Are QALYs really the best we have (& do we really need them)?

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Because we need it & have nothing better
Decision aid

\[ V(\text{Benefit}) + V(\text{Resource use avoided}) \geq V(\text{Resources required}) \]

\[ \lambda \times \text{QALY gain} \]

Requirements

- **Properly addresses the nature of disease (badness)**
  - Zero based (= no disease)
  - No upper end (can always imagine something worse)

- **Accounts for both**
  - Deadliness (higher mortality)
  - Impact on (quality of) life

- **Does not impose constant proportional tradeoff or risk neutrality**

- **Applies properly to all diseases and interventions**
  - Surgery/anesthesia
  - Pediatrics
  - Neonatal & maternal care
  - Vaccines

- **Has face validity and intelligibility**

- **Leverages accumulated knowledge, experience, information (e.g., EQ5D).**
**Senescence**

All humans age and die

![Graph of senescence rate vs age]

**Bad effects of disease**

All humans age and die & disease augments the burden of ageing in 2 ways

**Burden Augmented by Deadliness & Impact on loss of QoL**

![Graph of burden vs age]

Impact on loss of QoL
Deadliness

\[ \text{Deadliness} = \frac{\text{LYL}}{\text{LYL}} = \frac{L_s - E_s}{E_s} \]

Zero-based? \( \times \)

Deadliness

<table>
<thead>
<tr>
<th>Max Burden</th>
<th>Burden</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>60</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
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\[ \text{LYL} = \text{LY} - \text{LYL} \]

\[ \text{LY} = \text{LS} - \text{ES} \]

Tasting D

\[ D \text{ as a function of Age Onset & OS} \]

- Birth
- Age 50
- Age 85

\[ D \text{ vs. OS (yrs)} \]

\[ 0 \text{ to } 120 \]

\[ 0 \text{ to } 50 \]
Impact on QoL

Loss due to burden by age
Loss function

\[ I = EL_I - EL_A \]

\[ EL = \frac{1}{2} r I (A_I^2 - A_A^2) \]

\[ EL = \int_0^1 L_I dt \]

Expected loss due to ageing

BADI (Burden Augmented by Deadliness and Impact)

BADI for various diseases

Deadliness (D)

Surgery

Ideal cure

Realistic cure (AE)

Cancer int.

Impact (I)

Impact (I)
Measuring intervention effects using BADI

- Keep the two dimensions separate
- Using cartesian coordinates
  - \((\delta D, \delta I)\), hopefully \((-D, -I)\)
  - "Reduced BADI"
- Using polar coordinates
  - \(R\) is the length of the ray; \(\theta\) is the angle
  - Interpretability?
    - \(180 < \theta < 270\) desirable
    - Longer \(R\) better
- Valuation
  - Can depend not only on \(\delta D, \delta I\) but on \(D, I\) as well (i.e., consider severity not just effects)

\[ V(\delta D, \delta I | (D, I)) + V(\text{Resource use avoided}) \geq V(\text{Resources required}) \]

- Conjoint analysis can handle multiple dimensions and provide monetary valuations
- Could start with (unmanipulated) EQ5D valuations.

BADI

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