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PUBLIC HEALTH &
PREVENTIVE
MEDICINE

Cost-effectiveness Of Screening And Treating Children With Familial Hypercholesterolemia Early In Life From A Dutch Healthcare Perspective

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GROUP OF EIGHT AUSTRALIA

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Disclosure

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I have no conflict of interest to disclose

However, other researchers who were involved in this study have received grants or financial assistance from pharma companies for work not related to this study

Outline

- Why familial hypercholesterolaemia (FH)?
- Economic case for FH screening and treatment
- Why CEA of HeFH in children?
- Methods
- Results
- Conclusions

Why familial hypercholesterolemia?

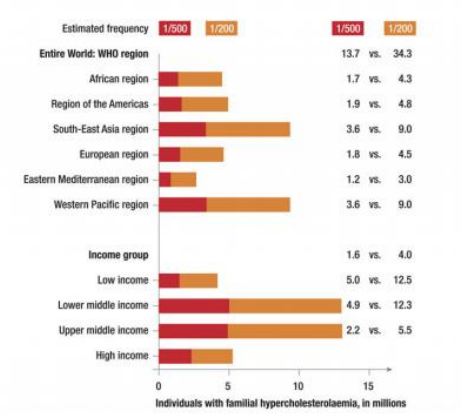
- FH is an inherited condition
- Heterozygous FH (HeFH)
- Homozygous FH
- FH cause of premature CHD
- Global issue:

  a baby is born with FH every minute

2. Wiegman et. Al. European Heart Journal (2015).36.2425-2437

Why familial hypercholesterolemia?

- Prevalence higher than previously thought
- HeFH is present in 1 per 200–250
- Of whom 20–25% are children and adolescents



2. Wiegman et. Al. European Heart Journal (2015).36.2425-2437

5

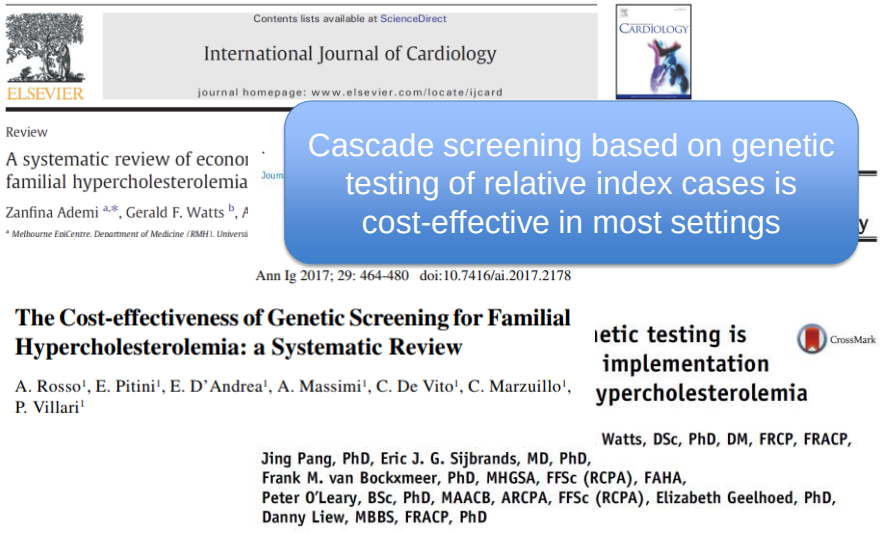
Economic case for FH screening and treatment

Two aspects:

- identification / diagnosis
- management and primary prevention of CVD

6

Current state of knowledge



Cascade screening based on genetic testing of relative index cases is cost-effective in most settings

Why CEA of HeFH in children?

- Contemporary evidence
- Importance of early intervention
- Rationale

"lower LDL-C depends on the assumption that risk in later life is determined by lifetime exposure of elevated LDL-C, rather than their LDL-C at one point"

- Balance between benefits vs. risk of treatment

2. Wiegman et. Al. European Heart Journal (2015).36.2425-2437
3. Norman et al. Current opinion Lipidology 2016,. 27:563-569

Aims

- This research study explores the cost-effectiveness of early intervention in children with FH.
- Does early intervention (at age 10) represent a cost-effective intervention relative to usual care?

9

Model Structure

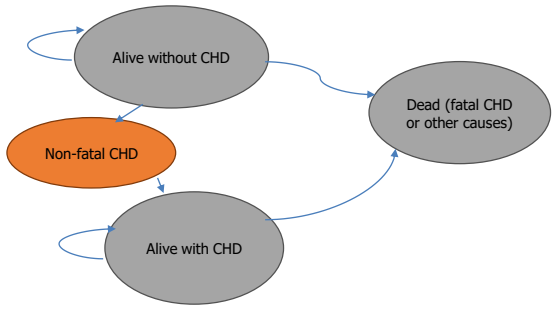
1.Screening

2.Decision tree

Intervention (at age 10) with statins

Usual Care

3.Markov model



10

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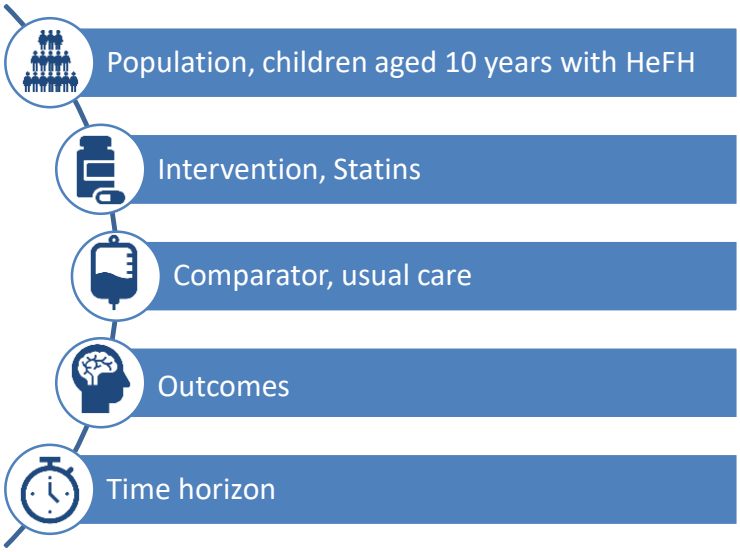

11

Methods

Model Assumption 1 (statin efficacy)

Variables	Braamskamp et al. 2015
LDL-C-before	6.13
LDL-C after	3.85

12

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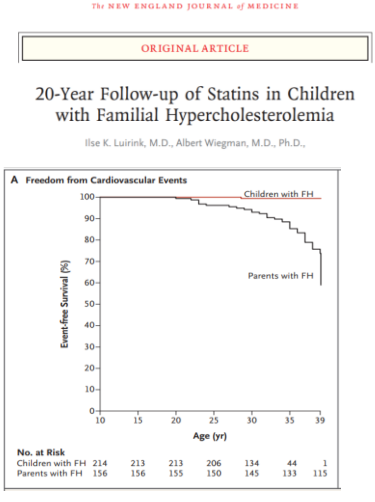
Model Assumption 2 (untreated cohort)


The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

20-Year Follow-up of Statins in Children with Familial Hypercholesterolemia

Ilse K. Luirink, M.D., Albert Wiegman, M.D., Ph.D.,

A Freedom from Cardiovascular Events

Children with FH

Parents with FH

Event-free Survival (%)

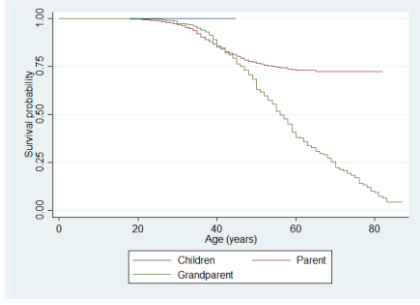
Age (yr)

No. at Risk

Children with FH 214 213 213 206 134 44 1

Parents with FH 156 156 155 150 145 133 115

- For Dutch cohort, grandparents who do not receive statins was utilised
- The risk of a first event is assumed to be a function of age and cumulative LDL-C.



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Model Assumption 3 (effect of reduced lifetime LDL-C)

- If your lifetime LDL-C is at one point lower than in the untreated arm, then your risk of first CVD event is reduced by 55%

Ference et al. 2012

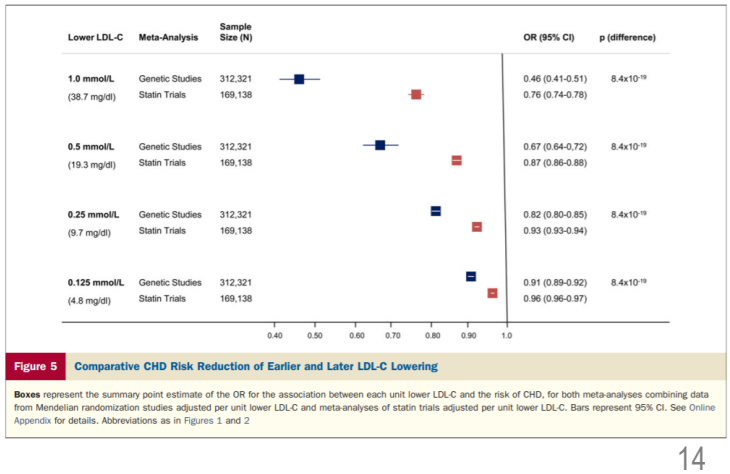

Figure 5 Comparative CHD Risk Reduction of Earlier and Later LDL-C Lowering

Boxes represent the summary point estimate of the OR for the association between each unit lower LDL-C and the risk of CHD, for both meta-analyses combining data from Mendelian randomization studies adjusted per unit lower LDL-C and meta-analyses of statin trials adjusted per unit lower LDL-C. Bars represent 95% CI. See Online Appendix for details. Abbreviations as in Figures 1 and 2

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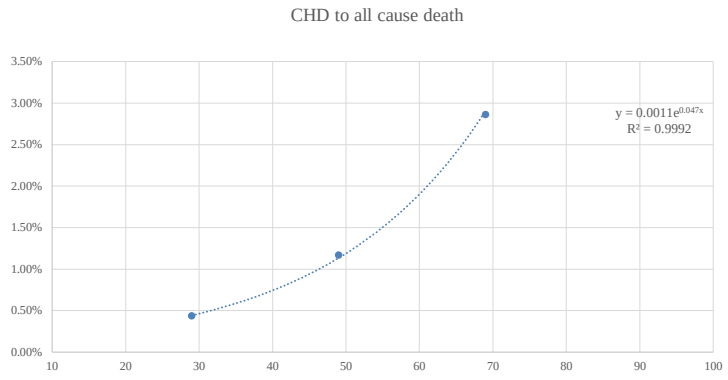
Model Assumption 4 (CHD to all cause death, Simon Broome)



15

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Model Assumption 5 (statin perseverance and natural identification)

- People identified with HeFH will continue on statins for life
  - Attrition was modelled at 18.0%.
- Patients not treated at a young age may begin at an older age
- 51% of Usual-care patients start treatment at 25 years old
- Once you have an event you will be on statins

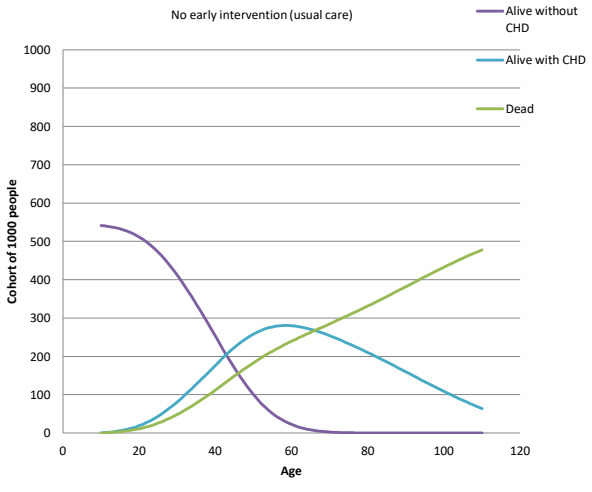
16

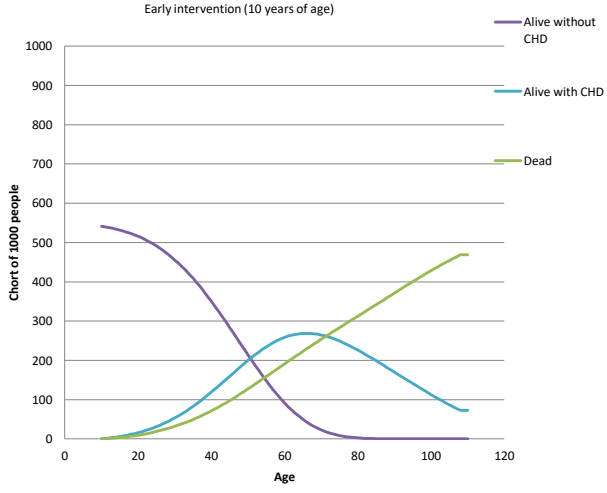
Costs

Annual Costs	Dutch data
First year cost of GP specialist visit, counselling nurse	€ 861
Average follow up year costs	€ 364
Yearly visit (80%)	€ 450
Patient on target with treatment follow-up by GP (20%)	€ 20
Cost of non-fatal MI (includes proportion of patients with PTCA and stent) plus bypass surgery	€ 15,197
Cost of CHD management	€ 683
Follow up costs once with CHD including acute admission	€ 288
Yearly costs statins Rosuvastatin and Pravastatin	€ 121.50
Once off costs	
Next generation sequencing (23%)	€ 1,190
Cost to detect one child through Cascade screening (77%)	€ 831
Weighted costs of screening (including cascade and next generation sequencing)	€ 914
Cost of dying in hospital	€2000

17

Results: Markov trace





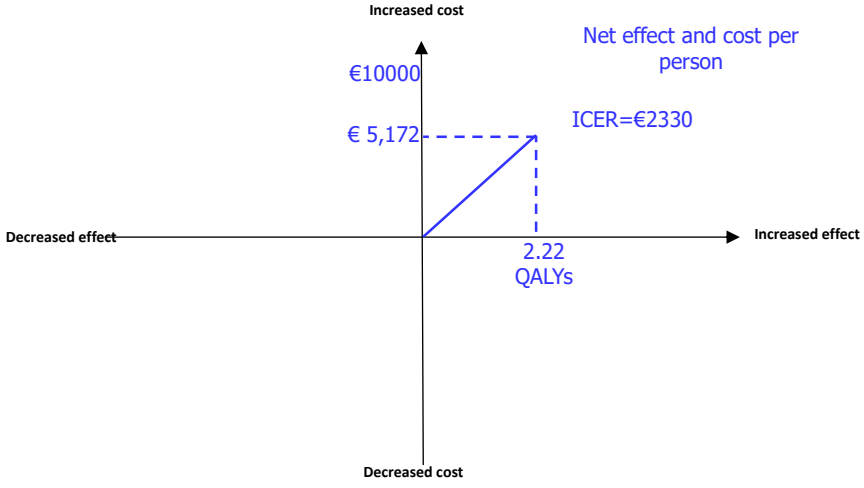
18

Results: Base Case

Outputs	Undiscounted		Discounted	
Cost items (AUD$)	Screened and genetically confirmed, followed by statin treatment* of affected individuals	Not screened (usual care)	Screened and genetically confirmed, followed by statin treatment* of affected individuals	Not screened (usual care)
Screening costs	1,774,844		1,774,844	
Statin use (primary prevention and monitoring)	€ 8,785,322	€ 5,966,657	€ 3,760,611	€ 2,139,311
Cost of events	€ 6,112,264	€ 5,825,938	€ 1,721,131	€ 2,007,168
Chronic costs of management	€ 10,000,480	€ 10,848,326	€ 1,404,796	€ 1,715,525
Total costs	€ 26,672,910	€ 22,640,921	€ 8,661,382	€ 5,862,005
Benefits				
Expected life years	33,886	31,599	21,003.77	19,825
Expected QALYs	28085	25,851.35	18,231.27	17,029.15
Difference in QALY gained per person			2.22	
Difference in LYG per person			2.18	
Difference in total costs per person			€ 5,172	
ICER (cost per QALY)			€ 2,330	
ICER (cost per LYG)			€ 2,372	

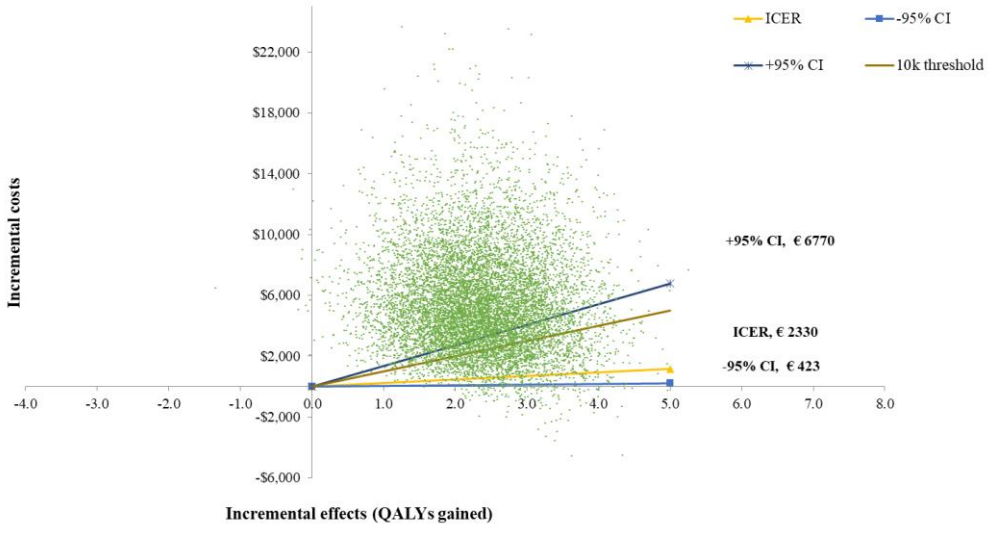
19

Results: Cost-effectiveness analysis

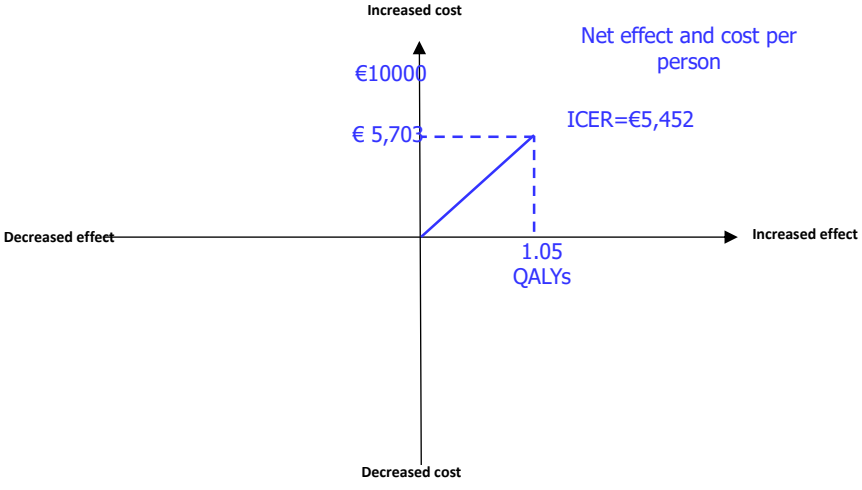


20

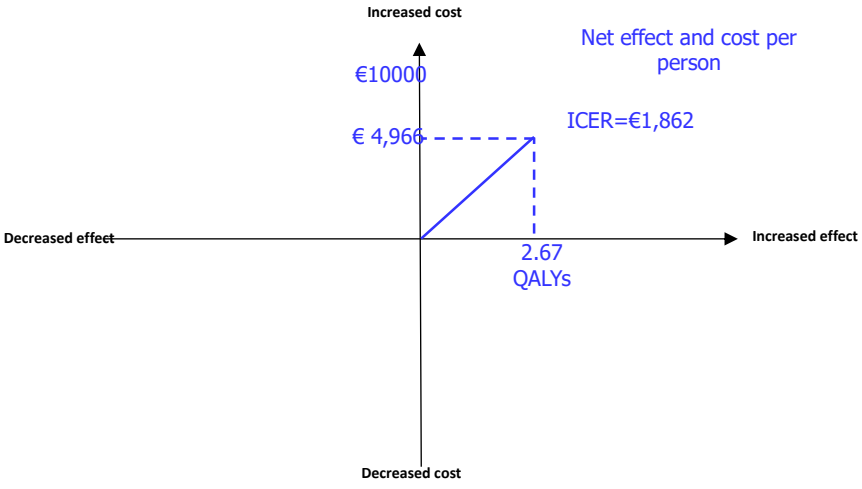
Results: Probabilistic Sensitivity Analysis



Results: Scenario analysis



Results: Scenario analysis



23

Conclusions

- cascade screening of children followed by statin treatment of affected individuals with heterozygous FH at an age of ten years is a highly cost-effective means of delaying and preventing CHD.
- our findings and conclusion are conditional on the assumptions inherent in our health economic model.
- only healthcare perspective, due to limited data available
- lastly, our results are important as atherosclerosis in FH starts at birth, and childhood is an important period for screening and prevention.

24

Thank you!

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