Health Economics: Beyond Cost-Effectiveness

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Why is considering **cost-effectiveness** important?

New Personalised Medicine Technology → Expected health **improvements**

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HEALTH CARE BUDGET

$$$

Disinvestment from other health care (e.g. longer waiting lists, delisting) → Expected health **losses**

The purpose should be to consider the **health of the population**, *not* dollars spent

Expected health **improvements**

Economic evaluation allows us to compare these, and consider the expected impact on the overall **health of the population**

Essential if **all patients** are to be given a 'voice' at the decision making table

Expected health **losses**

Expected health **improvements**

A treatment should be considered **cost-effective** if its reimbursement is expected to **improve** the overall health of the population

Expected health **losses**

Expected health **improvements**

A treatment should be considered **not** cost-effective if its reimbursement is expected to **diminish** the overall health of the population

Expected health **losses**

How much **expected health loss** arises from any given **incremental cost**?

Requires **empirical** analysis

Peer-reviewed estimates of the incremental cost required to lose **one quality-adjusted life year (QALY) of population health**

REVIEW ARTICLE

Empirical Estimates of the Marginal Cost of Health Produced by a Healthcare System: Methodological Considerations from Country-Level Estimates

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Abstract
Many health technology assessment committees have an explicit or implicit reference value (often referred to as a 'threshold') below which new health technologies or interventions are considered value for money. The basis for these reference values is unclear but one argument is that it should be based on the health opportunity costs of funding decisions. Empirical estimates of the marginal cost per unit of health produced by a healthcare system have been proposed to capture the health opportunity costs of new funding decisions. Based on a systematic search, we identified eight studies that have sought to estimate a reference value through empirical estimation of the marginal cost per unit of health produced by a healthcare system for England, Spain, Australia, The Netherlands, Sweden, South Africa and China. We review these eight studies to provide an overview of the key methodological approaches taken to estimate the marginal cost per unit of health produced by the healthcare system with the aim to help inform future estimates for additional countries. The lead author for each of these papers was invited to contribute to the current paper to ensure all the key methodological issues encountered were appropriately captured. These included consideration of the key variables required and their measurement, accounting for endogeneity of spending to health outcomes, the inclusion of lagged spending, discounting and future costs, the use of analytical weights, level of disease aggregation, expected duration of health gains, and modelling approaches to estimating mortality and morbidity effects of health spending. Subsequent research estimates for additional countries should (1) carefully consider the specific context and data available, (2) clearly and transparently report the assumptions made and include stakeholder perspectives on their appropriateness and acceptability, and (3) assess the sensitivity of the preferred central estimate to these assumptions.

1 Introduction

The estimated costs and effects of investments in healthcare are used to guide funding decisions, but this approach is limited if the health opportunity cost of an investment is unknown. Under a constrained budget, the health opportunity cost of a new investment is the health lost elsewhere from reducing funding to an existing service. An estimate of health opportunity cost can therefore allow decision makers to invest in new health technologies or interventions that are expected to generate net health gains, allowing for the expected health gains forgone elsewhere in the healthcare system, thus ensuring efficient reimbursement decisions when the goal is to improve population health [2].

Precisely which healthcare intervention(s) are forgone when a new intervention is funded is rarely known. Empirically estimating the marginal cost per unit of health produced by the healthcare system offers a practical alternative to determine an expectation on health opportunity costs. Seminal work from Claxton et al. [1], building on prior work by Martin et al. [2, 3], empirically estimated the health opportunity costs from funding decisions in the English National Health Service (NHS) in this way. This has been followed by estimates in Spain [4], Australia [5], The Netherlands [6, 7], Sweden [8], South Africa [9] and China [10], which all employ different methodological approaches based on available data. While such estimates may be constrained by uncertainty in the data and the methodological approaches taken, they can be explicit about their uncertainty, the assumptions made and the directional impact

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Peer-reviewed estimates of the incremental cost required to lose **one quality-adjusted life year (QALY) of population health**

Mean and median ≈ **$30,000 per QALY** (2019 CAD)

Legend

- Public health care
- Hospital-based care
- Hospital-based CVD care
- Private health care

England

| Simple Conversion **$25,376** (2008 CAD) | |
| Original Estimate[1] **£12,936** (2008 GBP) | Advanced Conversion **$27,172** (2019 CAD) |

Sweden

| Simple Conversion **$28,449** (2016 CAD) | |
| Original Estimate[6] **183,539 kr** (2016 SEK) | Advanced Conversion **$26,948** (2019 CAD) |

USA

| Simple Conversion **$137,998** (2019 CAD) | |
| Original Estimate[7] **$104,000** (2019 USD) | Advanced Conversion **$130,832** (2019 CAD) |

Spain

| Simple Conversion **$31,958** (2012 CAD) | |
| Original Estimate[2] **€24,870** (2012 EUR) | Advanced Conversion **$49,143** (2019 CAD) |

Netherlands

| Simple Conversion **$56,010** (2010 CAD) | |
| Original Estimate[4] **€41,000** (2010 EUR) | Advanced Conversion **$64,280** (2019 CAD) |

Netherlands

| Simple Conversion **$108,017** (2014 CAD) | |
| Original Estimate[5] **€73,626** (2014 EUR) | Advanced Conversion **$125,987** (2019 CAD) |

Australia

| Simple Conversion **$29,023** (2012 CAD) | |
| Original Estimate[3] **$28,033** (2012 AUD) | Advanced Conversion **$30,628** (2019 CAD) |

References

1. Claxton et al. (2015)
2. Vallejo-Torres et al. (2018)
3. Edney et al. (2018)
4. Van Baal et al. (2019)
5. Stadhouders et al. (2019)
6. Siverskog & Henriksson (2019)
7. Vanness et al. (2020)

What about **equity** in the distribution of population health?
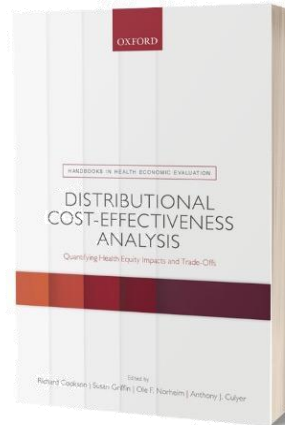
We can use **distributional cost-effectiveness analysis**

Apply **direct equity weights** to QALYs

Distributional Cost-Effectiveness Analysis: Quantifying Health Equity Impacts and Trade-Offs. 2020. *Richard Cookson (ed.), Susan Griffin (ed.), Ole F. Norheim (ed.), Anthony J. Culyer (ed.).* Oxford University Press.

Chapter 14

Direct equity weights

Mike Paulden, James O'Mahony, and Jeff Round

Direct equity weights are indicators of relative importance applied to effects and opportunity costs for specific subgroups of the population—such as people with or without a severe or rare or terminal illness—giving higher priority to some and lower priority to others. This chapter shows how two different forms of direct equity weighting can be used: 'health weighting', in which weights are applied directly to the health-adjusted life year (HALY) effects and opportunity costs on each side of the equity-weighted net health benefit equation; and 'threshold weighting', in which an adjustment is instead made to the cost-effectiveness threshold. The latter approach is a simple approximation to the former, though can be misleading because it fails to account for the distribution of health opportunity costs between people with different equity-relevant characteristics. In effect, threshold weighing is a one-sided form of equity weighting in which equity weights are only applied to benefits but not opportunity costs. The chapter then shows how net equity impact can be plotted on the equity-efficiency impact plane using direct equity weights. The chapter concludes by examining the circumstances under which threshold weighting can be misleading, with the aid of simple hypothetical examples that illustrate the importance of paying careful attention to the distribution of health opportunity costs.

14.1 Introduction

This chapter describes the use of direct equity weights to evaluate and rank decision options. Direct equity weights can be used to give priority to population subgroups based on disease categories, such as people suffering from rare or terminal or severe diseases. For example, national healthcare technology assessment processes in the Netherlands and Norway use direct equity weights that give priority to people suffering from severe diseases with a high burden or morbidity or mortality or both (Franken et al., 2015; Ottersen et al., 2016).

Expected health **improvements**

We must **also** consider whether some of the patients who stand to **lose health** have characteristics that we wish to prioritize

Expected health **losses**

Recommendations

Decision makers should support **empirical research** into the **health opportunity cost** of reimbursing health technologies within the health care system

This allows for an **evidence based cost-effectiveness threshold,** giving a 'voice' to those patients whose health is diminished and allowing for the **net impact on population health** to be considered

The **characteristics** of those patients who stand to benefit, and those who stand to lose health, can also be taken into account through **distributional cost-effectiveness analysis**, via **direct equity weights** applied to their QALYs

Questions and Answers