Fair prices, fair access and future innovation

Karl Claxton
26/7/2019
What is a fair price?

Cost

Price > P* £60,000
Price = P* £40,000
Surplus to the HCS £20,000
Price < P* £20,000

QALYs gained

Health opportunity costs $K_{H} = £20,000$ per QALY

1. Net Health Benefit 1 QALY
2. £20,000 per QALY
3. £30,000 per QALY
4. £10,000 per QALY
What is a fair price?

Health opportunity costs

\[ K_h = £20,000 \text{ per QALY} \]

Consumption value of health

\[ V_h = £30,000 \text{ per QALY} \]

Cost

Price > P*  
£60,000

Price = P*  
£40,000

Price < P*  
£20,000

£ Value of QALYs gained

£30,000  
£60,000  
£90,000

Net Consumption Benefit

[£30,000] [−£30,000]

Net Consumption Benefit

[£0] [£0]
What is a fair access?

<table>
<thead>
<tr>
<th>Thresholds</th>
<th>Plan 1</th>
<th>Plan 2</th>
<th>Plan 3</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>$K_{h_1}$ and $V_{h_1}$</td>
<td>2*£60,000 - 2*£60,000 = 0</td>
<td>2*£30,000 - 3*£30,000 = -£30,000</td>
<td>2*£20,000 - 6*£20,000 = -£80,000</td>
<td>-5 QALYs or -£110,000</td>
</tr>
<tr>
<td>$K_{h_2}$ and $V_{h_2}$</td>
<td>2*£60,000 - 1.333*£60,000 = £52,000</td>
<td>2*£30,000 - 2*£30,000 = 0</td>
<td>2*£20,000 - 4*£20,000 = -£40,000</td>
<td>-1.333 QALYs or £12,000</td>
</tr>
<tr>
<td>$K_{h_3}$ and $V_{h_3}$</td>
<td>2*£60,000 - 0.666*£60,000 = £80,000</td>
<td>2*£30,000 - 1*£30,000 = £30,000</td>
<td>2*£20,000 - 2*£20,000 = 0</td>
<td>2.333 QALYs or £110,000</td>
</tr>
</tbody>
</table>

$K_{h_1} = £30,000$ per QALY
$V_{h_1} = £60,000$ per QALY

$K_{h_2} = £20,000$ per QALY
$V_{h_2} = £30,000$ per QALY

$K_{h_3} = £10,000$ per QALY
$V_{h_3} = £20,000$ per QALY

Price = $P_1^*$ £60,000
Price = $P_2^*$ £40,000
Price = $P_3^*$ £20,000

£ Value of QALYs gained
What about future innovation?

Threshold for decision = health opportunity costs ($P^*$)
Patent expires and generic entry at $t=15$
Generic prices are 25% of the brand
All prescribing switches to generic
Or new brands compared to generic versions of old brands
Discounted (3.5% for UK Treasury)
How is value shared?

- 15 years of patent
- Generic 25% of brand
- Discount 3.5%

Proportion of total surplus retained by HCS

Cost per QALY ‘threshold’ used for pricing and reimbursement

Health opportunity costs

15 years of patent
Generic 25% of brand
Discount 3.5%
How is value shared?

- 15 years of patent
  - Generic 25% of brand
  - Discount 3.5%

- 10 years of patent
  - Generic 25% of brand
  - Discount 1.5%

- Health opportunity costs
How is value shared?

Proportion of total surplus retained by HCS

Cost per QALY ‘threshold’ used for pricing and reimbursement

Health opportunity costs

- 15 years of patent
  - Generic 25% of brand
  - Discount 3.5%

- 10 years of patent
  - Generic 75% of brand
  - Discount 1.5%

- 10 years of patent
  - Generic 25% of brand
  - Discount 1.5%
How is value shared?

- Proportion of total surplus retained by HCS
- Cost per QALY ‘threshold’ used for pricing and reimbursement

10 years of patent
- Generic 25% of brand
- Discount 1.5%

10 years of patent
- Generic 75% of brand
- Discount 1.5%

15 years of patent
- Generic 25% of brand
- Discount 3.5%

Incidence grows at 2% pa
- 10 years of patent
- Generic 25% of brand
- Discount 1.5%

Health opportunity costs
How should value be shared?

- Proportion of total surplus retained by HCS.
- Cost per QALY ‘threshold’ used for pricing and reimbursement.
- Health opportunity costs.
- Incidence grows at 2% pa.

- 10 years of patent:
  - Generic 25% of brand
  - Discount 1.5%

- 10 years of patent:
  - Generic 75% of brand
  - Discount 1.5%

- 15 years of patent:
  - Generic 25% of brand
  - Discount 3.5%
TA391 Cabazitaxel for prostate cancer

- Consumer surplus does not rise above zero due to high approval norm
- Consumer surplus will be lower if initial approval within the Cancer Drugs Fund taken into account
Recent UK estimates

- Scale of health opportunity costs
- Type of health effects (mortality, survival and morbidity)
- Where these are likely to occur (disease, age, gender)
- Severity of disease (burden, absolute and proportional)
- Net production effects (marketed and non marketed)
- Impact on health inequality
- Affordability and the scale of budget impact
- Elicitation from clinical and policy experts (surrogacy and extrapolation assumptions)
- Re-estimated for all waves of data
- Other categories of non NHS expenditure (public health, social care)

- Love-Koh J, Cookson R, Claxton K, Griffin S. Who gains most from public healthcare spending? Estimated health impacts of changes in English NHS expenditure by age, sex and socioeconomic status. Re-submission MDM
### What are the expected health consequences of £10m?

<table>
<thead>
<tr>
<th></th>
<th>Change in spend</th>
<th>Additional deaths</th>
<th>LY lost</th>
<th>Total QALY lost</th>
<th>Due to premature death</th>
<th>Quality of life effects</th>
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</thead>
<tbody>
<tr>
<td><strong>Totals</strong></td>
<td>10 (£m)</td>
<td>51</td>
<td>233</td>
<td>773</td>
<td>150</td>
<td>623</td>
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<tr>
<td>Cancer</td>
<td>0.45</td>
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<td>Circulatory</td>
<td>0.76</td>
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<td>116.0</td>
<td>107.8</td>
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<td>Respiratory</td>
<td>0.46</td>
<td>13.37</td>
<td>16.1</td>
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<td>Gastro-intestinal</td>
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<td>Infectious diseases</td>
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<td>5.3</td>
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<td>Endocrine</td>
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<td>60.6</td>
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<td>Neurological</td>
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<td>6.5</td>
<td>109.1</td>
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<td><strong>104.8</strong></td>
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<td>Genito-urinary</td>
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<td>2.25</td>
<td>3.3</td>
<td>10.6</td>
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<tr>
<td>Trauma &amp; injuries*</td>
<td>0.77</td>
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<td>Maternity &amp; neonates*</td>
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<td>0.2</td>
<td>0.1</td>
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<td>Disorders of Blood</td>
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<td>0.36</td>
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<td>21.8</td>
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<td>Mental Health</td>
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<td>2.83</td>
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<td>Learning Disability</td>
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<td>0.7</td>
<td>0.1</td>
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<td>Problems of Vision</td>
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<td>4.2</td>
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<td>Problems of Hearing</td>
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<td>Dental problems</td>
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<td>Skin</td>
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<td>1.1</td>
<td>1.9</td>
<td>0.7</td>
<td>1.2</td>
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<td>Musculo skeletal</td>
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<td>23.2</td>
<td>1.2</td>
<td>22.1</td>
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<tr>
<td>Poisoning and AE</td>
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<td>0.04</td>
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<td>0.1</td>
<td>0.7</td>
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<tr>
<td>Healthy Individuals</td>
<td>0.35</td>
<td>0.03</td>
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<td>0.7</td>
<td>0.1</td>
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<td>Social Care Needs</td>
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<tr>
<td>Other (GMS)</td>
<td>1.01</td>
<td>0.00</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>
What type of QALYs are lost/gained and what are the other effects of changes in expenditure?

The effects of 1 QALY gained or lost in each ICD code
Re-estimated for all waves of data

Other estimates using within country data

- Australia (Edney et al)
  - $28,033 per QALY AUD ($20,758 to $37,667)
- Spain (Vallejo-Torres et al)
  - 22,000€ to 25,000€ per QALY
- Netherlands (van Baal)
  - 41,000€ per QALY (CVD hospital care only)
- Sweden (Siverskog and Henriksson)
  - 39,000€ per QALY
- Indonesia (Kreif et al)
  - $331 per DALY averted (USD)
- South Africa (Edoka and Hofman)
  - $3,000 per DALY averted (USD)
Evidence of health opportunity costs

L/M IC = 2% - 56%
M/H IC = 20% - 77%

USA
($23,283 - $40,112, 2013 USD)

Evidence of health opportunity costs

Evidence of health opportunity costs

Average and range of estimates of cost per DALY averted by LIC

Evidence of health opportunity costs

Range of cost per DALY averted estimates for MICs 2015


USA ###
(### -#### US$ 20##)
Estimating health opportunity costs in Canada

<table>
<thead>
<tr>
<th></th>
<th>Claxton et al</th>
<th>Andrews et al</th>
<th>Bokhari et al</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(-1.028)</td>
<td>(-0.705)</td>
<td>(-0.193)</td>
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<tr>
<td>Canada</td>
<td>$19,914</td>
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<td>Alberta</td>
<td>$26,060</td>
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<td>British Columbia</td>
<td>$19,227</td>
<td>$28,029</td>
<td>$96,042</td>
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<tr>
<td>Manitoba</td>
<td>$21,722</td>
<td>$31,667</td>
<td>$104,498</td>
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<tr>
<td>New Brunswick</td>
<td>$18,265</td>
<td>$26,628</td>
<td>$90,166</td>
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<tr>
<td>Newfoundland and Labrador</td>
<td>$21,392</td>
<td>$31,186</td>
<td>$104,902</td>
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<td>Northwest Territories</td>
<td>$52,191</td>
<td>$76,087</td>
<td>$249,536</td>
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<td>Nova Scotia</td>
<td>$18,002</td>
<td>$26,244</td>
<td>$89,814</td>
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<td>Nunavut</td>
<td>$41,776</td>
<td>$60,903</td>
<td>$177,375</td>
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<tr>
<td>Ontario</td>
<td>$19,606</td>
<td>$28,582</td>
<td>$95,706</td>
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<tr>
<td>Prince Edward Island</td>
<td>$16,425</td>
<td>$23,945</td>
<td>$82,939</td>
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<tr>
<td>Quebec</td>
<td>$17,936</td>
<td>$26,147</td>
<td>$87,446</td>
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<td>Saskatchewan</td>
<td>$20,804</td>
<td>$30,329</td>
<td>$99,467</td>
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<tr>
<td>Yukon</td>
<td>$30,633</td>
<td>$44,659</td>
<td>$155,899</td>
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<thead>
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<tr>
<td></td>
<td>(-1.028)</td>
<td>(-0.705)</td>
<td>(-0.206.)</td>
</tr>
<tr>
<td>USA</td>
<td>$16,048</td>
<td>$23,397</td>
<td>$80,234</td>
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What are the health effects of additional health care costs in the USA?

- Single payer health care systems (marginal productivity of expenditure)
  - Medicaid (50 systems), federal and state $
  - Veterans Administration, federal $
  - Medicare (not allowed make decisions, still good to know you what get for federal $)

- Private health insurance plans
  - Health effect of being ‘priced out’ at plan choice or point of care
  - Costs net of the co-pay are passed on
    - Co-pay for the new drug has health (at point of care), consumption, and federal $(HAS)$ effects
  - Employers or employees may decide
    - Stop offering/buying coverage (has health and consumption effects)
    - Reduce the benefits offered to control costs (has health and consumption effects)
    - Increase in co-pays and deductibles (has health, consumption, and federal $ effects)
    - Health and consumption effects likely greater for lower income and greater health need
Estimating health opportunity costs for private plans in the USA

• Dave Vanness iHEA 2017
  • Proportion insured by age
  • 100% pass through
  • Elasticity coverage wrt premium
  • Mortality effects of loss of coverage
    • Quality adjusted survival effects
  • Morbidity effects of loss coverage
    • Quality life effects of survivors
  • QALY effects of additional costs
  • = £100,000 per QALY
Estimating health opportunity costs for private plans in the USA
What are the effects of approving a new drug

- New drug 1 QALY gained ppt (100 patients)
- Costs additional $200,000 ppt
- 20% co-pay
- 10% have HAS, will be topped up
- Marginal costs of public finance is 1.2 ($1 federal = $1.20 in your pocket)
- Marginal income tax 25%
- Health opportunity costs, $kh = $100,000 per QALY (Dave)
- Consumption value of health $Vh = $100,000 per QALY (Chuck)
- 10,000 initially in the plan
- Probability drop coverage 0.1

<table>
<thead>
<tr>
<th></th>
<th>New drug</th>
<th>Opportunity costs</th>
<th>Net value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health effects</td>
<td>1</td>
<td>1.6</td>
<td>- $60,000</td>
</tr>
<tr>
<td>Consumption effects HSA</td>
<td>-$3,000</td>
<td></td>
<td>-$3,000</td>
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<tr>
<td>Consumption effects</td>
<td>-$36,000</td>
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<td>-$36,000</td>
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<tr>
<td>Total consumption costs</td>
<td>-$39,000</td>
<td>$2,222.22</td>
<td>-$41,222</td>
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<tr>
<td>Consumption value of Federal $ effects</td>
<td>-$1,200</td>
<td></td>
<td>-$1,200</td>
</tr>
<tr>
<td>Total cost (plan + consumption)</td>
<td>-$200,200</td>
<td></td>
<td>-$202,422</td>
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</tbody>
</table>
What else do we need?

• Courage
  • We use estimates of health opportunity costs because you don’t pay for your health care, other people do, sometimes with their lives and the lives and dignity of their loved ones

• Honesty (tell the truth)
  • $K_h$ and $V_h$ differ across your health care ‘systems’ and ‘plans’ or tell a story
    • Reduce health overall
    • Force those who can afford it least to pay too much for their health care
    • Impoverish those already struggling with non health care bills
  • Reveal the implications of current arrangements and add to the accountability of those responsible for them

• Humility
  • There is no such thing as a ‘decision rule’
  • But there can be accountable decisions
    • Accountable to reason, evidence and reasonably held, but disputed social values