

The impact of modern treatment on the cost-effectiveness of the National Bowel Cancer Screening Program

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Colorectal Cancer

- Colorectal Cancer (CRC)
 - 2nd highest incidence in Australia (AIHW 2008)
- Rising treatment costs
 - Increasing incidence
 - New costly treatments
 - Improved survival
- Increased focus on prevention and screening

FOBT Screening

- Biennial FOBT screening
 - Reduces CRC mortality
 - Diagnoses at early curable stages (Hardcastle 1996, Kronborg 1996, Mandel 1993)
 - Detection and removal of precancerous adenomas (Mandel 2000)
- National Bowel Cancer Screening Program (NBCSP)
 - Pilot Program in 2002
 - Evaluated as feasible, acceptable and cost-effective
 - Gradual rollout began in 2006
 - Currently, phase II implementation: 50, 55, 65 year olds
 - Ultimately aimed at 50 to 74 year olds

Cost Effectiveness

- Cost Effectiveness measured in cost per life years saved
 - Upper limit of \$50,000
 - BreastScreen ~\$8,000
- Analyses deemed NBCSP implementation cost-effective
 - Pilot Program Evaluation (2004)
 - Stone et al. (2004)
 - NSW Cancer Institute (2008)
- Analyses used out dated costs and survival rates
 - Uncertain relevance today

Out dated data

Treatment costs

(O'Leary 2004)

Stage A	\$17,148
Stage B	\$33,364
Stage C	\$25,771
Stage D	\$6,264

Five Year Survival rates

(McLeish 2002)

Stage A	89%
Stage B	79%
Stage C	35%
Stage D	1%

Biogrid Australia

- Multi site prospective CRC database
 - Demographic data
 - Diagnostic data
 - Treatment data
 - Survival data
- Multiple applications
 - Initial impact of NBCSP on stage at diagnosis (Ananda 2009)
 - Cost of treating colorectal cancer (Tran 2009)

Aims

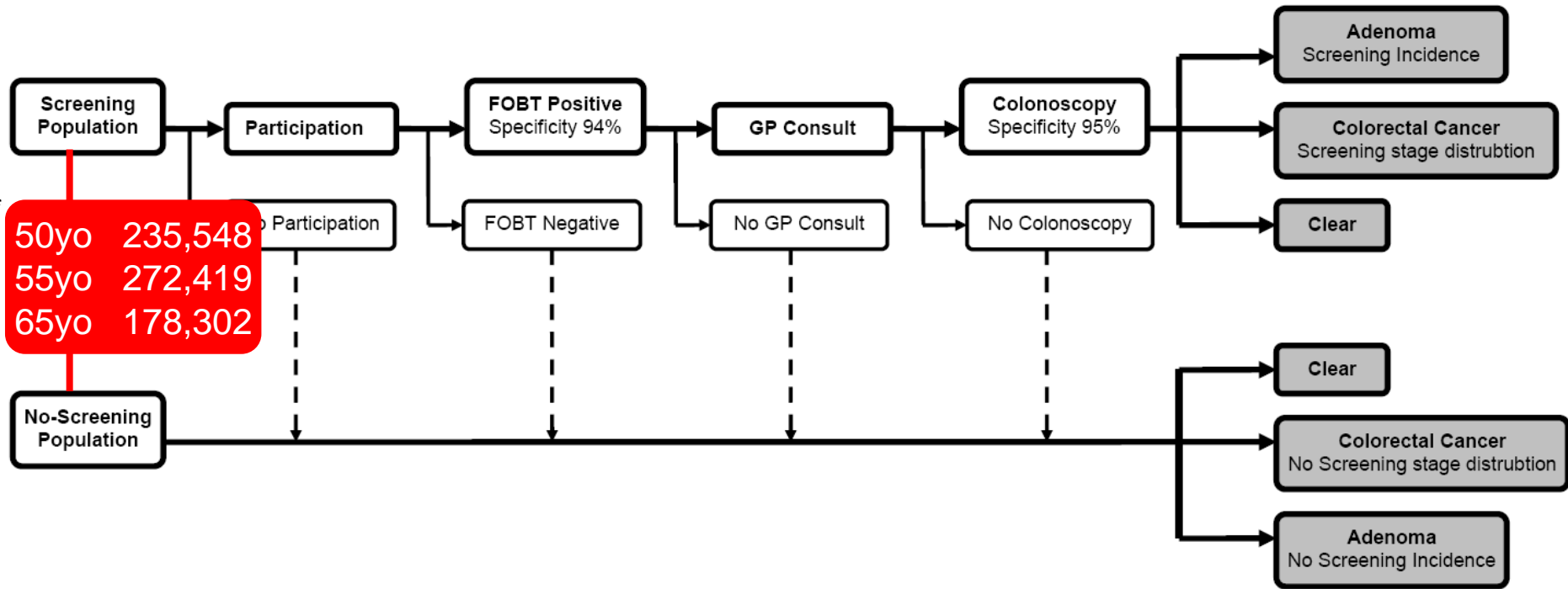
- Update data
 - Modern treatment costs specific for 50-74yo
 - Modern survival rates specific for 50-74yo

Analyse the cost effectiveness of the NBCSP

Model

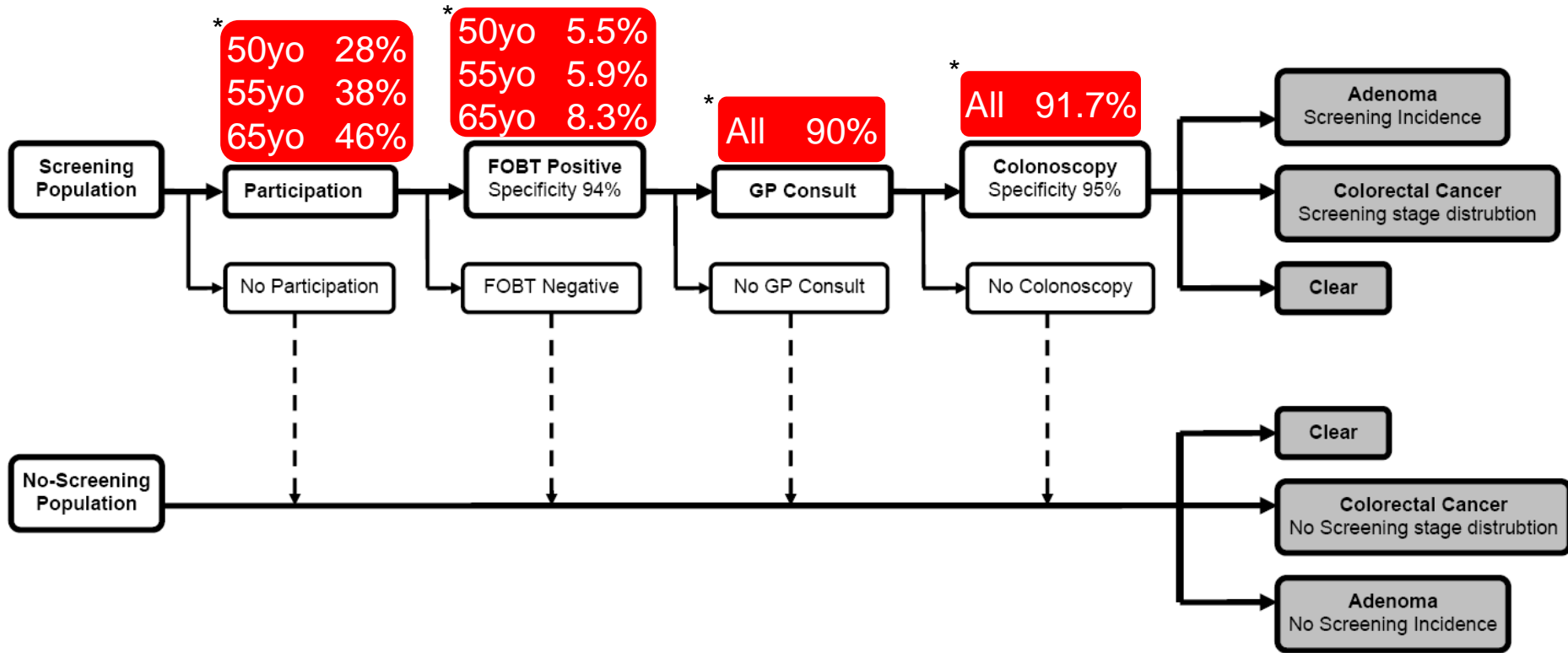
- Decision Analytic model
 - Healthcare utilisation
 - Costs
 - Benefits
- Screening versus No-screening
- Assumptions
 - No reduction in CRC incidence from FOBT screening
 - Screening effects expected cancers over two years
 - People alive at five years revert to normal life expectancy
 - No discounting

Model



*AIHW: NBCSP: Annual monitoring report 2009

Model

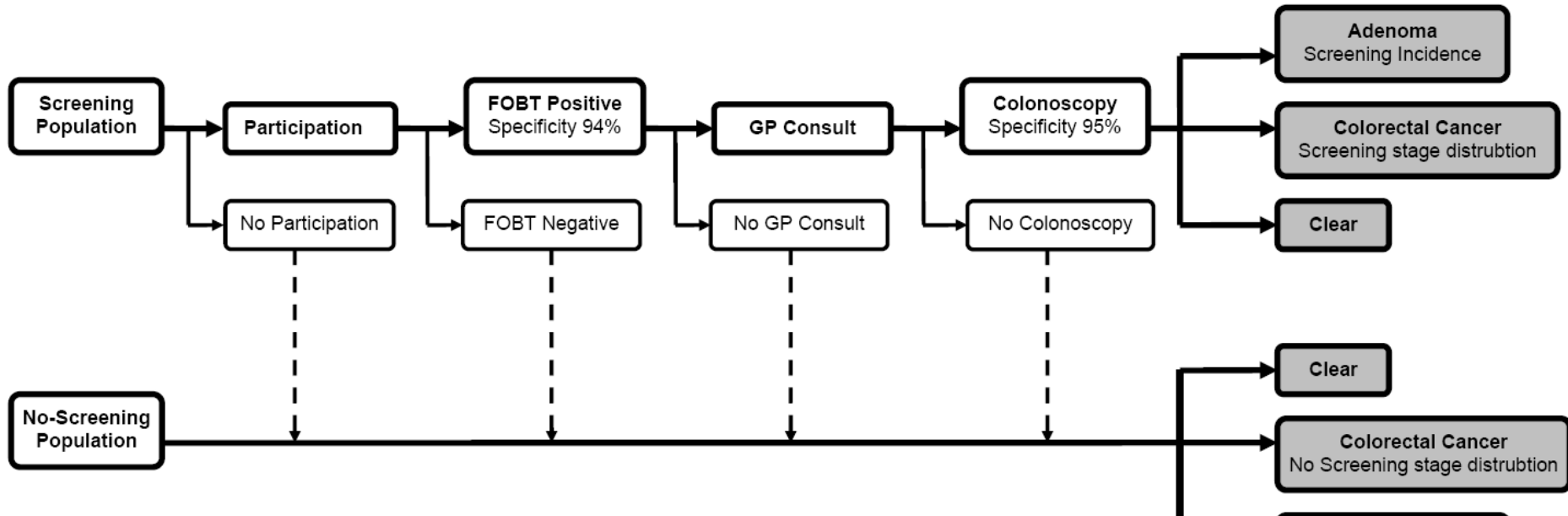


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Model

AIHW: NBCSP: Annual monitoring report 2009

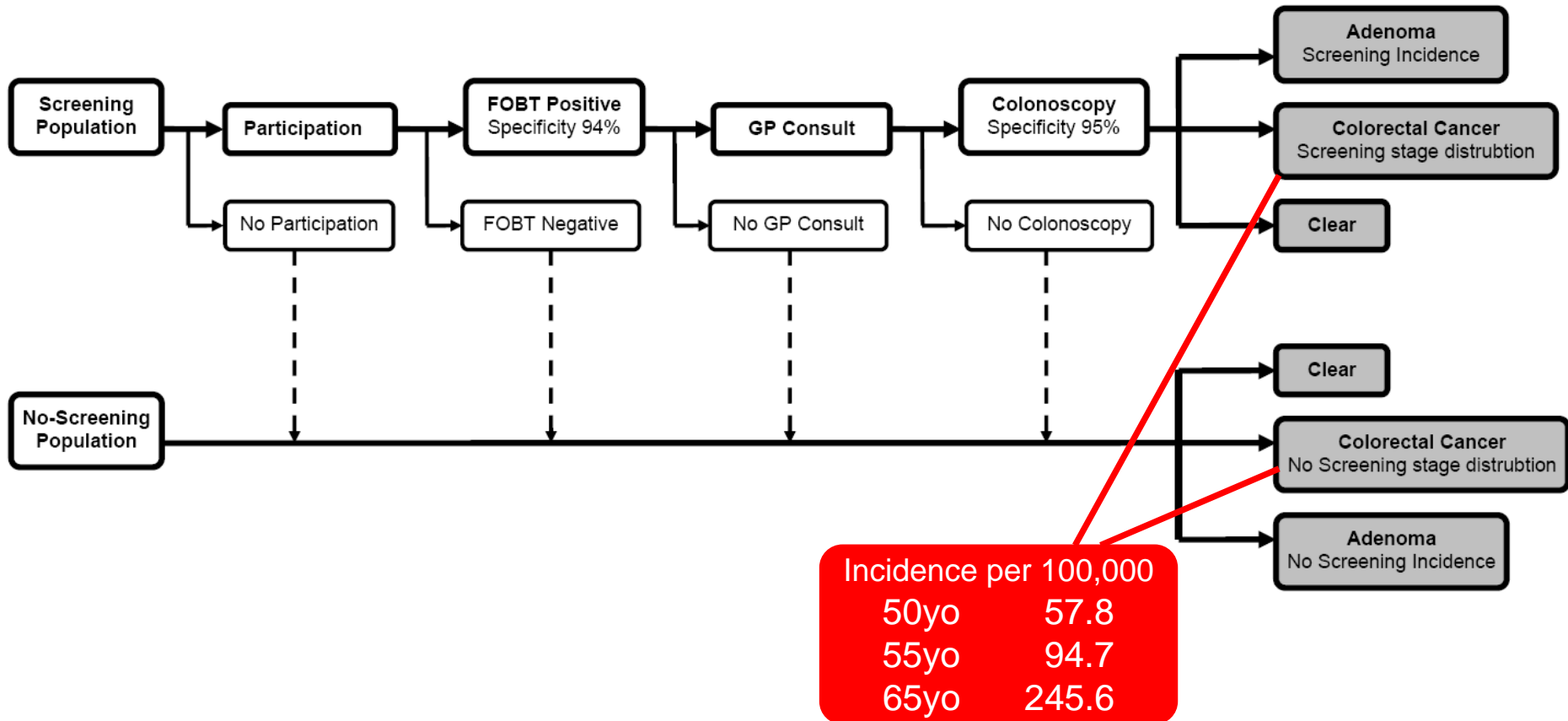
Incidence per 100,000		
	Low	High
50yo	311	239
55yo	313	544
65yo	527	1144



Incidence per 100,000		
	Low	High
50yo	69	95
55yo	29	40
65yo	58	81

Kronborg 1996

Model

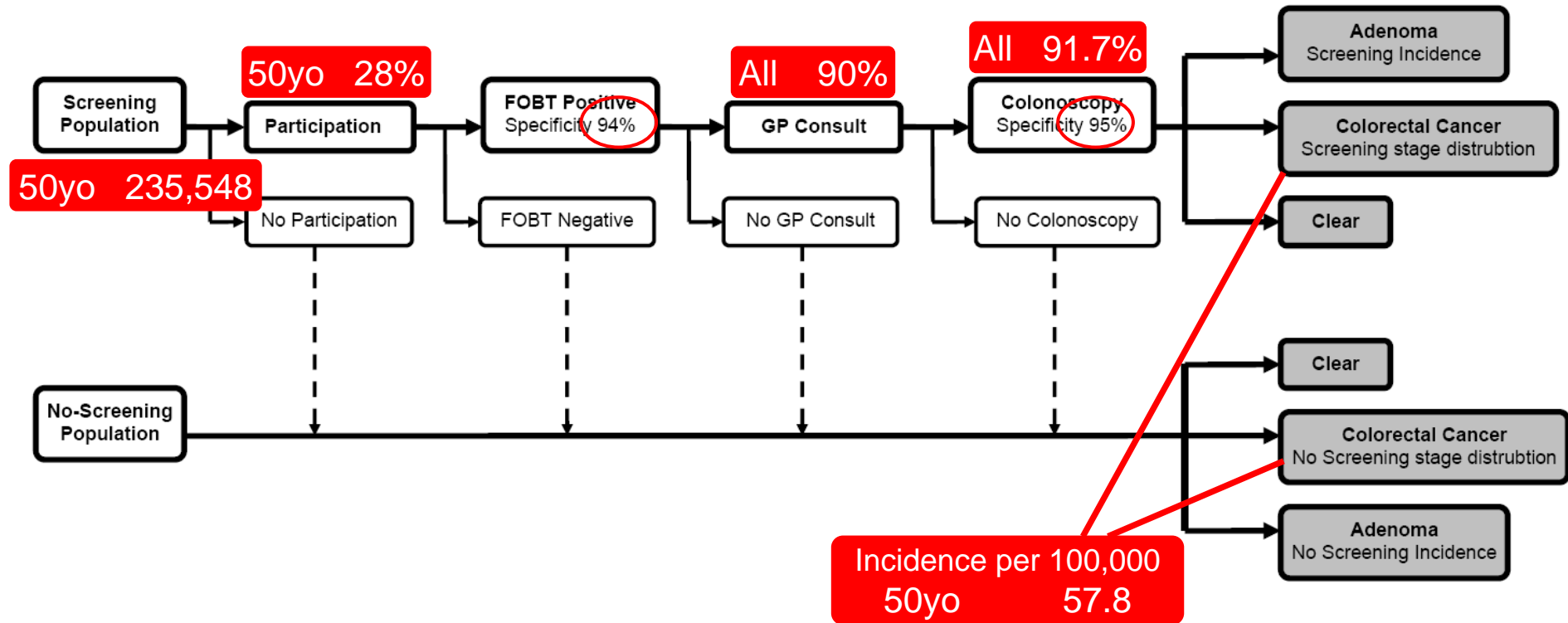


Model

Expected cancers (50yo) = 272 cases

- 59 cases diagnosed by screening
- 213 cases missed by screening

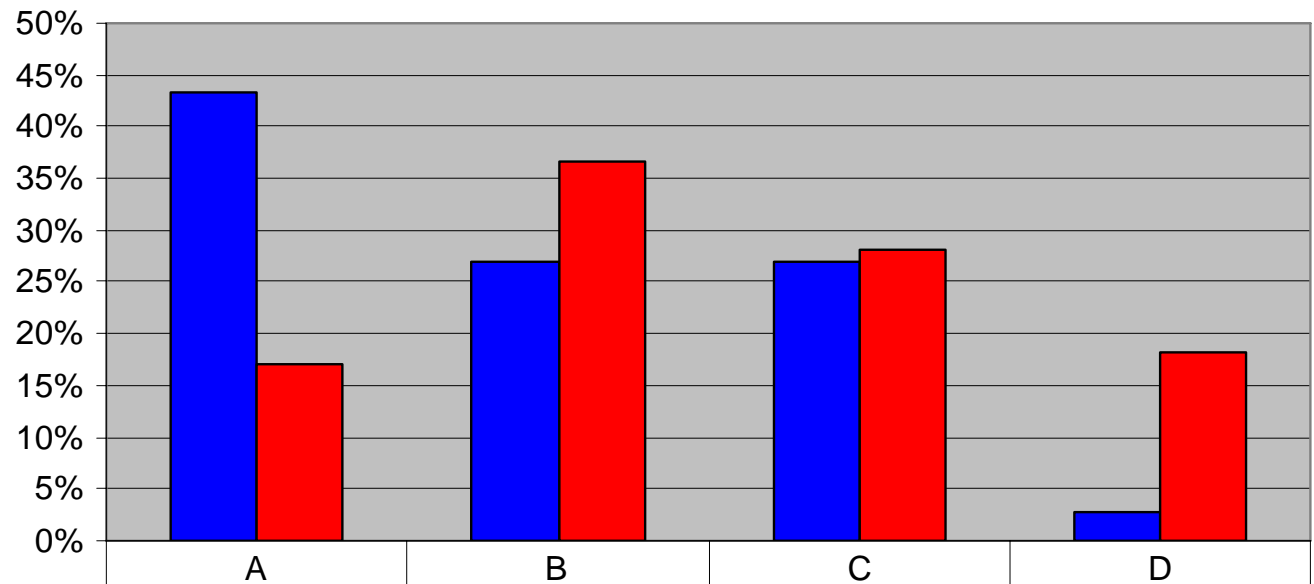
Due to non-participation or specificity rates



Stage at diagnosis

Stage at diagnosis: NBCSP v No-screening

Ananda et al. MJA 2009



■ NBCSP (n=40)	43%	27%	27%	3%
■ No-screening (n=1588)	17%	37%	28%	18%

Costs

	NBCSP	No-Screening	Difference
Screening Costs	\$30.8 Million	-	\$30.8 Million
Diagnostic Costs	\$19.9 Million	\$4.2 Million	\$15.7 Million
Treatment Costs	\$82.8 Million	\$87.5 Million	-\$4.7 Million
Surveillance Costs	\$31.3 Million	\$7.5 Million	\$23.8 Million
Total Costs	\$164.7 Million	\$99.2 Million	\$65.5 Million

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Total Costs	\$164.7 Million		

- Budgeted cost for 2008
Sourced from Department of Health
- Includes
 - FOBT kit
 - Pathology
 - Administration

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Surveillance Costs			\$23.8 Million
Total Costs			\$65.5 Million

- Includes

- GP Consultation \$33.50 (MBS)
- Colonoscopy \$1,192 (WIES 16)
 - uncomplicated \$1,162
 - bleeding \$7,070 (0.21%)
 - perforation \$19,102 (0.10%)

Complication rates sourced from Viiala et al. Int J Med 2004

- Colonoscopies

- 15,211 in NBCSP group
- 2,491 in No-screening group

Costs

	No Screening	Screening	Surveillance
Screening Costs	\$30		
Diagnostic Costs	\$19		
Treatment Costs	\$82		
Surveillance Costs	\$31.3 Million	\$7.5 Million	\$23.8 Million
Total Costs	\$164.7 Million	\$99.2 Million	\$65.5 Million

- Surveillance colonoscopy for adenomas
 - High Risk – 6 yearly for life
 - Low Risk – 10 yearly for life
- Adenomas diagnosed
 - 6,810 in NBCSP group
 - 1,654 in No-screening group

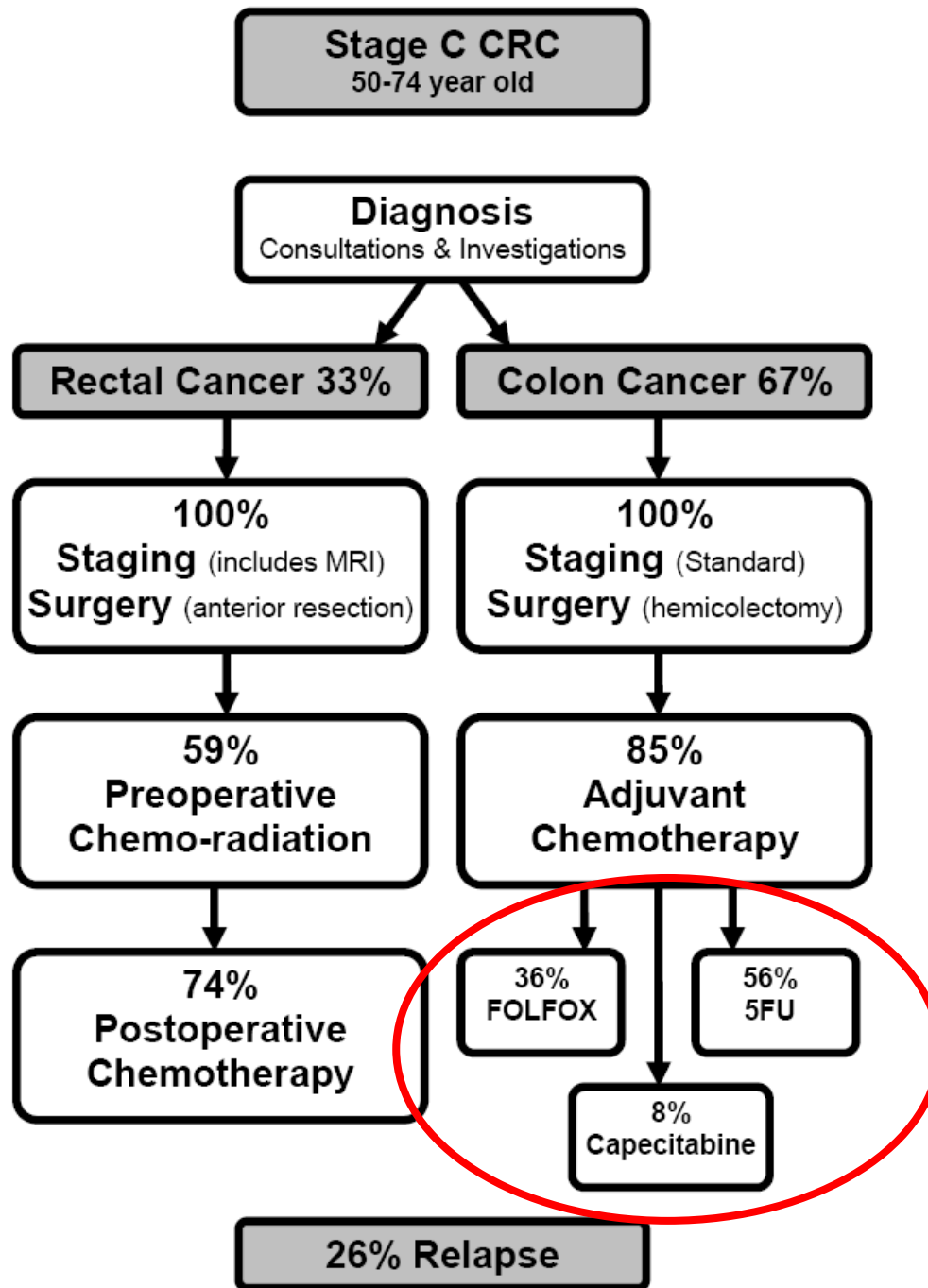
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Surveillance Costs	\$3		
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- Savings due to earlier stage diagnoses

Treatment costs

- Cost model encompasses
 - Wide ranging costs
 - Investigations
 - Consultations
 - Surgery
 - Chemotherapy
 - Radiotherapy
 - Complications of each
 - Takes into account
 - Stage
 - Primary site
 - Rates of complications
 - Rates of relapse
- Costs sourced from
 - Medicare Australia
 - Medicare Benefits schedule
 - WIES 16 Victorian Public Hospitals
- Healthcare utilisation sourced from
 - Biogrid Australia
 - 1,803 patients
 - 50-74 years old
 - Diagnosed from 1987 to 2009
 - Stratified for stage and primary site
- Complication rates sourced from
 - Pivotal studies



Treatment costs

Biogrid Australia (2010)

50-74 yo

Stage A	\$25,006
Stage B	\$38,985
Stage C	\$72,216
Stage D	\$50,771

O'Leary et al (2004)

All ages

Stage A	\$17,148
Stage B	\$33,364
Stage C	\$25,771
Stage D	\$6,264

Years Life Saved

- Calculated using
 - Five year survival rates
 - Median survival for non-survivors
 - Life expectancy data (ABS 2009)
 - Stage sojourn times used to account for lead time bias (Loeve 2000)
- Life years saved is calculated as the difference in years lived between the screening and no-screening group.

	NBCSP	No-Screening	Difference
Years Life Lived	31,970	30,421	1,549

Five year survival rates

Biogrid (1987-2003)

50-74 yo

n=814

Stage A 82%

Stage B 81%

Stage C 64%

Stage D 16%

Modern treatment

Younger age

Quaternary Hospitals

UK NCIN (1996-2009)

All ages

n=308,000

Stage A 93%

Stage B 77%

Stage C 48%

Stage D 7%

Modern treatment

McLeish et al (1987)

All ages

n=1,173

Stage A 89%

Stage B 79%

Stage C 35%

Stage D 1%

Cost Effectiveness

	NBCSP	No-Screening	Difference
Costs	\$164.7 M	\$99.2 M	\$65.5 M
Years Life	31,970	30,421	1,549
Cost-Effectiveness			\$42,306

The NBCSP is cost effective in 2008 at \$42,306 per LYS

Preliminary results from re-analysis using discounted costs and benefits validate cost-effectiveness and will be published when completed

Scenario Analyses

		Cost per LYS
Base scenario	Phase 2 implementation	\$43,284
Expanded population	Complete implementation	\$27,896
Participation	25% increase	\$38,330
	50% Increase	\$35,679
	Full participation	\$33,279
Survival	UK NCIN	\$28,873
Faulty FOBT	475,000 re-invitations	\$44,790

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Conclusions

- Colorectal cancer
 - Second most common cause of cancer related mortality
 - Increasing treatment costs
- NBCSP is cost effective
 - Poor participation rates limit its benefit
- Need for increased public education and awareness
 - Improve participation
 - Improve cost-effectiveness
 - Reduce colorectal cancer related deaths