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A cost-effectiveness model of prostate cancer screening

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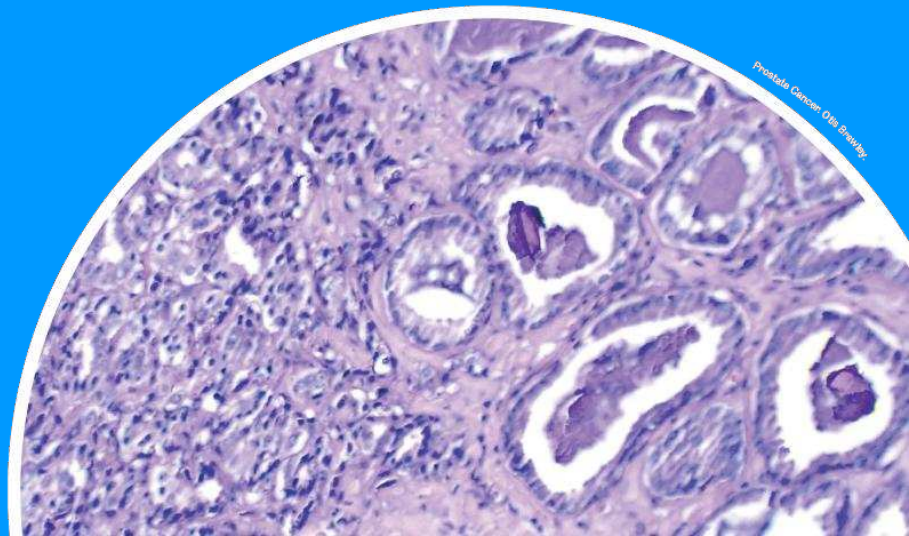

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Contents

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The project

- Client: UK National Screening Committee
- Purpose: Help determine IF a national prostate cancer screening programme should occur AND which screening strategy is best.
- Objectives:

  Estimate costs, benefits and resource implications of alternative screening options.

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Introduction to prostate cancer

The prostate is a small gland in men behind the bladder.

The most common cancer in men in UK

(excluding non-melanoma skin cancer)

In 2008:

Over 37,000 men diagnosed

Over 10,000 men died from prostate cancer

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Aim of screening:

Reduce cancer mortality, morbidity and treatment costs through early diagnosis and intervention.

Current evidence:

In 2009 two large RCTs reported apparently inconsistent results in terms of the death rate ratio:

- ERSPC – significant reduction in PCa death rate
- PLCO – no statistically significant reduction

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Challenges:

- Effectiveness of different screening programmes unknown.
- Scarce data around disease process due to its unobservable nature.
- Multiple unknown parameters in cancer screening model.

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Solution:

- Develop loosely parameterised cancer screening simulation model.
- Calibrate unobservable model parameters to observed data.
- Estimate impact of prostate cancer screening using calibrated model.

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About the model:

- Disease natural history model (Simul8)
- Calibration module (Excel, Visual Basic)
- Simulation model of prostate cancer screening (Simul8)
- Resource impact model (Excel)

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Screening strategies investigated

No. Screens	Screening Age (years)	Screening Interval (years)
Single	50	N/A
	55	
	60	
	65	
	70	
Repeat	50-70	2, 4
	50-74	1, 2, 4
	55-70	2, 4
	55-74	2, 4

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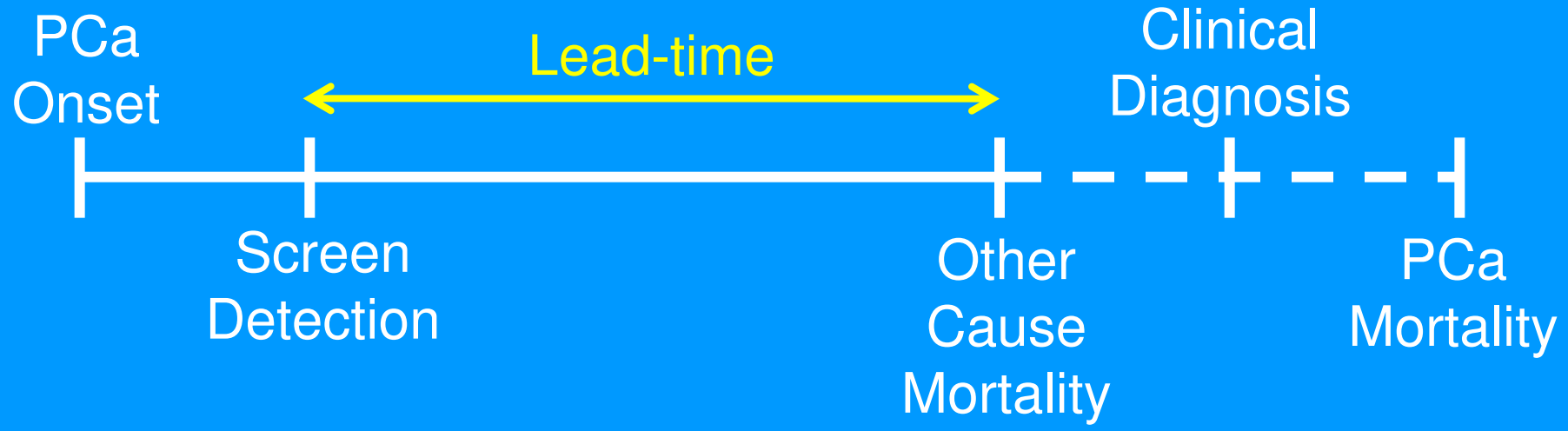
Outputs:

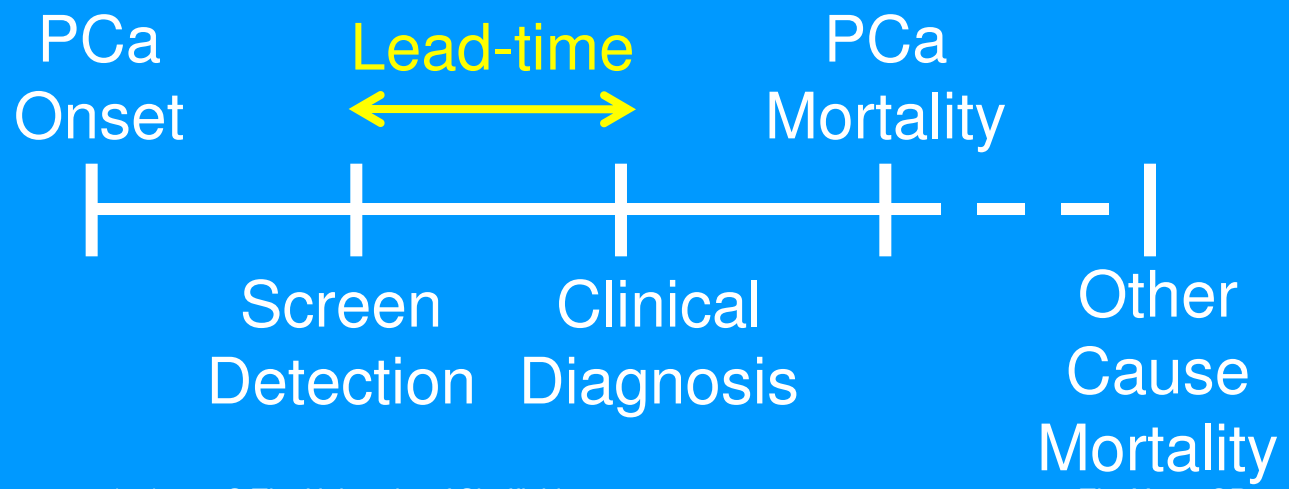
- Age-specific incidence
- Age-specific mortality
- Prostate cancer stage distributions
- Over-detection rate
- Lead time
- Life years gained, QALYs gained
- Probability of developing prostate cancer
- Etc...

Definitions & terms used

Over-detection:



Relevant:



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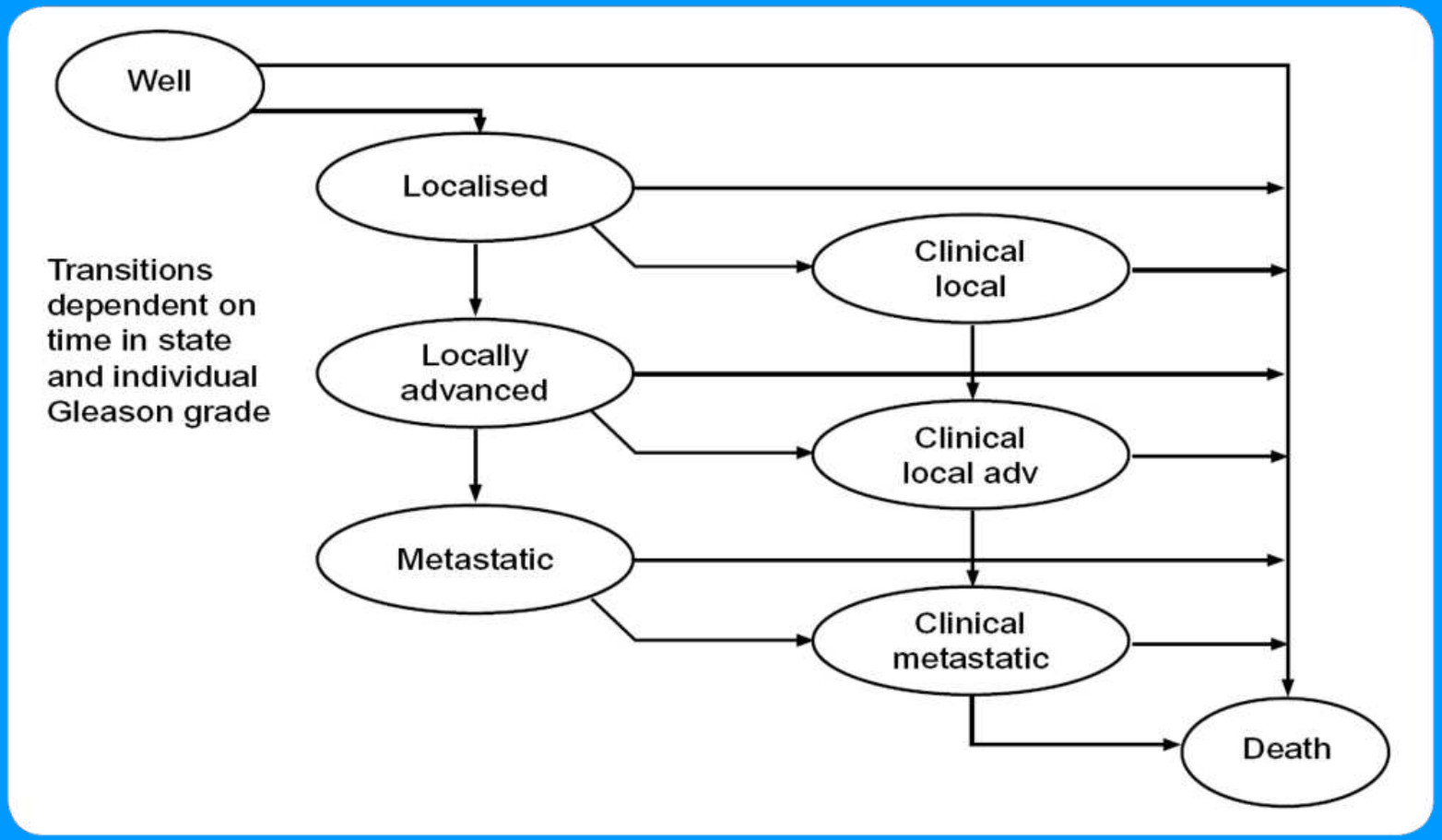
Disease natural history model



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Data

Data	Source
Age specific cancer incidence	Office of National Statistics
Cancer stage distributions	ProtecT RCT UK Cancer Registry (ERIC)
Gleason score distributions	ProtecT RCT UK Cancer Registry (ERIC)
PSA/biopsy test characteristics	ERSPC RCT (Rotterdam section)
Progression Free Survival	ERSPC RCT (Rotterdam section)
Overall Survival	ERSPC RCT (Rotterdam section)

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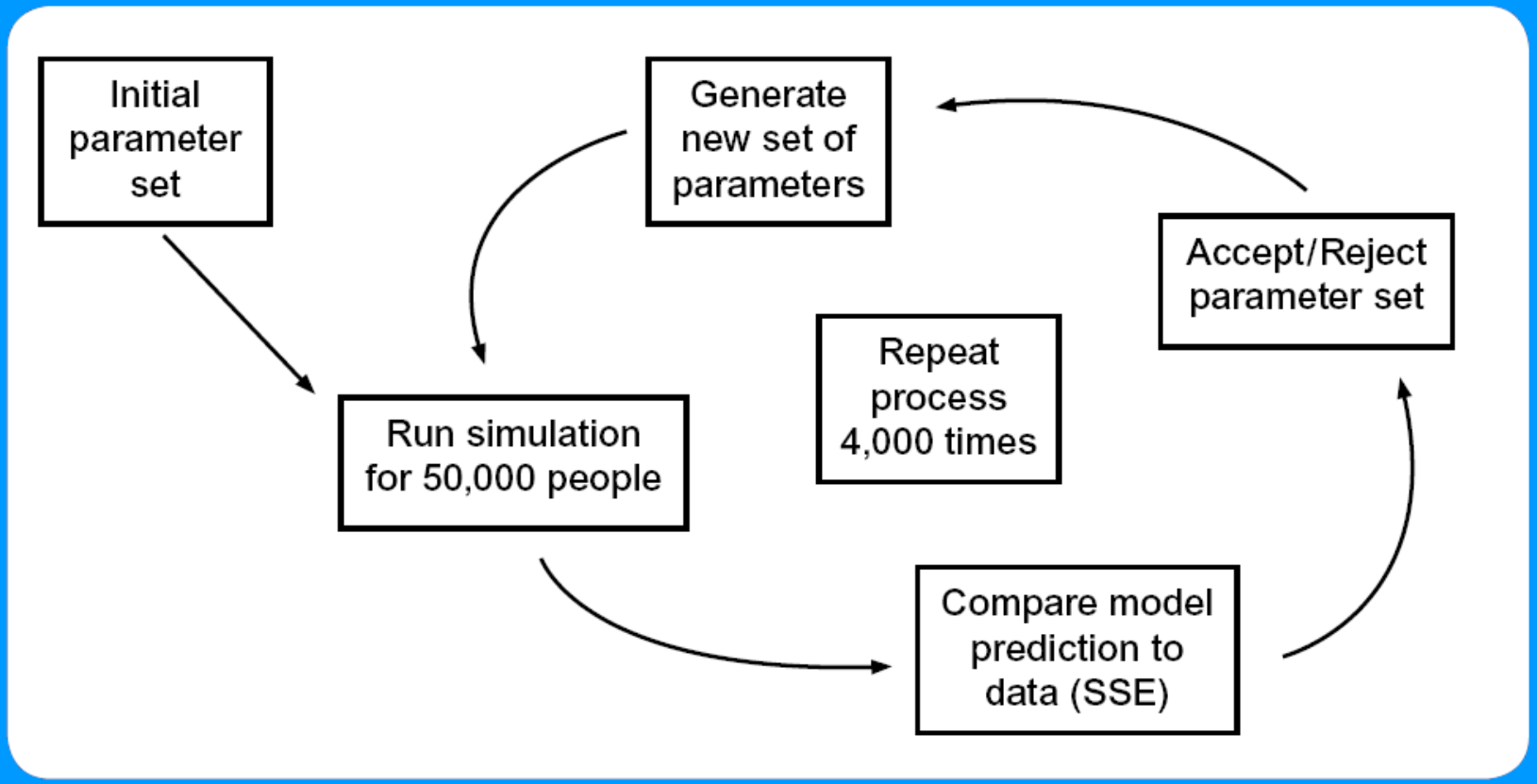
Calibration process



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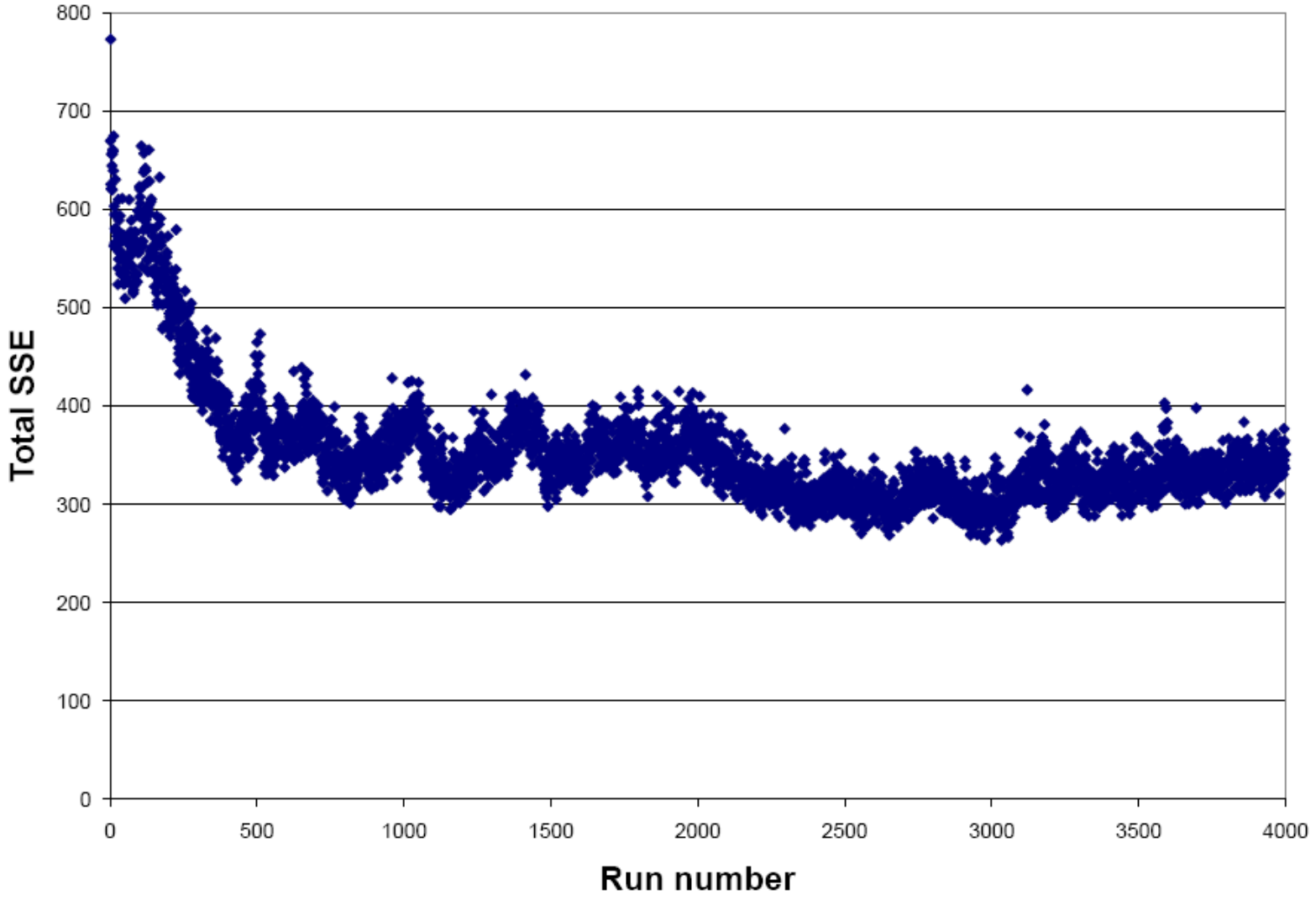
Total SSE during calibration



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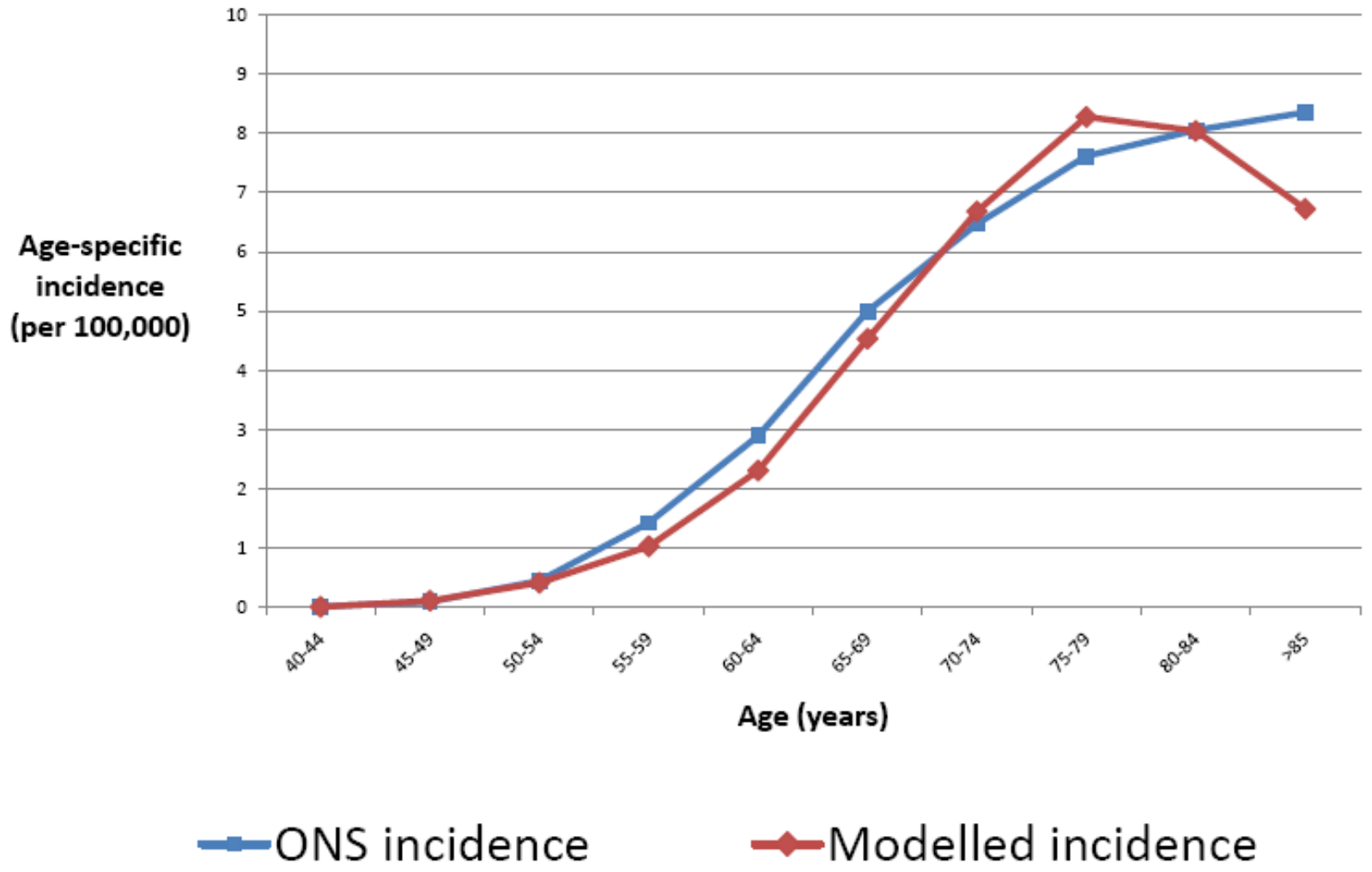
Validation: Incidence



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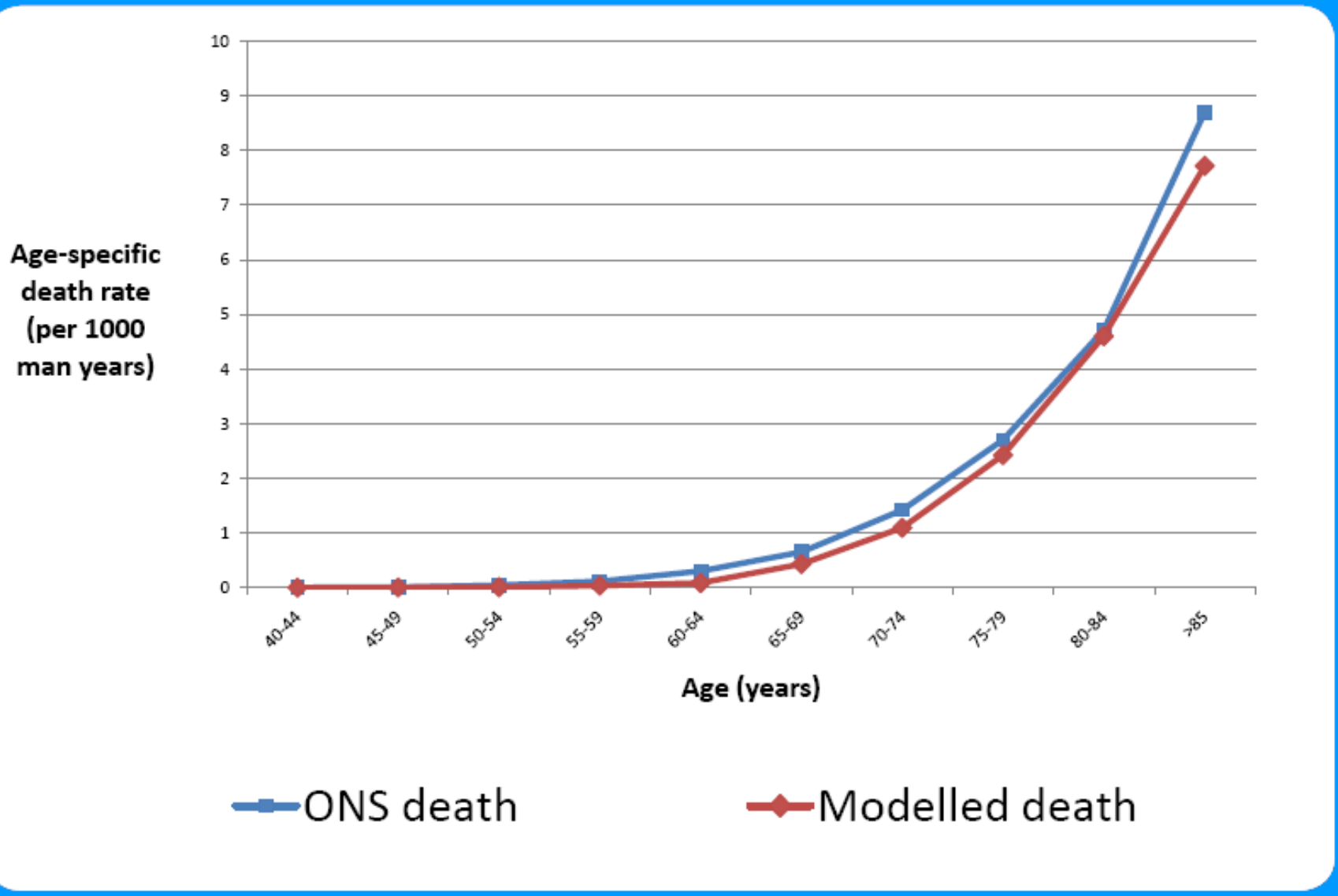
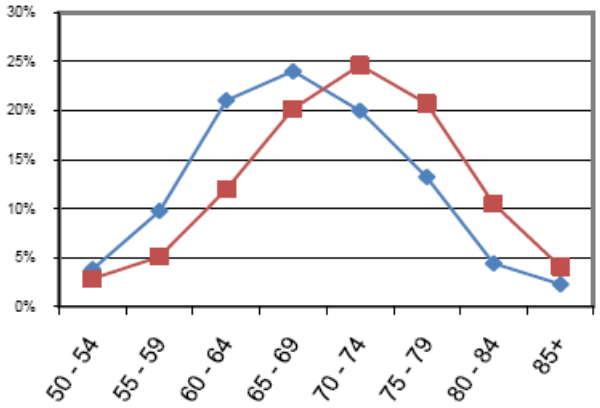
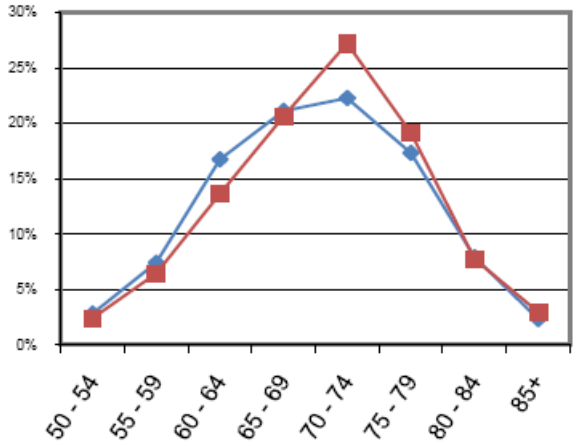
Validation: PCa mortality



Validation: BAUS



Localised G<7



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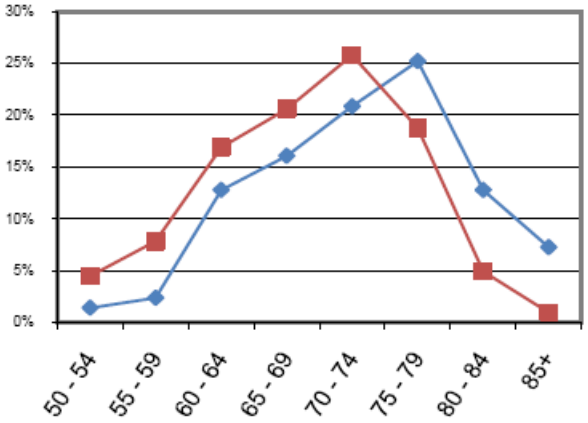

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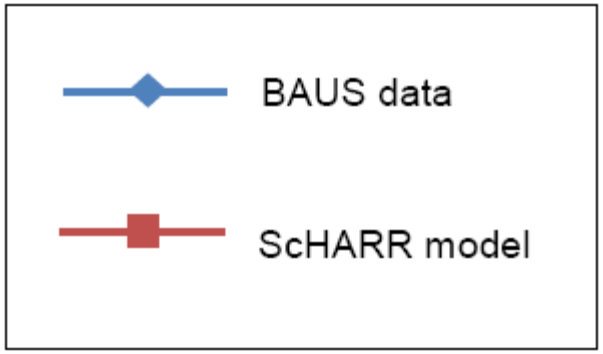

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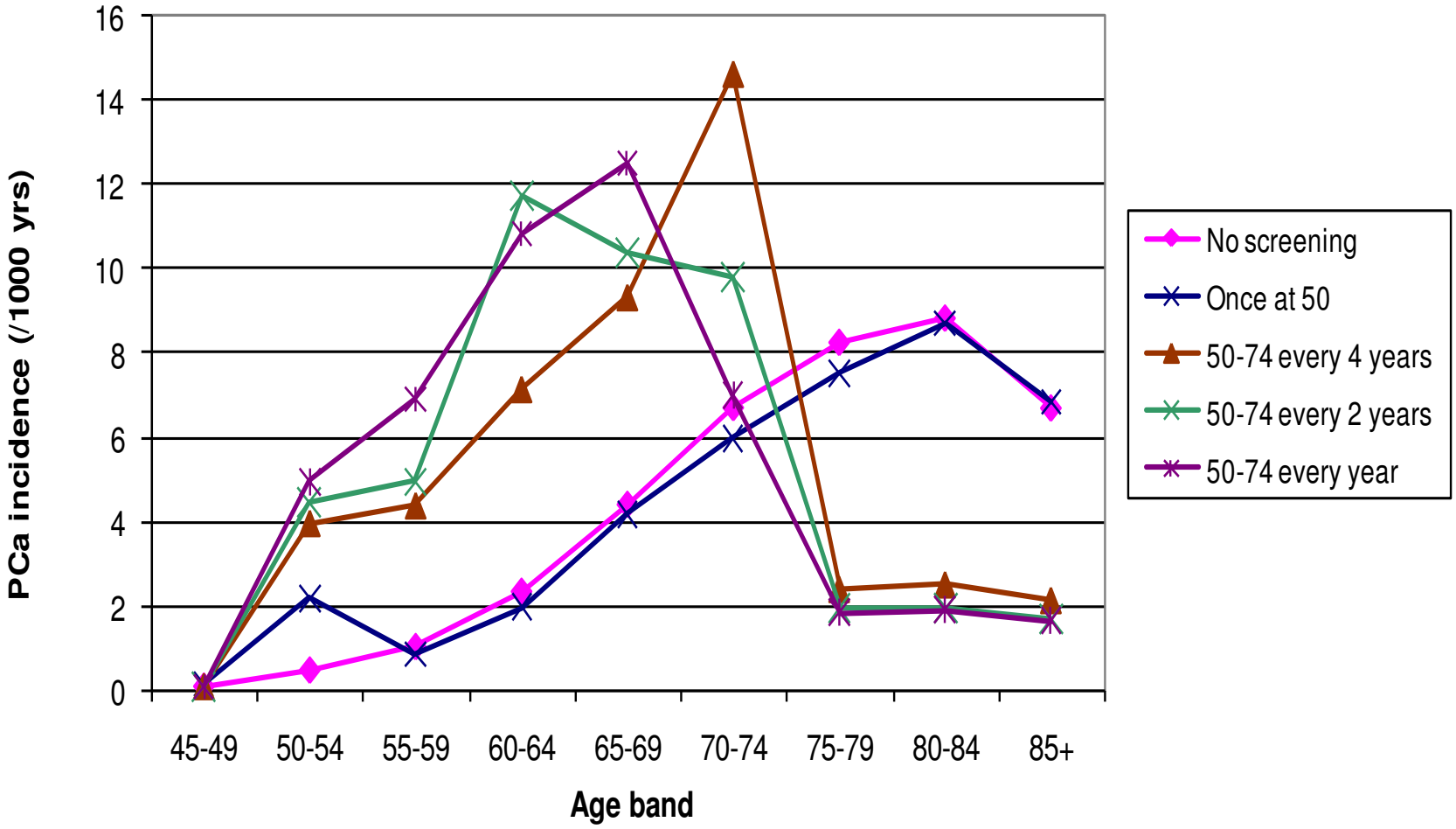
Results: Incidence



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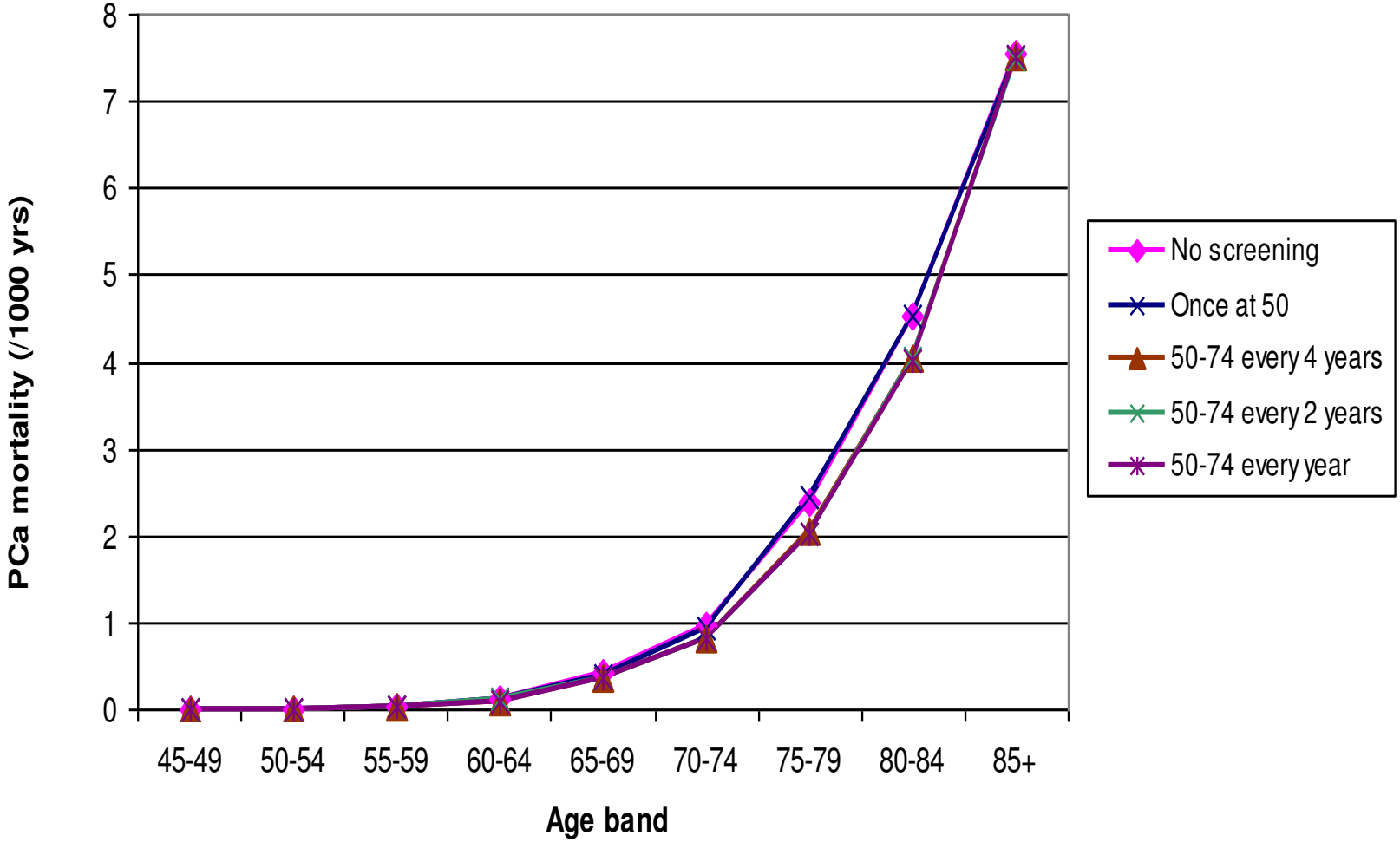
Results: Mortality



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Over-detection & Lead time:

	Once at 50	50-74 every 4 years	50-74 every 2 years	50-74 every year
Over-detection rate	18%	44%	45%	46%
Lead time (for over-detected cases)	15.2 yrs	11.6 yrs	12.5 yrs	13.0 yrs

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Conclusions:

A minimal life gain is offset by the high levels of disease management and over-diagnosis:

- One off screening: life gain of 0.004 years (1.2 days) with 36 years of additional disease management
- Repeat screening: life gain of 0.03 years (10-11 days) with 67-84 years of additional disease management

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6 December 2010 Last updated at 16:39

Experts scrap prostate screening proposal

UK experts have recommended against a screening programme for prostate cancer, saying its potential harms would outweigh any benefits.

The UK National Screening Committee says after weighing all the evidence, screening for this male cancer using a blood test called PSA is not advisable.

PSA screening has been contentious because of concerns about over-diagnosis.

Blood can be checked for PSA levels

BBC News 06/12/2010 http://www.bbc.co.uk/news/health-11930979

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