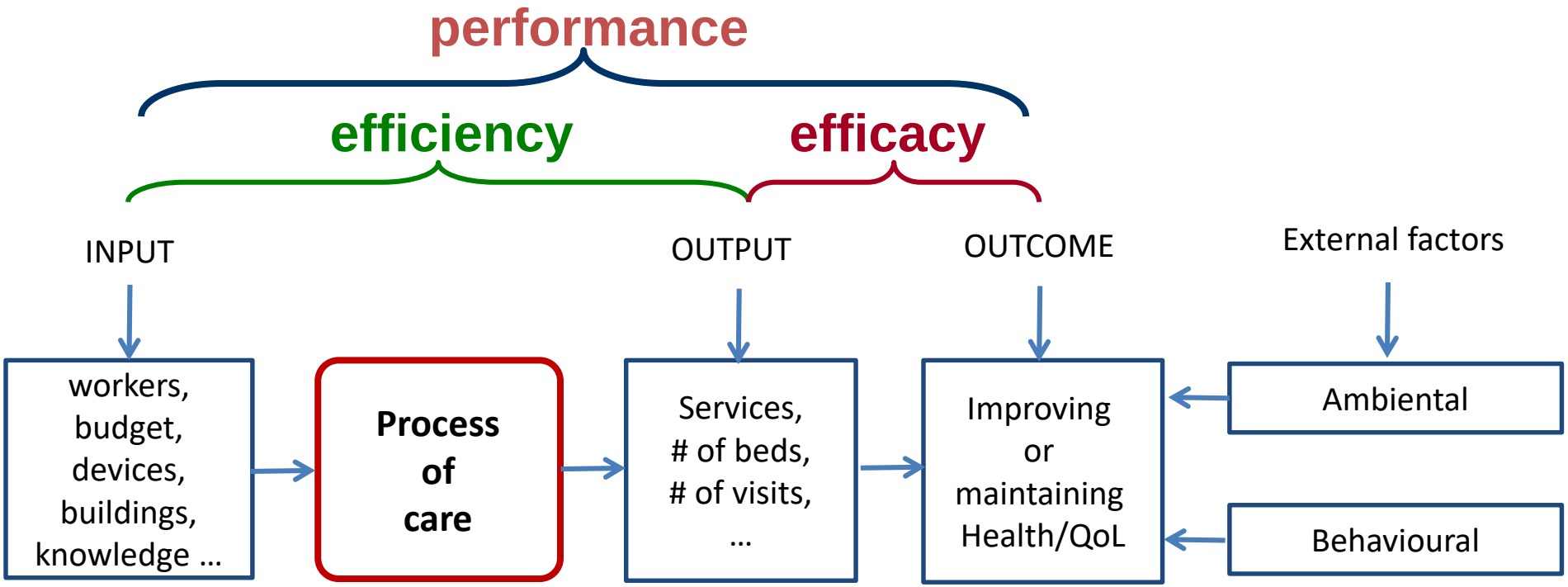
Healthcare Technology Assessment: health economics

Dr Leandro Pecchia – 01.02.2018

WARWICK

HTA
Performance, efficiency, efficacy



$$Efficiency = \frac{output}{input} \qquad Efficacy = \frac{outcome}{output} \qquad Performance = \frac{outcome}{input}$$

Typologies of complete analyses

Analysis	*Resources (Input)*	*Consequences (outcome)*	*How we measure the outcome?*	*Advantages*	*Limits*
Cost Minim.	£	• 1 result • assumed equally for each alternative	Not needed -ΔC-	• Univocal result • First step for the other analyses	•No effect measured
Cost Eff.	£	• 1 result • 1 technology perform better	Physical units (ages gained, pain) -iCER-	• Can measure univocally clinical results as far as are it is the same for all the technologies	• non heterogeneous effects • efficacy≠effectiveness; • no universal scales can measure the iCER
Cost Util.	£	• >1 results • 1 technology perform better	QALY -iCUR-	• Measure heterogeneous clinical results, by introducing an objective function (i.e. QALY)	• only clinical results • no universal scales to measure the iCUR
Cost Ben.	£	• >1 results not only medical • 1 technology perform better	£ -iCBR-	• Measure heterogeneous results (not only clinical), by converting their impact in £	• difficult to quantify the value of results in £ • less than the 4% of studies

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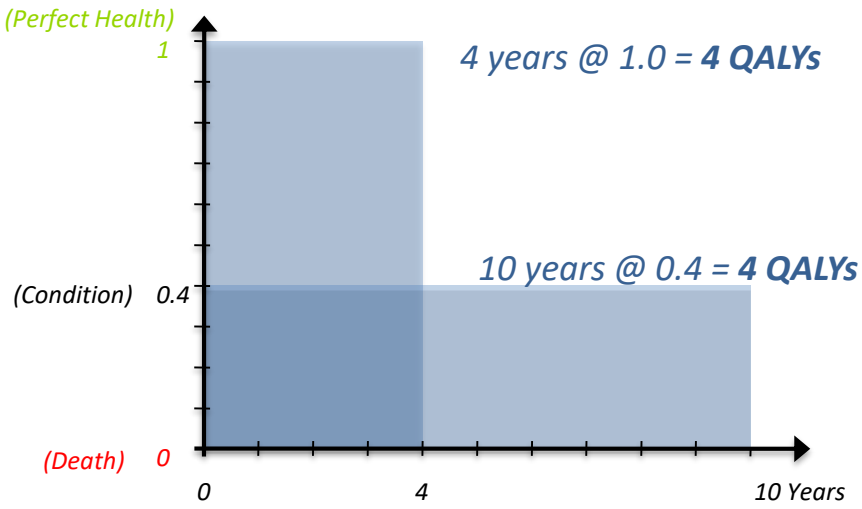
Quality of Life

- Five attributes (5 dimensions):
  - Mobility
  - Self-care
  - Independency
  - Pain
  - Anxiety depression
- 3 level for each attribute
  - No problem (0)
  - Some problems (1)
  - Significant problems (2)

243 possibile states of health (3^5)
+ 1 for uncontious
+ 1 for death
(total of 245 possible health statuses)



- This tool is standardise by a no-profit group: http://www.euroqol.org/
- Profiles of EuroQol exist for pathology, age, gender…

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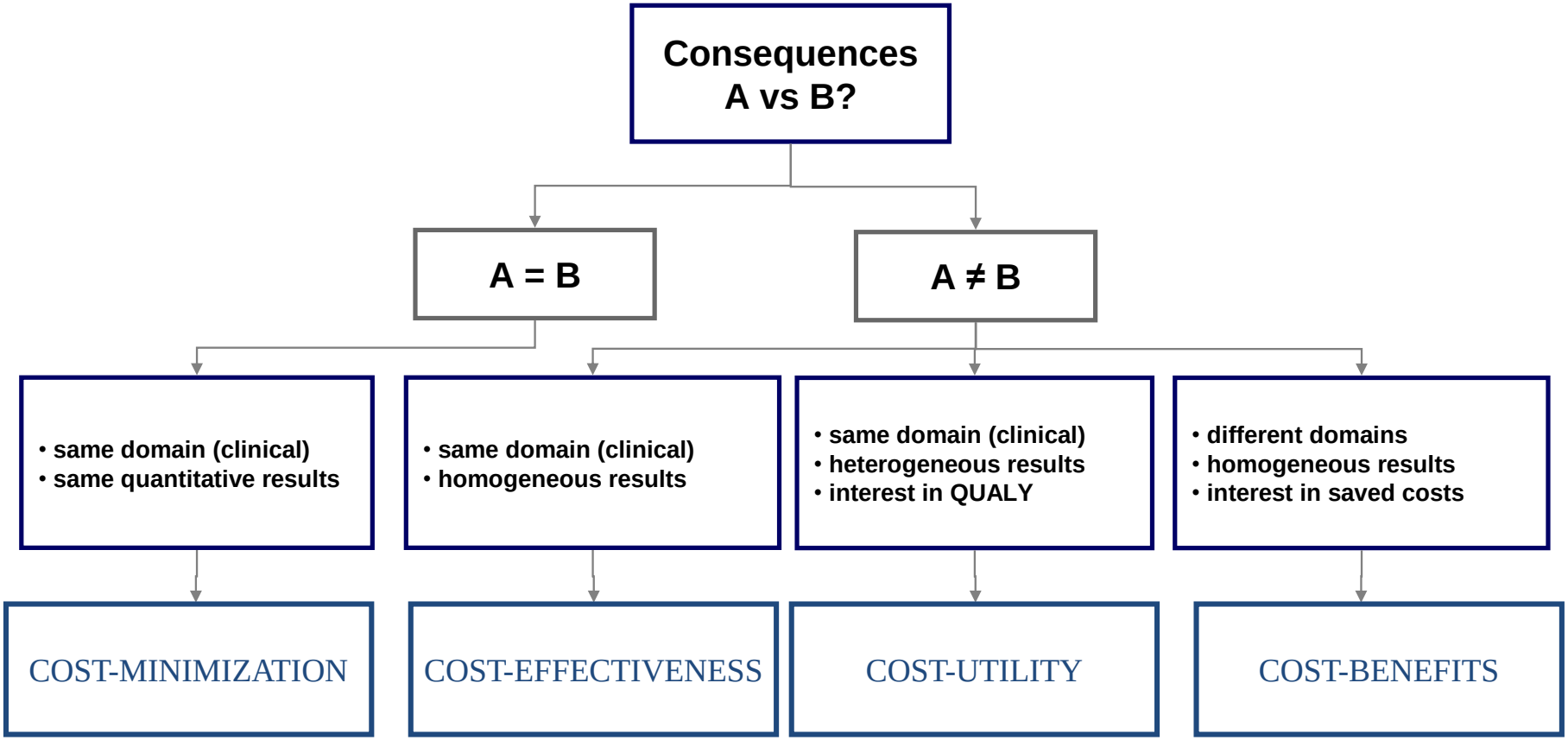
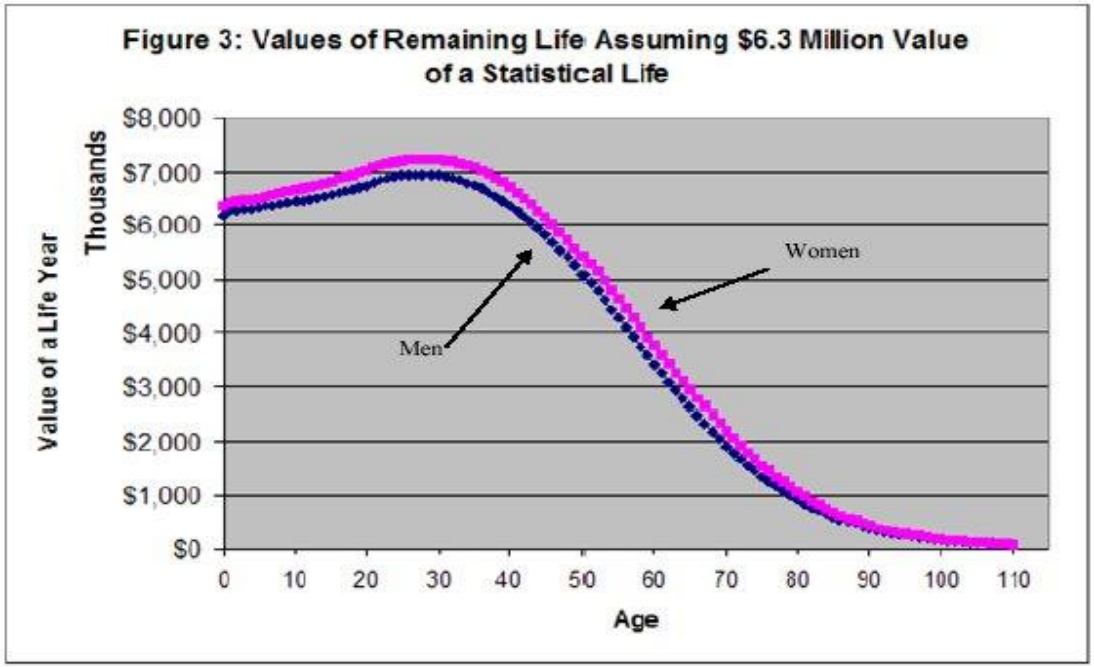
How to chose the analysis?

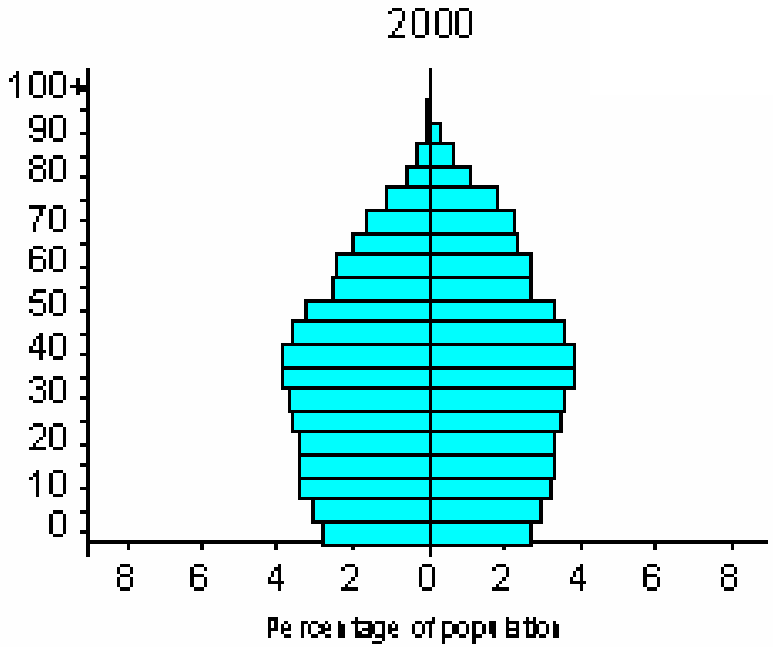


Incremental Ratio in £

Can we convert (quality of) life in £ ?

Value of Life (VoL)





Valore of a QALY (VoQ) = VoL/max(Qaly)

If (RICX > VoQ) => A is accepted

Incremental Ratio in £

Can we convert (quality of) life in £ ?

Table 2. Cost per QALY of healthcare interventions (adapted from references 2–4)

Intervention	£/QALY at 1990 prices
Cholesterol testing and diet therapy (all adults aged 40–69)	220
Neurosurgical intervention for head injury	240
GP advice to stop smoking	270
Neurosurgical intervention for subarachnoid haemorrhage	490
Antihypertensive treatment to prevent stroke (ages 45–64)	940
Pacemaker implantation	1,100
Hip replacement	1,180
Valve replacement for aortic stenosis	1,410
Cholesterol testing and treatment (all adults aged 40–69)	1,480
Docetaxel (as opposed to paclitaxel) in treatment of recurrent metastatic breast cancer	1,890*
CABG (left main-vessel disease, severe angina)	2,090
Kidney transplantation	4,710
Breast cancer screening	5,780
Heart transplantation	7,840
Cholesterol testing and treatment incrementally (all adults aged 25–39)	14,150
Home haemodialysis	17,260
CABG (one-vessel disease, moderate angina)	18,830
Hospital haemodialysis	21,970
Erythropoietin treatment for anaemia in dialysis patients (assuming 10% reduction in mortality)	54,380
Addition of interferon-α2b to conventional treatment in newly diagnosed multiple myeloma	55,060[5]
Neurosurgical intervention for malignant intracranial tumours	107,780
Erythropoietin treatment for anaemia in dialysis patients (assuming no increase in survival)	126,290

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When the incremental analysis is needed?

Costs	Consequences	Result
$C_A \geq C_B$	$X_A < X_B$	DOMINANCE. A is more expensive and less effective/utile than B. B continues to be the standard.
$C_A \leq C_B$	$X_A > X_B$	A IS COST-SAVING. A is less expensive and more effective/utile than B. The new technology A is introduced gradually in the NHS.
$C_A \geq C_B$	$X_A > X_B$	INCREMENTAL ANALYST IS REQUIRED. A is more expensive and more effective/utile than B. The new technology A may be introduced gradually in the NHS if the cost for unit of effectiveness/utility is less than the last one introduced into the NHS for the same problem: $iCXR = \frac{C_A - C_B}{X_A - X_B}$ $\quad X = \begin{cases} E \\ U \\ B \end{cases}$

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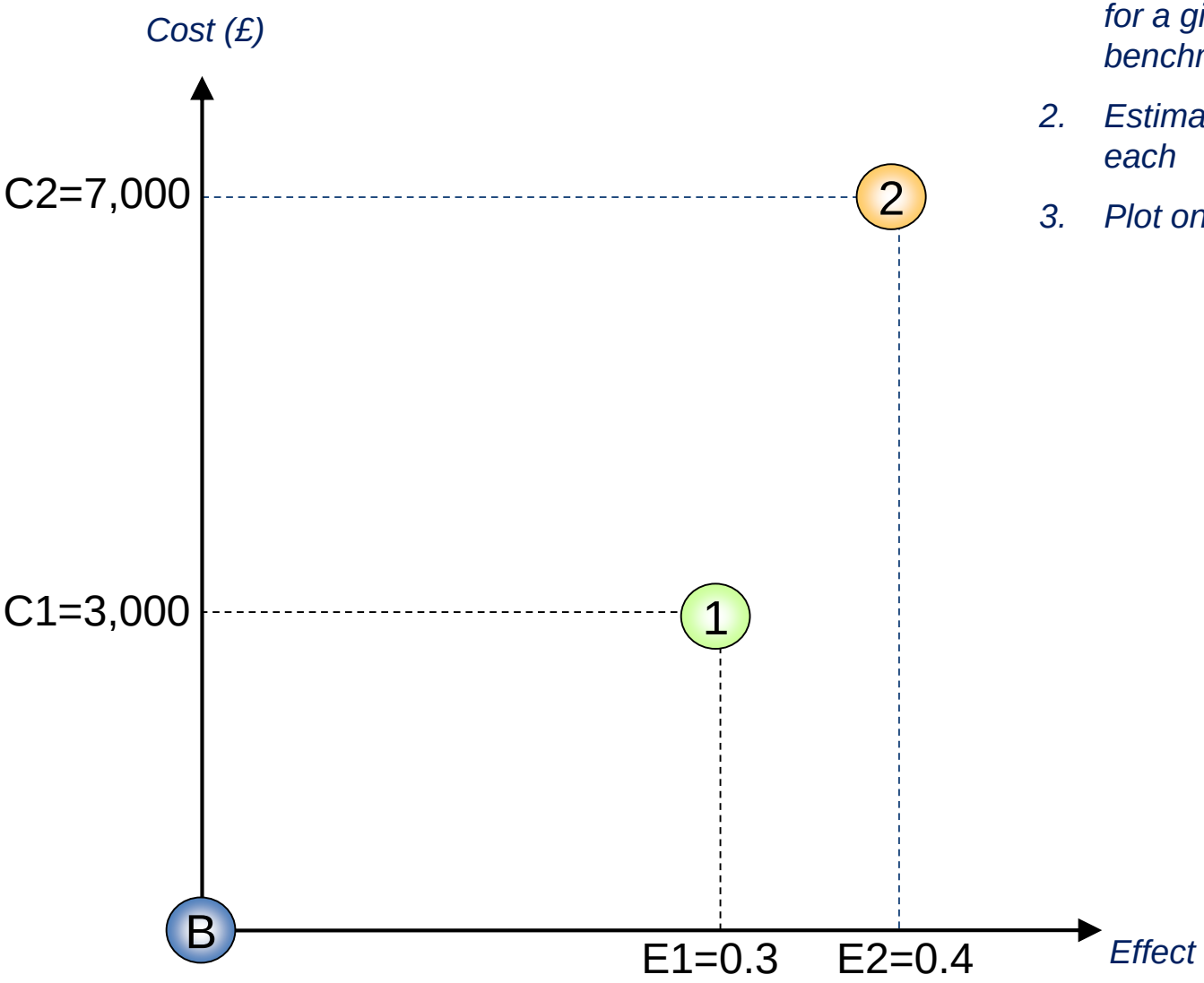
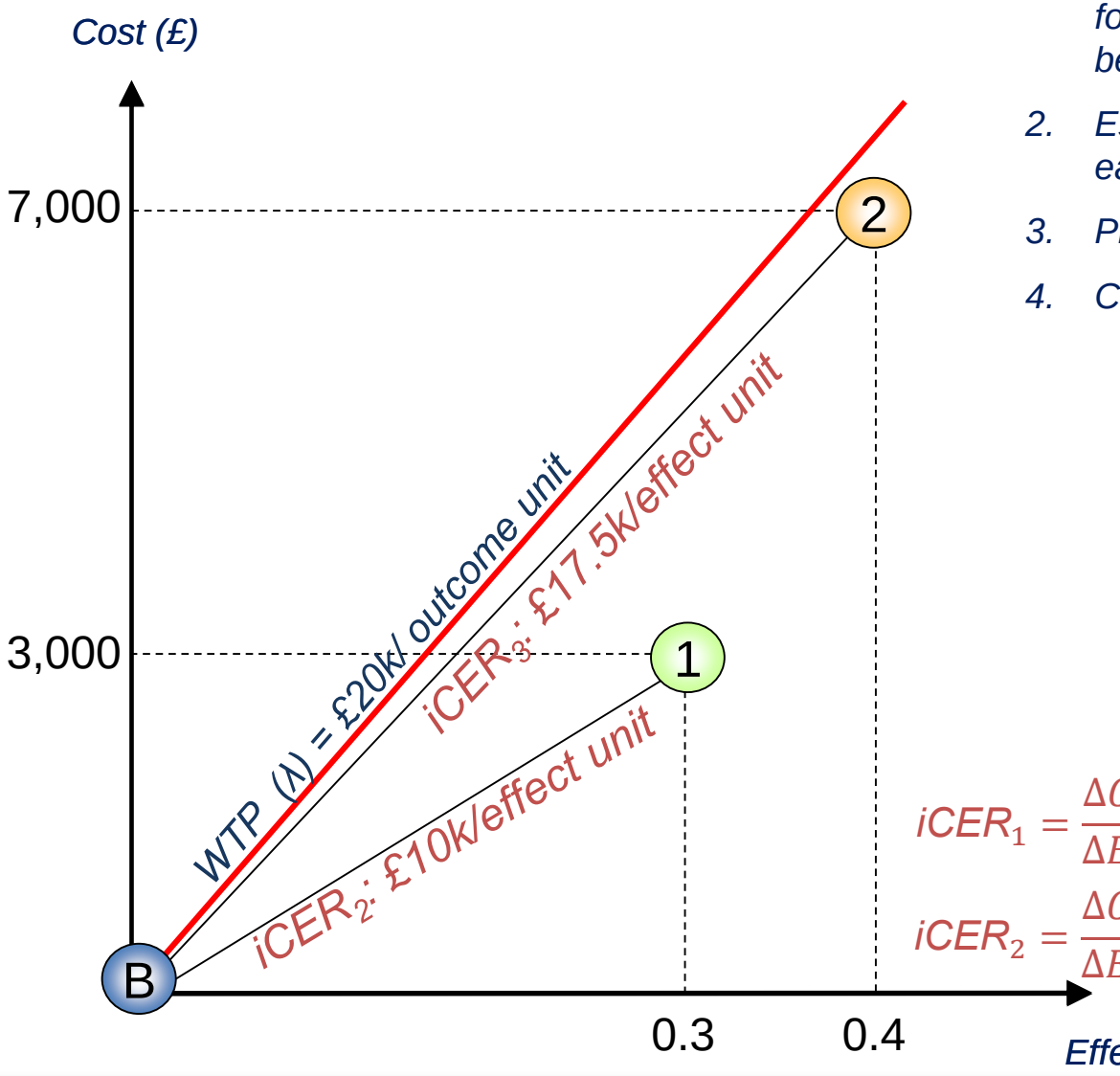
iCER

1. *Identify all feasible treatment options for a given patient group, including the benchmark, if any*
2. *Estimate the costs and health effects of each*
3. *Plot on the cost-effect plane*



HTA
standard methods

1. *Identify all feasible treatment options for a given patient group, including the benchmark, if any*
2. *Estimate the costs and health effects of each*
3. *Plot on the cost-effect plane*
4. *Compute and compare the iCERs*

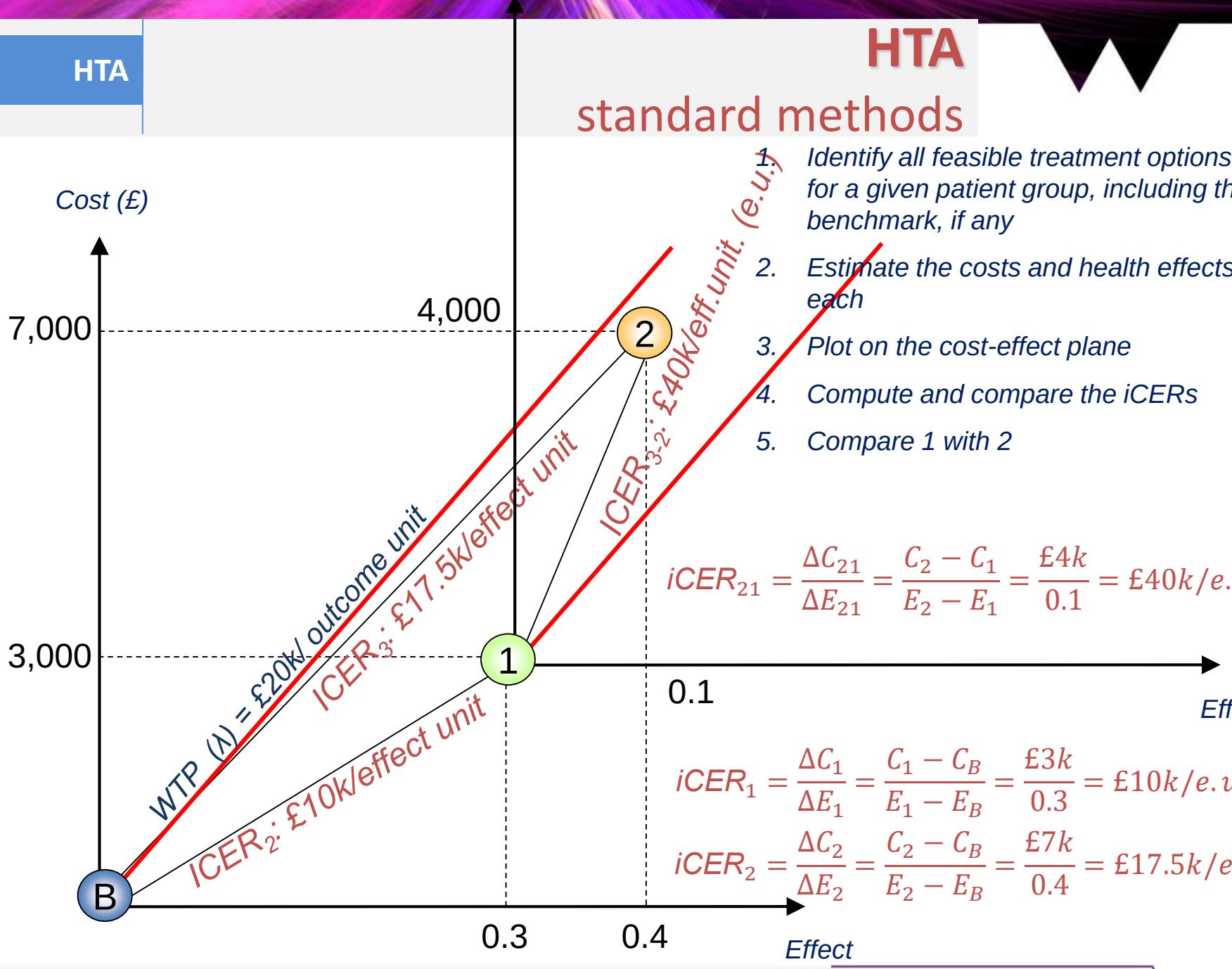


$$iCER_1 = \frac{\Delta C_1}{\Delta E_1} = \frac{C_1 - C_B}{E_1 - E_B} = \frac{£3k}{0.3} = £10k/e.u.$$

$$iCER_2 = \frac{\Delta C_2}{\Delta E_2} = \frac{C_2 - C_B}{E_2 - E_B} = \frac{£7k}{0.4} = £17.5k/e.u.$$

HTA
standard methods

1. *Identify all feasible treatment options for a given patient group, including the benchmark, if any*
2. *Estimate the costs and health effects of each*
3. *Plot on the cost-effect plane*
4. *Compute and compare the iCERs*
5. *Compare 1 with 2*



$$iCER_{21} = \frac{\Delta C_{21}}{\Delta E_{21}} = \frac{C_2 - C_1}{E_2 - E_1} = \frac{£4k}{0.1} = £40k/e.u.$$

$$iCER_1 = \frac{\Delta C_1}{\Delta E_1} = \frac{C_1 - C_B}{E_1 - E_B} = \frac{£3k}{0.3} = £10k/e.u.$$

$$iCER_2 = \frac{\Delta C_2}{\Delta E_2} = \frac{C_2 - C_B}{E_2 - E_B} = \frac{£7k}{0.4} = £17.5k/e.u.$$

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