Multi-criteria Decision analysis (MCDA) for informed decision-making and better access to innovative therapies

Sitaporn Youngkong, PhD
Faculty of Pharmacy, Mahidol University
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Outline

- Introduction to Multi-criteria decision analysis (MCDA)
- MCDA for better decision makings & case studies in Thailand
- Key challenges
Decision criteria

Clinical effectiveness

Cost-effectiveness

Equity

Ease of implementation

Severity of disease
Decision criteria

Why has MCDA been proposed?

Better decision

a collection of formal, transparent and mathematical approaches, which seek to take explicit account of multiple criteria

Ensures all relevant factors (including intangibles) are considered

A transparent link between performance, judgments and value
## MCDA common steps

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision problem</td>
<td>Problem structuring, i.e. identify objectives, alternatives, decision makers, and output required</td>
</tr>
<tr>
<td>Identify criteria</td>
<td>Identify value criteria relevant to the decision problem</td>
</tr>
<tr>
<td>Measure performance</td>
<td>Gather evidence on the performance of the alternatives on the criteria</td>
</tr>
<tr>
<td>Scoring</td>
<td>Convert performance measures into scores that describe the desirability of achieving different levels of performance for each criterion</td>
</tr>
<tr>
<td>Weighting</td>
<td>Elicit the opinions of the stakeholders on the relative importance of different criteria or their preferences for criteria.</td>
</tr>
<tr>
<td>Aggregation</td>
<td>Combine or ‘aggregate’ criteria scores and weights to estimate the overall value of an option</td>
</tr>
<tr>
<td>Supporting decision making</td>
<td>Use the outputs from the MCDA exercise to support decision making</td>
</tr>
</tbody>
</table>

Source: ISPOR MCDA Taskforce.
Evidences for UC Benefit Package development

• Based on Multi-criteria decision analysis (MCDA) and Health Technology Assessment (HTA) – efficiency and equity

• The subcommittee for development of benefit package and service delivery under the National Health Security Board – development of all services and devices package

>> participatory, transparent, and systematic <<
Case study: the Thai UC benefit package development
The Thai UC health benefit package development

1. **7 groups of stakeholders**
   - Secretariat (IHPP & HITAP)

2. **Submitted topics**
   - Working group on health topic selection

3. **Preliminary assessment of each submitted topic**
   - Prioritized topics
   - HTA researchers (IHPP & HITAP)

4. **HTA results/Preliminary recommendations**
   - Subcommittee on development of health benefit package & services system of the National Health Security Office (NHSO)

5. **Recommendations**
   - Subcommittee on health financing

6. **NHSO board**

**Topic nomination**
- No. of people affected
- Disease/health problem severity
- Effectiveness of technologies
- Variation in practice
- Financial impact to the households
- Equity/ethical implications (affecting the poor & rare diseases)

**Topic prioritization for assessment**
- Cost-effectiveness
- Budget impact

**Technology assessment**
- Effectiveness of technologies
- Variation in practice
- Financial impact to the households
- Equity/ethical implications (affecting the poor & rare diseases)

**Appraisal**
- Cost-effectiveness
- Budget impact

### Submitted topics

<table>
<thead>
<tr>
<th>Topic nomination</th>
<th>Technology assessment</th>
<th>Appraisal</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of people affected</td>
<td>Disease/health problem severity</td>
<td>Cost-effectiveness</td>
</tr>
<tr>
<td>Disease/health problem severity</td>
<td>Effectiveness of technologies</td>
<td>Budget impact</td>
</tr>
<tr>
<td>Effectiveness of technologies</td>
<td>Variation in practice</td>
<td></td>
</tr>
<tr>
<td>Variation in practice</td>
<td>Financial impact to the households</td>
<td></td>
</tr>
<tr>
<td>Financial impact to the households</td>
<td>Equity/ethical implications (affecting the poor &amp; rare diseases)</td>
<td></td>
</tr>
<tr>
<td>Equity/ethical implications (affecting the poor &amp; rare diseases)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### HTA researchers

- Technology assessment
- Decision making

### Subcommittee on health financing

- Recommendations
Stakeholder participation

7 working groups on topic nomination

- Policy makers
- Health professionals
- Academics
- Civil groups
- Patients
- Healthcare industry
- Lay citizens

4 working groups on topic selection

- Health professionals
- Academics
- Civil groups
- Patients

5 Topics/round to research studies

2 rounds/year to nominate & select topics
Priority setting criteria

- Size of population affected by disease/health problem
- Severity of disease
- Economic impact on household expenditure
- Equity/ethical and social implication

- Effectiveness
- Variation in practice

- 5-point for scoring
- Weight is omitted

Health intervention assessment

Cost-effectiveness
Budget Impact
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Definition</th>
<th>Parameter</th>
<th>Scoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Size of population affected by disease</td>
<td>Number of people affected by the disease or Prevalence</td>
<td>5 = &gt;500,000&lt;br&gt;4 = 100,001–500,000&lt;br&gt;3 = 50,001–100,000&lt;br&gt;2 = 10,001–50,000&lt;br&gt;1 = ≤10,000</td>
<td></td>
</tr>
<tr>
<td>2. Severity of disease</td>
<td>Severity of disease or health problem that is treated or prevented by the proposed intervention</td>
<td>5 = &gt;0.60&lt;br&gt;4 = 0.41–0.60&lt;br&gt;3 = 0.21–0.40&lt;br&gt;2 = 0.01–0.20&lt;br&gt;1 = ≤0</td>
<td></td>
</tr>
<tr>
<td>3. Effectiveness of health intervention</td>
<td>The final outcomes of the proposed intervention that benefit the patients with regard to the objective of the intervention</td>
<td>5 = cure&lt;br&gt;4 = prolong life and major improvement in QOL&lt;br&gt;3 = prolong life and minor improvement in QOL&lt;br&gt;2 = major improvement in QOL&lt;br&gt;1 = minor improvement in QOL</td>
<td></td>
</tr>
<tr>
<td>3.1 For treatment/rehabilitation:</td>
<td>Capacity of the proposed intervention to treat or rehabilitate the patients from the disease and its impact on the patients’ QOL</td>
<td>5 = accuracy &gt;80% and screened disease could be cured&lt;br&gt;4 = accuracy 60%–80% and screened disease could be cured&lt;br&gt;3 = accuracy &gt;80% but screened disease could not be cured&lt;br&gt;2 = accuracy 60%–80% and screened disease could not be cured or accuracy &lt;60% and screened disease could be cured&lt;br&gt;1 = accuracy &lt;60% and screened disease could be cured</td>
<td></td>
</tr>
<tr>
<td>3.2 For screening/diagnostic:</td>
<td>Quality of the proposed intervention to screen or diagnose the disease of the patients and the expected outcome beyond the screening or diagnostic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3 For prevention:</td>
<td>Risk reduction or preventive capacity provided by the proposed intervention to the population</td>
<td>5 = &gt;90%&lt;br&gt;4 = 81%–90%&lt;br&gt;3 = 71%–80%&lt;br&gt;2 = 61%–70%&lt;br&gt;1 = ≤60%</td>
<td></td>
</tr>
<tr>
<td>Criteria</td>
<td>Definition</td>
<td>Parameter</td>
<td>Scoring</td>
</tr>
<tr>
<td>----------</td>
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</tr>
<tr>
<td>4. Variation in practice</td>
<td>Variation of implementing the intervention in practice that leads to unequal accessibility to the intervention among Thais. Variation in practice could be identified from the different coverage of the three publicly funded health insurance schemes in Thailand and/or could be identified from the different distribution of the intervention throughout the country.</td>
<td>The difference of the benefit packages between the three health insurance schemes in Thailand</td>
<td>5 = national evidence presenting variation in practice in Thailand</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The difference of health interventions distribution</td>
<td>4 = national evidence presenting variation in practice in some areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 = international evidence presenting variation in practice in other countries that could assume there is variation in practice in Thailand</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 = no evidence but we could assume there is variation in practice in Thailand</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 = no variation in practice</td>
<td></td>
</tr>
<tr>
<td>5. Economic impact on household expenditure</td>
<td>Impact on household expenditure as a consequence of providing health intervention to a family member with consideration of catastrophic illness or health catastrophe</td>
<td>Direct medical and nonmedical household expenditure as a consequence of the disease or health problem per year</td>
<td>5 = &gt;62,500 baht/y</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4 = 35,601–62,500 baht/y</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 = 20,801–35,600 baht/y</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 = 12,000–20,800 baht/y</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 = &lt;12,000 baht/y</td>
<td></td>
</tr>
<tr>
<td>6. Equity/ethical and social implication</td>
<td>Priorities for specific groups of patients, i.e., the poor with rare disease, reflect the moral values that should be considered by policymakers</td>
<td>Disease of the poor</td>
<td>5 = targeting the poor and prevalence &lt;1,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prevalence &lt;1,000 (rare disease)</td>
<td>4 = targeting the poor and prevalence 1,000–10,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 = targeting the poor and prevalence &gt;10,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 = not targeting the poor and prevalence &lt;1,000 or not targeting the poor and prevalence 1,000–10,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 = not targeting the poor and prevalence &gt;10,000</td>
<td></td>
</tr>
</tbody>
</table>
## Performance matrix

### Appendix 1 Scores of the proposed health interventions against the selection criteria

<table>
<thead>
<tr>
<th>Health interventions</th>
<th>Size of population affected by disease</th>
<th>Severity of disease*</th>
<th>Effectiveness of health intervention</th>
<th>Variation in practice</th>
<th>Economic impact on household expenditure</th>
<th>Equity/ethical and social implication</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Anti-immunoglobulin E for severe asthma</td>
<td>4</td>
<td>—</td>
<td>3</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>18</td>
</tr>
<tr>
<td>2. Treatment for people with chronic hepatitis B</td>
<td>5</td>
<td>—</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td>3. System for screening, treatment, and rehabilitation of alcoholism</td>
<td>5</td>
<td>—</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>4. Implant dentures for people who have problem with conventional complete dentures</td>
<td>5</td>
<td>—</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>5. Screening for risk factors for leukemia in people living in the industrial areas</td>
<td>4</td>
<td>—</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>6. Treatment for severe lupus nephritis</td>
<td>2</td>
<td>—</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>7. Smoking cessation program</td>
<td>5</td>
<td>—</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>8. Treatment for people with chronic hepatitis C</td>
<td>3</td>
<td>—</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>9. Absorbent products for urinary and fecal incontinence among disabled and elderly people</td>
<td>4</td>
<td>—</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>13</td>
</tr>
</tbody>
</table>

### Performance matrix

Appendix 1 Scores of the proposed health interventions against the selection criteria

<table>
<thead>
<tr>
<th>Health interventions</th>
<th>Size of population affected by disease</th>
<th>Severity of disease*</th>
<th>Effect on health of intervention</th>
<th>Selection criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Anti-immunoglobulin E for severe asthma</td>
<td>4</td>
<td>—</td>
<td></td>
<td>5 = life threatening disease/ health problem</td>
</tr>
<tr>
<td>2. Treatment for people with chronic hepatitis B</td>
<td>5</td>
<td>—</td>
<td>4</td>
<td>4 = disease/health problem associated with major disability</td>
</tr>
<tr>
<td>3. System for screening, treatment, and rehabilitation of alcoholism</td>
<td>5</td>
<td>—</td>
<td>5</td>
<td>3 = disease/health problem associated with minor disability</td>
</tr>
<tr>
<td>4. Implant dentures for people who have problem with conventional complete dentures</td>
<td>5</td>
<td>—</td>
<td>2</td>
<td>2 = disease/health problem affecting quality of life</td>
</tr>
<tr>
<td>5. Screening for risk factors for leukemia in people living in the industrial areas</td>
<td>4</td>
<td>—</td>
<td>3</td>
<td>1 = minor inconvenience</td>
</tr>
<tr>
<td>6. Treatment for severe lupus nephritis</td>
<td>2</td>
<td>—</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>7. Smoking cessation program</td>
<td>5</td>
<td>—</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>8. Treatment for people with chronic hepatitis C</td>
<td>3</td>
<td>—</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>9. Absorbent products for urinary and fecal incontinence among disabled and elderly people</td>
<td>4</td>
<td>—</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

*Severity of disease: 5 = life threatening disease/health problem, 4 = disease/health problem associated with major disability, 3 = disease/health problem associated with minor disability, 2 = disease/health problem affecting quality of life, 1 = minor inconvenience

Topic nominated and selected during 2010 – 2014 under the benefit package development process

<table>
<thead>
<tr>
<th>Topic</th>
<th>Nominated</th>
<th>Selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening &amp; Tx for Liver CA</td>
<td></td>
<td></td>
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<tr>
<td>Screening Cholangiocarcinoma</td>
<td></td>
<td></td>
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<tr>
<td>HPV vaccination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screening for risk factors for leukemia</td>
<td></td>
<td></td>
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<tr>
<td>Hep B vaccination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HPV vaccination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hep B vaccination</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population-based screening for 50-yr old male for Prostate CA</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>Population-based screening for Chronic Myeloid Leukemia</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td>Population-based screening for Colorectal CA</td>
<td>22</td>
<td>13</td>
</tr>
<tr>
<td>Tx for prostate CA</td>
<td>29</td>
<td>24</td>
</tr>
<tr>
<td>Tx for advanced non-small cell lung cancer for patient with the 2nd-line-Tx</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>Chemoclave for health care providers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Velscope for screening Oral CA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tx for Chronic Myeloid Leukemia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screening for Hep C</td>
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<td></td>
</tr>
</tbody>
</table>
Example of implementing priority topics (1)

Policy question: Should Thai UHC offer free screening test for colorectal cancer?

Policy makers proposed that screening high-risk population for colorectal cancer should be included in the UC benefit package.

Population-based screening was assessed comparing with high-risk population-based screening.

High-risk population based (family history) screening by colonoscopy (once in lifetime) is the most cost-effective.

Research question:
Is it cost-effective to provide population-based screening for colorectal cancer in Thailand?

Source: UCBP project. 2012.
Example of implementing priority topics (2)

Policy question: Should Thai UHC offer free treatment for people with chronic hepatitis B?

- Treatment for chronic Hep B was proposed to be included in the UC benefit package
- Drug treatment in HBeAg positive chronic Hep B patients
  - Providing lamivudine & then tenofovir when drug resistance occurred & Providing tenofovir monotherapy were 2 cost-saving options
- Screening for Hep B was considered to be included in health check-up package (adults) + Hep B vaccination for people without immunization

Research question: Is the treatment (lamivudine and tenofovir) for people with chronic Hep B cost-effective in the Thai context?

Source: UCBP project. 2012.
MCDA in Thailand

MCDA was useful in Thailand in the 3 broad applications:

- To provide broad classifications of interventions within a specific disease area & across a broad set of interventions to guide decisions at the national-level
- To guide highly contextualized decisions on the implementation of a number of interventions for a health benefit package
- To raise a concern beyond cost and health outcome – social & ethical considerations
Challenges

- Challenges related to the methodology used
  - Complex interventions
  - The quality of evidence

- Challenges related to decision-context
  - Managing diverse perspectives from different stakeholders involved