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Intra-operative Autofluorescence for Parathyroid Identification – A Cost-Benefit Analysis

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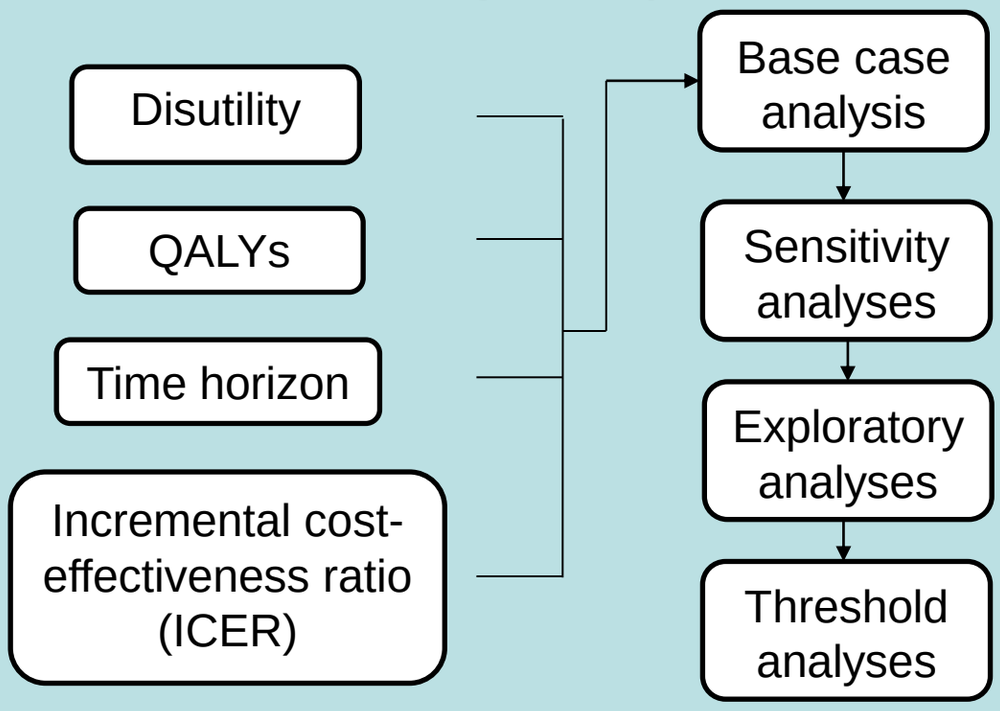
Introduction

- Hypocalcaemia is the most common complication post total thyroidectomy
  - Chronic complications
- Intra-operative identification and preservation of parathyroid glands
  - Visual inspection (conventional surgery)
  - Adjuncts including near infra-red autofluorescence (NIR-AF) imaging
  - NIR-AF systems involve significant outlay and ongoing costs.
- This cost-benefit study aims to analyse the economic feasibility of the use of NIR-AF for total thyroidectomies, for the prevention of permanent post-operative hypoparathyroidism (HPT)

Methods

A decision tree model was developed to compare NIR-AF guided surgery (intervention) to visual identification without adjuncts (conventional surgery)



Results

Base Case Analyses

Base Case	NIR-AF-guided surgery	Conventional surgery	ICER
Cost	$14,606	$13,582	**+$1,024**
QALYs	14.3390	14.3310	**+0.0080**
ICER = $128,234/QALY gained			

Analyses included:

Costs of:
- Conventional thyroidectomy
- NIR-AF equipment
- Ca/PTH monitoring + replacement

QALY's:
- Morbidity due to chronic HPT complications
- Excess burden of disease

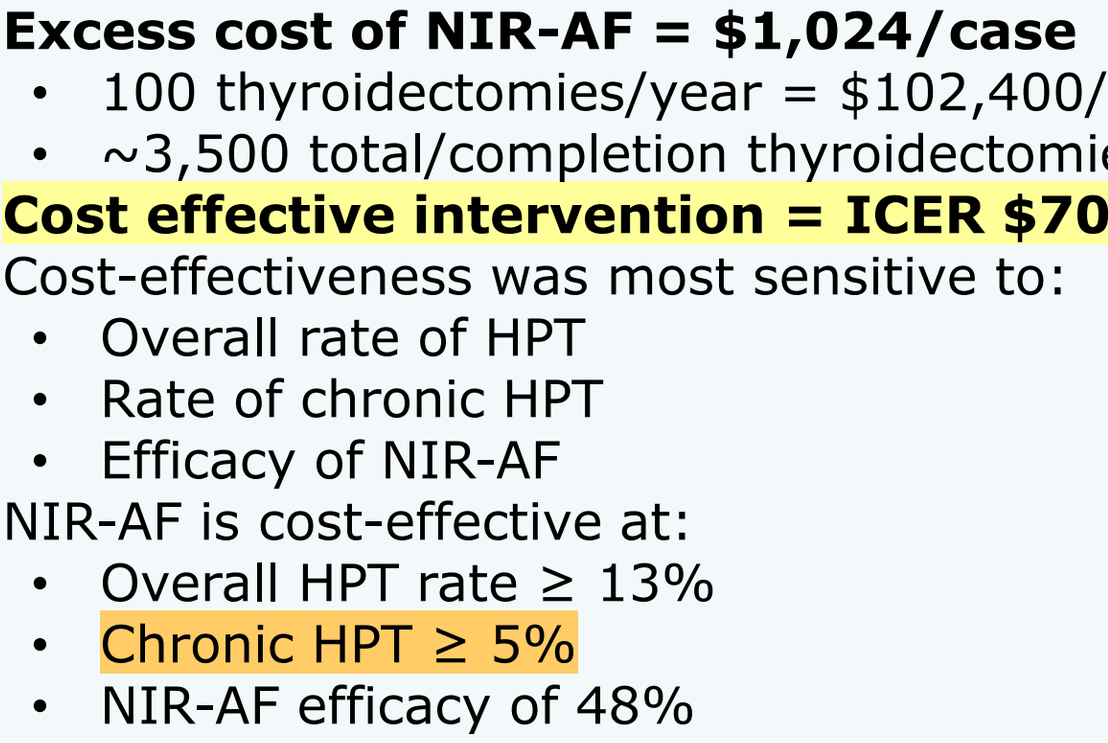
Time horizon:
- Lifespan of 36 years post thyroidectomy

ICER:
- Threshold of cost-effectiveness

Discussion

- **Excess cost of NIR-AF = $1,024/case**
  - 100 thyroidectomies/year = $102,400/year
  - ~3,500 total/completion thyroidectomies are performed annually in Australia
- **Cost effective intervention = ICER $70,000 per QALY gained**
- Cost-effectiveness was most sensitive to:
  - Overall rate of HPT
  - Rate of chronic HPT
  - Efficacy of NIR-AF
- NIR-AF is cost-effective at:
  - Overall HPT rate ≥ 13%
  - Chronic HPT ≥ 5%
  - NIR-AF efficacy of 48%
    - 28% in recent meta-analysis

Chronic HPT rate	ICER/QALY
2%	$128,000
5%	$69,000
10%	$10,000



Conclusion

- The economic feasibility of NIR-AF guided surgery is most influenced by the chronic HPT rate, as well as the efficacy of NIR-AF in the prevention of HPT
- NIR-AF becomes cost-effective at a chronic HPT rate of ≥ 5%