55		\$23,378	\$18,484
60		\$20,206	\$15,461
65		\$16,174	\$11,998
70		\$10,850	\$7,976

The cost of active surveillance increased by 20% (aged 45 years) to 36% (aged 70 years)

# Results: Life-time QALYs



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**Base-case results: Life-time quality-adjusted life-years (QALYs) per man, using 0.89 for AS, 0.90 for RP**

Age (years)	Active surveillance	Radical prostatectomy
45	16.34	16.43
50	15.24	15.35
55	13.97	14.08
60	12.52	12.65
65	10.9	11.05
70	9.17	9.35



# Results: Life-time QALYs



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## Scenario analysis: using 0.83 for AS, 0.80 for RP

Age (years)	Active surveillance	Radical prostatectomy
45	15.20	14.73
50	14.18	13.75
55	12.99	12.61
60	11.65	11.31
65	10.16	9.88
70	8.57	8.35

# Results: ICER



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**Baseline: using the 1.6% annual conversion rate from AS to RP, the quality of life of 0.89 for AS and WW, 0.90 for RP**

Age at diagnosis (Years)	ICER (Cost per QALY gained)		Dominance
	AS vs RP	RP vs AS	
45	-	-	RP is less costly and more effective
50	-	-	RP is less costly and more effective
55	-	\$10,255	-
60	-	\$21,485	-
65	-	\$33,160	-
70	-	\$43,583	-

# Results: ICER



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Scenario analysis: using the 5% conversion rate, 0.83 for AS, 0.80 for RP, and costing inputs based on guidelines

Age at diagnosis (Years)	ICER (Cost per QALY gained)		Dominance
	AS vs RP	RP vs AS	
45	\$21,015	-	-
50	\$18,456	-	-
55	\$14,969	-	-
60	\$8,952	-	-
65	-	-	AS is less costly and more effective
70	-	-	AS is less costly and more effective

# Conclusions



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- Active surveillance is less likely to be cost-effective compared to radical prostatectomy for younger men diagnosed with low risk localised prostate cancer
- The cost-effectiveness of active surveillance compared to radical prostatectomy is critically dependent on the 'trigger' for radical prostatectomy and the quality of life in men on active surveillance. Research on the latter would be beneficial





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# Thank you !