Dealing with Disability using

HEALTH YEARS IN TOTAL

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Disclaimer

- **No external funding sources for this project.**
- **No conflict of interest.**

Equity

- **Horizontal Equity (Non-discrimination)**
  - Two groups experiencing same increases in life years and/or quality of life should be *valued equally*
  - Corollary: Two groups experiencing different increases in life years and/or quality of life should be *valued differently*

- **Vertical Equity**
  - A group experiencing same increases in life years and/or quality of life as another one should be *valued more* if their opportunity to experience full health is less.

Controversy around QALYs

- **Theoretical construct fails horizontal equity for population with disability**
- **Health utility assigned to patients who are endowed with bad health raises distributional issues**
  - Extending life for patients with co-occurring illnesses or disability produces lower QALY for the same extension of life for an otherwise healthy patient
- **Seldom manifests a problem in real decision making around health care coverage**
- **Has been a target of criticism, including being on the primary reason for barring use of CEA in the US**

Alternatives

- Disability-adjusted life years (DALYs)
  - Same issue as QALYs, fails horizontal equity for population with disability
- Equal Value of Life (EVL, Nord et al) or Equal value of life years gained (evLYG, ICER)
  - Fails corollary of horizontal equity, also disproportionately affects population with disability
- Health Years in Total (HYT)
  - Meet both horizontal equity and its corollary
- GRACE-QALYs
- Formal Distributional CEA

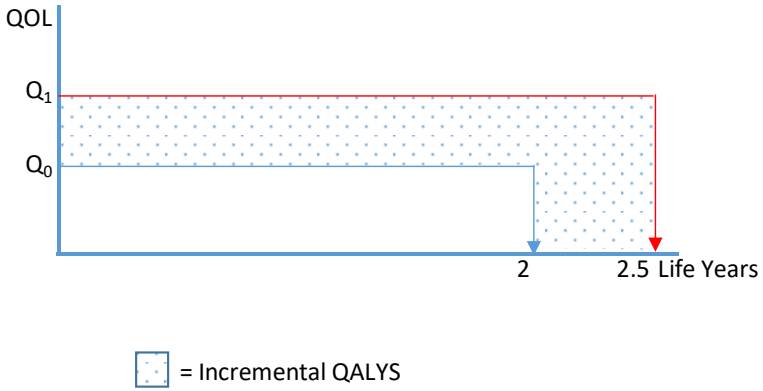
HYT

- **HYT = Life Expectancy + Modified QALYs**

- **Modified QALY =** number of expected QALYs if patients lived the maximum average life expectancy across any comparative treatments/intervention.

Traditional QALY Framework vs the Health Years in Total Framework

TRADITIONAL QALY FRAMEWORK



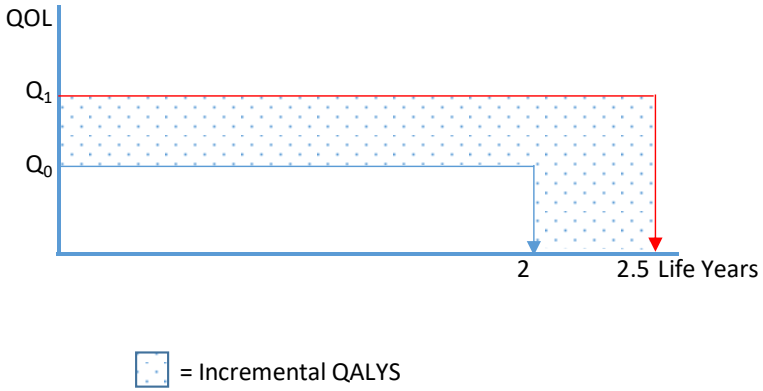
$QALY_0 = 2 \cdot Q_0$

$QALY_1 = 2.5 \cdot Q_1$

$\Delta QALYs = 2.5 \cdot Q_1 - 2 \cdot Q_0$

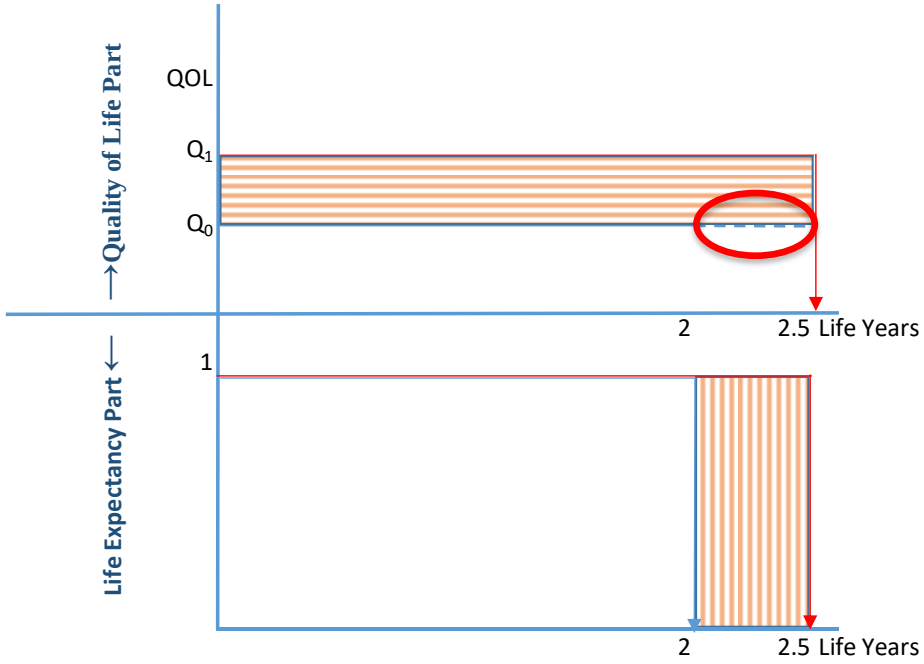
Traditional QALY Framework vs the Health Years in Total Framework

TRADITIONAL QALY FRAMEWORK



= Incremental QALYS

HEALTH YEARS IN TOTAL (HYT) FRAMEWORK



= Counterfactual QOL for Treatment A, had patients continued to live
= Incremental Life Years
= Incremental Modified QALYS
\+ = Incremental Health Years in Total (HYT)

$QALY_0 = 2 \cdot Q_0$

$QALY_1 = 2.5 \cdot Q_1$

$\Delta QALYs = 2.5 \cdot Q_1 - 2 \cdot Q_0$

Rationale

- It is important to answer the *"counterfactual"* question – what would have been the quality of life among patients getting the old intervention had those patients remain alive for more years?

- The "*factual*" QOL experienced by these patients under the new treatment during the additional years of life must be put in context to the counterfactual estimate under the old treatment

Horizontal Equity using HYT

Comparative Performance of QALYs, EVL and HYT. *Scenario #1*

Population	Treatment	LY	QOL weights	QALYs	ΔQALYs	EVLs	ΔEVLs	HYT	ΔHYT
A	No Trt	1	.4	.4		.4		1 + (2*.4) = 1.8	
	Trt	2	.6	1.2	**0.8**	1.6	**1.2**	2 + (2*.6) = 3.2	**1.4**
B	No Trt	1	.7	.7		.7		1 + (2*.7) = 2.4	
	Trt	2	.9	1.8	**1.1**	1.9	**1.2**	2 + (2*.9) =3.8	**1.4**

Population A: with disability

Fails Horizontal Equity

Passes Horizontal Equity

Passes Horizontal Equity

Comparative Performance of QALYs, EVL and HYT. *Scenario #2*

Population	Treatment	LY	QoL weights	QALY	ΔQALY	EVL	ΔEVL	HYT	ΔHYT
A	No Trt	1	.4	.4		.4		1 + (2*.4) = 1.8	
	Trt	2	Y1: .4, Y2: .8	1.2	**0.8**	1.4	**1**	2 + (.4+.8) = 3.2	**1.4**
B	No Trt	1	.7	.7		.7		1 + (2*.7) = 2.4	
	Trt	2	Y1:.7, Y2: .8	1.5	**0.8**	1.7	**1**	2+ (.7+.8) = 3.5	**1.1**

Population A: with disability

Fails Horizontal Equity Corollary

Fails Horizontal Equity Corollary

Passes Horizontal Equity & its Corollary

Theoretical Foundation of HYT

- In development..
- Health years in total (HYT) can be rationalized under a reference-dependent utility function – incorporates loss aversion w.r.t. LE
- HYT utility function is complete, transitive, and continuous, given a reference point
  - Reference Point: the max(LE) possible under any option
  - the reference point is always an element of the decision maker's opportunity set
- New technology can change the reference point, thereby changing the transitive order of preference for existing technologies.

Bleichrodt (2007, 2009)

Limitations of HYT

HYT does not directly address vertical equity.

HYT has potential to incorporate vertical equity, once such preference weights are known about

- tradeoffs between LE gains and QOL gains
- tradeoffs based on opportunity for gains (e.g., LE shortfall)

Conclusions

Health Years in Total (HYT)
A novel framework for valuing health outcomes in CEA in healthcare

- Addresses fundamental Limitations of QALYs & EVL
- Robust from a theoretical perspective
- Calculations in CEA models are feasible
- May have important policy implications as prioritization of technologies may be changed

We encourage further critique, development, application, and testing of the HYT framework