

Conflict of interest statement

The views expressed are those of the author.

Mattias Aronsson is currently employed by AstraZeneca, Nordics.

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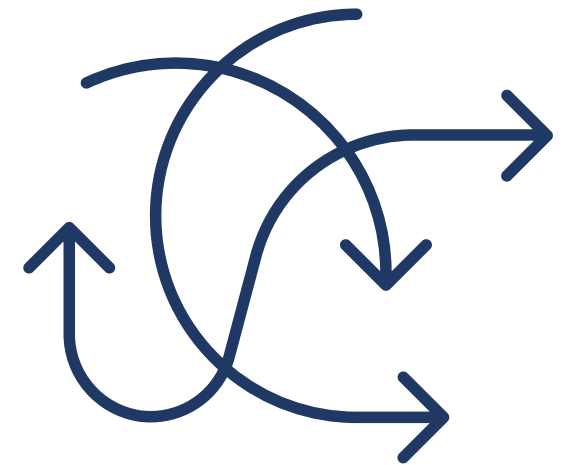
IDENTIFYING AN OPTIMAL SCREENING STRATEGY

An illustration in atrial fibrillation screening

Mattias Aronsson, PhD, MSc

Background

- Some technologies are associated many possible options
 - All strategies cannot be tested in clinical studies
- Models increasingly more popular for decision-making and design studies
- Screening is of those intervention:
 - When to start and stop?
 - How often should we repeat?
 - Who?
 - How?
 - Etc.
- Computing power are now cheap and easily available



Screening for atrial fibrillation

- Atrial fibrillation (AF) often unknown
- High risk of ischemic stroke
 - Effective treatments available
- One-off screening at the age of 75 years meant:
 - ICER of ~€5000/QALY
 - Recent studies show cost-savings



Decision: Screening for atrial fibrillation

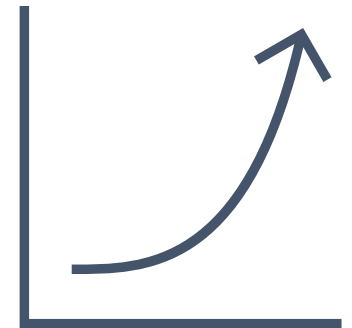
- Is this strategy cost-effective given a WTP of €50,000/QALY?
- Is this the optimal use of the intervention?



Possible designs

- Screening only relevant for 55- to 85-year-olds
- Maximum one screening per year
- How many screening strategy options would this imply?

Type your suggestion in the chat

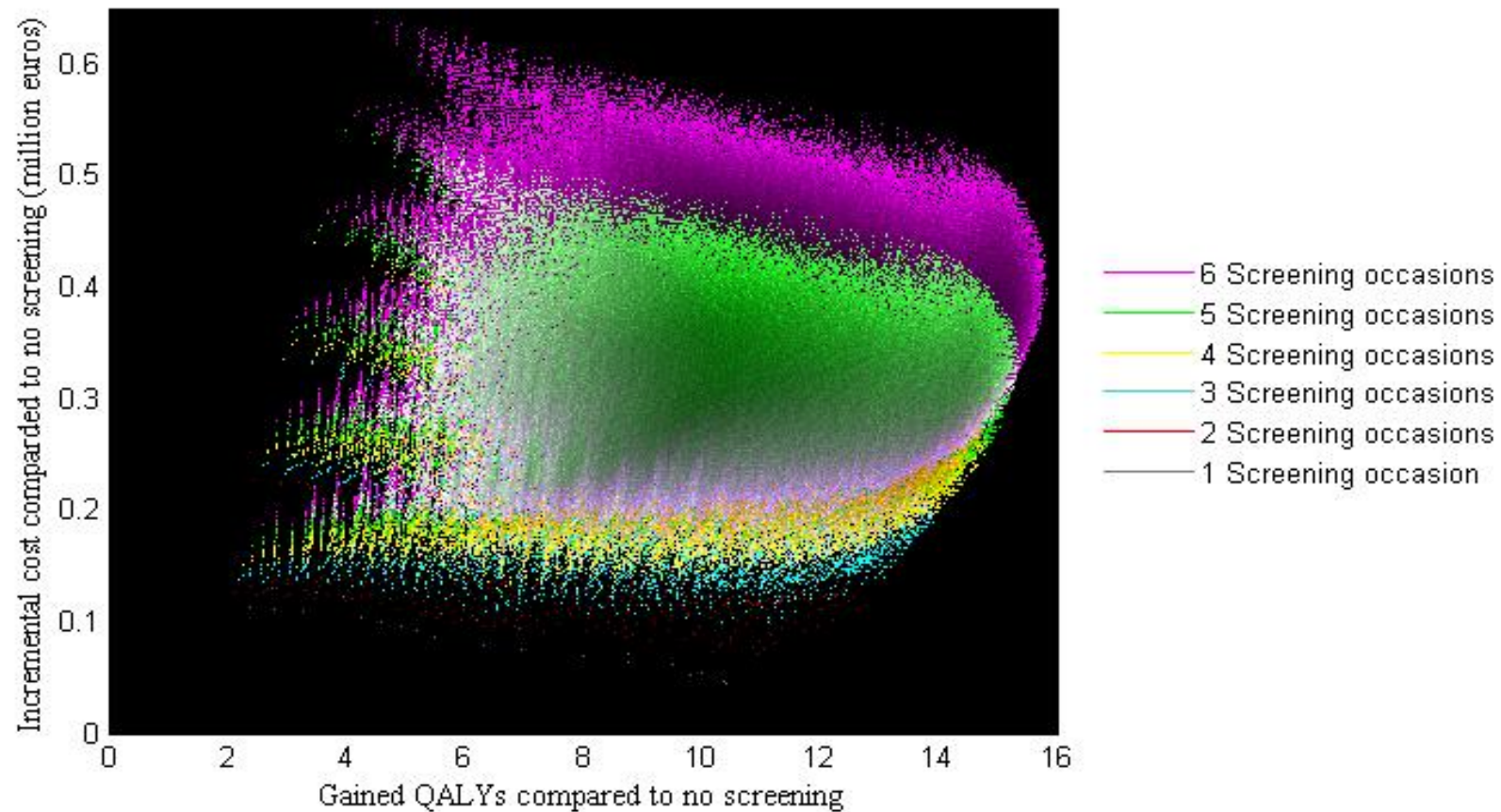


Method: Systematic brute force analysis

Program design	Screening strategy	Binary number/ Row vector $[a_x]$	Design definition
a_0	0	[0 ... 0 0 0 0 0 0 0 0 0 0 0 0]	No screening (reference design)
a_1	1	[0 ... 0 0 0 0 0 0 0 0 0 0 0 1]	Screening at the age of 55 years
a_2	2	[0 ... 0 0 0 0 0 0 0 0 0 0 1 0]	Screening at the age of 56 years
a_3	3	[0 ... 0 0 0 0 0 0 0 0 0 0 1 1]	Screening at the ages of 55 and 56 years
a_4	4	[0 ... 0 0 0 0 0 0 0 0 0 1 0 0]	Screening at the age of 57 years
a_5	5	[0 ... 0 0 0 0 0 0 0 0 0 1 0 1]	Screening at the ages of 55 and 57 years
...	...	...	...
$a_{34603008}$	34 603 008	[0 0 0 0 0 1 0 0 0 0 1 0 ... 0]	Screening at the ages of 75 and 80 years
...	...	...	...
$a_{2147483647}$	2 147 483 647	[1 ... 1 1 1 1 1 1 1 1 1 1 1 1]	Screening every year 55 to 85 years.

Cost-effectiveness plane: strategies with up to 6 screening occasions

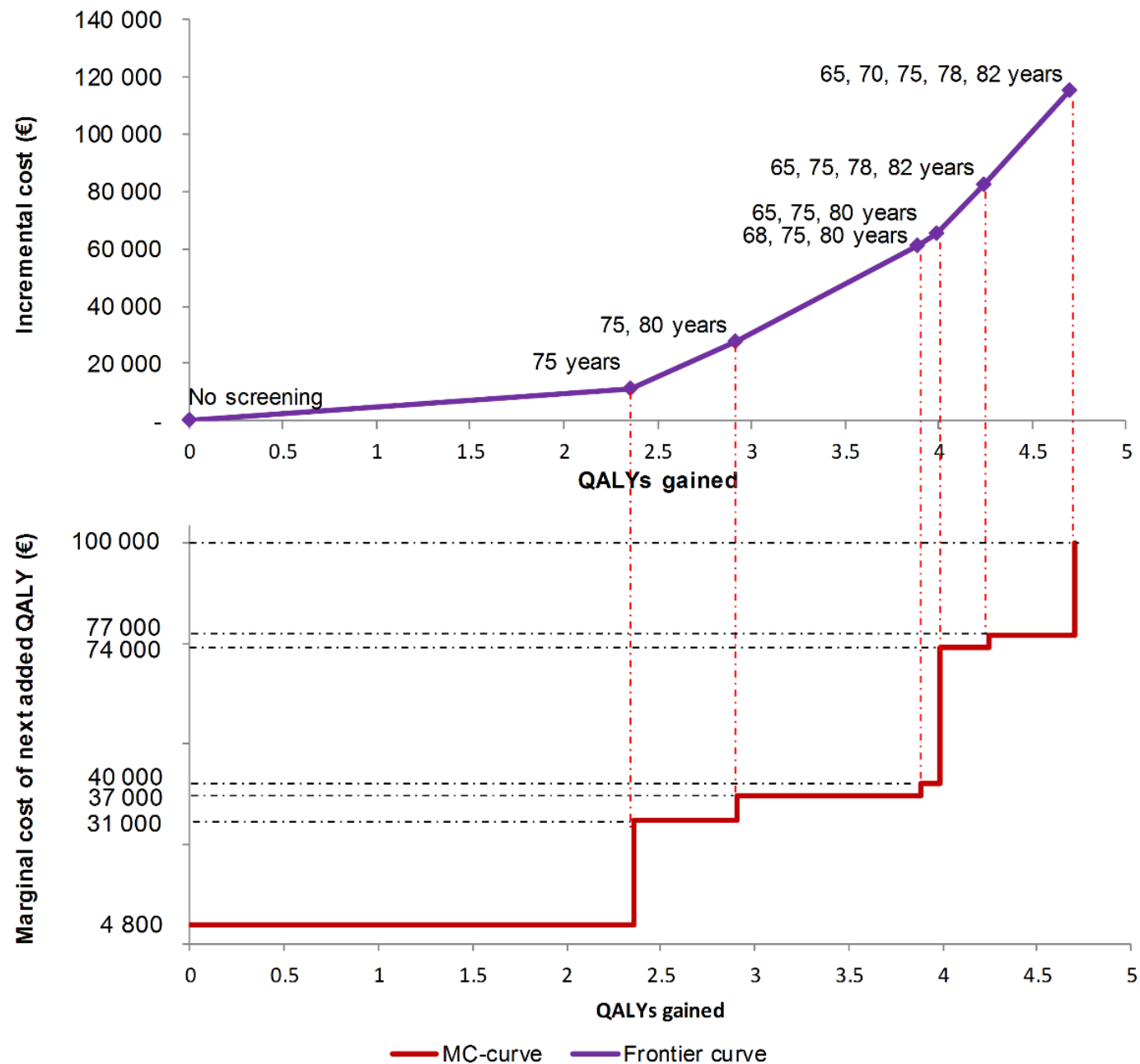
- Each dot is the deterministic mean value of one specific strategy



Finding the optimal screening strategy

- Exclude
 - Dominated screening strategies
 - Remove extendedly dominated screening strategies

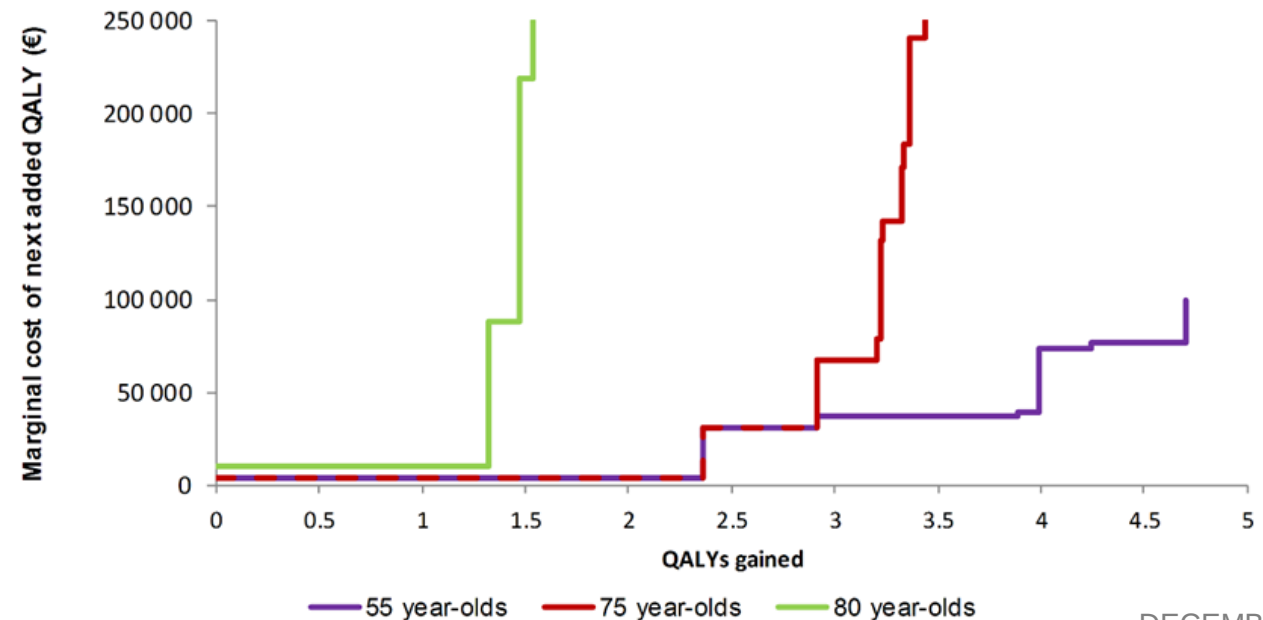
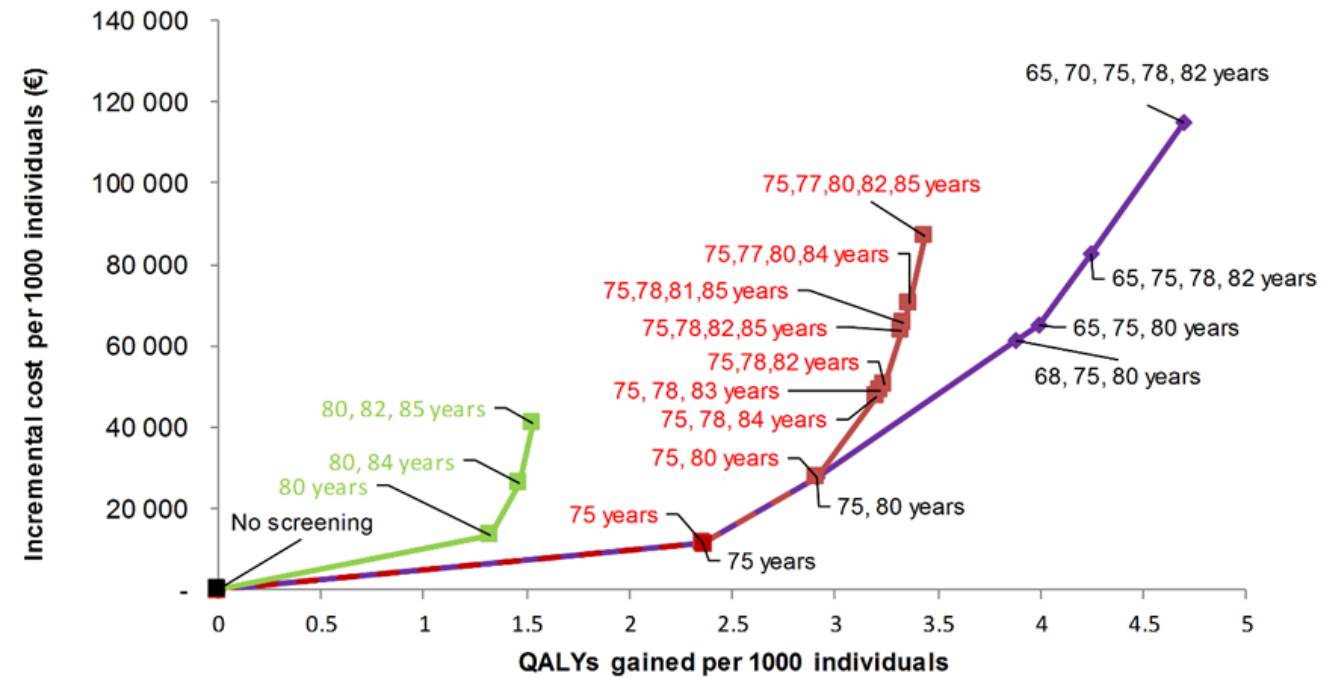
Optimal screening strategies



When is a strategy the optimal option?

Age when screening is conducted (years)	€/QALY vs no screening	Strategy is optimal if WTP is (€):
All		
No Screening	-	<4800
75	4800	4800–31 000
75, 80	9500	31 000–37 000
68, 75, 80	15 800	37 000–40 000
65, 75, 80	16 400	40 000–74 000
65, 75, 78, 82	19 500	74 000–77 000
65, 70, 75, 78, 82	24 500	77 000–100 000

Current population



Conclusion

- Systematic methods to identify optimal strategies are available
- Optimal starting age of the screening program and the number of potential repeated screening occasions, depend on the WTP for a QALY
- Visual presentation of the results are important to illustrative the complex decision problem for decision makers

Thank you for the attention!