

# Cost-effectiveness of the ThinPrep<sup>®</sup> System for population screening for cervical cancer in Australian women

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## BACKGROUND

- Australian national screening programme introduced in early 1990s.
- Women aged 18-70 years with no symptoms and no history of cervical pathology are screened every two years
- Currently, only the conventional Pap (CP) smear is publically subsidised in Australia

# OBJECTIVES

## Primary

- To determine the cost effectiveness (CE) of the ThinPrep System (TPS) versus the CP test, for cervical screening in Australia

## Secondary

- To compare the CE of 3 year screening with TPS versus 2 year screening with CP

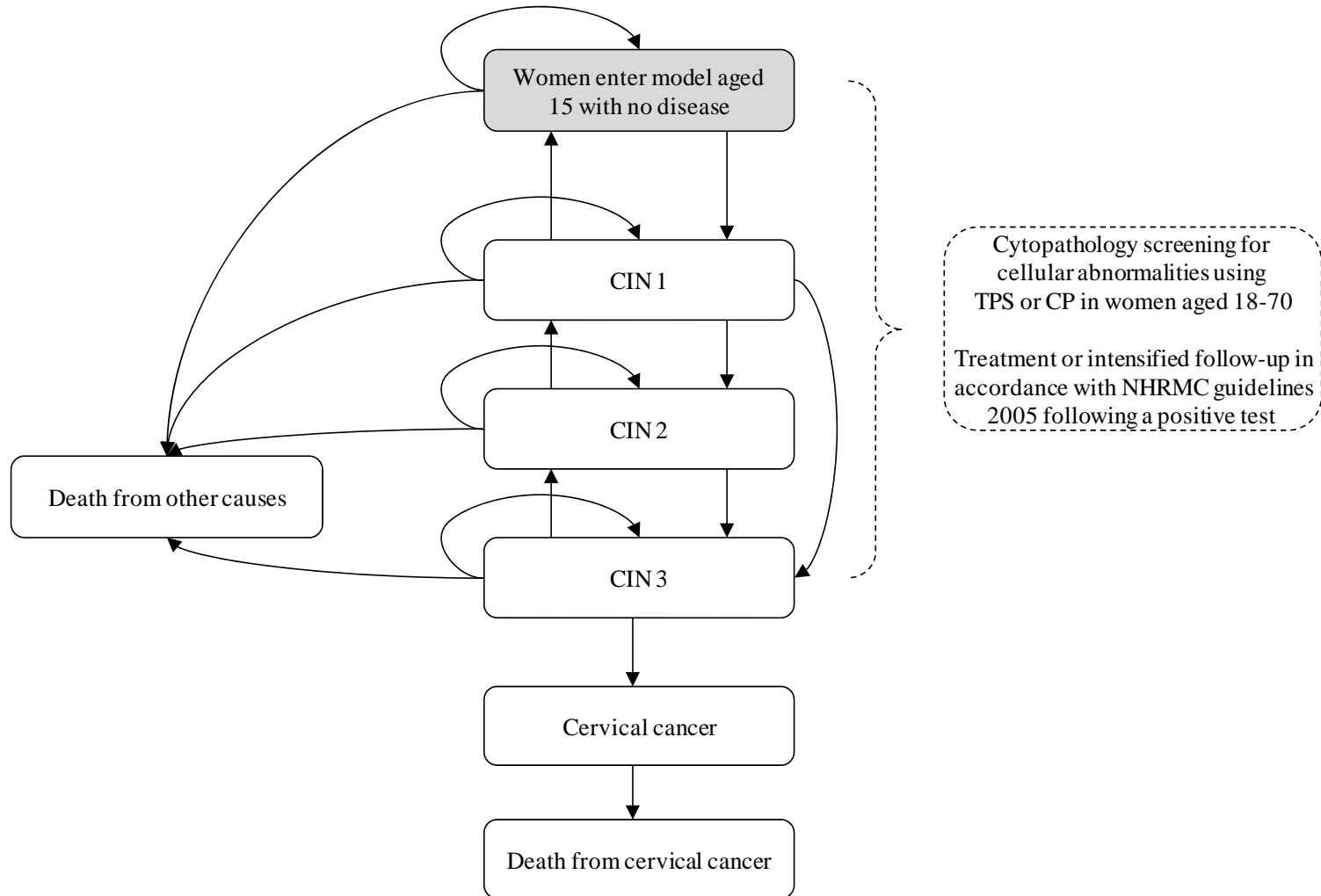
## THE TECHNOLOGY

- **ThinPrep System** = ThinPrep Processor  
+ ThinPrep Imager
- ThinPrep Processor mixes the liquid based cytology sample and applies a thin, even layer of diagnostic cellular material to a slide. The slide is then stained
- The ThinPrep Imager scans and locates 22 areas of interest or fields of view (FOV) for every slide
- Cytotechnologists review the 22 FOV on every slide and determine if slide is negative or requires further review by a pathologist

## METHODOLOGY (1)

- Perspective: whole of health care, direct costs only
- Timeframe: from age 15 through lifetime, with 12 month cycles
- Modelling approach: Cost-utility model using a Markov chain structure with two arms (TPS vs CP), with Monte Carlo microsimulation to allow tracking of individual 'patient' history over time.
- Discount rate: 5% pa for costs and benefits

# GENERALISED MODEL STRUCTURE



Abbreviations: CIN, cervical intraepithelial neoplasia; CP, conventional Pap test; TPI, ThinPrep System

## METHODOLOGY (2)

- Treatment algorithms were based on the *Screening to Prevent Cervical Cancer: Guidelines for the Management of Asymptomatic Women with Screen Detected Abnormalities* (NHMRC 2005)
- Natural history data were based on those used in NHS R&D HTA (Karnon et al, 2004), calibrated to Australian Registry data *prior to the introduction of private LBC in Australia in late 1995*
- Model ignores adenocarcinoma of the cervix

## CLINICAL EVIDENCE BASE

- Model captures **comparative diagnostic performance** and **sample unsatisfactory rates**
- Data from an Australian study of TPS vs CP in a consecutive cohort of ~53,000 women (Davey et al., 2007), who each provided a “split sample” (1<sup>st</sup> CP, 2<sup>nd</sup> TPS)
- Sensitivity for the detection of high-grade lesions (HSIL) for TPS vs CP: 75% vs 68% ( $p=0.005$ ).
- This equates to 1.29 extra cases of HSIL detected per 1,000 women screened, or 2,709 extra cases pa in Australia
- Rate of unsatisfactory samples for TPS vs CP: 1.8% vs 3.1% ( $p<0.0001$ )

## OTHER INPUTS

### Costs

- Manufacturer, Medicare Benefits Schedule, AR-DRGs and the AIHW as appropriate

### Utility weight

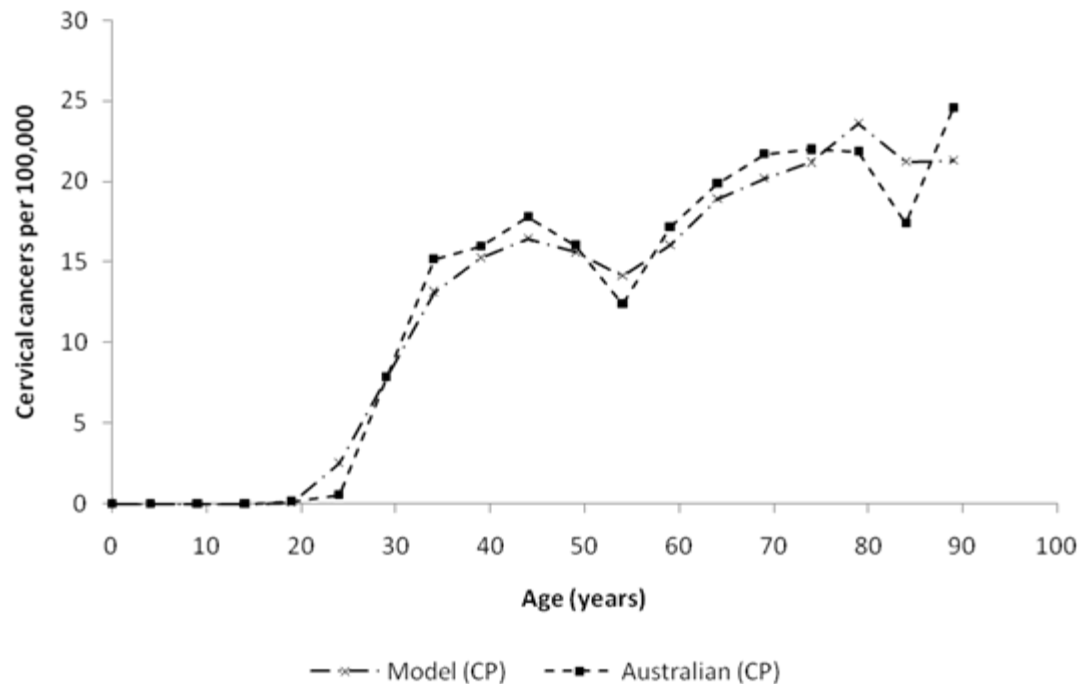
- NHS R&D HTA programme (Karnon et al., 2004)

### Other

- Screening compliance (AIHW 2008)
- Treatment success (published literature)
- Median survival from diagnosis of cervical cancer

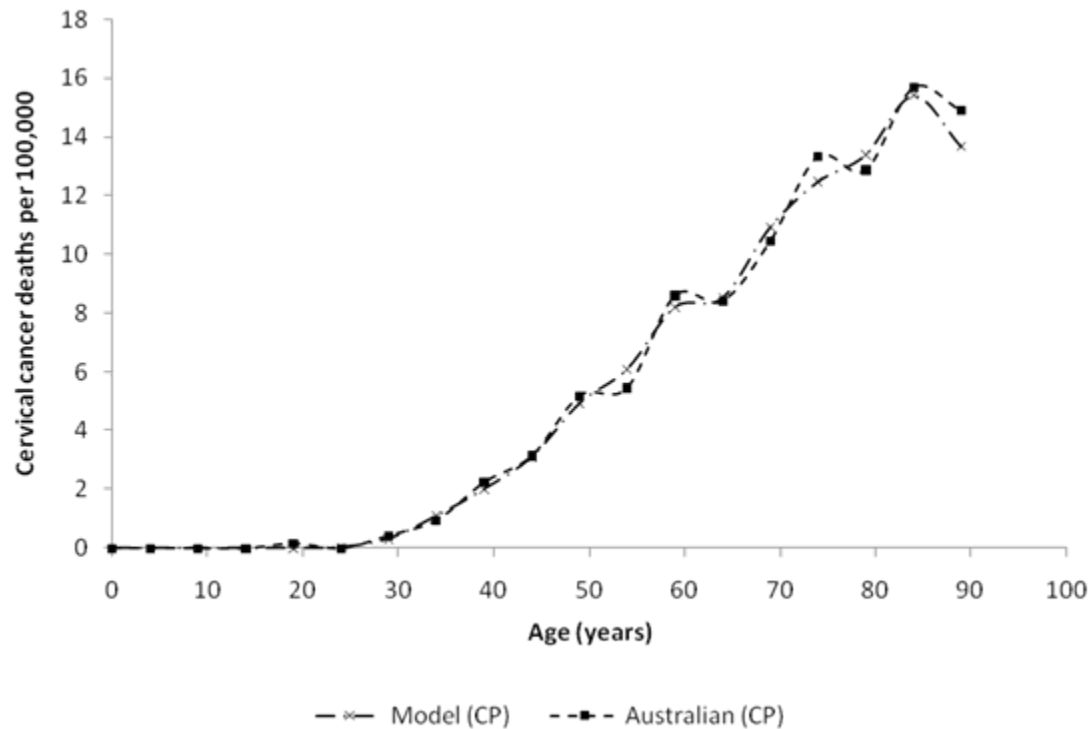
# Model calibration: cancer incidence

Cervical cancer incidence by age: model vs. registry  
(1995 data; CP alone)



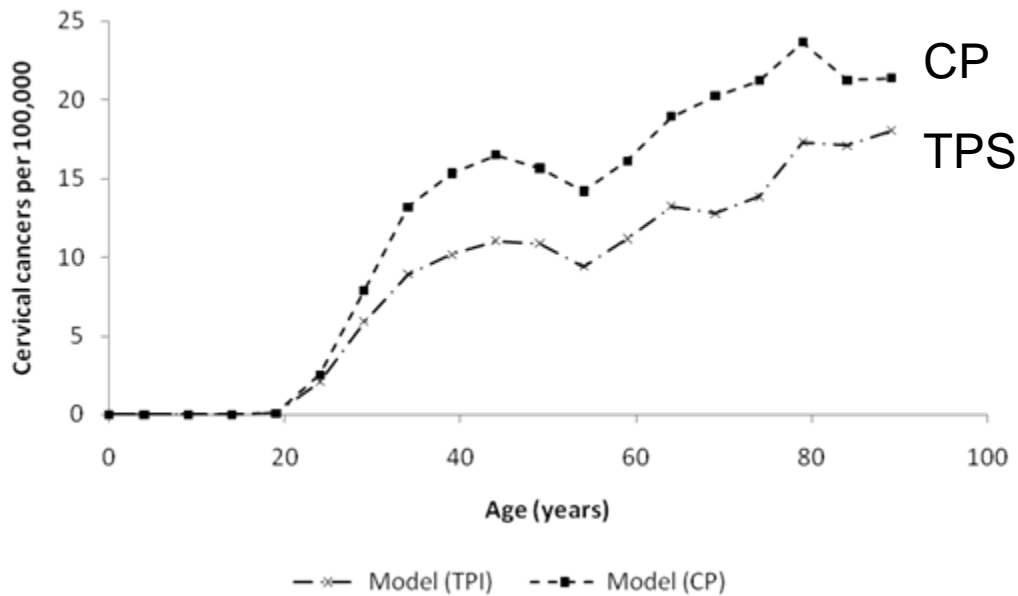
# Model calibration: cancer mortality

Cervical cancer mortality by age: model vs. registry  
(1995 data; CP alone)



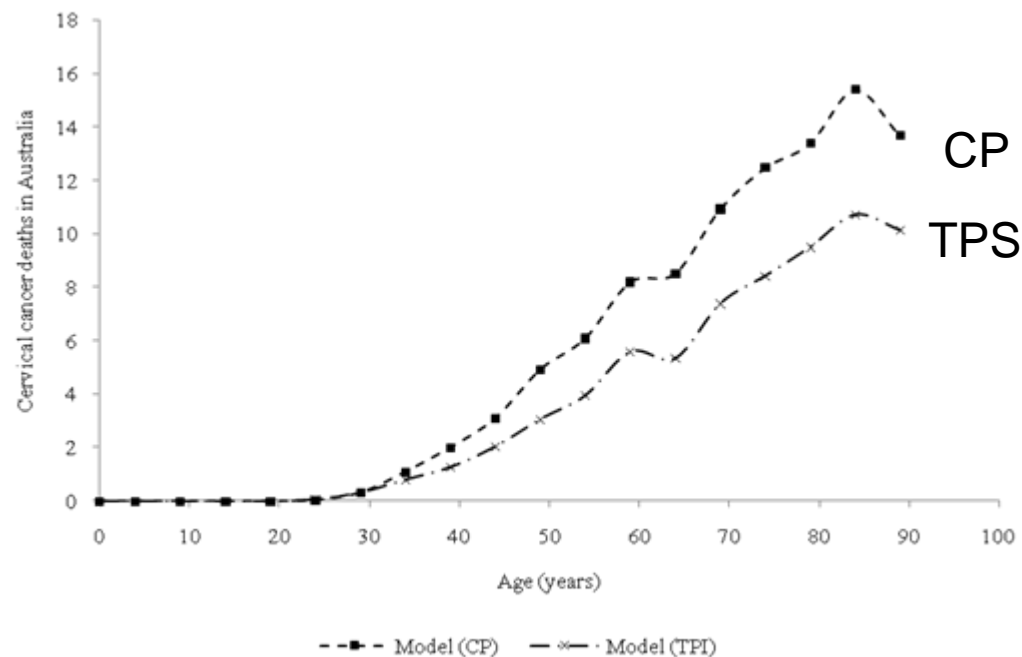
# Results: cervical cancer incidence

Cervical cancer incidence by age  
(modelled TPS vs modelled CP)



# Results: cervical cancer mortality

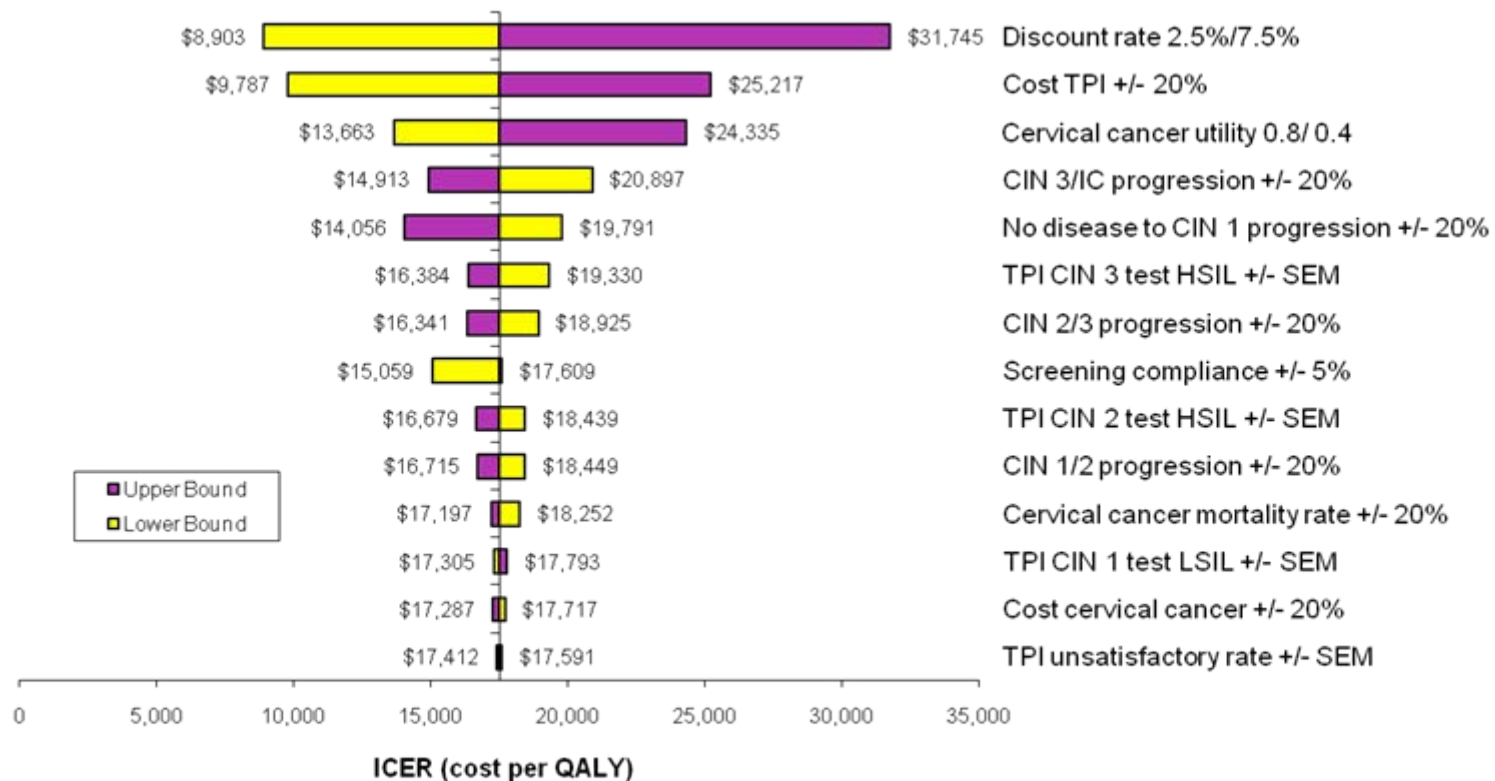
Cervical cancer mortality by age  
(modelled TPS vs modelled CP)



## RESULTS: ICERS

- Base case: TPS (2 yr) vs CP (2yr)  
~AUD\$17,500 per QALY  
~AUD\$39,900 per LYS
- Secondary case: TPS (3 yr) vs CP (2yr)  
~AUD\$4,300 per QALY  
~AUD\$15,550 per LYS

# Sensitivity analyses



## CONCLUSIONS

- TPS remained cost-effective over a range of input parameter values in univariate and multivariate sensitivity analyses
- As the split-sample study design will underestimate the true performance of TPS, the true ICER is likely to lie below the base case of \$17,500 per QALY

# REFERENCES

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