Third WHO Global Forum on Medical Devices

Health economic via web: the MAFEIP tool

Monitoring and Assessment Framework for the EIP on Active and Healthy Ageing

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Disclaimer

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THE CONTEXT

EIP on AHA

- The European Innovation Partnership in Active and Healthy Ageing is a pilot initiative launched (2011) by the European Commission to **foster innovation in the field of active and healthy ageing**.
- It brings **together all relevant actors** at EU, national and regional levels across different policy areas to handle with specific societal challenges and involves all the innovation chain levels.

EIP on AHA

- Aim: to increase the **average healthy lifespan by two years by 2020** and to pursue a **Triple win** for European citizens
  1. Better Quality of Care for Patients and Carers,
  2. More efficient health and care systems
  3. New opportunities, jobs, investment in the Silver Economy.
- **Actors**
  - 74 Reference Sites
  - Major of the latest calls of Spring-Summer 2016.
  - Commitments: 3000 Stakeholders ; € 4 billion in digital innovation for AHA

EIP on AHA

- To address these EIP challenges (2 extra HLY and Triple Win) altogether EIP members initially needed:
  - A joint framework to discuss these challenges whilst respecting the large diversity of Member States' institutions and constraints
  - A common evidence-based approach to measure our achievements and reinforce decision making process
  - A critical mass to ensure large scale changes and benefits

MAFEIP

THE PROJECT

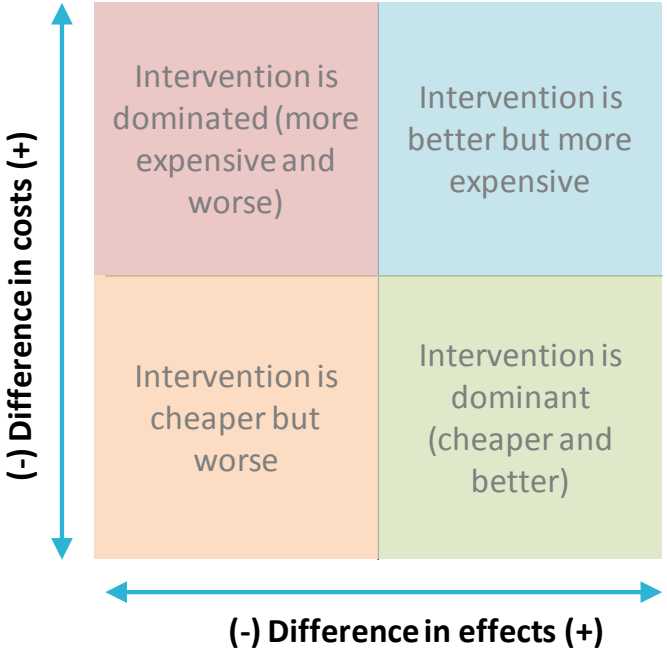
MAFEIP project

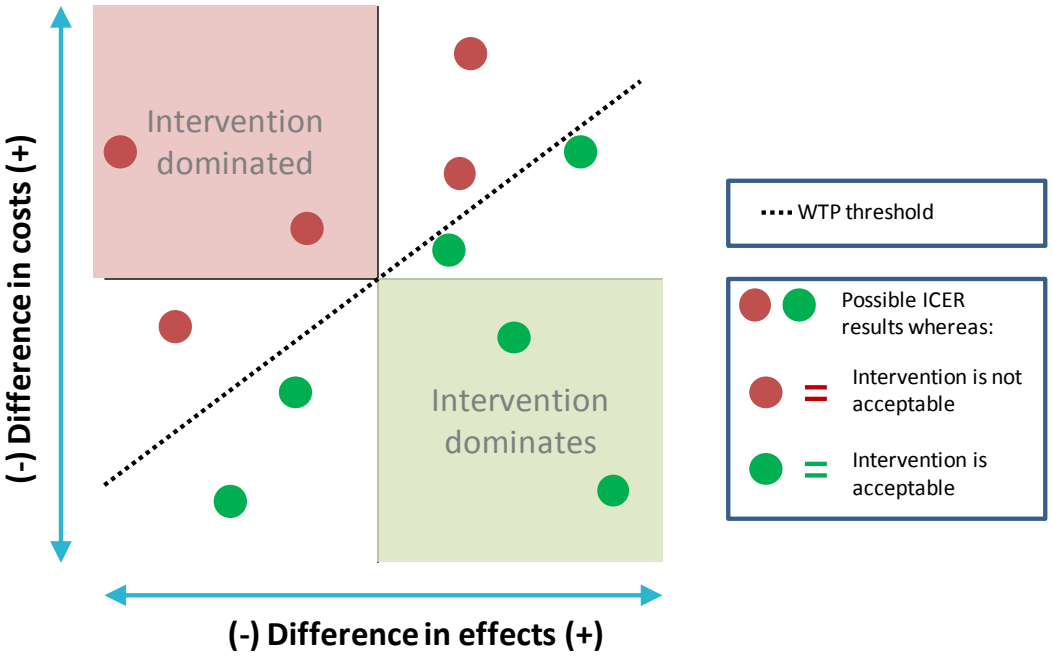
- The purpose of the MAFEIP tool is **to estimate the health and economic outcomes** of a large variety of social and technological innovations in the health and care sector relative to current care.
- MAFEIP provides an early **assessment** of the likelihood that interventions will achieve the anticipated impact,
- MAFEIP helps to identify what **drives interventions' effectiveness or efficiency** in order to guide further design, development or evaluation.

MAFEIP project

- MAFEIP represents a clear **support to the decision-making process**.
  - Based on existing knowledge and practice
  - Existing concepts (Markov Models)
  - Existing indicators starting from EUROSTAT concepts
  - Choice of indicators was based on litterature review and exchange with Action Groups
- Informing **'decisions to buy'** (demand-side) into the development process of a new technology (**'decision to invest'**).
- In doing so, the MAFEIP tool can be a useful for assessing the potential of policy options, with an investor perspective, which in turn, may provide valuable information for the decision maker himself.

MAFEIP project





Goals MAFEIP User Community

Raise …	… awareness of the MAFEIP tool, its purpose and functionality
Establish …	… a community of users – the MAFEIP User Community (MUC)
Support …	… the MUC in monitoring and assessing innovations and to help in decision-making
Improve …	… the MAFEIP tool functionality through feedback from the MUC

MAFEIP User Community (MUC)

- MUC will enable accelerate MAFEIP utilization and continuos improvement
- Goals of MUC:
  - Establish a community around MAFEIP
  - Provide a platform for the MAFEIP users to exchange knowledge and information
  - Provide training materials and organise workshops to facilitate the MAFEIP utilization
  - Support the community with tools such as FAQ document
  - Collect data from use cases and feedback to improve MAFEIP as a stand-alone tool
  - Sustain the community development through IT infrastructure

MAFEIP User Community (MUC)

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MAFEIP

Monitoring and Assessment Framework for the EIP on Active and Healthy Ageing

Home | About the study | Documents | News & Events | User support | Video

Welcome to the MAFEIP platform

MAFEIP "Monitoring and Assessment Framework for the European Innovation Partnership on Active and Healthy Ageing" was initially developed in response to the EIP specific monitoring needs. At present, it must be considered and used as a support to evidence-based decision-making process for all institutions and users.

But things have evolved and the new context underlined by the EU Blueprint "Digital Transformation of Health & Care for the Ageing Society" invites EIP members to frame a common language on this basis, but also to reach out a large number of users, from various institutional backgrounds, far beyond EIP context. Technically MAFEIP is based on statistical and IT concepts that are already in use worldwide and does not require extra knowledge for routine utilization.

Based on these user-friendly principles, this website will give information on the technicalities of MAFEIP tool and also clear guidance on how to contribute to the MAFEIP user community's own reflection. Specific EU support is provided to promote adoption of MAFEIP within EIP Community but also far beyond. MAFEIP is indeed an evolving tool and we rely on your feedback to improve it to make sure it will meet the users' expectations and support their own policy making.

MAFEIP purpose

The purpose of the MAFEIP tool is to estimate the health and economic outcomes of a large variety of social and technological innovations in the health and care sector relative to current care.

MAFEIP indeed provides an early assessment of the likelihood that interventions will achieve the anticipated impact, and also helps to identify what drives interventions' effectiveness or efficiency in order to guide further design, development or evaluation. MAFEIP therefore represents a clear support to the decision-making process.

The Commission does not intend to assess the incremental cost-effectiveness of an intervention carried out by an EIP on AHA commitment, nor to compare several interventions on their cost- effectiveness. Rather, the general aim of the

Join the MAFEIP User Community!

Benefit from joining the MAFEIP user community and collaborate with others in assessing innovative interventions in the health and care domain through the MAFEIP methodology.

Contact us to become a member.

User Support

Specific training and personalized support to the user community will be provided to promote MAFEIP utilization.

Training and supporting materials include a Users' Guide Manual, informative videos, introductory presentations, among others.

All these materials are available in the support section.

Go to the MAFEIP tool

Support Services EIP-MAFEIP Tool

MAFEIP User Community (MUC)

Infrastructure

Updated MAFEIP Tool
Web and on-line forum

Engagement

Continuos delivery of information to users via established infrastructure (forum, newsletters, etc.).
Users' feedback gathering.

Analysis

Results of use cases will be reported including a comprehensive analysis of MAFEIP

Recruitment

Users are recruited to form MUC

Training & Utilization

Training material (Users' Guide Manual) and workshops are envisaged to provide support to MUC

Improvement

Based on use cases results, the areas of improvement will be prioritized and implemented

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Join the community
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THE USE CASES

Badalona Serveis Assistencials (BSA)
Use Case

BSA Intervention

- BeyondSilos provides **ICT-enabled integrated care services** (health and social care) delivered with the help of suitable ICT systems.

- One of the key areas of the integration was to provide common access to home platforms for all the cross-sectorial care teams in order to improve care coordination and, therefore, the continuity of care.

- It included 7 pilots, but this analysis will focus on the one in **BSA** (Badalona Serveis Assistencials)

- The intervention wants to accelerate the integration of health and social care services, to improve the of care delivered to patients, and to increase the efficiency and sustainability of the health system.

The intervention

- Participants are divided in Intervention and Control groups, and in 2 pathways: *integrated short-term homecare support* and *integrated long-term homecare support.* This analysis will focus on the integrated **long-term homecare support**.

	Long-term pathway	Short-term pathway
Intervention	77	20
Control	80	20
Total	157	40

Introducing the information

- The first screen (step 1) is aimed at describing the intervention. Concretely it asks:
  - The name and EIP AHA action group.
  - To describe the setting and target population (age, gender, region, conditions).
  - To describe the type of intervention.
  - The type of study performed (e.g. Randomised Control Trial, Longitudinal study, etc.) and whether evidence on different topics was collected.

MAFEIP

Setting and target population

Step 1 Step 2 Step 3 Step 4 Step 5

Information

Before populating the model with data, we would like to clarify the characteristics and aims of your intervention in this section. This information is very important to us as it helps interpreting the data you will feed into the tool and the results received from the different options of analysis. We also hope that answering the questions below will help you understand the kind of data required to populate the tool and where this information could be obtained from.

General information

Setting and target population

Demographic characteristics of your target group (e.g. age, gender)	Older population (55-103 years old), both males and females.
Geographic characteristics of your target group (e.g. country, region)	People living in the cities of Badalona, Montgat or Tiana (Catalonia, Spain). This is the scope of BSA (Badalona Serveis Assistencials).
What is the condition that your intervention aims to prevent, improve or cure?	The project targets patients suffering from heart failure or stroke.
What are the typical disease characteristics of your target group (e.g. comorbidities)?	Targeted patients have at least one additional chronic condition included in the Charlson Comorbidity Index (CCI), and social needs based on Activities of Daily Living (ADL) or Instrumental Activities of Daily Living (IADL).

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Evidence

Do you collect empirical evidence on the *effectiveness* of your intervention?

(●) Yes ( ) No

What is the study design with which evidence on effectiveness is gathered?

( ) Randomized Controlled Trial ( ) Longtitudinal observational ( ) Cross-sectional observational
( ) Case-control (●) Other, please specify

Cohort-study (prospective observational study)

Was there a control group against which the effectiveness was assessed?

(●) Yes ( ) No

Number of patients in intervention arm of study

78

Number of patients in control arm of study

80

Do you collect empirical evidence on the impact of your intervention on *resource use*?

(●) Yes ( ) No

What is the study design with which evidence on resource use is gathered?

( ) Piggyback study with clinical trial ( ) Micro-costing study ( ) Patient records based study
(●) Other, please specify

Pilot sites provide information on the costs of the intervention. Moreover, information on costs is obtained from questionnaires for patients and carers (e.g. asking for how often they visit health professionals, how much they need to travel, etc.)

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Model input

- In the second screen (model input) we need to introduce the data that will be used to model the impact of our intervention.

- Before introducing the information, it is important to define the health states. The model works with two alive states:
  - Baseline Health
  - Deteriorated health

Defining the health states

- The project collected several variables related to health and social needs, including the observation of the possible changes within the instrumental activities of daily living (Barthel & IADL scales)
- The baseline state was defined as the patient *improves/stays the same* and the deteriorated health state as the patient's condition *worsens*

	Period 0	Value in Period 1:	
		Improves/stays the same	Worsens
Intervention group	68	45	23
Control group	80	51	29

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Model set-up

- We use the link in the template to find out the **discount rate** suggested by CatSalut:
  - **Discounting costs:** “An annual discount rate of **3%** should be used for the base case, and 0% can be applied to the sensitivity analysis ”
  - **Discounting outcomes:** “An annual discount rate of **3%** should be used for the base case, and 0% and 5% can be applied to the sensitivity analysis ”
- Age: our sample goes from 55 to 103 years old, but the model only includes until 95.
- We take as a reference a female, 85 years old.

Setting and target population

The discount factors for costs and effects are used to estimate outcomes in order to take into account the time preference for future costs and health effects. Often, the same discount rate (between 3% and 5 %) is used for both cost and outcomes. For information, standard discount rates suggested for use in economic evaluations covering many European countries can be found on this website.

Discount factor for costs	3 %
Discount factor for utilities	3 %

Target population

In this section you can indicate the minimum and maximum age and country of your target population. This will be used to select (age and sex dependent) baseline mortalities from the Human Mortality Database as well as the distribution of age and gender in the selected country.

Minimum age	55
Maximum age	95
Gender	Both males and females
Country	Spain
Currency	Euro

Patient flow through model states

The model outcomes show the effect of your intervention on the probability of a person to stay in each state of the model (model flow). This can only be shown for one specific age-gender combination. You can indicate here for which age-gender combination you would like to show this outcome. The age-gender combination you select here has no impact on the other outcomes, which depend on the age-gender selection made above.

Gender	○ Male ◉ Female
Age	85

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Setting and target population

Probabilities

In this section you can provide data on the probability of an individual to move from baseline health to deteriorated health (incidence), the probability of going back from deteriorated health to baseline health (recovery) and the probability of dying (mortality).

Transition probabilities

Transition probabilities should be entered as percentages. Incidence represents the rate of occurrence of the condition that is represented by the deteriorated health state. It is the annual probability for an individual of moving from baseline health to deteriorated health. For example, if in a given year 300 out of 1000 people in the target population become ill with the condition, the annual incidence would be 30%. Different incidences can be indicated for the current care and intervention scenario. This difference represents the impact the intervention may have on incidence. Recovery indicates the annual probability of moving from deteriorated health to baseline health. Again, recovery rates could be different for intervention and standard care.

	Control group	Intervention group
Incidence	4 %	0 %
Recovery	29 %	33 %

Setting and target population

Intervention costs

Cost items to be considered for the intervention include a) one-off intervention cost and b) total intervention cost per person per year. One-off intervention cost represent the total cost incurred only once per patient (e.g. the cost of a surgical procedure that happens only once for each patient in the intervention cohort or the per patient amount of implementation cost of the service). The total intervention cost per person per year consists of two components: First, variable cost of the intervention are incurred for each individual and each year and represent, for instance, the annual costs for medication, personal devices or delivery of the intervention. Second, the share of annual fixed costs per patient currently treated or targeted by the intervention represents, for instance, the annual cost of the infrastructure used for all patients divided by the number of patients currently treated or targeted by the intervention.

One-off intervention costs	€ 20166
Intervention costs per person per year	€ 17495

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Computing the probabilities

- We calculated the incidence rate as the percentage of patients whose Barthel Index had decreased, and the recovery rate as the percentage of patients whose Barthel had increased or remained equal for both the control and the intervention group

Transition probabilities	
Recovery Rate	Incidence Rate
66%	34%
64%	36%

Relative Risk for Mortality

- The default option is RR=1, which takes directly the data from the Human Mortality Database. RR>1 implies higher mortality, and RR1<1 lower.
- Since our participants have health conditions, the risk for mortality could be a bit higher than for the general population in the same country and age range.
- During the intervention five people died, but it is difficult to infer that it was due to the intervention.
- Therefore, we decide to increase a bit the relative risk for all 4 groups (to 1,005).

Setting and target population

Relative risks for mortality

Baseline mortality for the specified target population comes from the Human Mortality Database. You can adjust this mortality for both states (baseline and deteriorated health) as well as for both the current care and intervention scenario by specifying a relative risk. The relative risk of mortality is a proportional measure estimating the mortality in a certain population compared with the mortality in a reference population or condition. This reference condition is the all-cause mortality in the general population of the country you specified before. The RR is the proportion of mortality in the intervention group and/or in deteriorated health divided by the all-cause mortality in the general population. When the RR is greater than one, the mortality is higher compared to all-cause mortality in the general population. When the RR is less than one, the mortality is lower.

	Control group	Intervention group
Relative risk of mortality in baseline health	1,005	1,005
Relative risk of mortality in deteriorated health	1,005	1,005

Costs

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Intervention costs

Intervention one-off costs (per patient)	
Time spent by professionals (overhead 18%)	187.40
Time spent by Physician (service development, receiving training, adaptation)	40.63
Time spent by Nurse (service development, receiving training, adaptation)	112.06
Time spent by Social worker (service development, receiving training, adaptation)	5.49
Time spent by Physicians and Nurses on training provision to clients / patients	0.63
Installation of the software for Physicians and Nurses	2.50
Cost of the set of devices and the software for clients/patients	1,079.00
TOTAL	1,268.89
Intervention recurring costs (per patient and year)	
Telecommunication costs	144.00
Software costs	86.4
TOTAL	230.40

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Health care costs Control group

Control Group baseline health	
Total time spent by professionals in usual care (overhead 18%)	509.02
Time spent by Physicians in usual care (assessment and care planning, consultations)	58.46
Time spent by Nurses in usual care (assessment and care planning, consultations)	291.06
Time spent by Social workers in usual care (care provision, home consultation) compared to BeyondSilos	81.86
Travel costs in usual care (overhead 18%)	7.79
Travel costs in usual care (service provider visits to the patient's home)	3.60
Travel costs of Social workers' trips in usual care compared to BeyondSilos	3
Hospitalisation cost	4,681.81
TOTAL	5,198.62
Control Group deteriorated health	
Total time spent by professionals in usual care (overhead 18%)	509.02
Time spent by Physicians in usual care (assessment and care planning, consultations)	58.46
Time spent by Nurses in usual care (assessment and care planning, consultations)	291.06
Time spent by Social workers in usual care (care provision, home consultation) compared to BeyondSilos	81.86
Travel costs in usual care (overhead 18%)	7.79
Travel costs in usual care (service provider visits to the patient's home)	3.60
Travel costs of Social workers' trips in usual care compared to BeyondSilos	3
Hospitalisation cost	4,704.88
TOTAL	5,221.69

Health care costs Intervention group

Intervention Group baseline health	
Total time spent by professionals in intervention (overhead 18%)	627.80
Time spent by Physicians in intervention	292.30
Time spent by Nurses in intervention	207.90
Time spent by Social workers in intervention	31.83
Hospitalisation cost	5,037.09
TOTAL	5,664.89
Intervention Group deteriorated health	
Total time spent by professionals in intervention (overhead 18%)	627.80
Time spent by Physicians in intervention	292.30
Time spent by Nurses in intervention	207.90
Time spent by Social workers in intervention	31.83
Hospitalisation cost	3,875.09
TOTAL	4,502.89

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Societal costs

Control Group baseline health	
Extra travel time spent by patients in usual care compared to BeyondSilos	22.76
Extra travel costs and time for informal carers in usual care compared to BeyondSilos	37.76
Healthcare costs	5,198.62
TOTAL	5,259.14
Control Group deteriorated health	
Extra travel time spent by patients in usual care compared to BeyondSilos	22.76
Extra travel costs and time for informal carers in usual care compared to BeyondSilos	37.76
Healthcare costs	5,221.69
TOTAL	5,282.21
Intervention Group baseline health	
Time spent by patients using the service	288.26
Healthcare costs	5,664.89
TOTAL	5,953.15
Intervention Group deteriorated health	
Time spent by patients using the service	288.26
Healthcare costs	4,502.89
TOTAL	4,791.15

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Setting and target population

Health state costs

The health state costs represent the costs for both the intervention and control group in baseline and deteriorated health states. These costs are defined per person. Healthcare costs refer to resource use within the healthcare system, excluding the cost for the intervention itself (which should be indicated under intervention costs above). Societal costs represent a wider resource use perspective which includes healthcare costs, but also other costs outside the healthcare sector (e.g. out-of-pocket payments and travel costs for patients, productivity losses).

	Control group	Intervention group
Healthcare costs baseline health	€ 4290	€ 3010
Societal costs baseline health	€ 34163	€ 0
Healthcare costs deteriorated health	€ 11974	€ 1654
Societal costs deteriorated health	€ 34163	€ 0

Utilities (HRQoL)

- A Utility of 1 would refer to the quality of life in perfect health and a Utility of 0 would refer to no quality or dead.
- MAFEIP recommends using the EQ-5D to calculate utility, but BeyondSilos did not use this questionnaire.
- However, the Barthel Index can also be used to account for utility. In fact, some papers have compared both indexes. Thus, we mapped the Barthel Index into utility values using the formula from Kaambwa, Billingham, & Bryan (2013).

Barthel index (BI) as a proxy for HRQoL

	Utility Before	Utility After	Change in Utility
Control			
Baseline	0.52	0.53	0.01
Deteriorated	0.61	0.50	-0.11
Intervention			
Baseline	0.21	0.33	0.12
Deteriorated	0.48[8]	0.33	-0.14
Whole sample	0.44		
Baseline	0.38	0.44	0.06
Deteriorated	0.55[8]	0.42	-0.12

Estimated utility after intervention	Control	Intervention
Baseline	0.45	0.56
Deteriorated	0.33	0.30

Setting and target population

Utilities

Health-related quality of life weights associated with baseline health and deteriorated health should be provided here.

Health-related quality of life (HRQoL)

The HRQoL as expressed through a quality-of-life weight (utility) represents a particular health outcome. The higher this utility value, the higher the quality-of-life associated with that health outcome. A utility of 0 indicates no quality of life or dead, whereas a utility of 1 indicates quality-of-life in perfect health.

	Control group	Intervention group
Utility of baseline health	0,50	0,54
Utility of deteriorated health	0,21	0,20

$$\begin{aligned}\text{Overall EQ-5D score} = & -0.113 + 0.020^{*}\text{Grooming} \\ & + 0.126^{*}\text{Toilet} + 0.011^{*}\text{Feeding} \\ & + 0.051^{*}\text{Transfer} \\ & + 0.039^{*}\text{Mobility} \\ & + 0.092^{*}\text{Dressing} + 0.040^{*}\text{Stairs} \\ & + 0.026^{*}\text{Bathing} - 0.032^{*}\text{Bladder} \\ & + 0.008^{*}\text{Bowels}\end{aligned}$$

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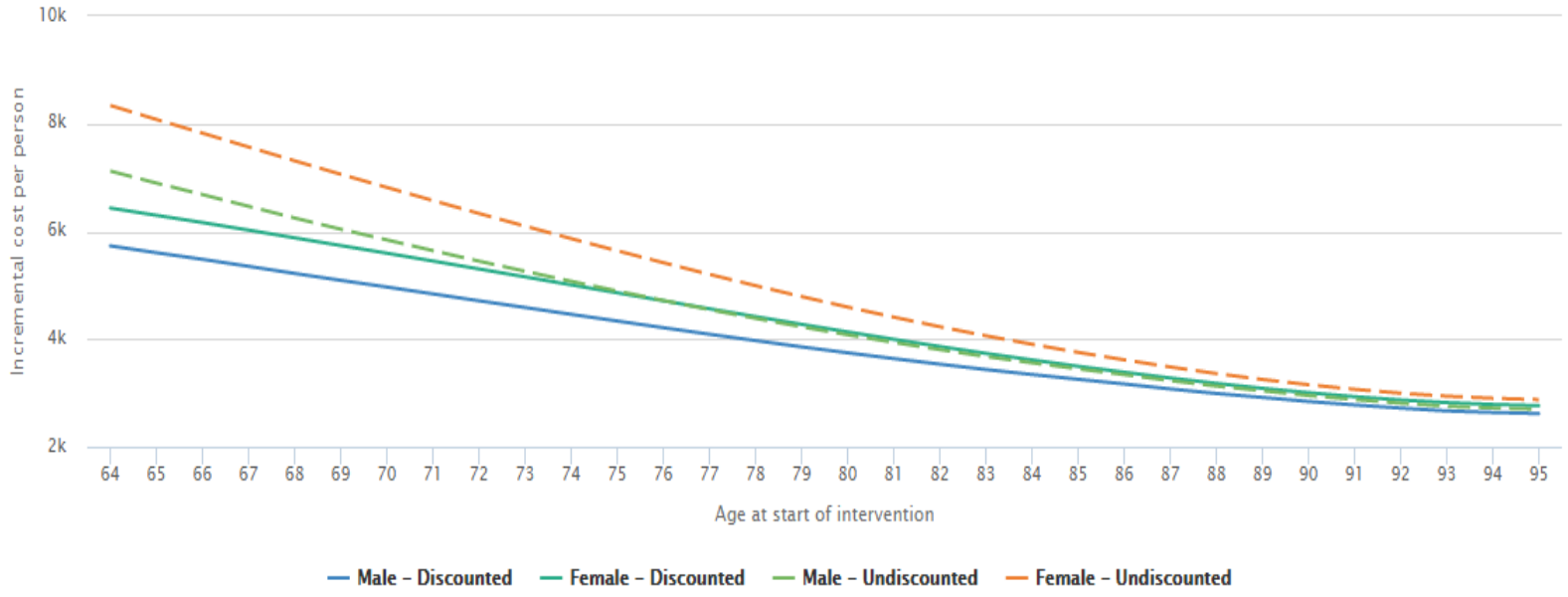
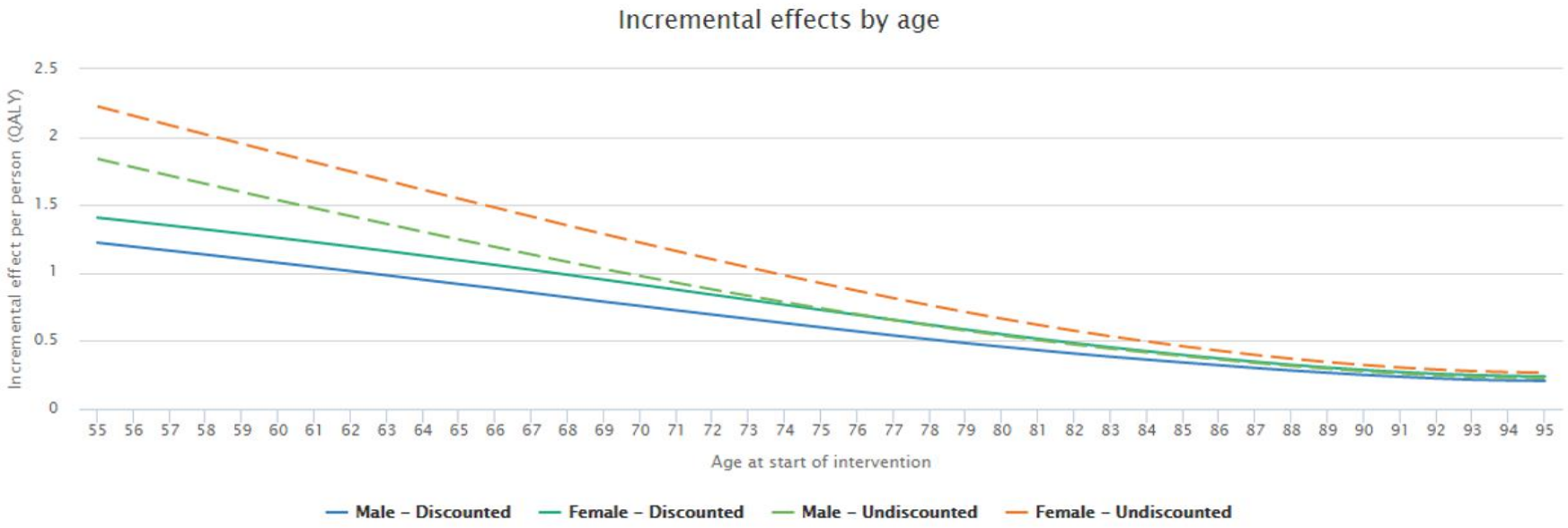
Results. Healthcare perspective

Incremental cost by age



The costs of the intervention are positive, thus higher than the usual care option.

Results. Incremental QALY



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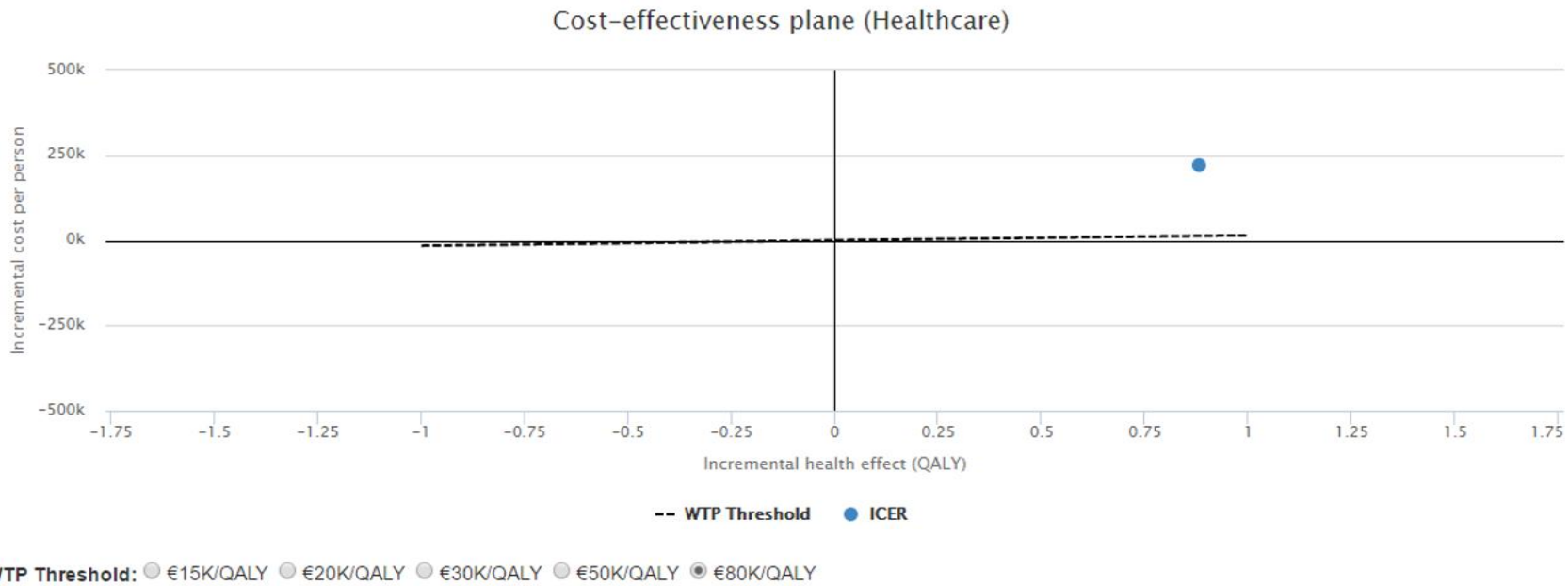
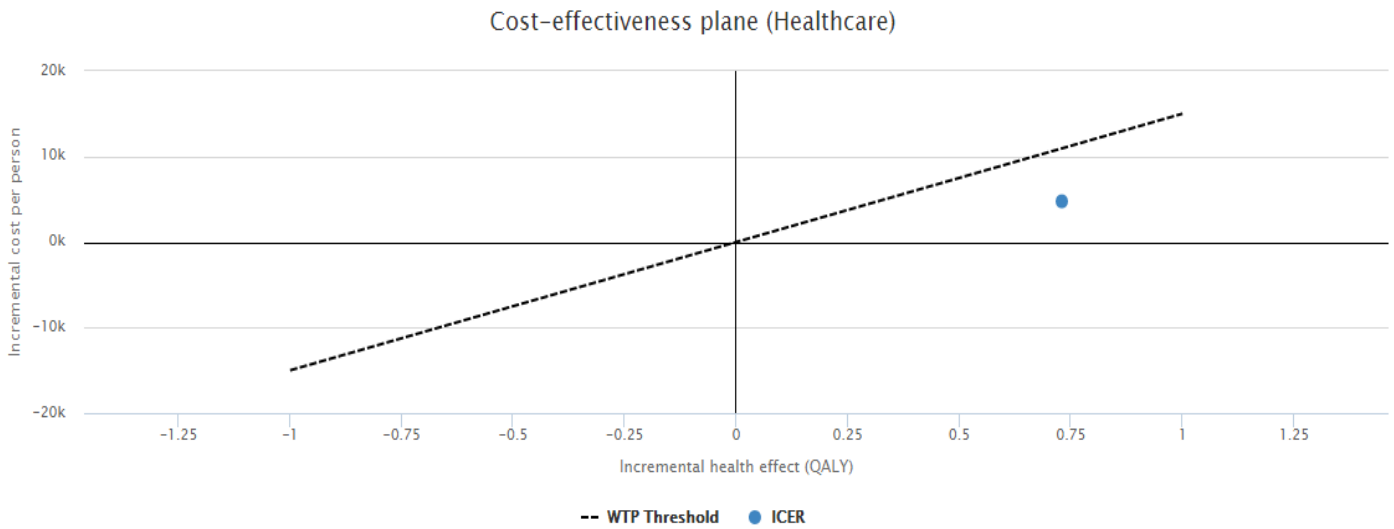
Results. Cost-Effectiveness



The solution is not cost-effective, and it is independent from the willingness to pay for an extra QALY, since the blue dot is always above the WTP threshold.

Results. Cost-Effectiveness

Incremental cost and HRQoL effects	
Incremental cost (Healthcare)	4755.05
Incremental effects	0.731
Incremental cost-effectiveness ratio (Healthcare)	6505.52

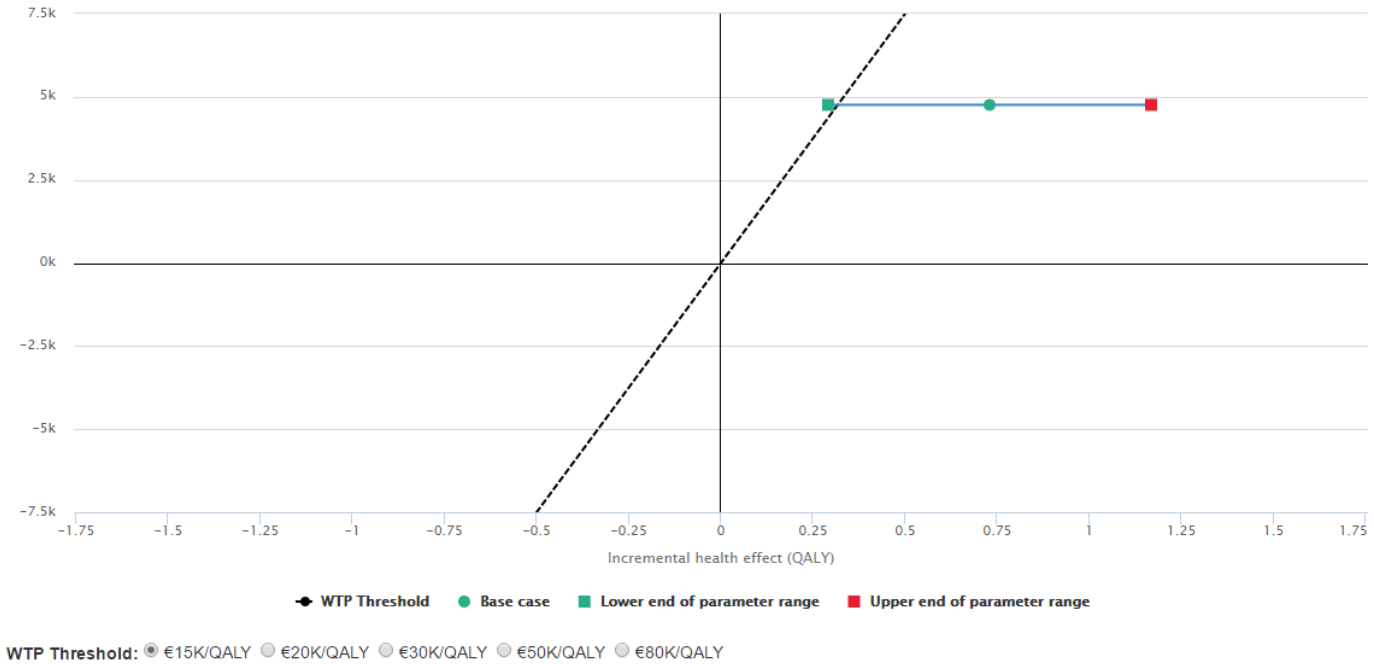


WTP Threshold: €15K/QALY €20K/QALY €30K/QALY €50K/QALY €80K/QALY

The combination of the incremental cost and effects place the incremental cost-effectiveness ratio (ICER) in the upper-right quadrant. This means that the intervention is better (more effective) than the current (standard) care, but it is also more expensive

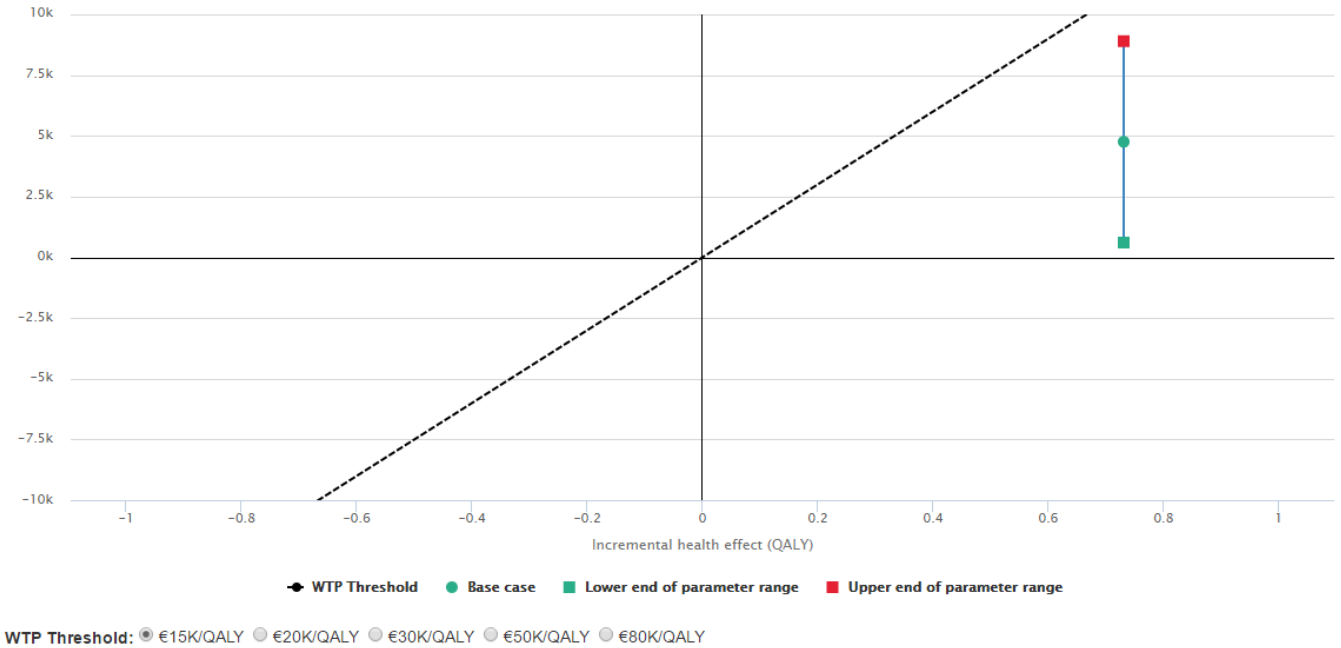
Sensitivity analysis - Utility

Univariate sensitivity analysis with a ±10% change in utility in baseline health for the intervention group



Sensitivity analysis Cost

Univariate sensitivity analysis with a ±10% change in healthcare costs in baseline health for the intervention group



Lessons learned

- The health states were defined based on the change in the Barthel Index to better analyse the impact of the intervention. The inclusion of additional health states will be therefore a possible improvement of the tool.

- In the BeyondSilos intervention evaluated in this use case, participants were suffering heart failure or stroke plus another chronic disease. Therefore, specifying starting health states will increase the flexibility of the tool.

- In BeyondSilos the participants had special health conditions, so the risk for mortality should be a bit higher than for the general population in the same country and age range. For this reason, we set the value of the relative risk a bit higher than 1, but it was difficult to determine how to correctly adjust this value.

PRACTICAL EXERCISE 1

Exercise 1. Set-up.

- Two state Markov model: Sick and Dead.
  - Since in MAFEIP all the population starts at the baseline state, we define this state as *Sick.* Then, we will input 0% for the recovery and incidence rates, so that the model runs only with two states: baseline and dead.

- All patients start in State 1 (Sick) and after a specified period of time some will move to the absorbing state, State 2 (Dead).

Probabilities.

- Transition probabilities:

Base case	Sick	Death
Sick	0.8	**0.2**
Death	-	1

Innovation	Sick	Death
Sick	0.9	**0.1**
Death	-	1

$$RRcontrol = \frac{MR*control}{MRIntervention}$$

$$*MR = -\ln(1 - prob)$$

- Input into MAFEIP:

	Control	Intervention
Incidence	0%	0%
Recovery	0%	0%

	Control	Intervention
$RR_{baseline}$	2.12	1
$RR_{deteriorated}$	-	-

Costs and utility

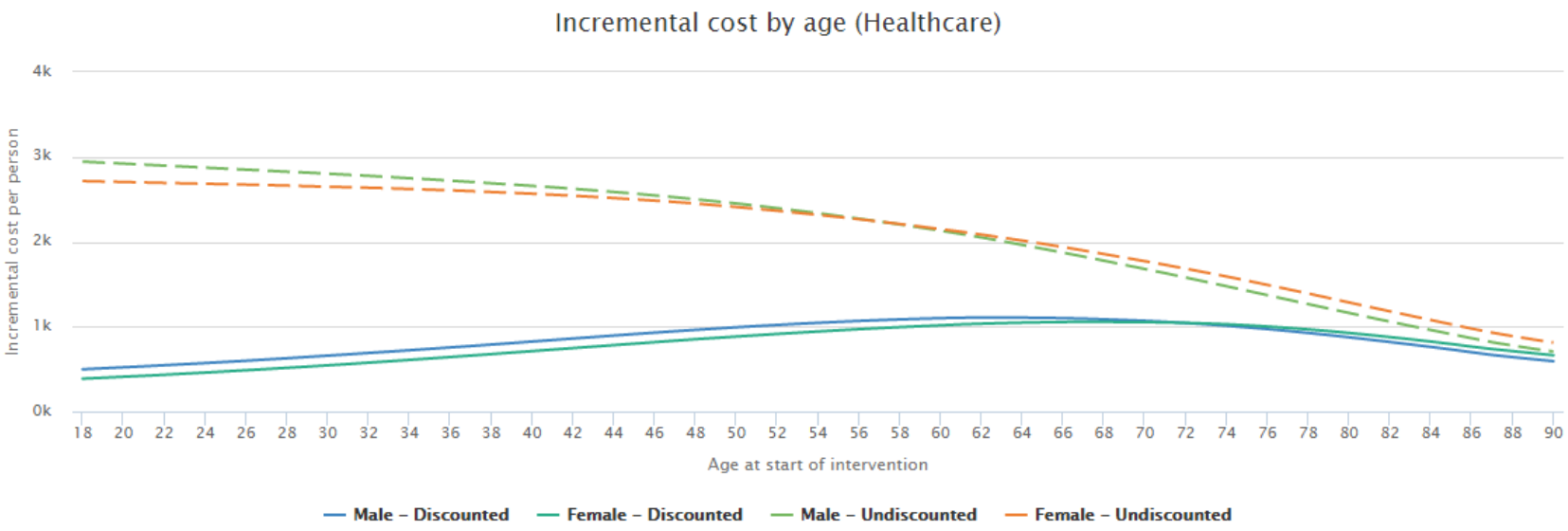
- Input into MAFEIP:

	Control	Intervention
One-off intervention costs (per person)	-	£0
Intervention costs (per person per year)	-	£0
Baseline health healthcare costs (per person per year)	£374	£374
Deteriorated health healthcare costs (per person per year)	-	-

- Input into MAFEIP:

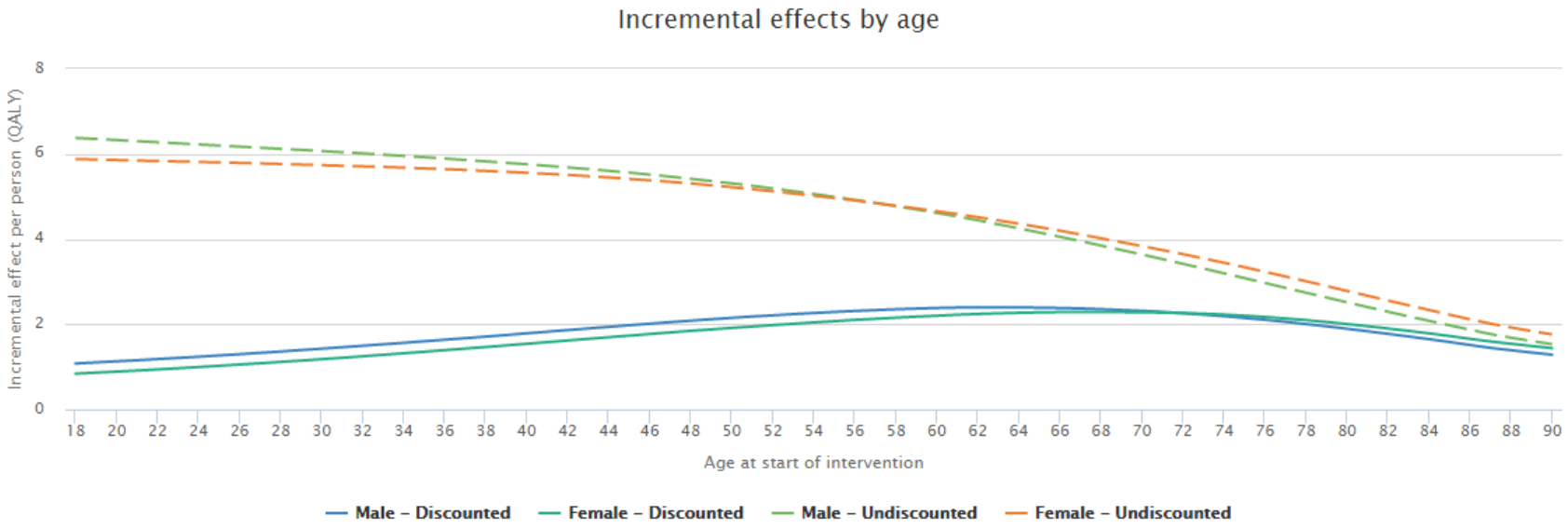
	Control	Intervention
Utility of baseline health	0.81	0.81
Utility of deteriorated health	-	-

Results. Incremental cost.



The incremental costs are positive, meaning that the intervention is more expensive than current care.

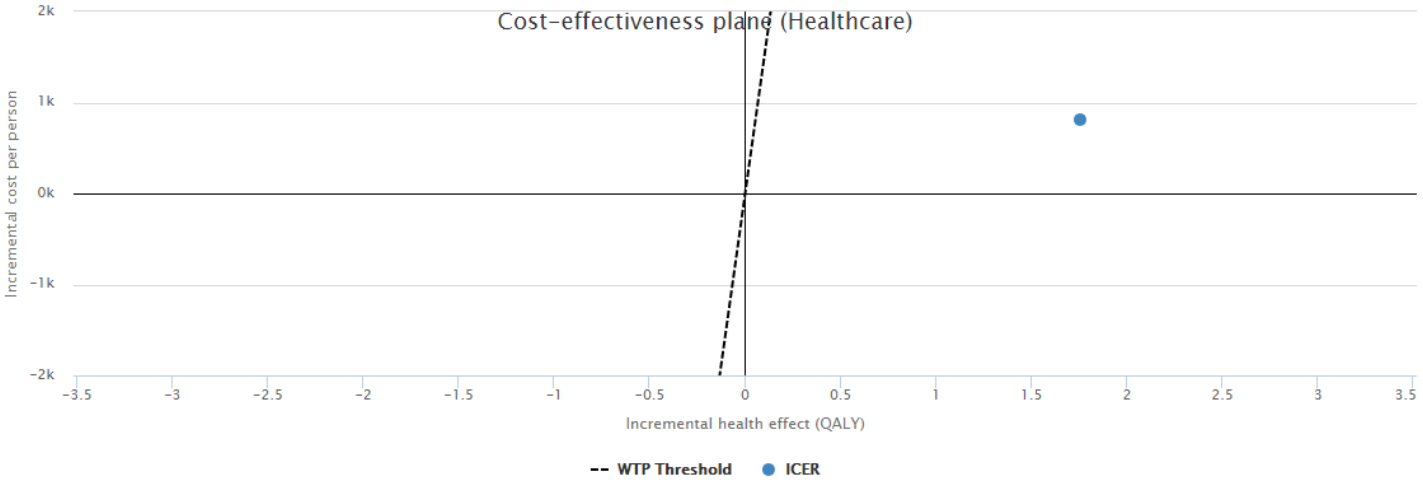
Results. Incremental QALY.



The incremental effects are positive, thus, QALY are higher in the intervention than in current care.

Results. Cost-Effectiveness

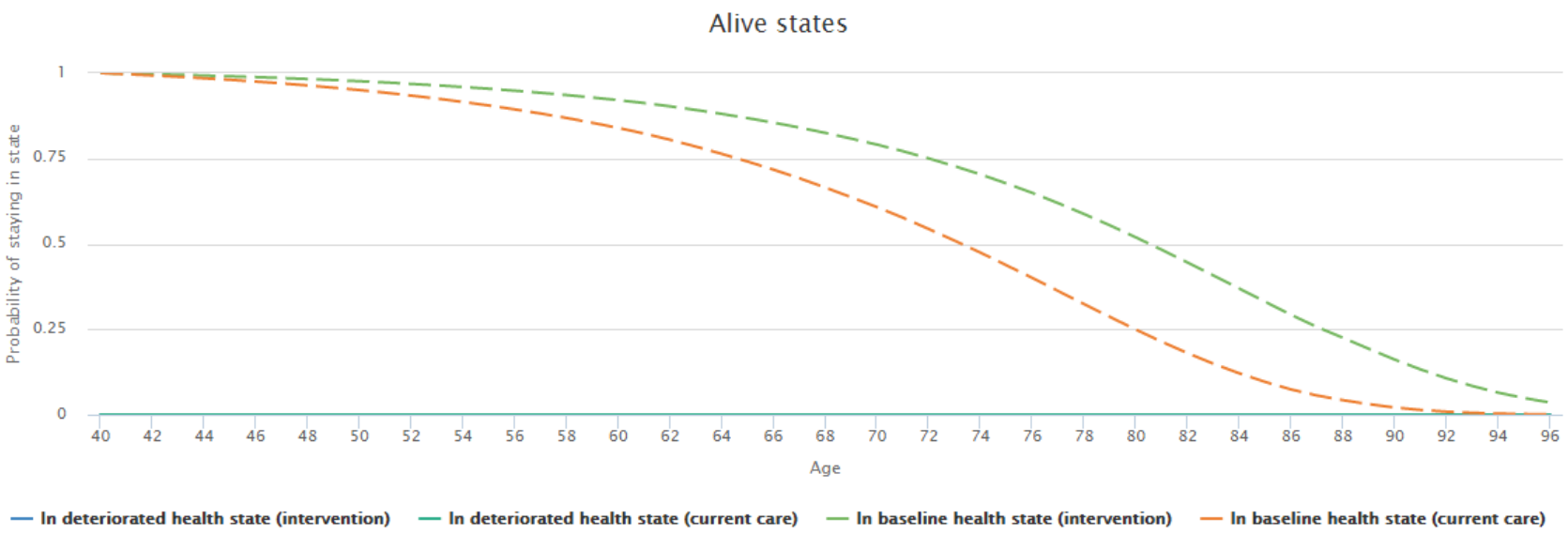
Incremental cost and HRQoL effects	
Incremental cost (Healthcare)	812.25
Incremental effects	1.759
Incremental cost-effectiveness ratio (Healthcare)	461.73



WTP Threshold: £15K/QALY £20K/QALY £30K/QALY £50K/QALY £80K/QALY

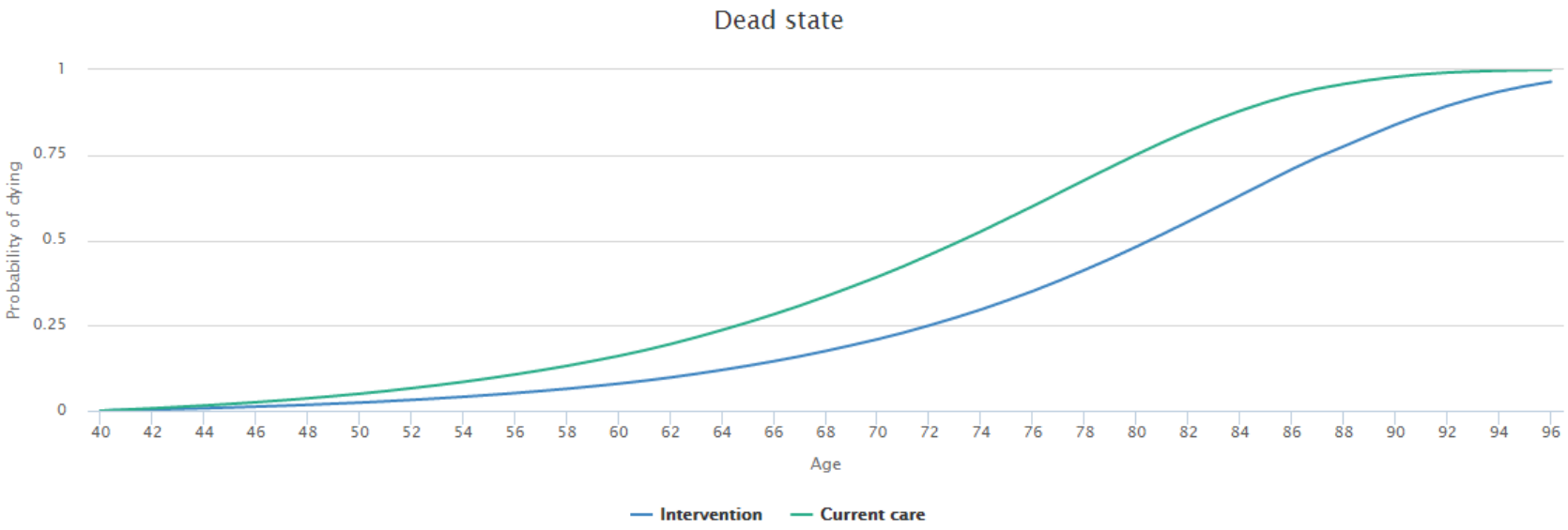
The ICER is in the upper-right quadrant. The intervention is cost-effective if the willingness to pay (WTP) is £461.73 per QALY or more.

Results. Patient flow through model states. Alive States.



This figure shows the flow through model states for a specific patient, in this case a 40 years old male. With the intervention, the patient remains longer in the baseline state.

Results. Patient flow through model states. Dead State.



The probability of dying is higher for those in current care.

PRACTICAL EXERCISE 2

Exercise 2a. Probabilities.

- Transition probabilities:

Base case	Well	Sick	Death
Well	0.90	**0.09**	**0.01**
Sick	**0.70**	0.20	**0.10**
Death	-	-	1.00

Innovation	Well	Sick	Death
Well	0.90	**0.09**	**0.01**
Sick	**0.85**	0.05	**0.10**
Death	-	-	1.00

- Input into MAFEIP:

	Control	Intervention
Incidence	9%	9%
Recovery	70%	85%

	Control	Intervention
$RR_{baseline}$	1	1
$RR_{deteriorated}$	10.48	10.48

Costs

- Input into MAFEIP:

	Control	Intervention
One-off intervention costs (per person)	-	£0
Intervention costs (per person per year)	-	£0
Baseline health healthcare costs (per person per year)	£374	£374
Deteriorated health healthcare costs (per person per year)	£3,153	£3,153

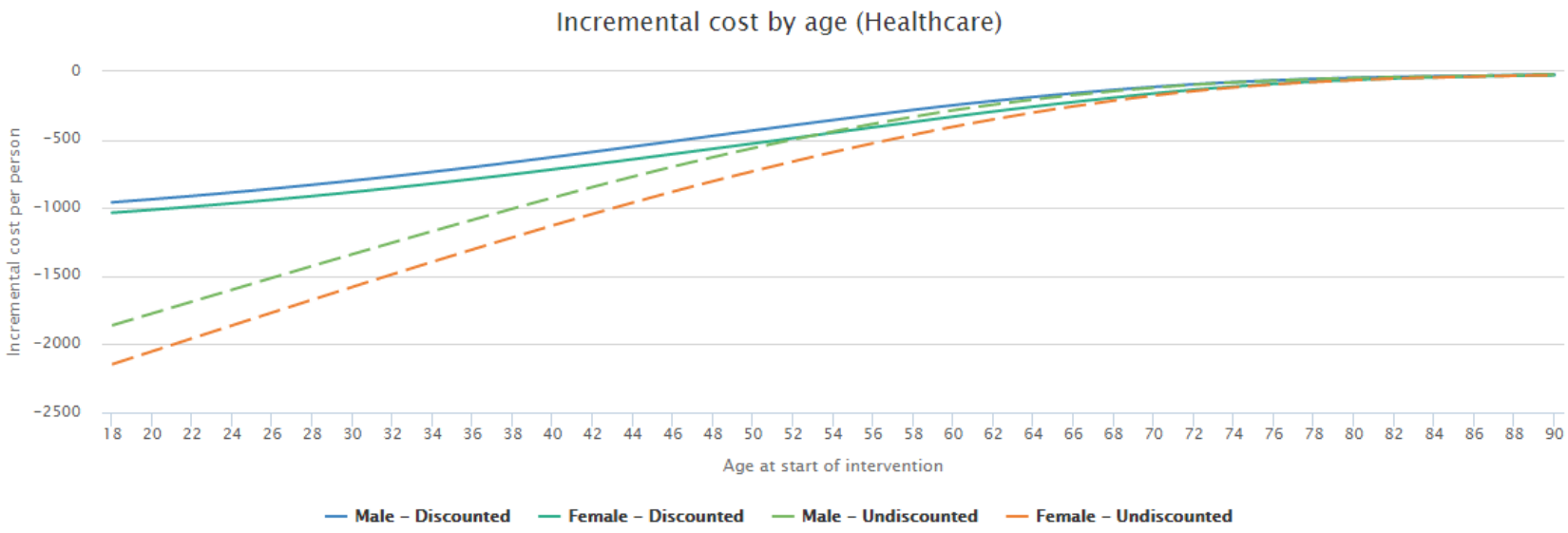
MAFEIP does not allow users to include intervention costs in the control group. The incremental cost is input in the healthcare costs section. The initial cost is not included in the tool because it is the same between intervention and control.

Utility

- Input into MAFEIP:

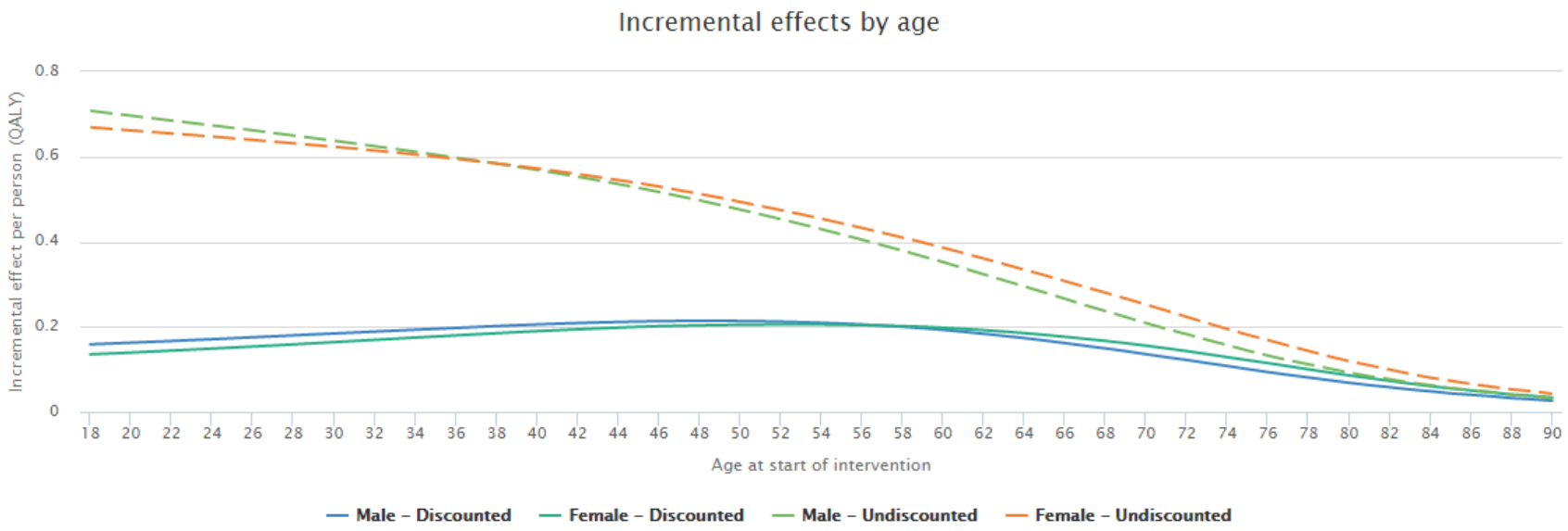
	Control	Intervention
Utility of baseline health	0.81	0.81
Utility of deteriorated health	0.70	0.70

Results. Incremental cost.



The incremental costs are negative, thus lower in the intervention.

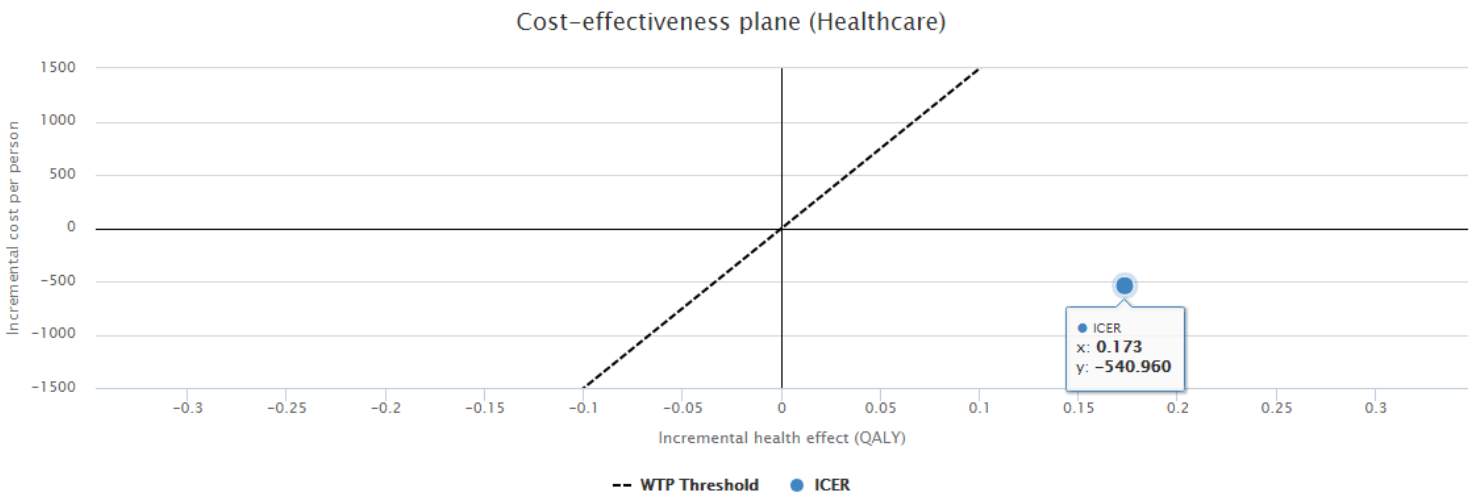
Results. Incremental QALY



The incremental effects are positive, thus QALY are higher in the intervention than in current care.

Results. Cost-Effectiveness

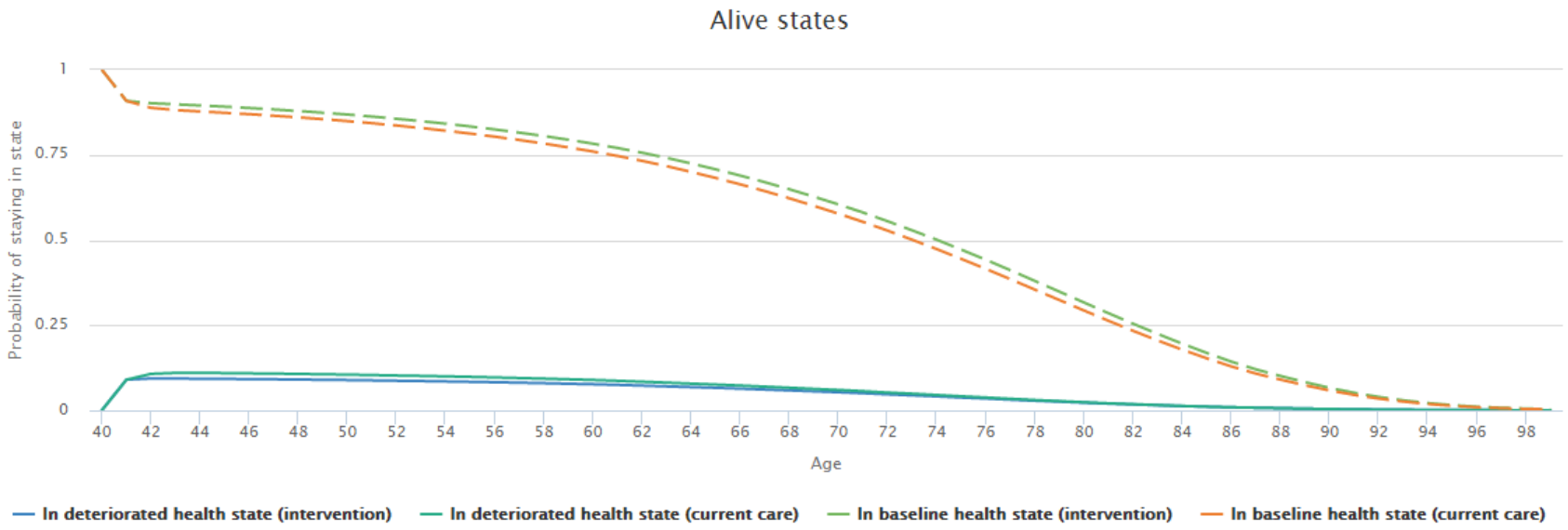
Incremental cost and HRQoL effects	
Incremental cost (Healthcare)	-540.96
Incremental effects	0.173
Incremental cost-effectiveness ratio (Healthcare)	Dominant



WTP Threshold: £15K/QALY £20K/QALY £30K/QALY £50K/QALY £80K/QALY

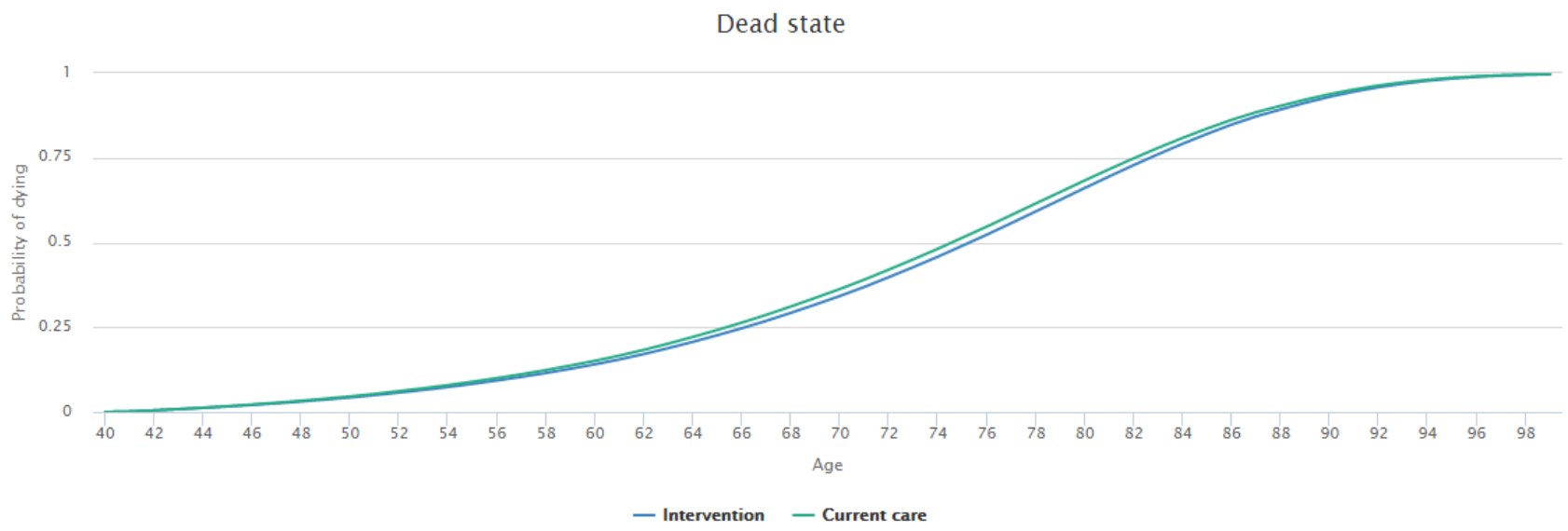
The intervention is always cost-effective, since the ICER lies on the dominant quadrant, implying that the intervention is both less costly and more effective than the current care option.

Results. Patient flow through model states. Alive States.



With the intervention, people remain a bit longer in the baseline state.

Results. Patient flow through model states. Dead State.



The probability of dying is slightly higher for those in current care.

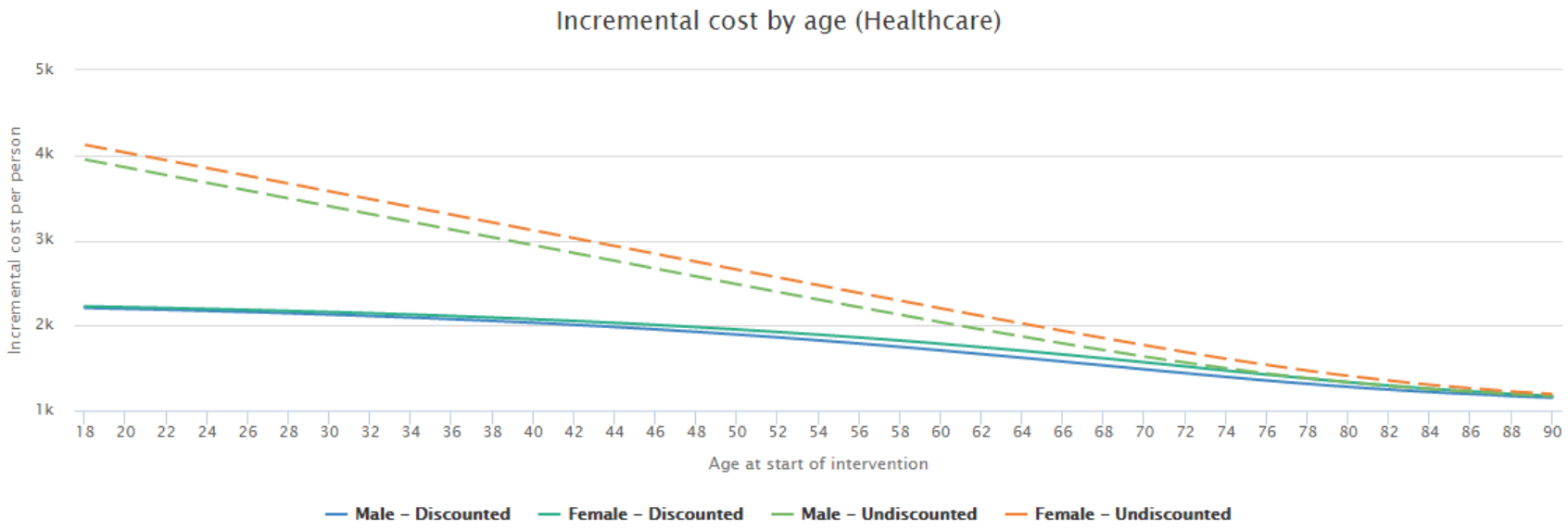
Exercise 2B.

- Increase in the cost of the innovation (both initial and incremental) by £1000.

	Control	Intervention
One-off intervention costs (per person)	-	**£1,000**
Intervention costs (per person per year)	-	£0
Baseline health healthcare costs (per person per year)	£374	£374
Deteriorated health healthcare costs (per person per year)	£3,153	**£4,153**

Since in MAFEIP we cannot input one-off costs for the control group, we enter the difference in these costs between intervention and control (£1,000) in the intervention group.

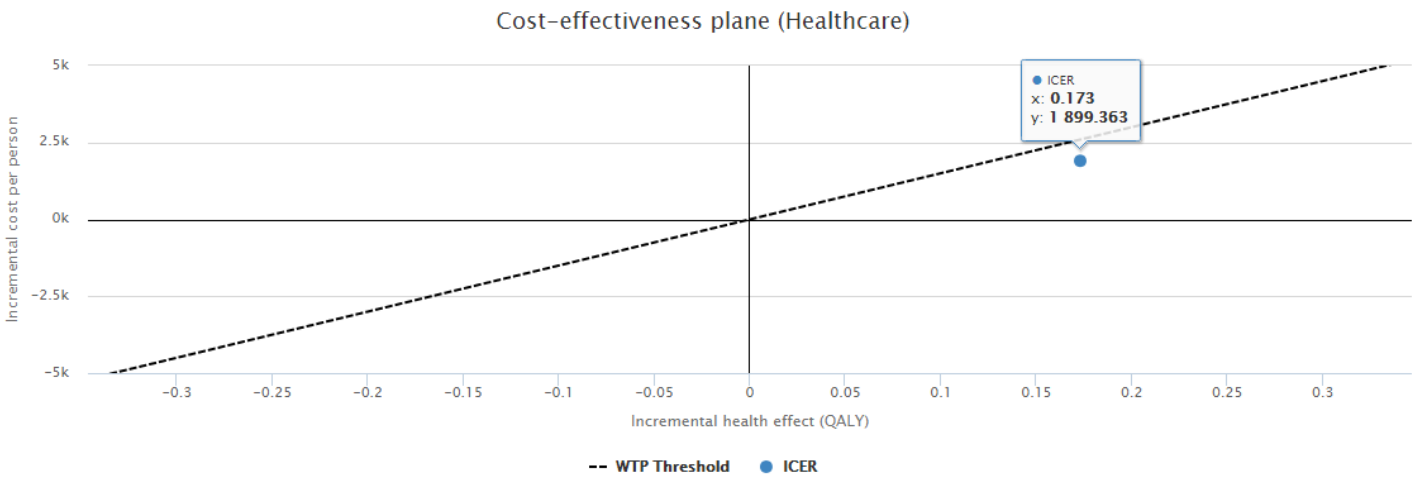
Results. Incremental cost.



Now the incremental costs are positive, meaning that the intervention is more expensive than current care. The incremental effects remain unchanged.

Results. Cost-Effectiveness

Incremental cost and HRQoL effects	
Incremental cost (Healthcare)	1899.36
Incremental effects	0.173
Incremental cost-effectiveness ratio (Healthcare)	10961.04

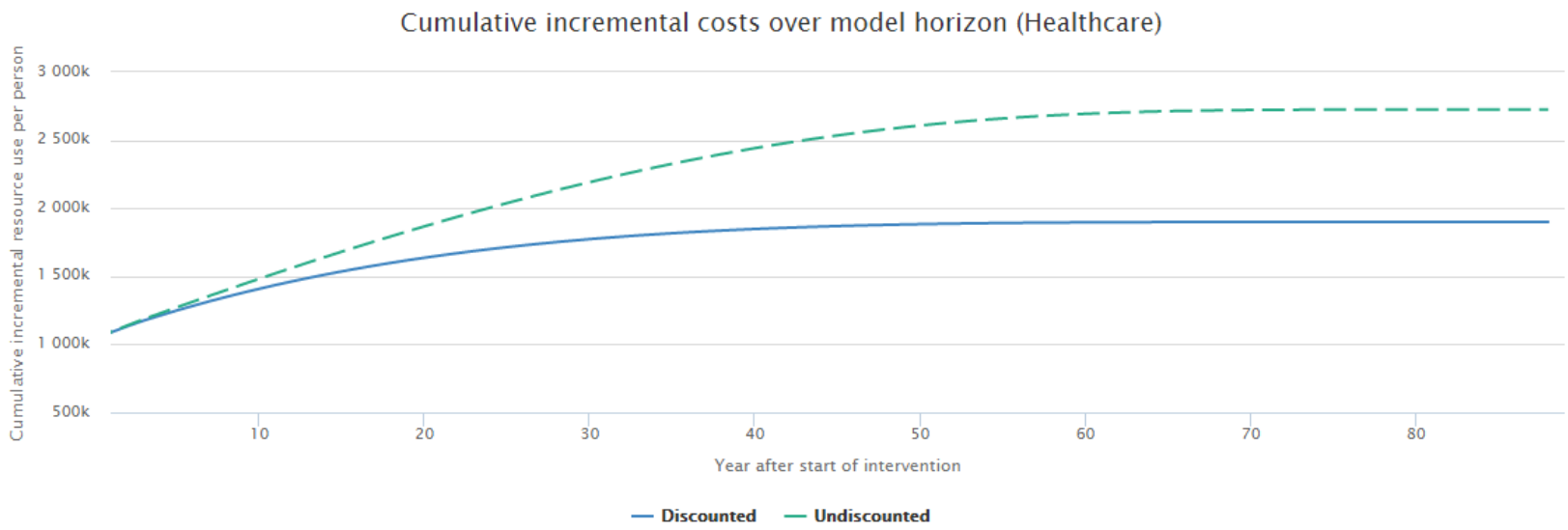


WTP Threshold: £15K/QALY £20K/QALY £30K/QALY £50K/QALY £80K/QALY

In consequence, the ICER moves to the upper-right quadrant. The intervention is cost-effective if the willingness to pay (WTP) is £10,961 per QALY or more.

Results. Cumulative incremental costs

Population-level impact	Population: 1000 Reset
Population-level impact on incremental cost (Healthcare)	1899362.92
Population-level impact on incremental HRQoL	173.28



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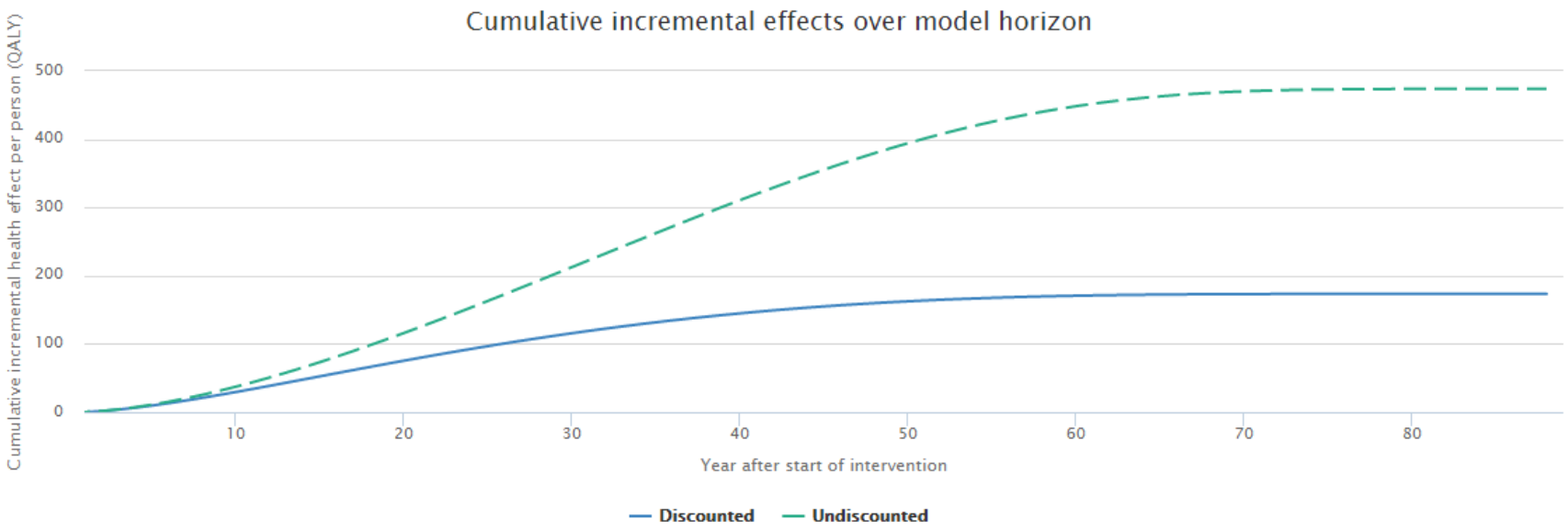
Results. Cumulative incremental effects.



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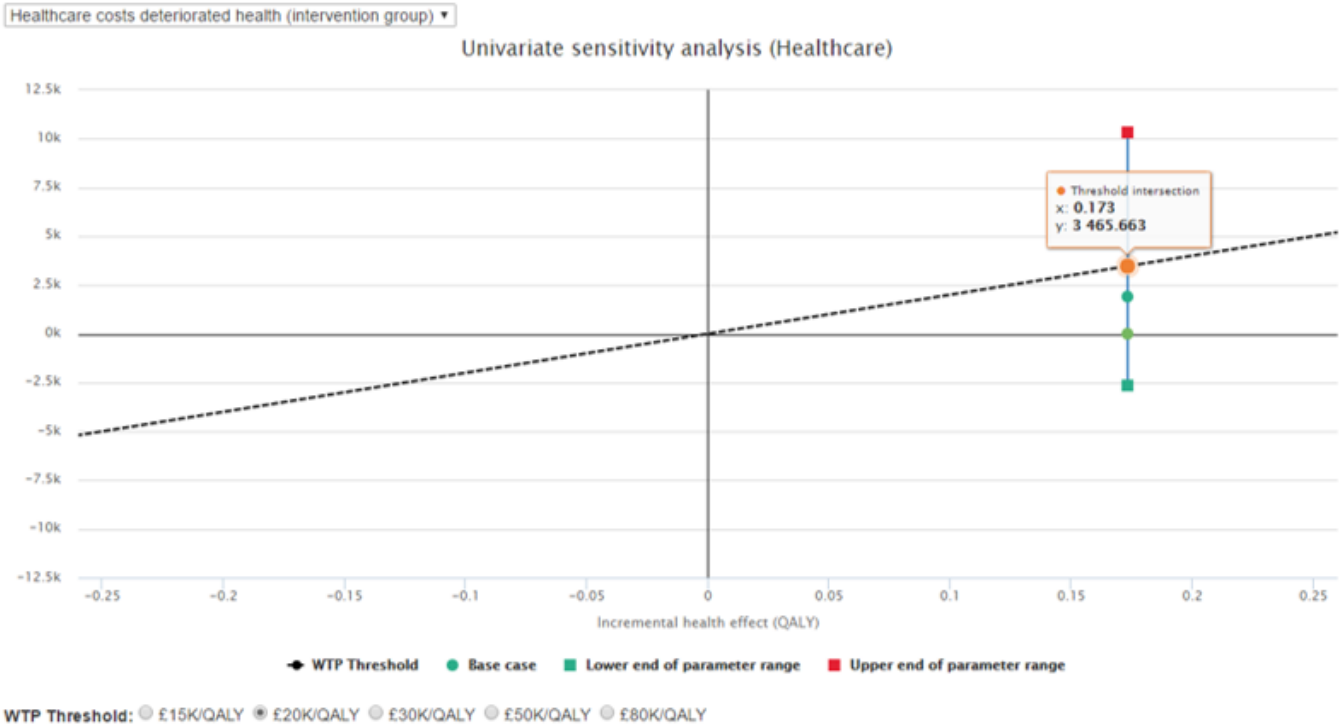
Sensitivity analysis



The sensitivity analysis shows how an increase in intervention costs can bring the ICER above the £20k/QALY threshold. The threshold intersection (orange dot) indicates the point where the intervention ceases to be cost-effective, this is when the incremental costs are 3,465. On the other hand, an important decrease in costs would move the ICER to the dominant quadrant.

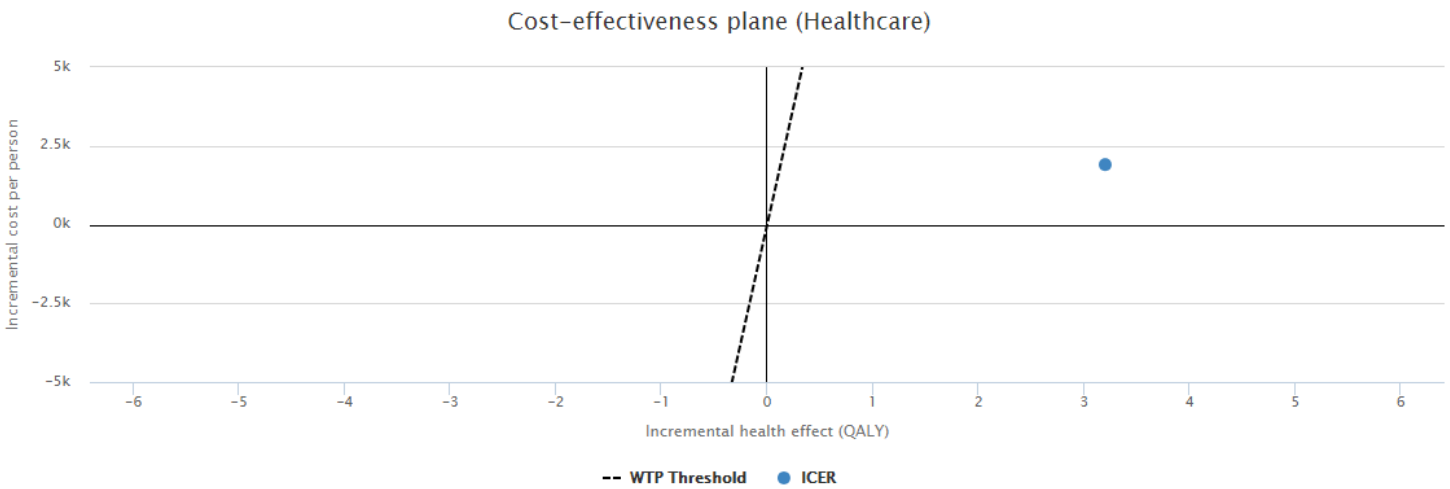
Exercise 2C.

- Change in the innovation utilities to obtain perfect health after healing.

	Control	Intervention
Utility of baseline health	0.81	**1**
Utility of deteriorated health	0.70	0.70

Results. Cost-Effectiveness

Incremental cost and HRQoL effects	
Incremental cost (Healthcare)	1899.36
Incremental effects	3.207
Incremental cost-effectiveness ratio (Healthcare)	592.35



WTP Threshold: £15K/QALY £20K/QALY £30K/QALY £50K/QALY £80K/QALY

As a result of this change, the incremental effects grow from 0.173 to 3.207, and the ICER decreases. The intervention is now cost-effective from a WTP of £592 per QALY.

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