Decision rules for value-based reimbursement: moving on from 'net health benefit'

Mike Paulden[1], James O'Mahony[2] and Christopher McCabe[1] University of Alberta[1] and Trinity College Dublin[2]

OVERVIEW

Net health benefit (NHB) and **net monetary benefit (NMB)** are alternatives to using **incremental cost-effectiveness ratios (ICERs)** in the **economic evaluation of health technologies**.

Conventionally, **NHB** and **NMB** are regarded as **equivalent**, and the **cost-effectiveness threshold (λ)** is used to **weight** the components of **NHB** when specifying **NMB**.

We demonstrate **important differences** between these measures, and argue that **NMB is the preferred measure when making value-based reimbursement decisions**.

We further show that **using λ to assign weights when specifying NMB is theoretically flawed**.

METHODS

We consider the **circumstances** under which **NHB** and **NMB** have **non-equivalent implications** for interpreting economic evaluations.

We then consider the **appropriate weights** for specifying **NMB** within a **'social decision making' (SDM) perspective on social choice**.

RESULTS

We demonstrate that **NHB and NMB are non-equivalent if λ changes over time or if λ is uncertain** (*see panel to the right*).

Given this **non-equivalence**, **decision makers must decide which measure to use**.

For value-based reimbursement decisions, NMB is preferred because it allows for differential weights to be assigned to health outcomes, while NHB does not.

Under a **SDM perspective**, the weights that **ought** to be assigned to **health outcomes in different time periods** are determined by the **value that society *currently* places on health in each period**.

Since the value that society *today* places on health in *future* periods might differ from that implied by *future* values of λ, using λ to determine these weights is *theoretically flawed*.

CONCLUSIONS

Our findings have **important implications** for **value-based reimbursement decisions**.

The conventional **methods used for economic evaluation** assume that **λ is a stochastic parameter that does not vary over time**. Under this **restrictive assumption**, **NHB** and **NMB** have **equivalent implications**, so ***either* may be used to report the results of an economic evaluation**.

However, as our **theoretical and empirical understanding of λ improves**, it is increasingly clear that λ is **uncertain** and **unlikely to remain constant over time**.

It is therefore important that we continue to develop the methods used for economic evaluation to account for any expected change and uncertainty in λ.

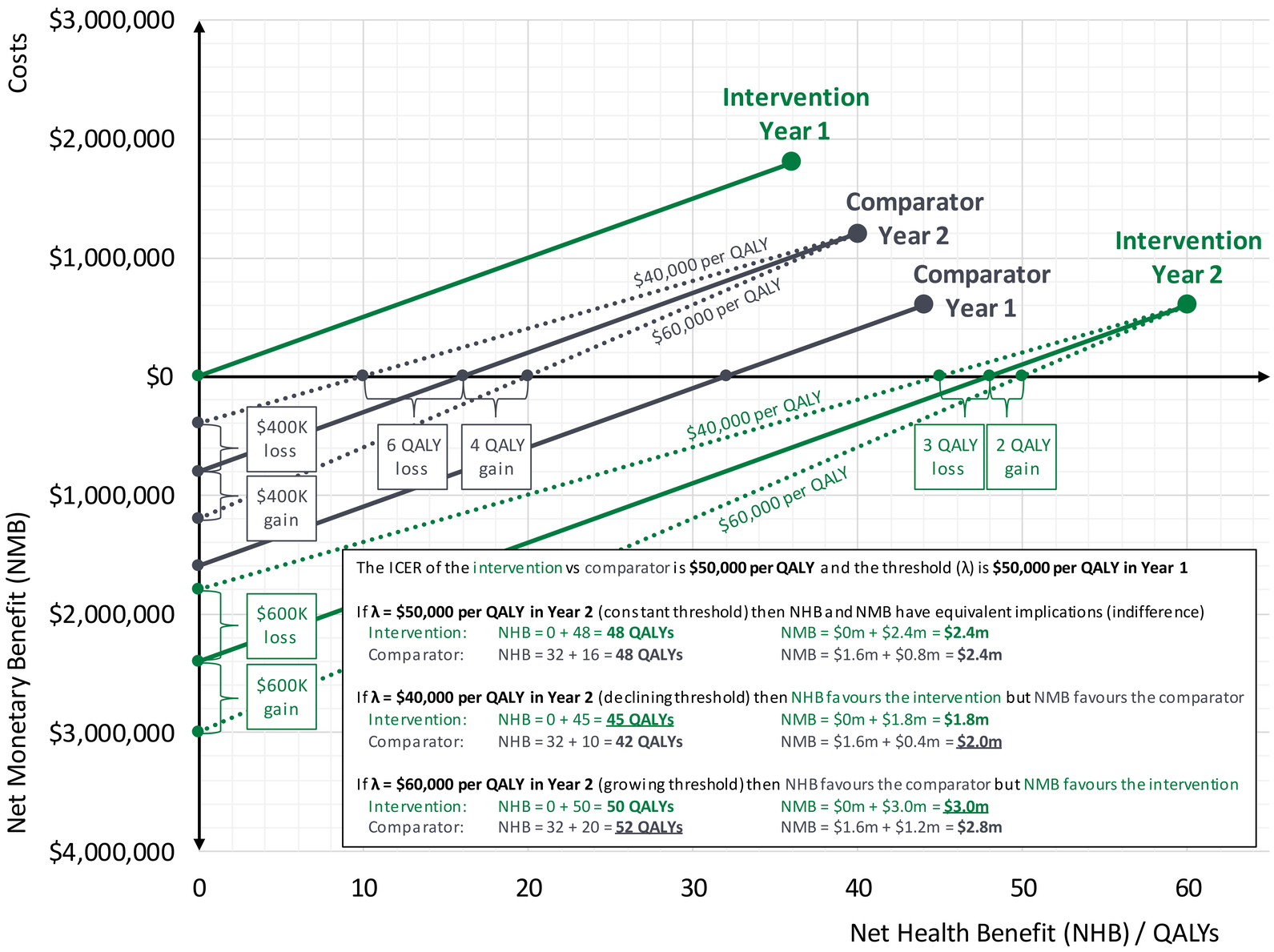
After developing these updated methods**, NHB and NMB will have non-equivalent implications** for economic evaluations, so **decision makers will need to decide which to use in their evaluations**.

Using NHB is inappropriate, since differential weights cannot be assigned to health outcomes to which the decision maker attaches differential value.

Conventional estimates of NMB are also inappropriate under a SDM perspective, since *future* values of λ may not reflect the value that society *today* assigns to *future* health outcomes.

It is time to move on from using NHB and adopt a measure of NMB that appropriately reflects society's valuation of health.

THE NON-EQUIVALENCE OF 'NET HEALTH BENEFIT' AND 'NET MONETARY BENEFIT'



An **intervention** is compared to a **comparator** over a **two-year horizon**.

In year 1, the **intervention** costs $1.8m and provides 36 QALYs, the **comparator** costs $0.6m and provides 44 QALYs, and λ is $50,000 per QALY.

In year 2, the **intervention** costs $0.6m and provides 60 QALYs, the **comparator** costs $1.2m and provides 40 QALYs, and λ either **remains constant** (at $50,000 per QALY), **decreases** (to $40,000 per QALY), or **increases** (to $60,000 per QALY).

In year 1, λ is $50,000 per QALY, so the $1.8m cost of the **intervention** displaces 36 QALYs. Within year 1 *only*, the **NHB** of the **intervention** is therefore 36 – 36 = 0 QALYs, so its **NMB** is 0 x $50,000 per QALY = $0m. Meanwhile, in year 1, the $0.6m cost of the **comparator** displaces 12 QALYs, so its **NHB** in year 1 *only* is 44 – 12 = 32 QALYs and its **NMB** is 32 x $50,000 per QALY = $1.6m.

If λ *remains* at $50,000 per QALY in year 2, the **intervention** ($0.6m) displaces 12 QALYs, so its **NHB** in year 2 *only* is 60 – 12 = 48 QALYs, and its **NMB** is 48 x $50,000 = $2.4m.

The **intervention's** total **NHB** over both years is 0 + 48 = **48 QALYs**, and its total **NMB** is $0m + $2.4m = **$2.4m**.

Meanwhile, the **comparator** ($1.2m) displaces 24 QALYs, so its **NHB** in year 2 *only* is 40 – 24 = 16 QALYs and its **NMB** is 16 x $50,000 = $0.8m.

The **comparator's** total **NHB** over both years is 32 + 16 = **48 QALYs**, while its total **NMB** over both years is $1.6m + $0.8m = **$2.4m**.

If λ remains constant in year 2, the intervention and comparator are equally cost-effective using either NHB (48 QALYs each) or NMB ($2.4m each), so NHB and NMB have equivalent implications for economic evaluations.

If λ *decreases* to $40,000 per QALY in year 2, the **intervention** ($0.6m) displaces 15 QALYs, so its **NHB** in year 2 *only* is 60 – 15 = 45 QALYs and its **NMB** (using λ as the weight) is 45 x $40,000 = $1.8m.

The **intervention's** total **NHB** over both years is 0 + 45 = **45 QALYs**, and its total **NMB** is $0m + $1.8m = **$1.8m**.

Meanwhile, the **comparator** ($1.2m) displaces 30 QALYs, so its **NHB** in year 2 *only* is 40 – 30 = 10 QALYs and its **NMB** is 10 x $40,000 = $0.4m.

The **comparator's** total **NHB** over both years is 32 + 10 = **42 QALYs**, while its total **NMB** over both years is $1.6m + $0.4m = **$2.0m**.

If λ *decreases* to $40,000 per QALY in year 2, using NHB favours the intervention (45 > 42 QALYs), while using NMB favours the comparator ($2.0m > $1.8m). NHB and NMB have non-equivalent implications for economic evaluations.

If λ *increases* to $60,000 per QALY in year 2, the **intervention** ($0.6m) displaces 10 QALYs, so its **NHB** in year 2 *only* is 60 – 10 = 50 QALYs and its **NMB** is 50 x $60,000 = $3.0m.

The **intervention's** total **NHB** over both years is 0 + 50 = **50 QALYs**, while its total **NMB** over both years is $0m + $3.0m = **$3.0m**.

Meanwhile, the **comparator** ($1.2m) displaces 20 QALYs, so its **NHB** in year 2 *only* is 40 – 20 = 20 QALYs and its **NMB** is 20 x $60,000 = $1.2m.

The **comparator's** total **NHB** over both years is 32 + 20 = **52 QALYs**, while its total **NMB** over both years is $1.6m + $1.2m = **$2.8m**.

If λ *increases* to $60,000 per QALY in year 2, using NHB favours the comparator (52 > 50 QALYs), while using NMB favours the intervention ($3.0m > $2.8m). NHB and NMB have non-equivalent implications for economic evaluations.

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