



# Principles of Economic Evaluation

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PH3915 Course  
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# Lessons Learned So Far

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- We have limited resources that force decision-makers to allocate
- How do we allocate efficiently?
  - Constraints → we have choices and opportunity costs
- Government has stake in resource allocation
- Demand & Supply determines value of resources/goods/services



# Lessons Learned So Far

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- U.S. spends more on healthcare and have worse healthcare outcomes
- Economic evaluation helps us understand the value of spending and guide comparisons and decision-making
- CEA vs CBA vs CUA
- Market failures in healthcare
  - Supplier demand, asymmetric information
- Public goods= nonprovision, nonrival, nonexcludable

# A. Principles of Economic Evaluation

Drummond et al. text Chap 4 Principles of Economic Evaluation, **except pp 94-98 & 108-112.**

Claxton et al. "Methods for the estimation of the National Institute for Health and Care Excellence cost-effectiveness threshold"

Frakt, Austin (2020) What is the Value of a Human Life? Governments Already Tally It.

--Hoeft et al. Costs of implementing and sustaining enhanced collaborative care programs involving community partners.

Kaplan R.S., Anderson S. R., (2003) "Time Driven Activity Based Costing"

Karanth, Siddharth S. David R. Lairson, et al. The cost of implementing two small media interventions to promote HPV vaccination. Preventive Medicine 99 (2017) 277-281.

<http://dx.doi.org/10.1016/j.ypmed.2017.03.002>. PMID: 28322881

# Topics



- Alternatives; costs and benefits
- Making decisions about healthcare
  - ICERS (incremental cost-effectiveness ratios)
  - Net Health Benefit
  - Net Monetary Benefit
  - Willingness to Pay Thresholds

# Alternatives; costs and benefits

- “Informing decisions is the primary role of any type of economic evaluation”.
- 4 key issues
  - What are the alternatives?
  - Which measure of benefit?
  - How can Costs & Benefits be estimated?
  - What will be given up as a consequence of additional costs?



# What are the alternatives?

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- Courses of action that could be taken to improve the health of people in a particular situation.
  - May include different combinations or sequences of treatment and different ways in which an intervention can be used.
  - Examples
    - Class project ideas?



# How can C & B of each alternative be estimated?

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- No single study is likely to be adequate
- Usually requires a systematic review and synthesis of available evidence.
- Decision analytic models often used as the structure within which the evidence from different sources and assumptions provide estimates of cost and health effects.





# Making Decisions about Healthcare

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- When faced with the choice of two mutually exclusive alternatives, the question is whether the additional or incremental health benefits of choosing one intervention rather than another are sufficient to justify the incremental costs.
- Review the cost-effectiveness plane in box 3.2. (dominated vs. non-dominated strategies)

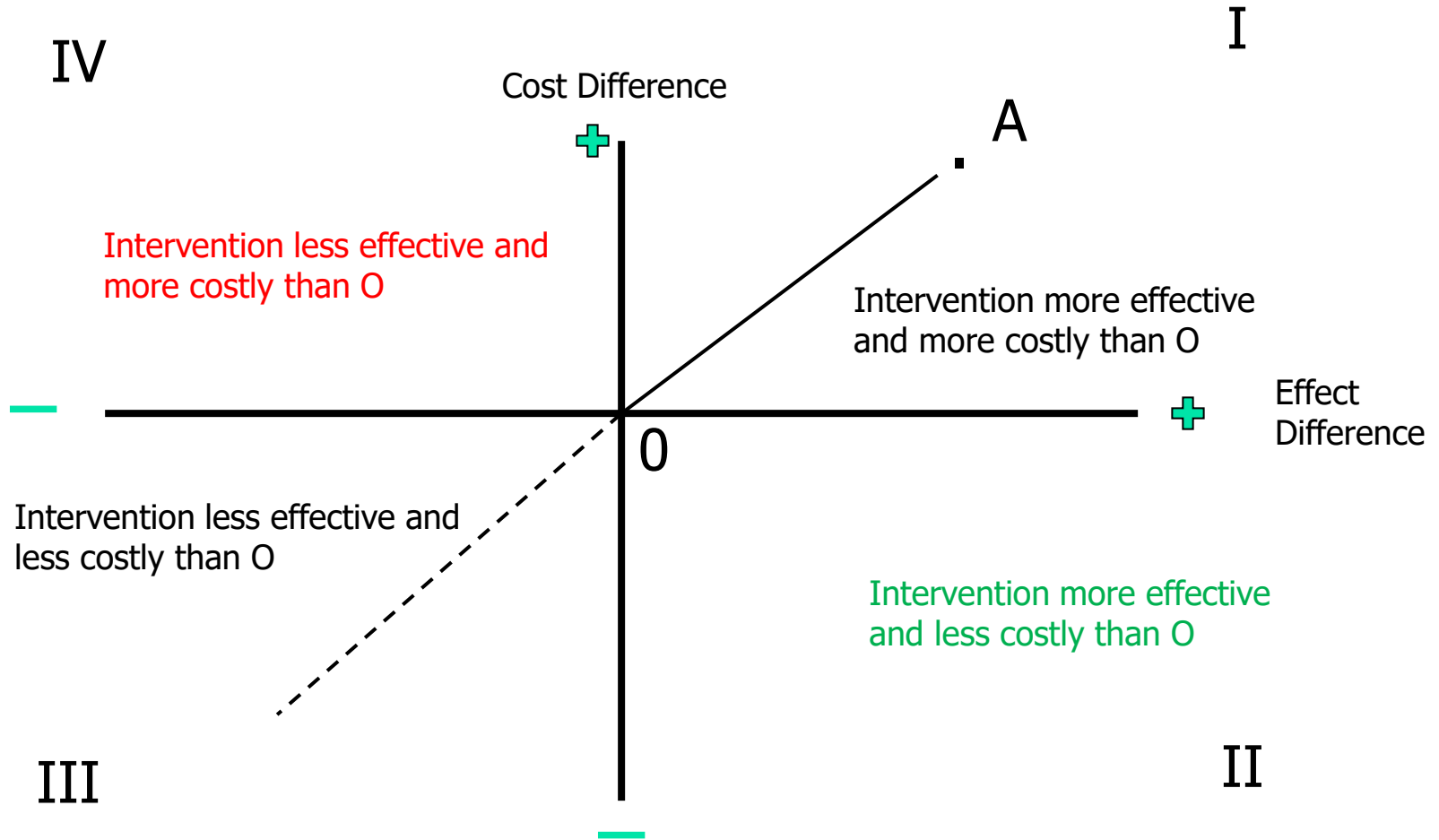


Fig. 3.2 The cost-effectiveness plane

Costs &  
Benefits

Making Healthcare  
Decisions

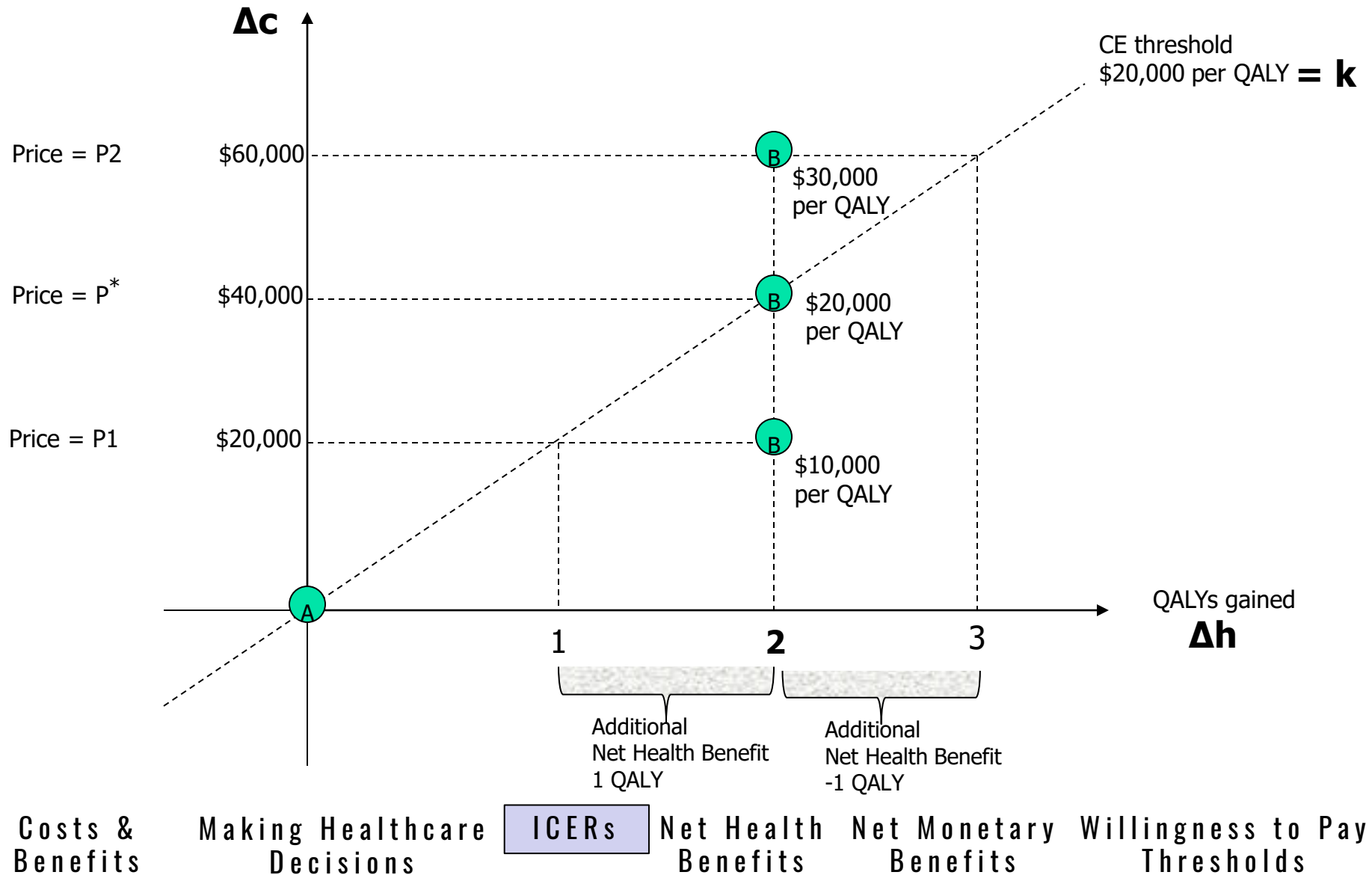
ICERs

Net Health  
Benefits

Net Monetary  
Benefits

Willingness to Pay  
Thresholds

Fig. 4.1 ICERs, decisions, net benefit





## Fig. 4.1 ICERs, Decisions, and Net Benefit

- X axis represents the incremental (incr.) health benefit of alt. B and y axis the incr. cost of B.
- B provides health benefits ( **$\Delta h = 2$  QALYs per patient treated**) at some positive incremental cost.
- Costs include acquisition costs of B and any other costs associated with its use. They also include any resources savings, e.g. from quicker recovery.
- At cost (price) of P1, the incr. costs of B ( $\Delta c$ ) are \$20k per patient treated. The additional costs generate incr. benefits of 2 QALYs, so B offers 1 QALY gained for each \$10k spent ( $\Delta c / \Delta h = \$20k / 2$  QALYs).
- The question remains whether an ICER of \$10k per QALY is acceptable and B ought to be regarded as cost-effective.



# Opportunity Cost

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- Opportunity Cost is the health expected to be given up as a consequence of the incr. costs.
  - This assessment is commonly referred to as the CE threshold ( $k$ ) which can be compared to the ICER for B.
  - CE threshold in 4.1 is represented by the rising diagonal (every \$20k of healthcare resources is expected to displace 1 QALY elsewhere in the healthcare system.



# Opportunity Cost (OC) cont'd.

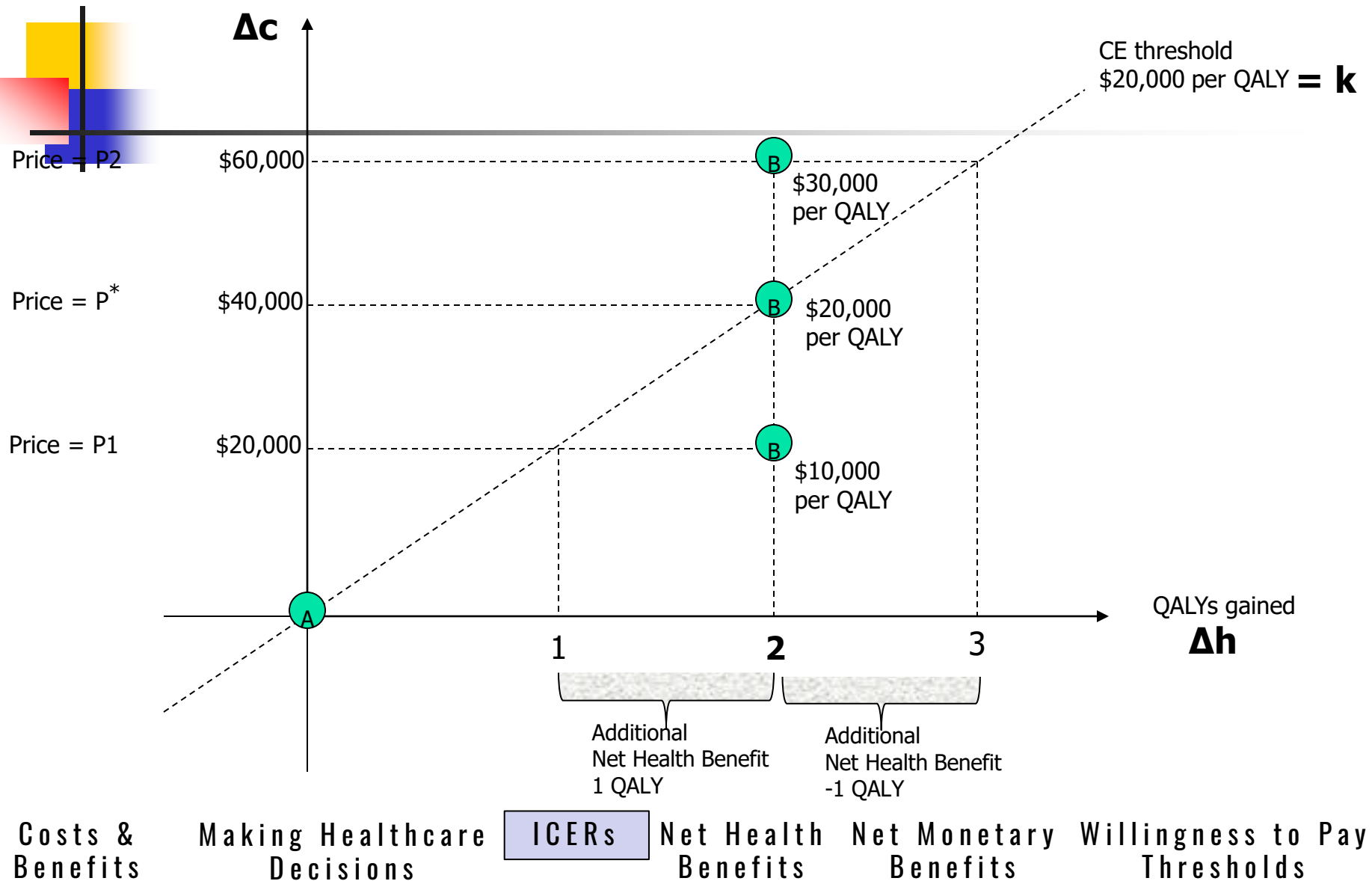
- The health expected to be gained by using B (2 QALYs) can be compared to the health expected to be lost through additional \$20k costs.
  - At a threshold of \$20k per QALY, these costs are expected to displace 1 QALY elsewhere ( $\Delta c / k$ ) = \$20k / \$20k
  - At price P1, B offers incr. net health benefits of 1 QALY
    - $NHB = (\Delta h - \Delta c / k) = \text{QALYs gained from B}$
    - $NHB = (2 - \$20,000 / \$20,000) = 1$



# 3 equivalent ways of deciding whether an intervention is cost-effective

- At P1, alt. B has an ICER of \$10,000 per QALY which is < the CE threshold of \$20,000 per QALY ( $\Delta c / \Delta h < k$ )
- The incremental net health benefit of B ( $\Delta h - \Delta c / k$ ) is positive because the health gained (2 QALYs) exceeds the health equivalent of the additional healthcare costs (\$20,000/\$20,000 = 1 QALY)
- The incremental net monetary benefit of B ( $\Delta h \cdot k - \Delta c$ ) is positive because the resources required to provide 2 QALYs elsewhere (2 x \$20,000 = \$40,000) exceeds the incremental cost (\$20,000).

Fig. 4.1 ICERs, decisions, net benefit







# Implications

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- Not possible to make statements about what is cost-effective without reference to a CE threshold that represents an assessment of opportunity costs.
- Some implicit or explicit assessment of the threshold is unavoidable because, when any decision is made, it implies a value of the threshold.
- In a resource constrained healthcare system, healthcare costs represent the health outcomes of other patients with competing claims on healthcare resources; therefore:
  - decisions based on economic evaluation are about identifying the alternative which offers the greatest net health benefits overall.

Costs &  
Benefits

Making Healthcare  
Decisions ICERs

Net Health  
Benefits

Net Monetary  
Benefits

Willingness to  
Pay Thresholds



# Implications cont'd.

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- Healthcare costs matter because they represent the opportunity to improve the health of other patients with legitimate claims on the healthcare system.
  - Costs of a healthcare intervention are just as important as how effective it might be.
  - Although the health gains of the beneficiaries of an effective intervention may be more readily identified compared to the health likely to be displaced elsewhere as a consequence of the additional costs, there is little reason to treat those that are known different to those that are difficult to identify.



## Estimating the CE Threshold (box 4.2)

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- “The problem of estimating a CE threshold is the same as estimating the relationship between healthcare expenditure and health outcome”.
- The UK study (Claxton et. al. 2015) exploited variation in expenditure and mortality outcomes to estimate the relationship between expenditure and mortality.
  - These estimates were converted to cost per life year threshold and adjusted for HRQoL (tables 4.2 & 4.3).

Table 4.2 Cost-effectiveness thresholds for UK NHS (2008-09) from Claxton et al., 2015

	Cost per death averted	Cost per life-year	Cost per QALY (life yr. effects only)	Cost per QALY
Life yrs. per death averted	--	4.5	4.5	4.5
QALYs per death averted	--	--	3.8 <small>Some lost years are not of good quality</small>	12.7 <small>Accounts for quality of life gains not just years of life.</small>
11 PBCs (with mortality)	£105,872	£23,360	£28,045	£8,308
23 PBCs	£114,272	£25,214	£30,270	£12,936

Costs & Benefits

Making Healthcare Decisions

ICERs

Net Health Benefits

Net Monetary Benefits

Willingness to Pay Thresholds



# Summary

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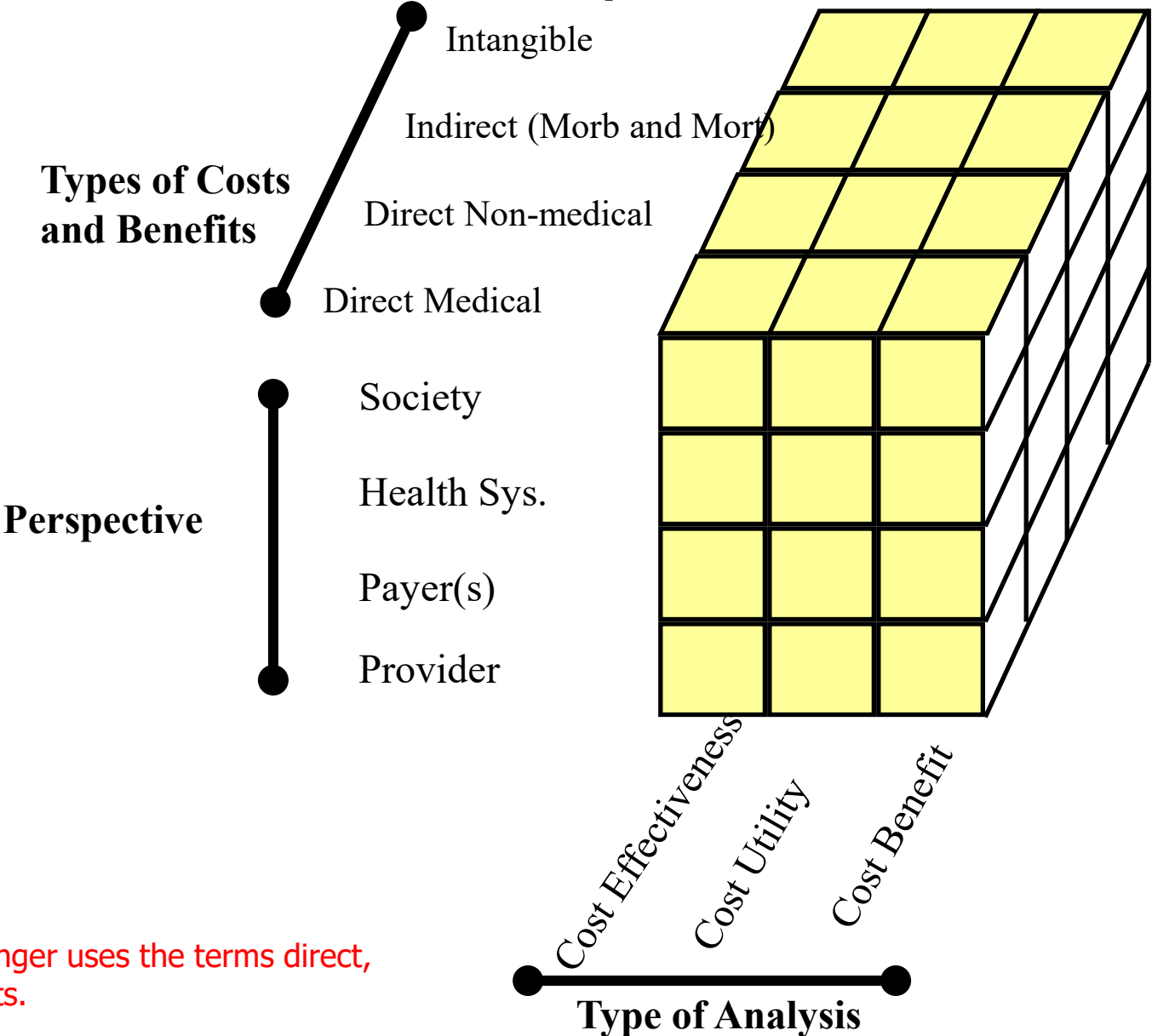
- Economic evaluation depends on comparing the opportunity cost of using resources in one way compared to the next best alternative.
- A valid threshold based on the health or value of health given up due to displaced resources is necessary for judging cost-effectiveness of alternative uses of resources.

**Fig. 1 - Three Dimensions of Clinical Economics (Modified From Bombardier and Eisenberg <sup>24</sup>**

**(population)  
Public Health**



**Medical Care  
(individual)**



Note: Some analysts no longer uses the terms direct, indirect, and intangible costs.

Costing Theory	Costing Measures	Costing Approach	Ingredients Method Overview	Microcosting Components	Other Cost Concepts
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