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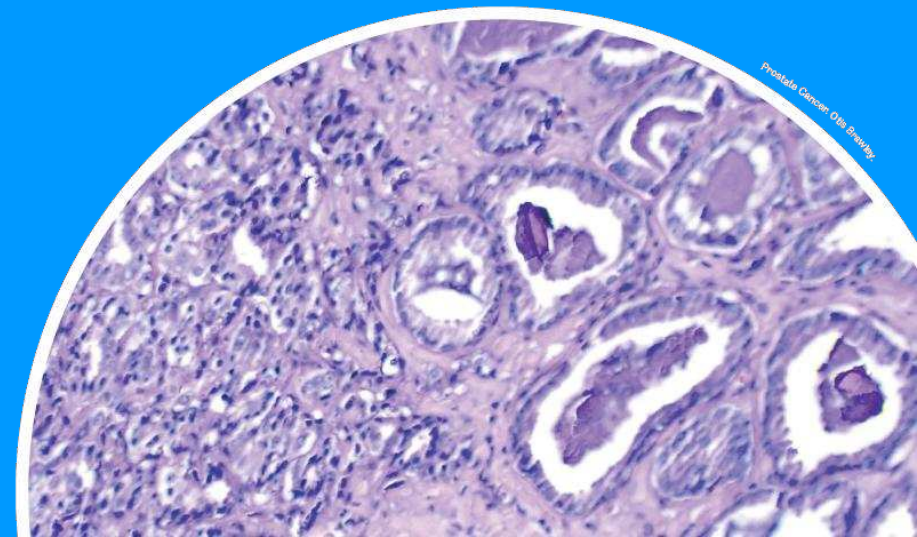
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The
University
Of
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A cost-effectiveness model of prostate cancer screening

Matthew Mildred
Jim Chilcott
Silvia Hummel
ScHARR





Contents

- Introduction to the project and topic
- Disease natural history model
- Data and model calibration
- Validation
- Results
- Conclusions



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.



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



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



Challenges:

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



Solution:

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



About the model:

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



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

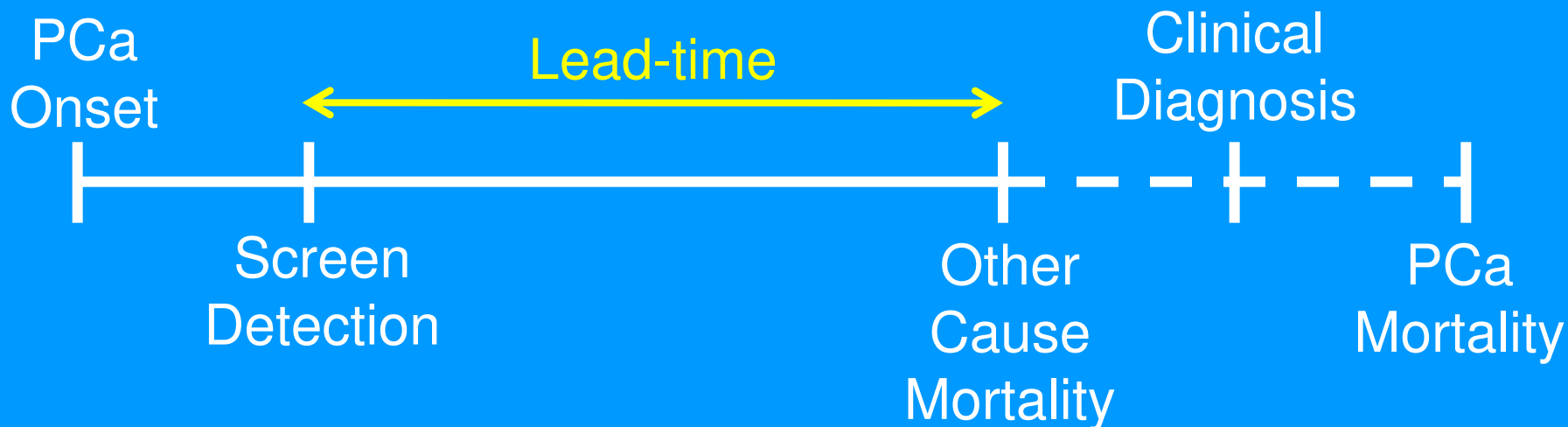


Outputs:

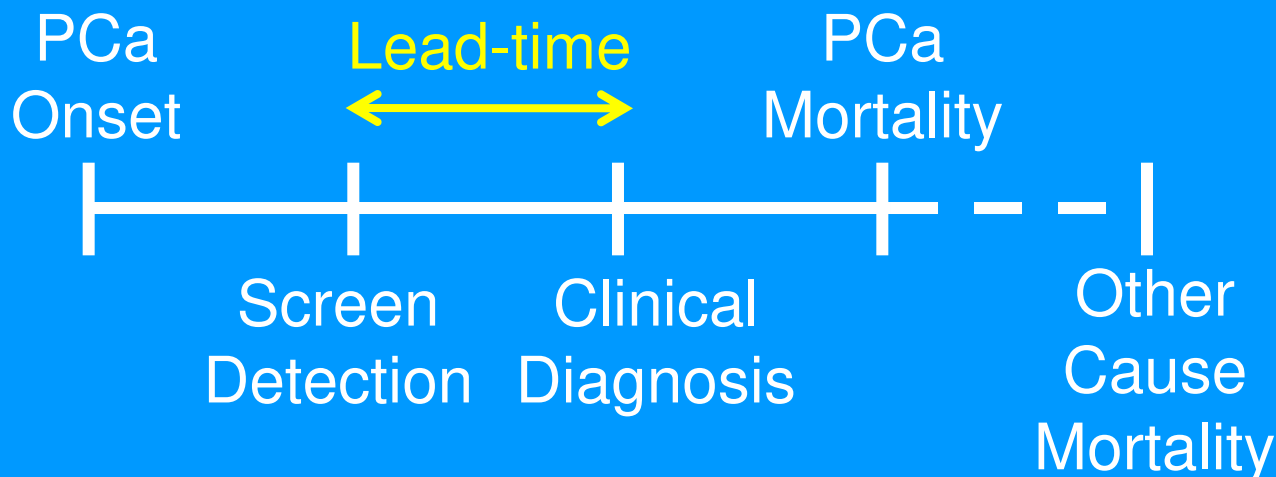
- Age-specific incidence
- Age-specific mortality
- Prostate cancer stage distributions
- Over-detection rate
- Lead time
- Life years gained, QALYs gained
- Probability of developing prostate cancer
- Etc...

Definitions & terms used

Over-detection:

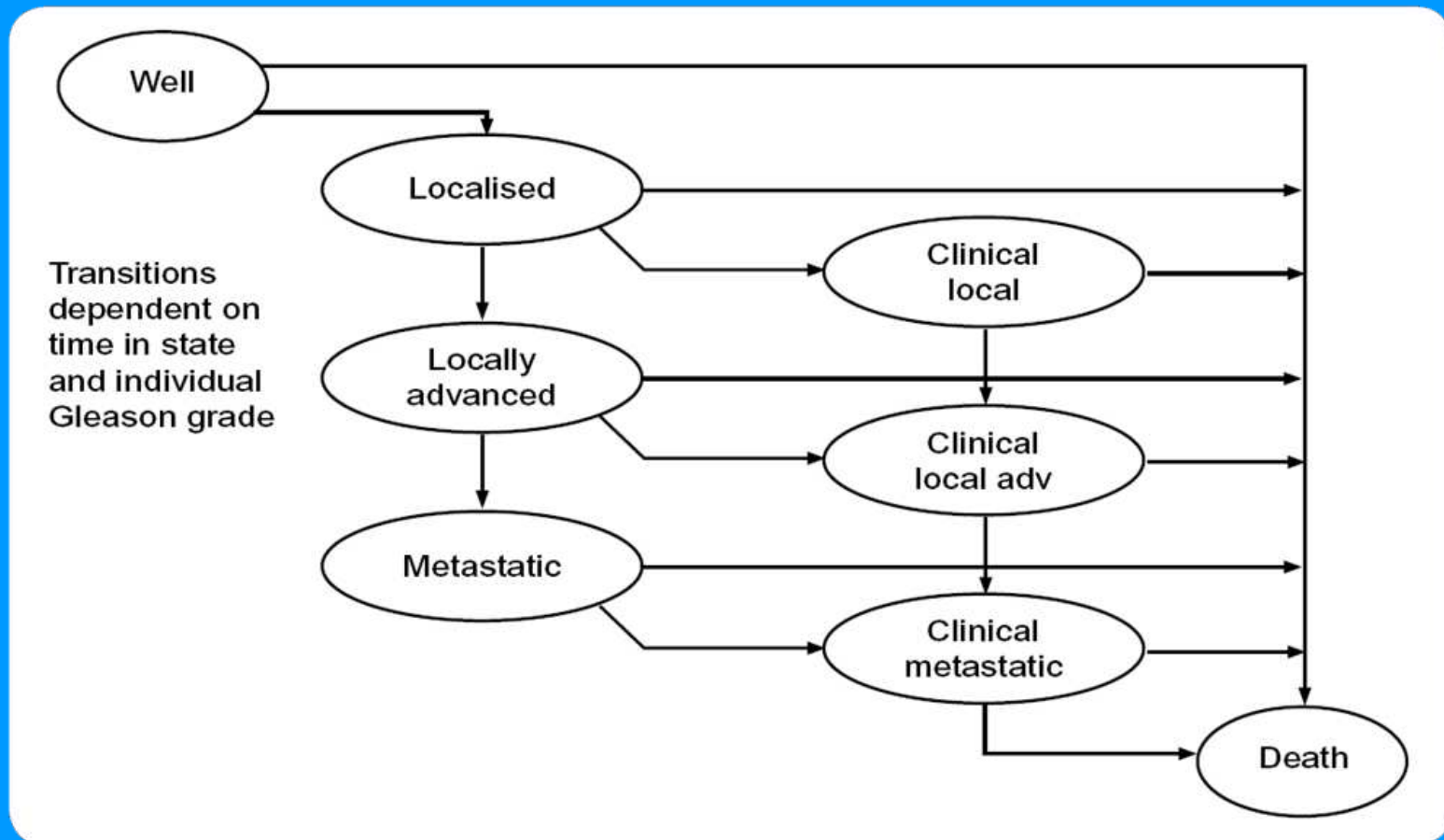


Relevant:





Disease natural history model



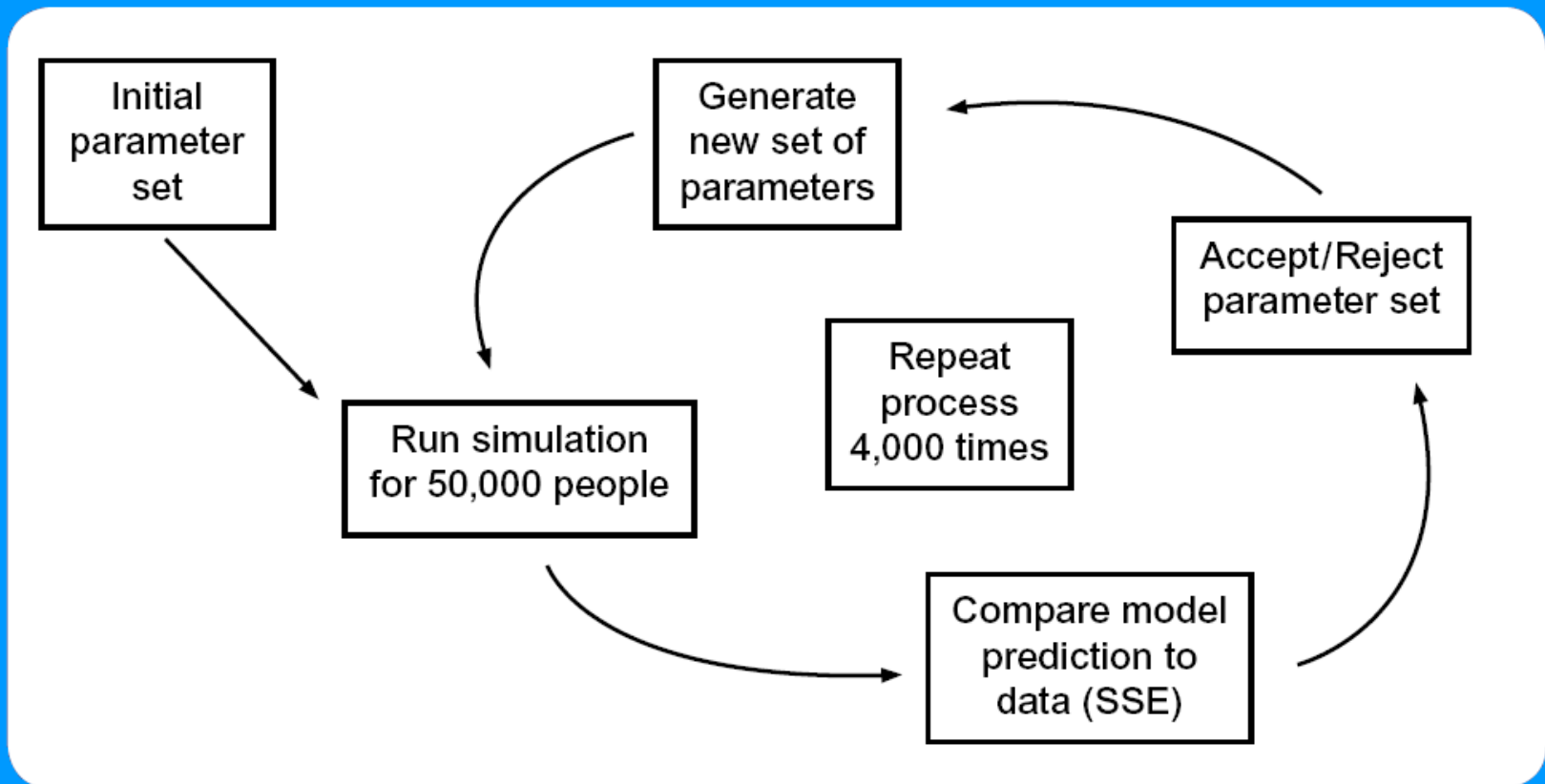


Data

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)

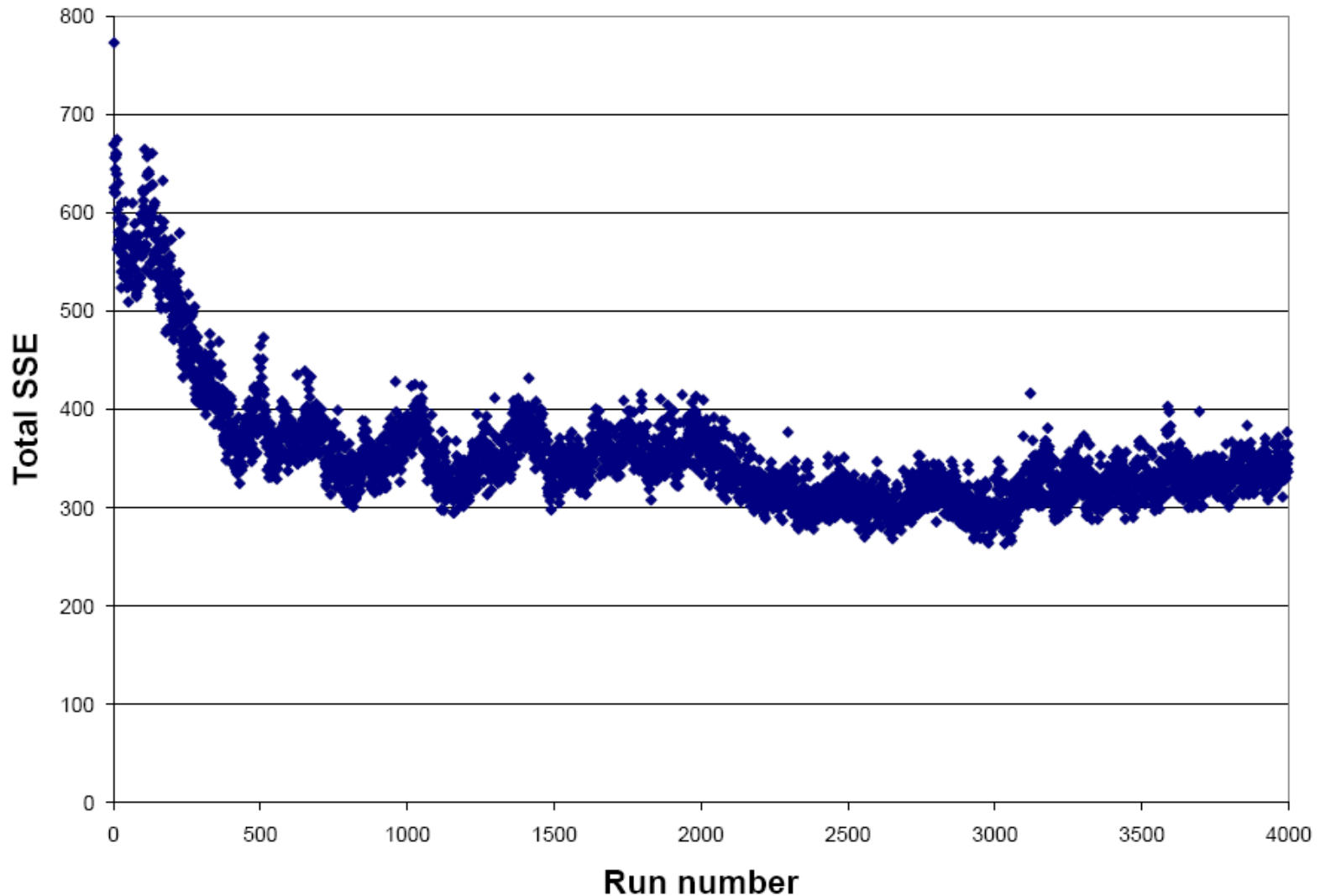


Calibration process



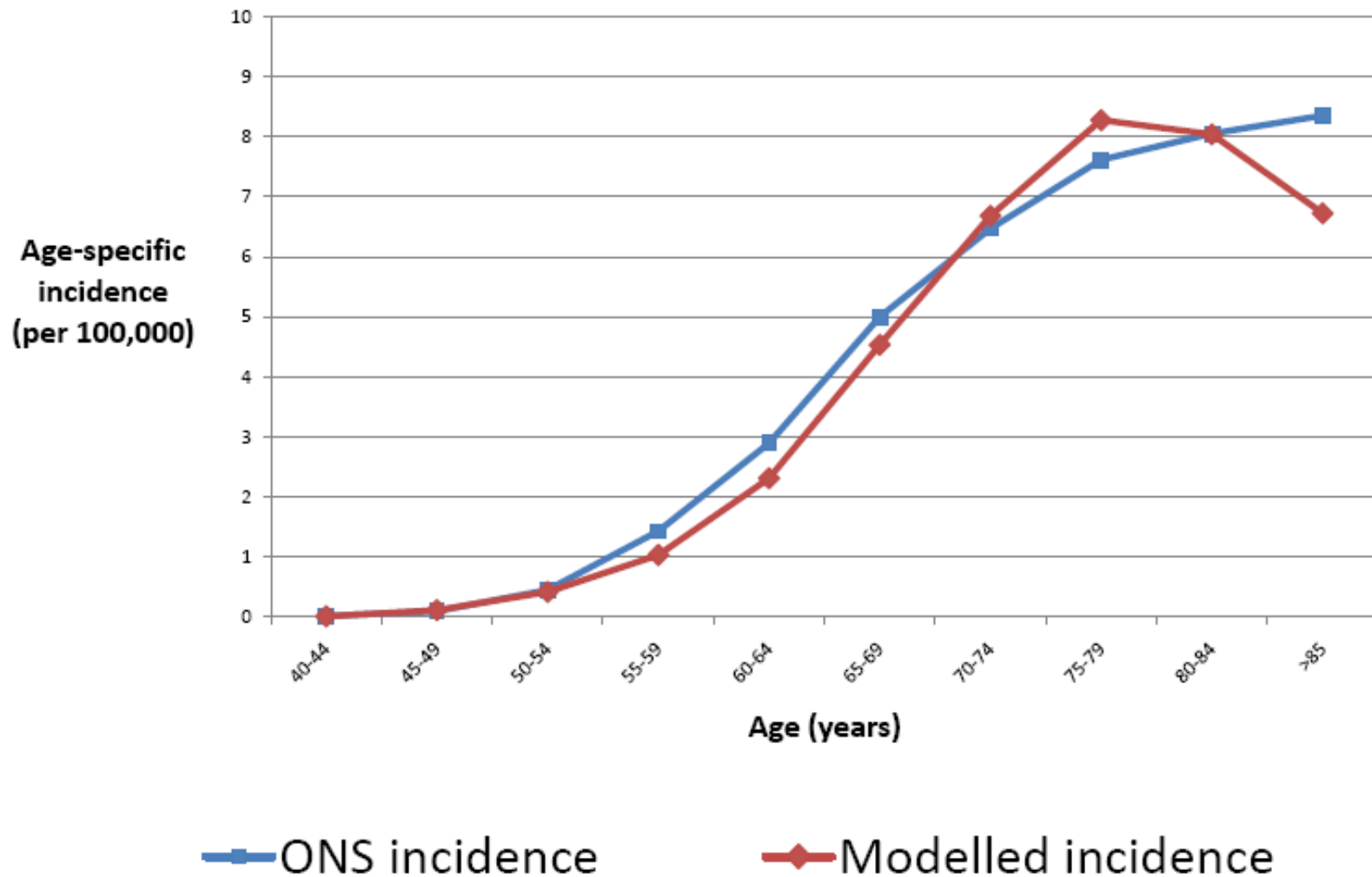


Total SSE during calibration



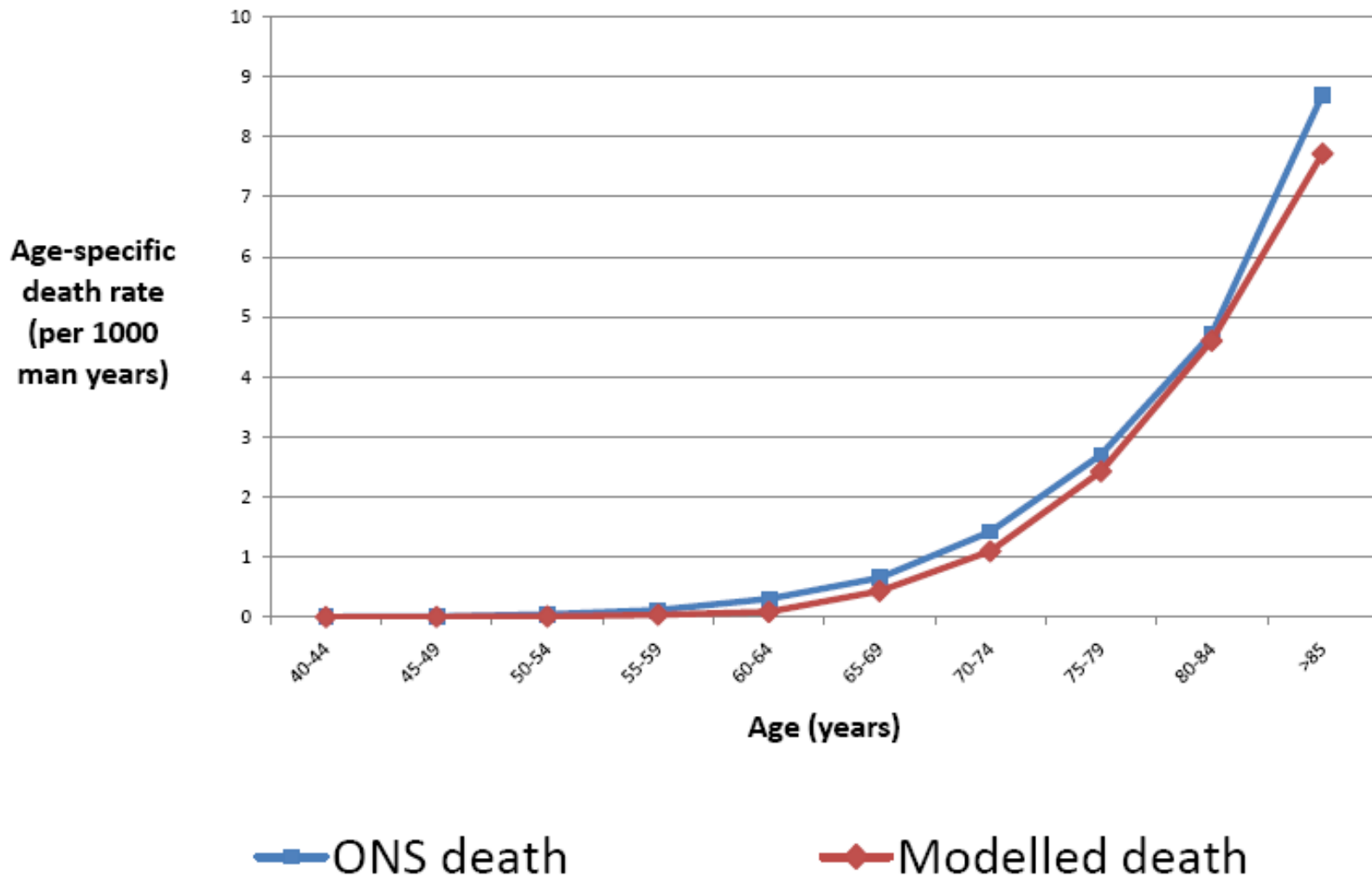


Validation: Incidence



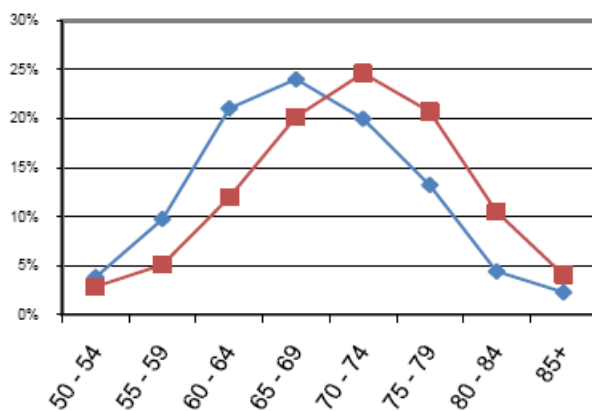


Validation: PCa mortality

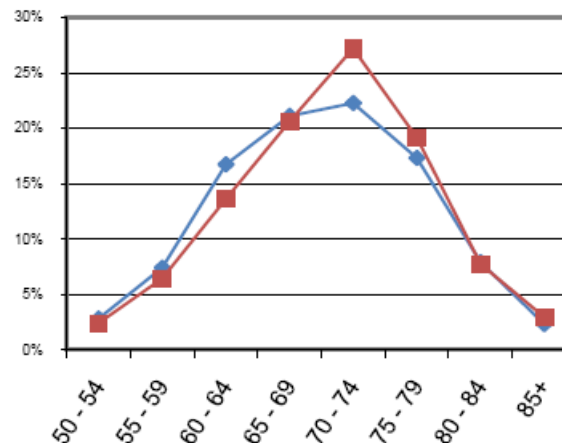




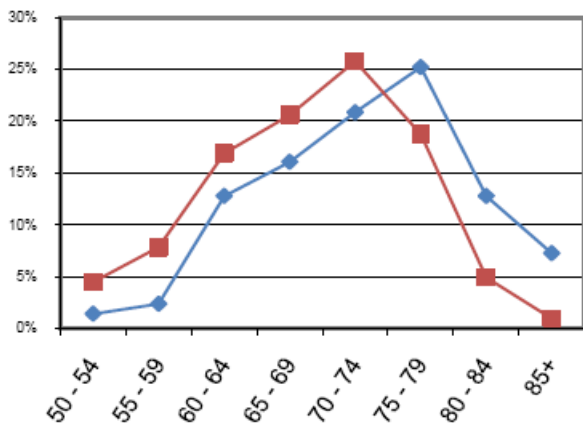
Validation: BAUS



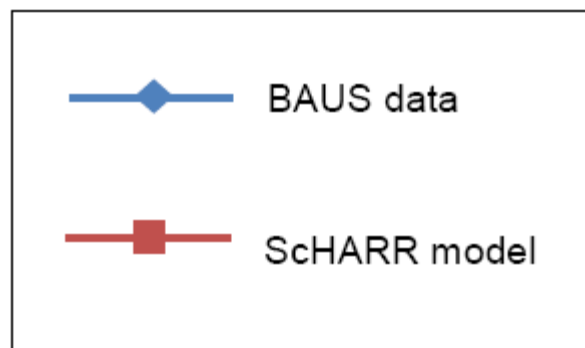
Localised G<7



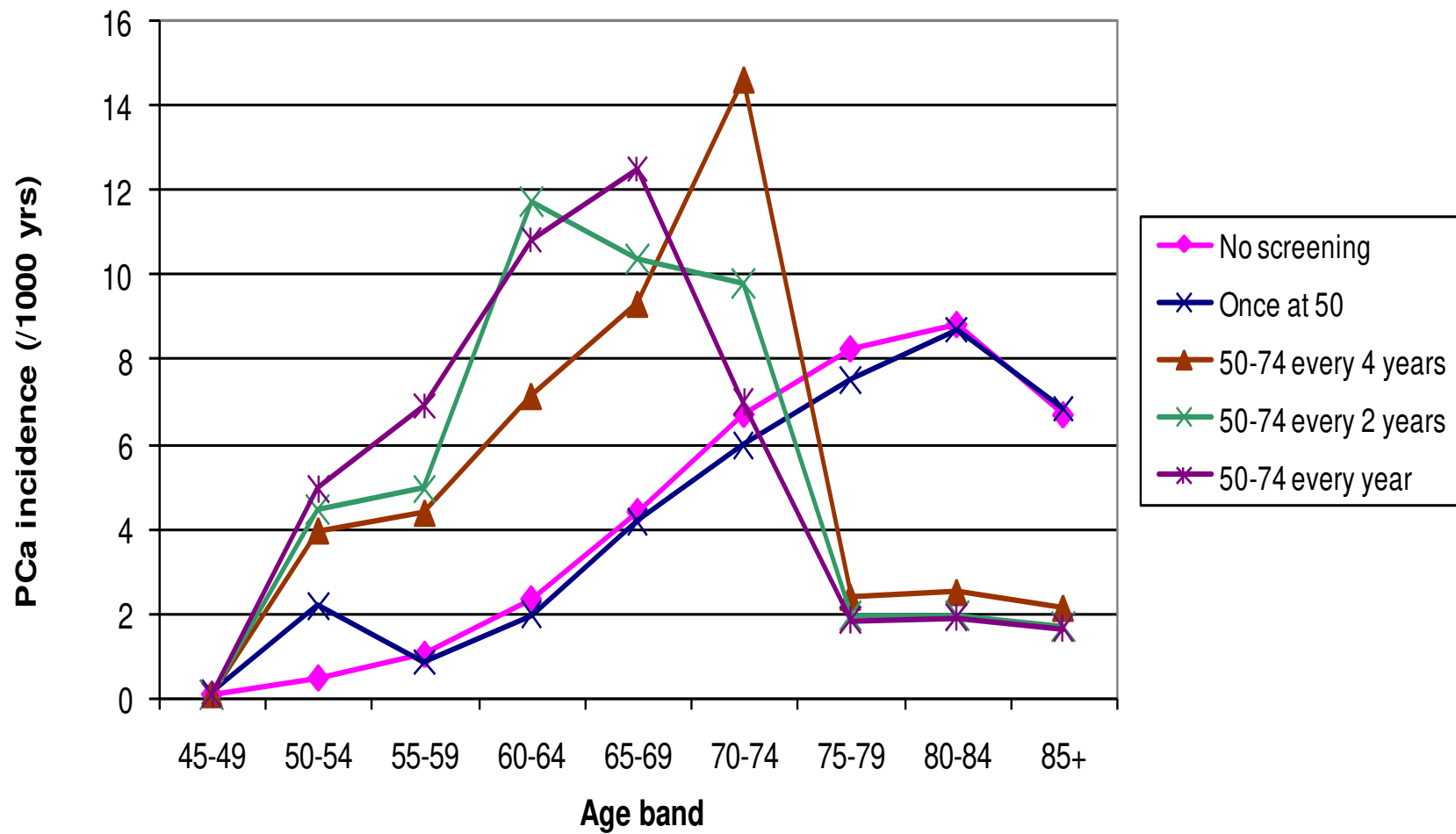
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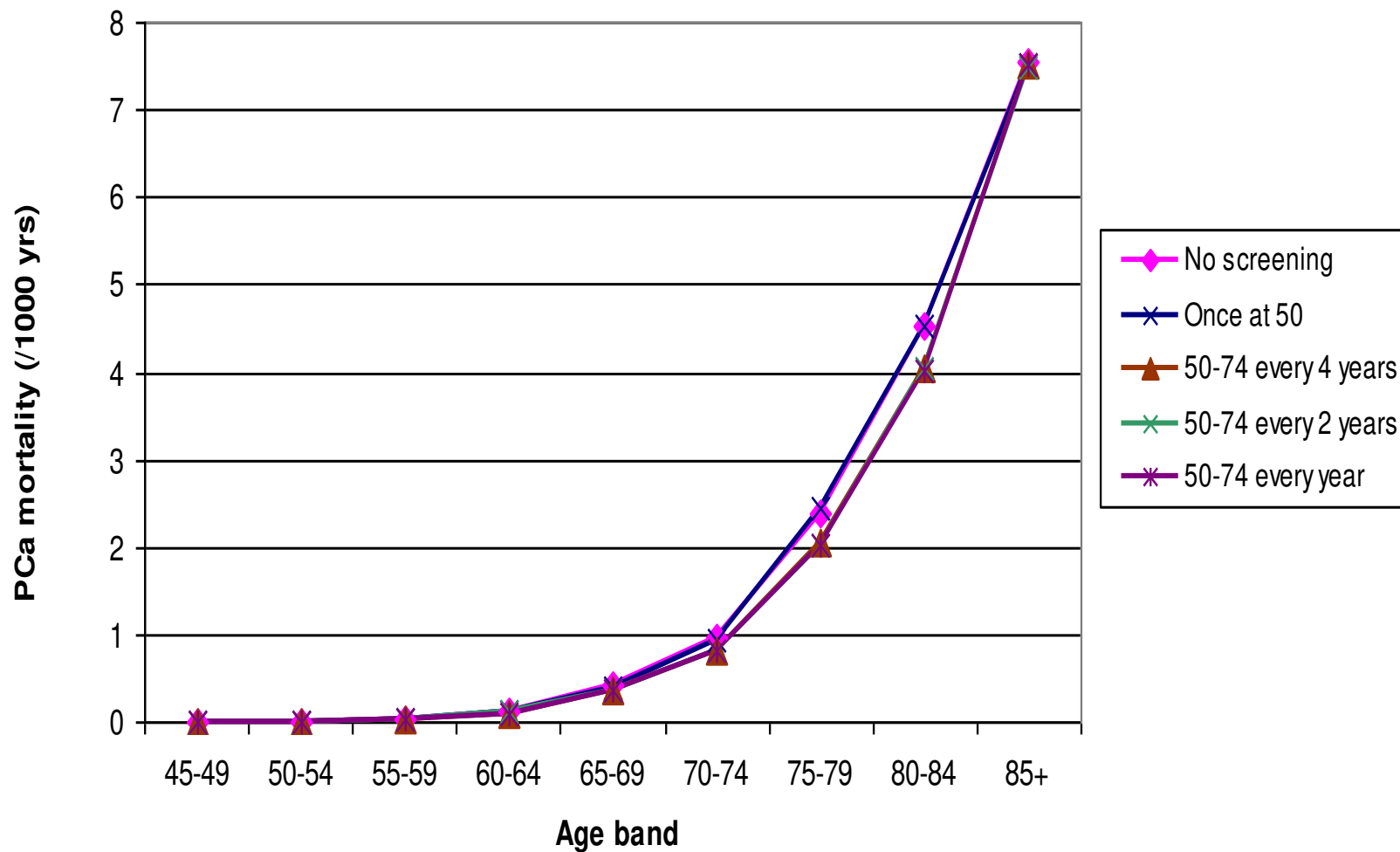
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Results: Incidence



Results: Mortality





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



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



Have you heard our findings?



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



Acknowledgements:

- Dr Anne Mackie and Prof Julietta Patnick at the UK National Screening Committee
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- The British Association of Urological Surgeons
- The ProtecT team