Fake or novel elements of value

Implementation of ‘insurance value’ and ‘value of hope’

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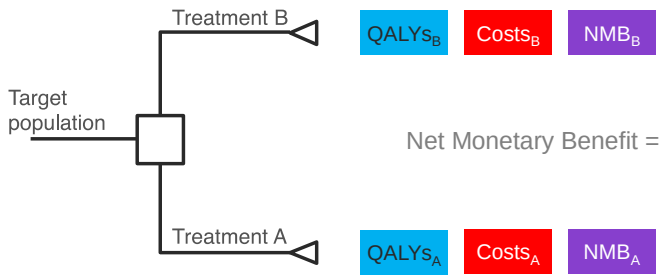
Conventional cost-effectiveness analysis



Treatment A			Treatment B			Incremental NMB
QALYs	Costs	NMB	QALYs	Costs	NMB	
4	20,000	380,000	6	200,000	400,000	20,000

Willingness-to-pay for a QALY is 100k

Incorporating ‘insurance value’

	Mean	Variance
Physical	health outcomes	health outcomes *risk*
Financial	healthcare spending	healthcare spending *risk*
Full value	**Conventional value**	**Insurance value**

Source: Lakdawalla D, Malani A, Reif J. The insurance value of medical innovation. Journal of public economics. 2017 Jan 1;145:94-102.

Incorporating ’insurance value’

$$dV = k \cdot dh - dc$$

$$dV_c = \pi(k \cdot dh - dc)$$

Insurance value without health insurance

Conventional value | *Reduction in physical risk* | *Increase in financial risk*

$$dV_F^{NHI} = \underbrace{\pi(k \cdot dh - dc)}_{\text{Conventional value}} + \underbrace{\pi(1-\pi)\,\varphi\,k \cdot dh}_{\text{Reduction in physical risk}} - \underbrace{\pi(1-\pi)\,\varphi\,dc}_{\text{Increase in financial risk}}$$

$$\varphi = \frac{\frac{u_c^s}{u_c^w} - 1}{\pi\frac{u_c^s}{u_c^w} + 1 - \pi}$$

$$dV_F^{NHI} = (k \cdot dh - dc)\,[\pi + \pi(1-\pi)\,\varphi]$$

Value of health insurance

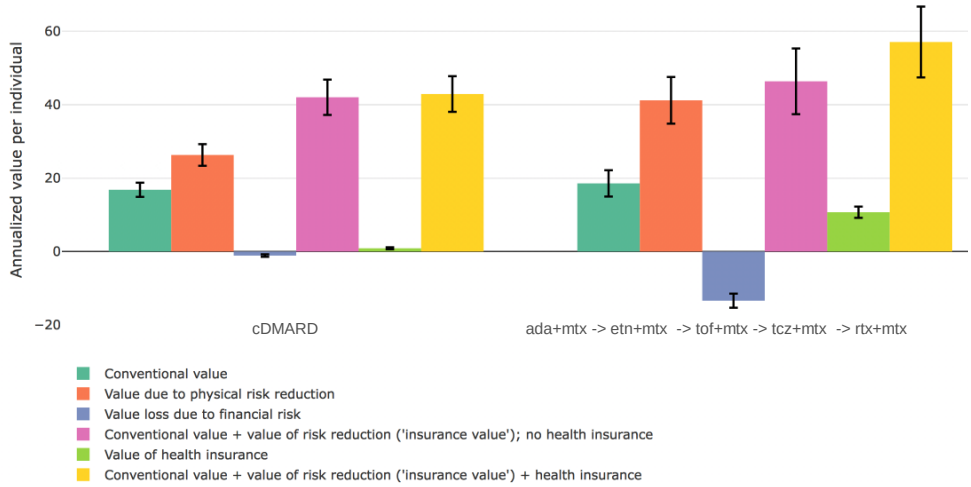
$$dV_F^{WHI} = (k \cdot dh - dc)\,[\pi + \pi(1-\pi)\,\varphi] + \underbrace{\phi\;\pi(1-\pi)\,\varphi\,dc}_{\text{Value of health insurance}}$$

Source:
Lakdawalla D, Malani A, Reif J. The insurance value of medical innovation. Journal of public economics. 2017 Jan 1;145:94-102.
Incerti DI, Curtis JR, Shafrin J, Lakdawalla DN, Jansen JP. A flexible open-source decision model for value assessment of biologic treatment for rheumatoid arthritis. Pharmacoeconomics 2019;37:829-843.

https://innovationvalueinitiative.github.io/IVI-RA/

CEA RA; Incorporating 'insurance value'

$\frac{u_c^s}{u_c^w} = 2.5$



Source: Incerti DI, Curtis JR, Shafrin J, Lakdawalla DN, Jansen JP. A flexible open-source decision model for value assessment of biologic treatment for rheumatoid arthritis. Pharmacoeconomics. 2019;37:829-843.

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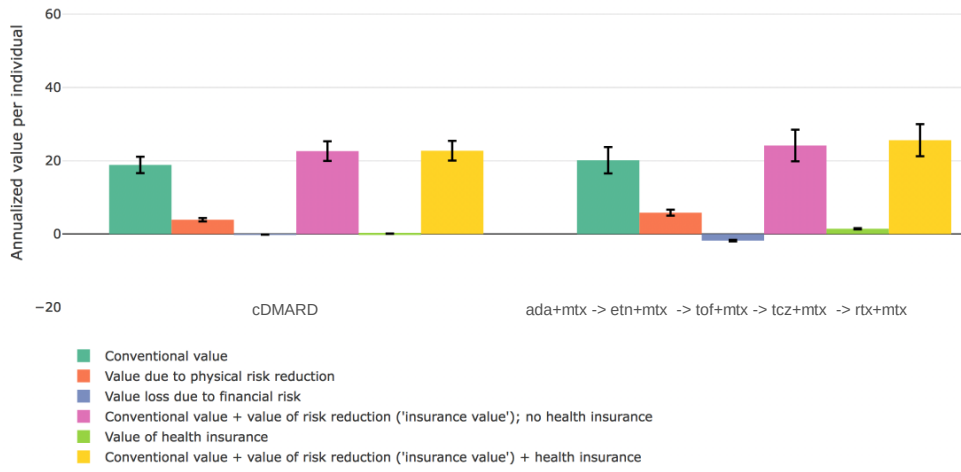
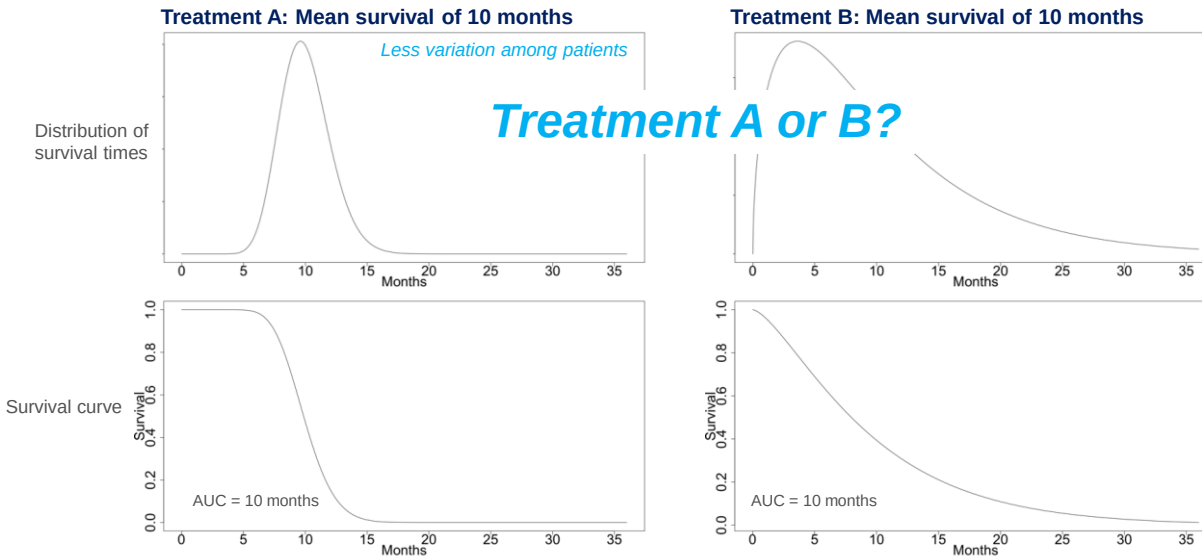
CEA RA; Incorporating 'insurance value'

$\frac{u_c^s}{u_c^w} = 1.2$



Source: Incerti DI, Curtis JR, Shafrin J, Lakdawalla DN, Jansen JP. A flexible open-source decision model for value assessment of biologic treatment for rheumatoid arthritis. Pharmacoeconomics. 2019;37:829-843.

Variability in outcomes: 'individual uncertainty'



Source: Garrison LP, Jansen JP, Devlin NJ, Griffin S. Novel approaches to value assessment within the cost-effectiveness framework. Value in Health 2019;22(6S):S12-S17

Certainty equivalent

- Utility function: $u(x) = x^{\eta}$
  - risk averse: $\eta < 1$
  - risk loving: $\eta > 1$

- The certainty equivalent, α_{AB}, for treatment *B* relative to *A* is computed by solving:

$$\int u(x - \alpha_{AB}) f_B(x) dx = \int u(x) f_A(x) dx$$

"How much do I need to subtract from x with B to make A and B equally valuable"

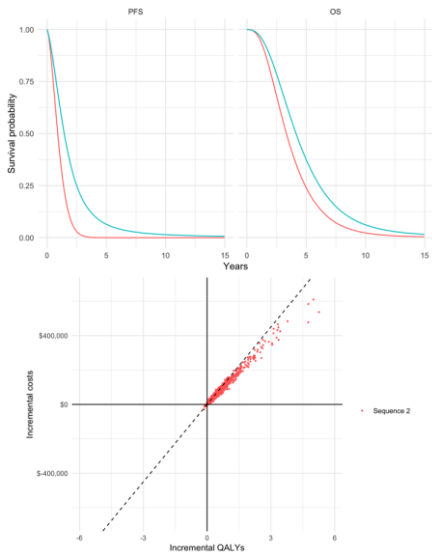
- 'Value of hope' is calculated as is the difference between the certainty equivalent and difference in expected x with *A* and *B*:

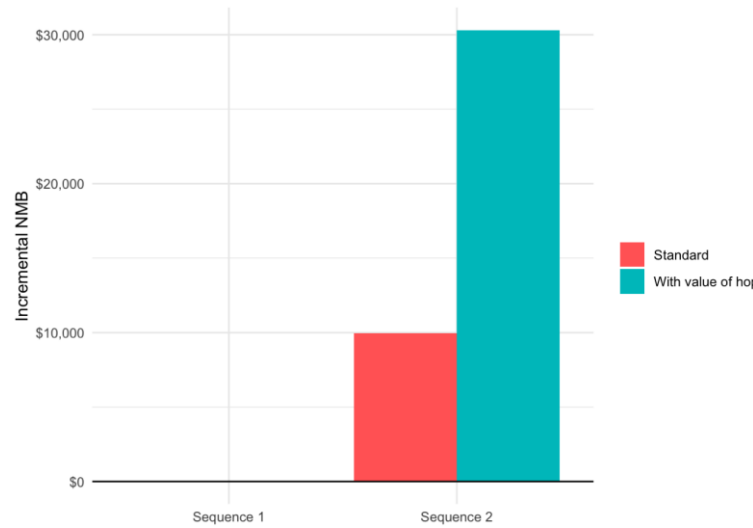
$$VoH = \alpha_{AB} - [E_B(x) - E_A(x)]$$

Source: Incerti D, Jansen JP. A Description of the IVI-NSCLC Model v1.0; last updated January 31, 2019; available from https://innovationvalueinitiative.github.io/IVI-NSCLC/modeldoc/model-doc.pdf.

https://innovationvalueinitiative.github.io/IVI-NSCLC/

CEA EGFR+ NSCLC; incorporating ‘value of hope’





Source: Incerti D, Jansen JP. A Description of the IVI-NSCLC Model v1.0; last updated January 31, 2019; available from https://innovationvalueinitiative.github.io/IVI-NSCLC/modeldoc/model-doc.pdf.

Summary

- Implementation of ‘insurance value’ and ‘value of hope’ in open-source models
  - Structural uncertainty?
- Better to use a single framework where ‘value of risk reduction’ (‘insurance value’) and ‘value of hope’ are both captured simultaneously (Lakdawalla and Phelps 2019)
- Evidence for the required parameters
  - Marginal rate of substitution, risk aversion
  - Parameter uncertainty?
- When does it make a difference?

Thank you