Cost-Effectiveness Analysis of Atrial Fibrillation Screening in the Elderly Population of Taiwan

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BACKGROUND

- The incidence of atrial fibrillation (AF) surged dramatically in the elderly population.
- AF is an important risk factor for ischemic stroke (IS), but the risk can be reversed by anticoagulation therapy.
- Screening for undiagnosed AF can identify patients who could benefit from anticoagulant therapy and reduce the burden of IS through early intervention.
- The cost-effectiveness of population screening in the elderly population of Taiwan remains unknown.

OBJECTIVES

- The aims of this study were: (1) to evaluate **the cost-effective profile** of **one-time population screening for AF**, and (2) to determine the **optimal age** for implementing AF screening, from **a governmental perspective in Taiwan**.

METHODS

- **Study design: cost-utility analysis**
  - A cohort of **10,000 65-year-old Taiwanese** was modeled
  - AF screening (with single-lead electrocardiogram) vs. no screening
  - Time horizon: lifetime
  - Study outcomes: (1) Clinical events; (2) Direct medical costs (in 2018 USD); (3) Quality-adjusted life-years (QALYs)
  - Incremental cost-effectiveness ratios (ICERs), defined by the incremental cost per QALY gain, were used to present the cost-effectiveness
  - Willingness-to-pay (WTP) thresholds: one GDP (USD 25,838) and three GDP (USD 77,514) per QALY gained
  - Discount rate: 3% for both health gains and costs
- **Model structure**
  - Decision tree: AF screening results
  - Markov model: clinical events after screening (with cycle length = 3 months) (**Figure 1**)
- **Input parameters and data sources**
  - Screening accuracy and costs, anticoagulants prescription rates, and proportion of patients having AF history: an AF population screening study of Taiwanese adults
  - Clinical event rates and associated costs: analysis using Taiwan's National Health Insurance Database
  - Utility values: based on literature with EQ-5D[1,2]
- **Data analysis**
  - Base-case analysis
  - Sensitivity analyses: one-way sensitivity analysis (OWSA) and probabilistic sensitivity analysis (PSA)
  - Scenario analyses: cohort age varied from 65 to 90 at AF screening

Table 1. Base-case and scenario analyses for 10,000 screening individuals

Age of screening	Inremental costs (USD)	Incremental QALYs	ICER (USD/QALY)
65	345,920	25.64	13,493
70	452,327	35.65	12,689
75	592,451	47.42	12,493
80	738,286	59.04	12,505
85	601,152	38.57	15,585
90	580,298	23.55	24,636

Figure 1. Markov model

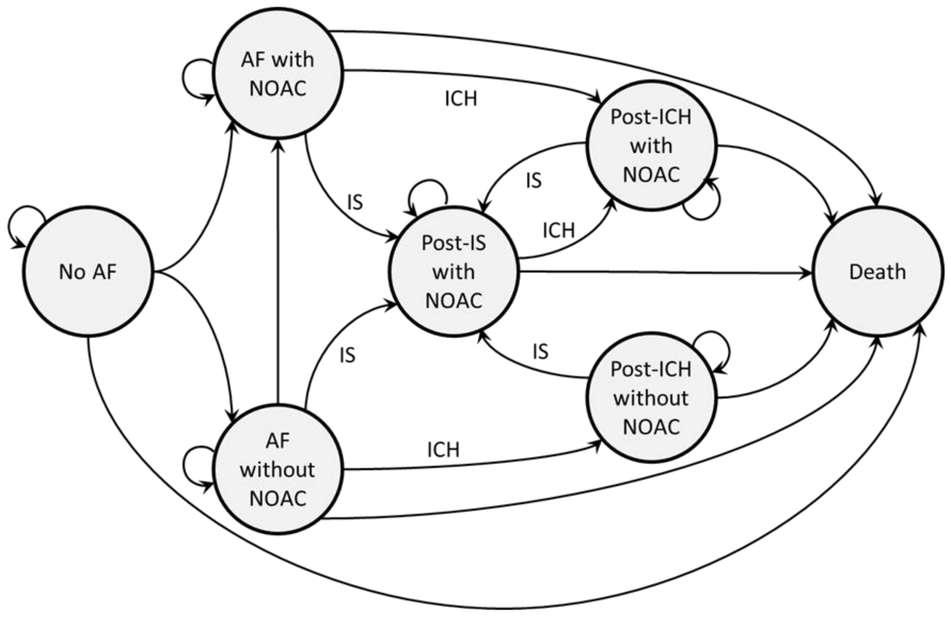


Figure 2. Tornado diagram

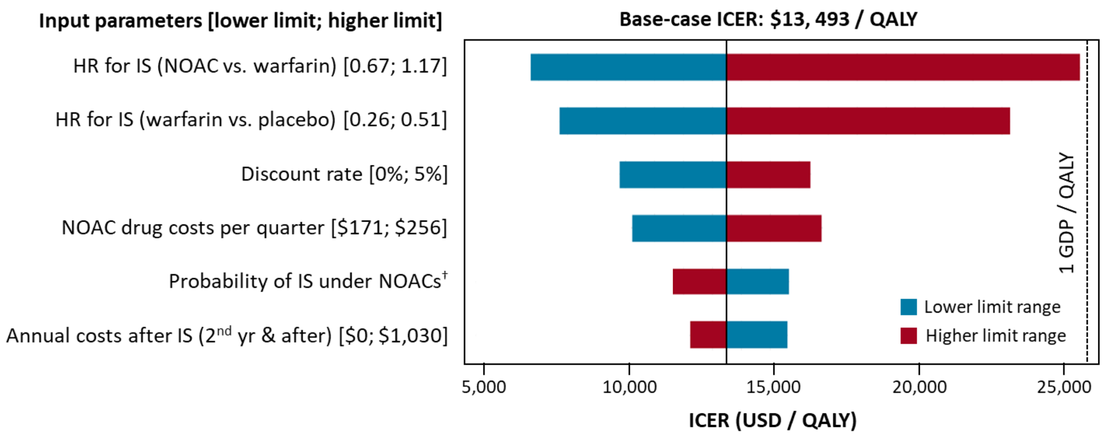
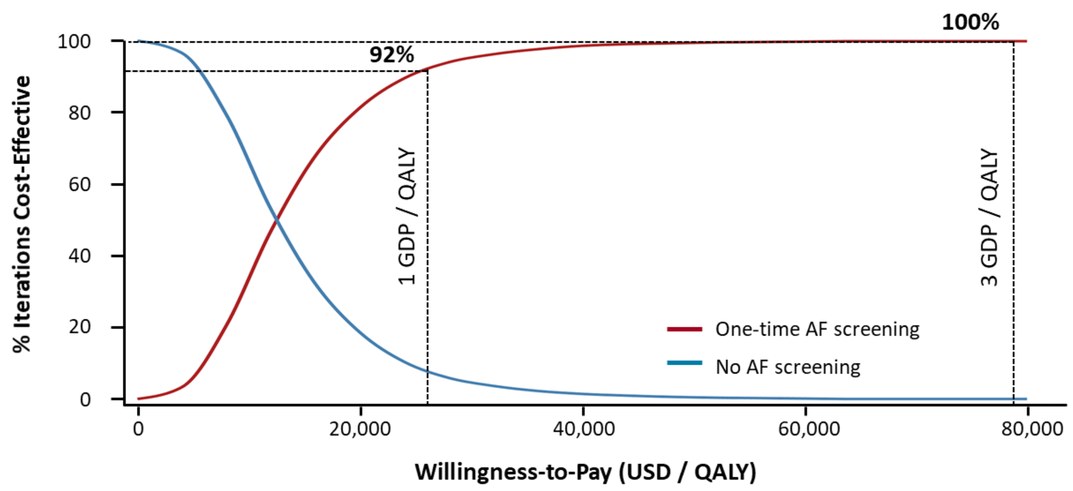


Figure 3. Cost-effectiveness acceptability curve



RESULTS

- In a hypothetical cohort of 10,000 individuals aged 65 years, one-time population screening for AF compared with no screening could **detect 406 undiagnosed AF cases**, **preventing 22 IS** in the remaining lifetime. The ICER was USD 13,493 per QALY gained (**Table 1**).
- The results were robust in all sensitivity analyses. OWSAs showed that the ICERs were most sensitive to the effectiveness of anticoagulants in IS prevention. In the PSA, 92% and 100% of iterations produced ICERs below the WTP threshold of one and three GDP per QALY, respectively (**Figure 2**).
- Screening at the **age of 75 years** yielded the lowest ICER value (**Table 1**).

CONCLUSION

- Screening for AF to detect undiagnosed AF in the elderly population can be a cost-effective intervention in Taiwan.
- Further studies considering the budget impact are required to determine the most optimal screening program.

References: [1]Chao et al. *Chest* 2018; **153**(2): 453-66.; [2]Sullivan et al. *Med Care* 2005; **43**(7): 736-49.; [3]Sullivan et al. *Med Decis Making* 2006; **26**(4): 410-20.