WAYS OF USING OUTCOME DATA IN INCREMENTAL ECONOMIC ANALYSIS

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WAYS OF USING OUTCOME DATA IN INCREMENTAL ECONOMIC ANALYSIS

ICERs present the cost per unit of outcome.

This could be cost per life year gained, cost per death averted, cost per case successfully diagnosed, or cost per patient successfully treated.

It can also be cost per mmHg reduction or cost per percentage point improvement in lung function.

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For example, in the cost-effectiveness analysis of rhDNase in children with cystic fibrosis discussed in previous lecture, the outcome measure was percentage improvement in FEV1.

In this study, the authors report the ICER to be £200 per 1% gain in FEV1. This approach is often used in CEA.

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The advantage of this outcome measure is that it is objective and generally accepted as 'true'.

However, sometimes it is not easy to interpret the clinical significance of this type of ICER.

An improvement of 1% in FEV1 is not likely to be clinically significant.

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Therefore, we might be more interested in knowing the ICER for an improvement of 10% or 20% in FEV1 which is more likely to be clinically significant.

The ICER will also be correspondingly larger.

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Another approach would be to convert the results into numbers of patients successfully treated.

We can easily explain this if we consider the cost-effectiveness analysis of rhDNase in children with cystic fibrosis again.

Clinicians working in the management of people with cystic fibrosis consider that a **clinically significant** improvement in **FEV1 is 10% or greater**.

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Therefore, an alternative approach would be to examine the change in FEV1 of each patient in the study and allocate them to

'successfully treated' or 'unsuccessfully treated'.

Then the ICER could be calculated on the basis of patients rather than percentage change in FEV1.

The disadvantage of this method is that it may introduce subjective judgments about whether a patient has been treated successfully or not.

Using an incremental cost-effectiveness ratio to make a decision

USING AN INCREMENTAL COST-EFFECTIVENESS RATIO TO MAKE A DECISION

After reading Worked Antibiotics example, you may now ask yourself:

Which antibiotic do you think should be chosen by the healthcare decision maker?

This example illustrates that carrying out ICER does not necessarily provide an obvious option: this will only happen when dominance occurs, where it is clear that the more effective, less costly option should be selected.

However, the decision-maker usually has to select between the more costly, more effective option and the less costly, less effective option.

USING AN INCREMENTAL COST-EFFECTIVENESS RATIO TO MAKE A DECISION

The generation of the ICER allows us to see how much extra cost is incurred for the extra benefit.

It is then left to the decision-maker to make a value judgment as to whether they think that the extra benefit is worth the extra cost.

In the example above, the decision-maker must decide whether they think that the extra case of pneumonia successfully treated with antibiotic C is worth £200.

This is a disadvantage of cost-effectiveness analysis.

Should the incremental cost-effectiveness ratio be large or small?

SHOULD THE INCREMENTAL COST-EFFECTIVENESS RATIO BE LARGE OR SMALL?

The larger the ICER, the more money is required to buy each unit of outcome.

Therefore, as an ICER becomes larger, the intervention is said to be less cost-effective.

Table 5.1 ICERs for lowering cholesterol concentration with statins in different groups of patients (adapted from Pharoah and Hollingworth, 1996)

Patient group	*ICER (£ per life year gained)*
Women aged 45–54, history of angina, cholesterol 5.5–6.0 mmol/l	£361,000
Men aged 45–64, no history of heart disease, cholesterol >6.5 mmol/l	£136,000
All patients, history of heart disease, cholesterol >5.4 mmol/l	£32,000
Men aged 55–64, history of myocardial infarction, cholesterol >7.2 mmol/l	£6,000

SHOULD THE INCREMENTAL COST-EFFECTIVENESS RATIO BE LARGE OR SMALL?

It can be seen that different groups of patients had very different ICERs.

To generate one additional life year women aged 45-54 with a history of angina and cholesterol 5.5-6.0 mmol/1 it would cost £361,000.

This is 60 times what it would cost to generate one additional life year in men aged 55-64 with a history of myocardial infarction and cholesterol above 7.2 mmol/1.

SHOULD THE INCREMENTAL COST-EFFECTIVENESS RATIO BE LARGE OR SMALL?

Therefore, although statins are effective and safe in all these groups of patients, they have very different levels of cost-effectiveness.

It is generally accepted that healthcare providers cannot afford to treat all patients in whom statin treatment is likely to be effective.

The implications of these different magnitudes of ICERs, in a resource-constrained healthcare system is that they may be used to prioritize which patients receive statins.

COST-EFFECTIVENESS GRID

A cost-effectiveness grid can be used to illustrate the definition of "cost-effectiveness".

To determine if a therapy or service is cost effective, both the costs and effectiveness must be considered.

Think of comparing a new drug with the current standard treatment.

		Cost of Alternative A relative to Alternative B		
		LOWER	EQUAL	HIGHER
Effectiveness of Alternative A relative to Alternative B	HIGHER	A (+) (Dominant)	B (+)	C (+/-) (TRADE-OFF)
	EQUAL	D (+)	E Arbitrary	F(—)
	LOWER	G (+/-) (Trade-off)	H (—)	I (Dominated)

Figure 5.1. Cost-effectiveness grid

COST-EFFECTIVENESS GRID

If the new treatment is:

1) *Both more effective and less costly (cell A),*
2) *More effective at the same price (cell B), or*
3) *Has the same effectiveness at a lower price (cell D),*

The new therapy is considered cost effective.

COST-EFFECTIVENESS GRID

On the other hand, if the new drug is:

1) *Less effective and more costly (cell I),*
2) *Has the same effectiveness but costs more (cell F), or*
3) *Has lower effectiveness for the same costs (cell H).*

Then the new product is not cost effective.

COST-EFFECTIVENESS GRID

For the middle cell E, other factors may be considered to determine which medication might be best.

For the other two cells (C and G), an ICER is calculated to determine the extra cost for each extra unit of outcome (2).

COST-EFFECTIVENESS GRID

Dominant strategies are defined as offering both lower cost and higher effectiveness compared with an alternative, while a dominated strategy is one that costs more than the comparator and is less effective.

Options requiring a trade-off include technologies that present a higher cost with higher effectiveness or lower cost with lower effectiveness relative to comparators

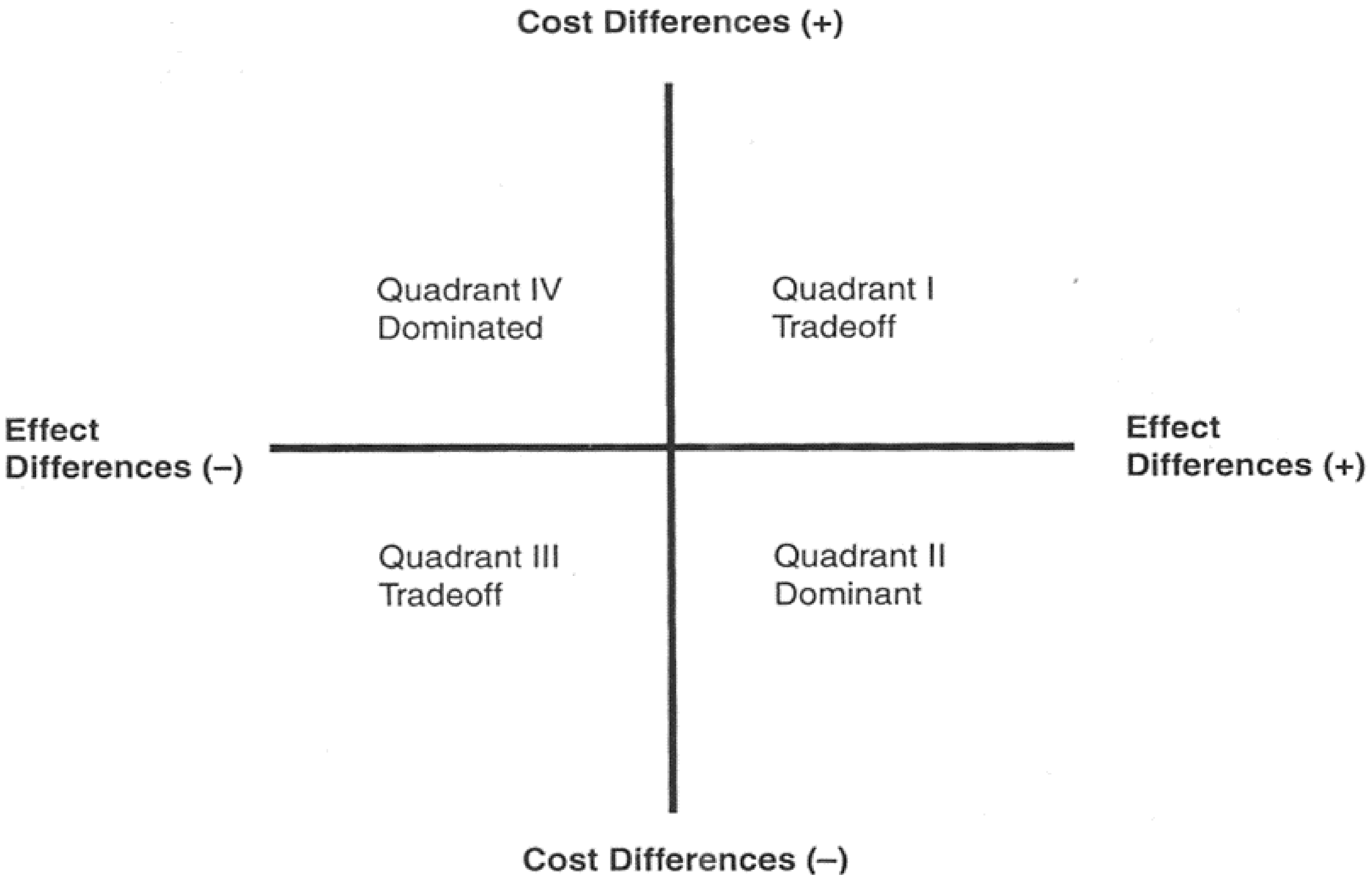
COST-EFFECTIVENESS PLANE

A graphical depiction of cost-effectiveness comparisons is also sometimes seen in the literature.

Figure 5.3 is a cost-effectiveness plane.

The point on the plane where the x and y axes cross indicates the starting point of costs and effectiveness for the standard comparator.

COST-EFFECTIVENESS PLANE



COST-EFFECTIVENESS PLANE

A point is placed in the plane for each alternative to the standard comparator by indicating how much more or less it costs than the starting point (y-axis) and how much more or less effective it is than the starting point (x-axis).

If an alternative is more expensive and more effective than the standard comparator, this point will fall in quadrant I, and a Trade-off is required (i.e., is the increased cost of the new treatment worth the increase in effectiveness?)

COST-EFFECTIVENESS PLANE

If an alternative is less expensive and more effective, the point would fall in quadrant II, and the alternative would dominate the standard comparator.

If an alternative was less costly and less effective, the point would fall in quadrant III, and again a tradeoff would have to be considered.

(Do the costs savings of the alternative outweigh its decrease in effectiveness?) If an alternative was more expensive and less effective, the point would fall in quadrant IV, and the alternative would be dominated by the standard comparator.

THANK YOU
for your
ATTENTION!