NCEC
Economic Evaluation Training

Shelley O’Neill
Health Technology Assessment Directorate
Training outline

1) What is Health Technology Assessment (HTA)?
2) What are the relevant NCEC guideline criteria?
3) How to conduct a budget impact assessment
4) How to review the economic literature
1) What is Health Technology Assessment (HTA)?
Objective:

To inform safe and effective health policies that are patient focussed and achieve best value.

HTA is a “decision support tool”
Health Technologies

Includes a wide range of interventions used in healthcare and health promotion

- Pharmaceuticals (Drugs)
- Vaccines
- Medical Devices
- Diagnostics
- Medical and surgical procedures
- Public health activities

Includes the systems within which health is protected and maintained
Why do we need HTA?

• Introduce technologies speedily with proven significant health benefits
• Prevent the introduction of technologies which fail to meet the requirements of evidence-based analysis

The best interests of the individual
Fair & equitable allocation of resources for society
Scarcity means that choices must be made!

Hospital to close ward to pay for drugs, nurses told
Long list of bed and ward closures outlined

HSE set to make major cuts over €1bn budget shortfall
Bed closures likely as talks planned with Government

THE IRISH TIMES
24-28 TARA STREET, DUBLIN 2
SATURDAY, OCTOBER 18TH, 2008
www.irishtimes.com

Crisis over medical cards
“HTA is a decision support tool”

Multidisciplinary process, summarises information about:

- Safety
- Clinical and cost-effectiveness
- Budget impact
- Organisational impact / resource implications
- Social and ethical issues

related to use of a health technology in a systematic, transparent, unbiased and robust manner
HTA for consumers/patients

“rationing”

RATIONING

TALK and ACTION IN HEALTH CARE

Edited by Bill New

One in, one out?
HTA for Clinicians……

..a clinical purist?

..or a financial realist?
Questions addressed in an economic evaluation:

1. Can it work (efficacy)?
2. Does it work (effectiveness)?
3. Is it worth doing (efficiency)?
4. How much will it cost (affordability)?
Common outcome measures

**Life years gained:**

Number of years an individual’s life is prolonged as a result of a particular intervention.

**Quality-adjusted life years (QALY):**

Number of years an individual’s life is prolonged as a result of a particular intervention, incorporating adjustments for the quality of that life.

**Why?...**

- Universally applicable to all patients and diseases
- Allows comparisons between different health programmes
- Useful for decision makers
- QALYs allow for measurement of values or preferences for a particular health state
Cost-effectiveness analysis

- Compares costs and consequences of two technologies A and B

Cost A – Cost B
Effect of A – Effect of B

Choice

Cost / QALY

Incremental cost-effectiveness ratio (ICER)
### Economic evaluation

<table>
<thead>
<tr>
<th>Evaluation Type</th>
<th>Costs</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost-effectiveness analysis (CEA)</strong></td>
<td>€</td>
<td>Natural units (e.g. life years gained)</td>
</tr>
<tr>
<td><strong>Cost-utility analysis (CUA)</strong></td>
<td>€</td>
<td>Health Status (e.g. QALYs or DALYs gained)</td>
</tr>
<tr>
<td><strong>Cost-benefit analysis (CBA)</strong></td>
<td>€</td>
<td>€ (e.g. based on willingness-to-pay)</td>
</tr>
<tr>
<td><strong>Cost-minimisation analysis (CMA)</strong></td>
<td>€</td>
<td>Assume benefits to be equivalent</td>
</tr>
</tbody>
</table>

Economic evaluations are usually in the form of CEA or CUA.
Cost-effectiveness plane

Effect (QALY)

- **Reject**
  - Q4: Intervention less effective and more costly
  - Q1: Intervention more effective and more costly

- **Probably Reject**
  - Q3: Intervention less effective and less costly
  - Q2: Intervention more effective and less costly

Cost (€)
The incremental cost-effectiveness ratio is usually represented graphically as a line passing through the origin on the cost effectiveness plane.

Cost (€)

Effect (QALY)

Q4

Q1

Q3

Q2

Accept (probably)

€10,000/QALY
Cost-effectiveness plane

The incremental cost-effectiveness ratio is usually represented graphically as a line passing through the origin on the cost-effectiveness plane.

\[ \text{Cost (€)} \]

\[ \text{Effect (QALY)} \]

\[ \text{Reject (probably)} \]

\[ \text{€60,000/QALY} \]
The line passing through the origin represents our ‘acceptable’ cost-effectiveness ratio. That is our maximum (or threshold) willingness-to-pay for a unit of effect (life year or QALY).
Acceptability of a technology with an ICER value in the region of the threshold will be influenced by:

- Degree of uncertainty in calculating the ICER
- The innovative nature of the technology
- Particular features of the condition and population receiving the technology
- The wider societal costs and benefits
Training outline

1) What is Health Technology Assessment (HTA)?
2) What are the relevant NCEC guideline criteria?
Prioritisation of Clinical Guidelines

Criteria 4 Economic Impact

While there is often limited Irish data available on the economic impact of healthcare interventions, guideline developers should consider international evidence and make an effort to include some estimation or approximation of the cost-effectiveness, and any possible budget increases or savings, if the guideline is implemented.

- Would implementing this guideline have a substantial budget impact on the healthcare system?
  - Have the resource implications of implementing the guideline been considered?
  - Have the resources required for any initial set up or roll out phase been considered?
  - Have the cost of these resources to the publicly-funded system been estimated?

- Are there potential cost savings to be realised if the guideline is implemented?
  - Are there any potential cost savings due to changes in the use of resources?
  - Have the benefits from improved outcomes been quantified and the associated costs or savings been estimated?

- Is there national or international cost-effectiveness evidence to support implementing the guideline?
  - Is a summary of the cost-effectiveness evidence presented? Is this generalisable or relevant to the Irish healthcare setting?
  - Has this evidence been gathered using systematic searching methods and are these methods documented?
How does it fit into the NCEC guidelines?

Appraisal of Clinical Guidelines - Relevant criteria

• Part A- Pre-requisite quality assurance criteria for the Irish context

6. Consideration of cost-effectiveness, resource implications and health service delivery issues should be included in the development of the recommendations. Resource implications from an Irish health service perspective should be explicit and include equipment, staff, training etc.

• Part B- Appraisal of Guidelines for Research & Evaluation II (AGREE II)

APPLICABILITY

20. The potential resource implications of applying the recommendations have been considered.
To meet requirements guideline developers need to:

1. Conduct a budget impact assessment

2. Systematically search and review the relevant economic literature.
1) What is Health Technology Assessment (HTA)?
2) What are the relevant NCEC guideline criteria?
3) How to conduct a budget impact assessment
What is a Budget impact analysis?

Budget impact analysis

Budget impact analysis looks at the financial impact of implementing a new clinical guideline over a finite period.

- How much will it cost (affordability)?

- Describes the incremental (change) in costs and resources
Budget impact matters – even when a technology is deemed cost effective?

Government gives up cervical cancer vaccine plan

Harney cites ‘very scarce’ health resources
Budget impact

• The incremental impact should be considered, the total cost of implementing the national guideline less what would have been spent on the current standard of care.

• The comparator should be ‘routine care,’ that is, the current or most widely used clinical practice in Ireland; this may be a mix of a number of different practices

Who’s budget? *(Perspective)*

• Typically only the direct costs to the publicly-funded health and social care system (HSE) in Ireland are included

• Indirect costs (absenteeism from work, disability, need for long term care etc.) are important in instances where significant budget implications for other publicly-funded services are anticipated.
Assessing the budget impact can be broken into 4 steps:

1. Identify the recommendations with a resource impact
2. Identify the resources used that might change
3. Estimate the size of these changes
4. Determine the applicable costs.
Step 1- Identify the recommendations with a resource impact (Guidelines only)

- For each recommendation is this a change from current practice?
- Current practice = No additional resources
- Consider grouping into general topics that cover a number of recommendations e.g. training.
Step 2- Identify the resources that might change

- What is current practice? Is it consistent nationally or is there variation?
- What is the new treatment? Does this affect the ongoing treatment or the patient pathway?
- Does the intervention replace current systems?
- Who will receive treatment?
- Who delivers the current intervention? Who will deliver the new intervention?
- Where is the proposed setting for the intervention?
- Are new facilities required?
- Is new equipment required?
- For how long will patients receive treatment?
- Is there a change to outcomes?
- Are there extra/different harms or adverse events?
- What are the initial set-up requirements?
  - Are there training requirements?
What is the new treatment? Does it affect the ongoing treatment or the patient pathway?

**Example:** from National Clinical Guideline No. 2- Prevention and Control of MRSA\(^{(18)}\)

Recommendation of an extra throat swab – The addition of a throat swab to the testing sites was expected to have a negligible cost by the guideline development group. In a number of laboratories, specimens are pooled for processing and the implication of the extra swab was not thought to add significantly to the financial or personnel resources needed for processing.
Who delivers the current intervention? Who will deliver the new intervention?

**Example:** from National Clinical Guideline No. 11- Communication (Clinical Handover) in Acute and Children’s Hospital Services

Medical duty shift handover is not a routine structured task involving protected time and, on foot of recommendation 17 (Protected time should be designated for interdepartmental clinical handovers), there will be an additional cost in ensuring a minimum of 30 minutes for duty shift overlap. Assuming that medical staff will conduct two duty shifts per day, the estimated duration of protected time is 1 hour (x2 30 minutes).
Are there training requirements?

**Example:** from National Clinical Guideline No. 1- National Early Warning Score\(^{(29)}\)

The amended COMPASS\(^{©}\) Programme takes approximately 8.5 hours which consists of reading the manual (2 hours), working from an interactive education CD (15 minutes), an on-line quiz (15 minutes) and a 6 hour face-to-face session.
Is new equipment required?

HTA of public access defibrillation (premises would be required to install an automated external defibrillator)
Step 3- Estimate the size of these changes

- How will predicted activity over the next number of years be estimated?
- How many patients will be affected? What is the incidence and prevalence of the disease?
- Where is the proposed setting for the intervention- How many of these are there? Who is delivering the intervention?
- How frequently is training offered to staff?
Who will receive the intervention? How many patients/individuals?

The target population!

The target population characteristics

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life expectancy</td>
<td>Co-morbidities</td>
</tr>
<tr>
<td>Socio-economic status</td>
<td>Treatment response</td>
</tr>
</tbody>
</table>

Will dictate how much of the intervention is required and will also impact on the treatment response.

This could be presented as a range, to incorporate variation in the estimate, projected changes, or possible different scenarios.
Data we might be interested in and potential sources:

• Morbidity
  o Hospital In-Patient Enquiry Scheme (HIPE) [www.hpo.ie](http://www.hpo.ie)
  o Primary Care Reimbursement Service (PCRS) [www.hse.ie/eng/staff/PCRS/](http://www.hse.ie/eng/staff/PCRS/)
  o National Cancer Registry [www.ncri.ie/](http://www.ncri.ie/)

• Mortality
  o Vital Statistics [www.cso.ie](http://www.cso.ie)
  o National Paediatric Mortality Register [www.sidsireland.ie/](http://www.sidsireland.ie/)
  o National Drug-Related Deaths Index [www.hrb.ie/](http://www.hrb.ie/)
  o National Perinatal Reporting System (NPRS) [www.hpo.ie](http://www.hpo.ie)
Budget impact

• Health service utilisation
  o HIPE & PCRS
  o BreastCheck [www.breastcheck.ie](http://www.breastcheck.ie) & CervicalCheck [www.cervicalcheck.ie](http://www.cervicalcheck.ie/)
  o Health Protection Surveillance Centre [www.ndsc.ie/hpsc](http://www.ndsc.ie/hpsc/)
  o National Psychiatric Inpatient Reporting System [www.hrb.ie](http://www.hrb.ie/)

• Demographic (Census) [www.cso.ie](http://www.cso.ie)

• Exposure
  o National Roads Authority [www.nra.ie](http://www.nra.ie/)
  o Office of Tobacco Control [www.hse.ie/eng/about/Who/TobaccoControl](http://www.hse.ie/eng/about/Who/TobaccoControl)

• HIQA catalogue of health information sources:
Budget impact-Example

Where is the proposed setting for the intervention- How many of these are there? Who is delivering the intervention?

**Example:** from National Clinical Guideline No. 1- National Early Warning Score

There are approximately 17,500 WTE nurses working in acute public hospitals

A specified proportion of doctors and allied health professionals will also require training. Using the current numbers trained across staff groups, and based on the latest NEWS audit evidence, it was estimated that in total an estimated 20,500 staff require training, split between nurses (17,500), doctors (2,000) and allied health professionals (1,000).

Approximately 300 staff have been trained to provide the education programme consisting of 80% nurses, 10% doctors, 10% allied health professionals. Delivering a training session is estimated to take eight hours. On average the education sessions are predicted to include 10 trainees, so approximately 2,050 training session will be required.
How many patients will be affected? What is the incidence and prevalence of the disease?

**Breast cancer guidelines**
In newly diagnosed asymptomatic patients with breast cancer, use of staging imaging for metastatic disease is recommended for stage III and IV disease.
Budget impact

Step 4 - Determine the applicable costs for these changes

- What are the technology costs?
- Is the training accredited and does this incur costs?
- Is new equipment required? Who are the suppliers?
- Are there start-up costs of training, equipment, rebuilding etc?
- Are there cost savings or cost offsets?
- What are the healthcare utilisation costs?
Budget impact

- Technology/intervention- (Data from the manufacturer)
- Staff- include pay at mid-point of pay scale, employers’ PRSI, imputed pension cost, and overheads [www.hse.ie/eng/staff/Benefits_Services/pay/](http://www.hse.ie/eng/staff/Benefits_Services/pay/)
- Hospital in-patient, daycase procedure costs and OPD [www.hpo.ie/](http://www.hpo.ie/)
- Drugs covered on the community schemes (PCRS) [www.hse.ie/eng/staff/PCRS/](http://www.hse.ie/eng/staff/PCRS/)
- Hospital finance departments
• Annual depreciation of any capital costs should be included in the analysis.

• Include any maintenance contracts

• If using cost from literature:
  
  o Retrospective health costs must be inflated to current prices using the Consumer Price Index (CPI) for Health.
  
  o Where costs are applied from other countries, all costs must be converted to euro using Purchasing Power Parity indices (PPP).
  
  o If transferring costs from another currency, the inflation should be calculated using the CPI for the local currency prior to conversion to euro using PPP. [www.oecd.org/std/prices-ppp/](http://www.oecd.org/std/prices-ppp/)
**Is the training accredited and does this incur costs?**

**Example:** from National Clinical Guideline No. 12 - The Irish Paediatric Early Warning System (PEWS)

**National PEWS Nurse Coordinator Costs**

A national PEWS nurse coordinator was appointed in August 2014 to oversee the development and implementation of the Irish PEWS. For 2016, this post has been costed based on 1WTE as set out below.

<table>
<thead>
<tr>
<th>Profession</th>
<th>Grade costed (DoH 2013, pre-2010 scales chosen)</th>
<th>Annual salary (taken as top of scale)</th>
<th>Full labour cost (pay + employer PRSI salary costs of 10.75% + 4% imputed cost on pay + overheads of 25% on pay)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1WTE National PEWS Nurse Coordinator</td>
<td>CNM3</td>
<td>€61,491</td>
<td>€85,934</td>
</tr>
</tbody>
</table>
Are there start-up costs of training, equipment, rebuilding etc?

**Example:** from National Clinical Guideline No. 1 - National Early Warning Score\(^{(29)}\)

To support the initial phase of education and training, education materials were provided by the Office of the Nursing and Midwifery Services Directorate through the Nursing and Midwifery Planning and Development Units. These included 5,000 Manuals, 700 CDs, 10,000 sample observation charts and 3,000 ISBAR Charts, costing a total of €17,982. This cost includes VAT at the appropriate rate of 23%.
Are there potential cost savings to be realised if the guideline is implemented?

• Changes in the use of resources, stopping or changing current practice (different material costs)

• Treatment avoided due to improved health outcomes (e.g. fewer bed days), a reduction in adverse events.

• Particularly relevant for preventive care – use of intervention may result in reduced health service use

• Although introduction of a new guideline may lead to a reduction in staff requirements, it may be difficult to realise any potential savings (e.g., redeployment of staff).
**Are there cost savings or cost offsets?**

**Example:** from National Clinical Guideline No. 3- Surveillance, Diagnosis and Management of Clostridium difficile Infection

Fidaxomycin-cost offsets and cost savings
Prescribing fidaxomicin in preference to vancomycin and metronidazole will lead to:

- cost offsets from replacing prescriptions for vancomycin and metronidazole
- cost savings from reduced length of stay from recurrences avoided
1) What is Health Technology Assessment (HTA)?
2) What are the relevant NCEC guideline criteria?
3) How to conduct a budget impact assessment
4) How to review the economic literature
How does it fit into the NCEC guidelines?

To meet requirements guideline developers need to:

1. Conduct a budget impact assessment

2. Systematically search and review the relevant economic literature.
Systematic search

• Searching for economic evaluation literature
  • How to search?
  • Where to search?
  • Finding the right studies?

• Reviewing the evidence
  • Is it a useful study?
  • Is it good quality?

• Summarising and Interpretation
  • Can I use the study results?
  • Why can’t I use the results?
  • How should I report this?
How to search?

• Systematic literature search to identify cost effectiveness evidence should be reproducible, thorough and transparent, consistent with the search for clinical effectiveness/guidelines

• Same methods for defining search question (PICOs) and reporting search strategy (inclusion/exclusion criteria, flow chart etc.)
Where to search?

- Specialised databases

<table>
<thead>
<tr>
<th>Database</th>
<th>Websites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database of Abstracts of Reviews of Effects</td>
<td><a href="http://www.crd.york.ac.uk/CRDWeb">www.crd.york.ac.uk/CRDWeb</a></td>
</tr>
<tr>
<td>NHS Economic Evaluation Database (EED)</td>
<td><a href="http://www.crd.york.ac.uk/CRDWeb">www.crd.york.ac.uk/CRDWeb</a></td>
</tr>
<tr>
<td>Health Technology Assessment Database</td>
<td><a href="http://www.crd.york.ac.uk/CRDWeb">www.crd.york.ac.uk/CRDWeb</a></td>
</tr>
<tr>
<td>Cochrane Central Register of Controlled Trials</td>
<td><a href="http://www.thecochranelibrary.com">www.thecochranelibrary.com</a></td>
</tr>
<tr>
<td>Cochrane Database of Systematic Reviews</td>
<td><a href="http://www.thecochranelibrary.com">www.thecochranelibrary.com</a></td>
</tr>
</tbody>
</table>

- Search should be performed using the major health search engines such as MEDLINE and EMBASE using economic search filters (available www.york.ac.uk/inst/crd/intertasc/econ.htm)

- Has intervention/drug been assessed by HIQA or NCPE?
Systematic search

Finding the right studies?

• Methods same as for clinical search, clear inclusion/exclusion criteria, timeliness, initial screening etc.
Is it a useful study?

Assess relevance to current study setting?
1. Is the population similar?
2. Is the intervention the same?
3. Is the comparator(s) relevant?
4. Are the outcomes relevant?
Is it good quality?

Appraising the evidence:

• Is the study of adequate quality?

• Are there major limitations in the study design or in the economic modelling?

Available tools in considering the quality of economic studies (CHEC-list, BMJ, Philips)
Systematic search

Can I use the study results?

Assessing transferability

- Use a defined framework (ISPOR, Welte, EUnetHTA)
- Highlight any expected differences from Irish setting
- ISPOR very user friendly

<table>
<thead>
<tr>
<th>Question</th>
<th>Helper questions to consider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is external validation of the model sufficient to make its results credible for your decision?</td>
<td>Has the model been shown to accurately reproduce what was observed in the data used to create the model?</td>
</tr>
<tr>
<td></td>
<td>Has the model been shown to accurately estimate what actually happened in one or more separate studies?</td>
</tr>
<tr>
<td></td>
<td>Has the model been shown to accurately forecast what eventually happens in reality?</td>
</tr>
</tbody>
</table>
Patients who survive the acute phase of respiratory failure often are transferred to units with specialized expertise. These patients have a high risk of being readmitted to the acute care hospital. We conducted this study to determine whether supplementing a written report with a verbal telephone report reduces readmission rates within the first 72 h after discharge and decreases hospital costs. The study design was observational with a historical control group that included patients admitted to our respiratory acute care unit between November 2003 and October 2005. In November 2005, we implemented a strategy in which a written report at discharge was supplemented with a telephone report by the physician or nurse practitioner, nurse, and respiratory therapist. The intervention group began in November 2005 and continued through October 2007. The primary end point was readmission to Massachusetts General Hospital within 72 h of discharge. We also determined the cost related to readmission. The study included 362 patients. The OR for readmission if the handoff included a verbal report was 0.42 (95% CI, 0.17-1.04). The total hospital cost was significantly lower in the group where verbal report was used ($111,723 vs $148,574; P = .002). Supplementing a written report with a verbal telephone report was associated with a significant reduction in cost and an average savings of ~$184,000 for every 100 patients discharged, representing added value in delivered care.  

*CHEST 2010; 138(6):1475–1479*
Why can’t I use the results?

Additional issues to consider for economic literature

- Perspective
- time horizon
- costing approaches
- modelling
- discounting
- sensitivity analysis
- threshold
Synthesising and summarising the results

How Should I report this?

• Similar to any systematic review, clear search strategy, flow chart of studies, evidence table

• Link literature to guidelines, does it support the recommendations

• Is literature consistent with clinical reviews and strength of recommendations

• Identify any gaps
1) What is Health Technology Assessment (HTA)?
2) What are the relevant NCEC guideline criteria?
3) How to conduct a budget impact assessment
4) How to review the economic literature
Useful websites

Ireland

– HIQA HTAs/Guidelines:  [www.hiqa.ie](http://www.hiqa.ie)
– National Centre for Pharmacoeconomics:  [www.ncpe.ie](http://www.ncpe.ie)

International Collaborations and Organisations

– [www.euroscan.org.uk](http://www.euroscan.org.uk)

Databases

– [http://www.crd.york.ac.uk/crdweb/](http://www.crd.york.ac.uk/crdweb/)
– [http://www.hta.ac.uk/](http://www.hta.ac.uk/)

HTA explained

Further Reading


MF Drummond et al. Guidelines for authors and peer reviewers of economic submissions to the BMJ. BMJ 1996; 313:276-83
Thank You