

## Health Technology Assessment



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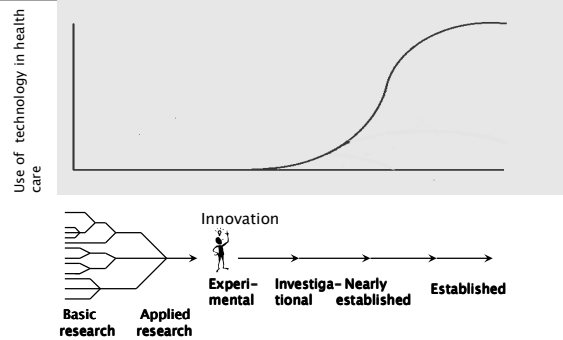
### What is a Health Technology?

- Any intervention that may be used to promote health, to prevent, diagnose or treat disease for rehabilitation or long-term care.
- The term encompasses drugs, devices and clinical procedures

### Today's Surgical Technology



### Diffusion of Technology



### What is a Health Technology Assessment?

Health Technology Assessment (HTA) is a multi-disciplinary field of policy analysis, which SYSTEMATICALLY studies the:

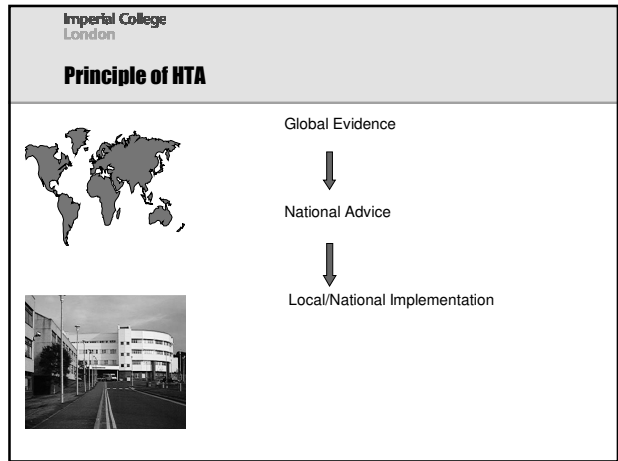
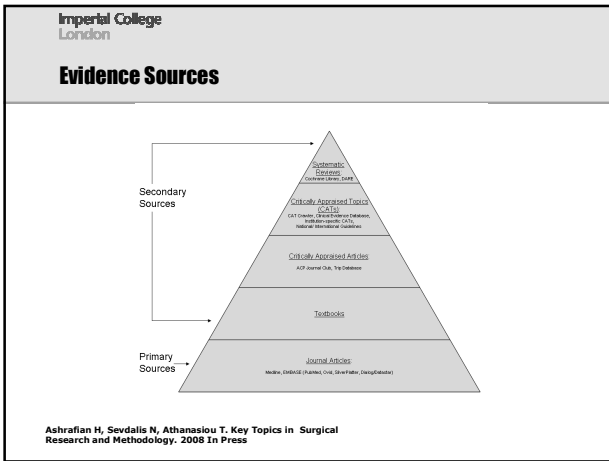
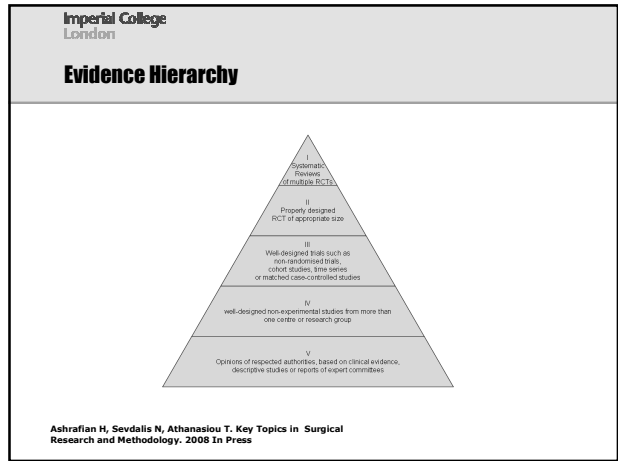
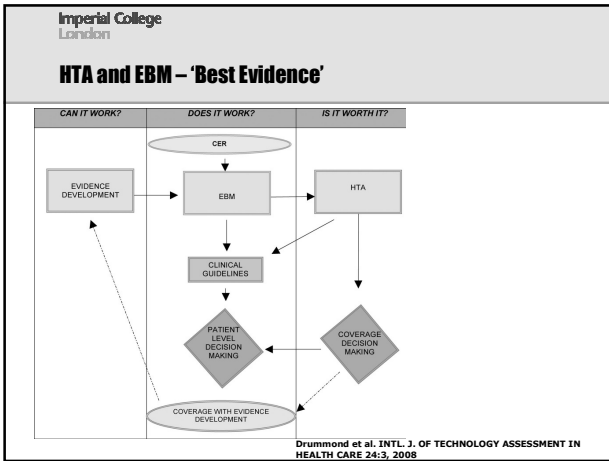
- Medical
- Social
- Ethical
- Economic

implications of development, diffusion and use of health technology.

INAHTA, 2008

### HTA Objectives

- does the technology work?
- for whom?
- at what cost?
- how does it compare to alternatives?



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### Attributes of health technologies that require assessment.

**Safety**  
Information on harm or adverse effects of the technology considered by regulatory agencies and also safety issues associated with procedures and with effects of technology on overall process.

**Efficacy**  
The performance of a technology under "ideal" conditions or conditions of best practice.

**Effectiveness**  
The performance of a technology under "routine" conditions, for example when it has become widely distributed in a healthcare system.

**Economic impact**  
Costs of a technology are of immediate interest for healthcare budgets, but HTA will often be concerned with economic costs and benefits, and in judgments as to whether a technology is good value for money.

**Equity**  
The extent and distribution of access to a technology.

**Ethical issues**  
The consequences of the technology for the well-being and rights of those whom it might affect.

Halley D. Health technology assessment. 2006

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### Questions to ask about an HTA report I

**Preliminary information**  
Is there:

- Appropriate contact information?
- Identification of who prepared the HTA report?
- A statement regarding conflict of interest?
- A statement on whether the report has been externally reviewed?
- A short summary that can be understood by the nontechnical reader?

**Why the assessment has been undertaken**

- Is reference made to the question that is addressed and the context of the assessment?
- Is the scope of the assessment specified?

Halley D. Health technology assessment. 2006

### Questions to ask about an HTA report II

**How the assessment has been undertaken**

- What sources of information have been used?
- Is there information on the process for selecting material for assessment?
- Is there information on the basis for interpretation of selected data?

**Results of the assessment**

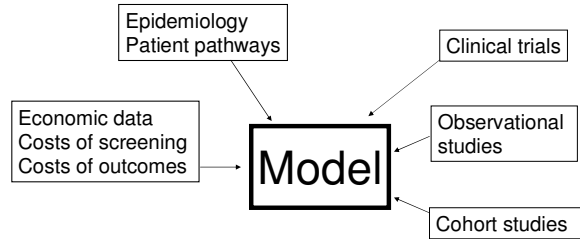
- Are the results of the assessment clearly presented?
- Is there interpretation of the assessment results?

**Implications of the assessment results and conclusions**

- Are the findings of the assessment discussed?
- If relevant to the assessment, are medico-legal implications considered?
- Are the conclusions from the assessment clearly stated?
- Are there suggestions for further action?

Halley D. Health technology assessment. 2006

### Economic Modelling



### An Example

**Drug A (old)**

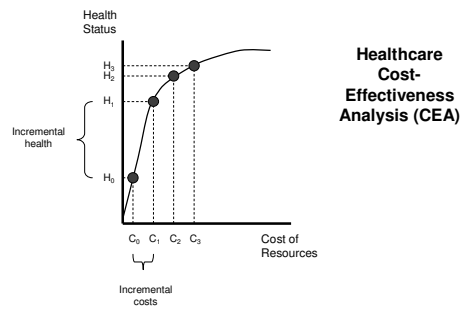
- Costs \$280
- 30-day mortality rate: 7.3%
- 30-day major stroke rate: 1.0%

**Drug B (new)**

- Costs \$2,750
- 30-day mortality rate: 6.3%
- 30-day major stroke rate: 1.1%

Source: 1995 analysis published in *New England Journal of Medicine* - t-PA compared to streptokinase (example given by D. Fryback in intro. To HSE, April 21, 2003)

### Cost Effectiveness Analysis



### A classic example - FOC

**6th stool test?**

Neuhauser & Lewicki  
*New England Journal of Medicine*  
1975

**HOW DO I DO THE TEST?**

It is very simple. Obtain a small stool specimen from the toilet bowl (using the collection tissues and applicator sticks provided) for three separate bowel movements. After collecting each specimen, apply a thin smear onto the windows inside the test cards. More complete instructions are included on the envelope containing the test cards. Completing all three test cards is very important. Research has shown that lower intestinal bleed- ing may not occur all the time. Testing three bowel movements increases the chances of detecting any blood that may be present during the test period. Please follow the instructions carefully, completely and promptly. Return the test to your physician or designated laboratory.



Screen for blood in the stool indicating colon cancer

How: 1 test panel = 6 "smears"

Each smear:

- 91.7% sensitivity
- 63.5% specificity

Cost: 1st smear = \$4, each additional = \$1 (cost for 6-smear panel = \$9)

Prevalence of cancer is 72/10000

Source: Slides adapted from Dennis Fryback, April 23, 2003, Introduction to Health Systems Engineering

### Computations

| No. of Smears Per Test | Test Sensitivity | No. of Cancers Found | Total Cost (\$) | Add'l Costs (\$) | Add'l Cancers Found | Inc. Costs/ Inc. Cancers Found |
|------------------------|------------------|----------------------|-----------------|------------------|---------------------|--------------------------------|
| 1                      | 91.6667%         | 65                   | \$77,511        | --               | --                  | \$1,175                        |
| 2                      | 99.3056%         | 71                   | \$107,690       | \$30,179         | 5.4956              | \$5,492                        |
| 3                      | 99.9421%         | 71                   | \$130,199       | \$22,509         | 0.458               | \$49,150                       |
| 4                      | 99.9952%         | 71                   | \$148,116       | \$17,917         | 0.0382              | \$469,534                      |
| 5                      | 99.9996%         | 71                   | \$163,141       | \$15,024         | 0.0032              | \$1,724,695                    |
| 6                      | 99.9999%         | 71                   | \$176,331       | \$13,190         | 0.0003              | <b>\$47,107,214</b>            |

### Incremental Cost Effectiveness Ratio

We can compare a given intervention to an alternative:

$$CER = \frac{\Delta C}{\Delta E}$$

C = Cost of Intervention + Cost induced by the intervention - costs averted by the intervention

Outcomes E can be measured by:

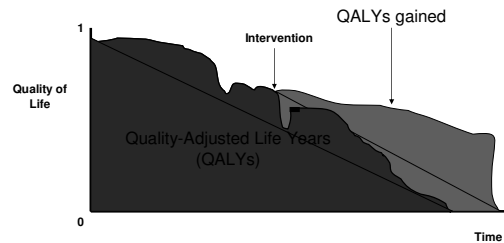
Life-Years saved (LYS) = Amount by which an intervention reduces or mortality

Or

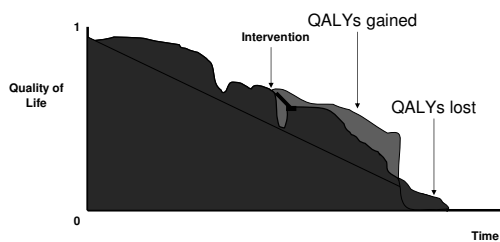
Quality-Adjusted Life Years (QALY) = Effect on an intervention on both loss and quality of life.

Ashrafian H, Sevdalis N, Athanasiou T. Key Topics in Surgical Research and Methodology. 2008 In Press

### Quality of Life



### In reality



### Benefits of CEAs

- Measuring best care with the best value.

- Can be used to compare the costs and benefits of various interventions for the same pathology or disease. (for example colorectal screening by examining occult blood tests, barium enemas or colonoscopies).

- Can clarify:

- Specific population subgroups

- Specific age groups

- Frequency of treatments

- QALYS considers particular health preferences not only mortality results

Ashrafian H, Sevdalis N, Athanasiou T. Key Topics in Surgical Research and Methodology. 2008 In Press

### Some Important Points

- What is the acceptable £/QALY?

- CEA only one of the criteria for health policy formulation

- CEA also depends on patient - severity, longer lead times

- Ethical concerns (for example is a year of life saved or QALY for a 70yr old equivalent to that for a 1yr old? Or the perception that CEAs can be used as tools for "rationing" in health care.)

- Complexity of some models

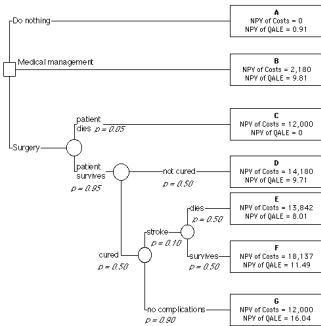
- Historical lack of standardized CEA's

Ashrafian H, Sevdalis N, Athanasiou T. Key Topics in Surgical Research and Methodology. 2008 In Press

### CER League Table

| Treatment:                        | Compared to:    | \$/QALY   |
|-----------------------------------|-----------------|-----------|
| PKU screening                     | no screening    | < \$0     |
| coronary bypass LMD               | medical therapy | \$6,500   |
| treat severe hypertension         | no treatment    | \$14,400  |
| treat mild hypertension           | no treatment    | \$29,000  |
| annual mammogram                  | no screening    | \$35,000  |
| Step I diet for high cholesterol  | no treatment    | \$44,000  |
| coronary bypass mild disease      | medical therapy | \$56,000  |
| lifetime statin for high cholest. | Step 1 diet     | \$150,000 |
| non-ionic contrast                | ionic contrast  | \$256,000 |

**Example Model**

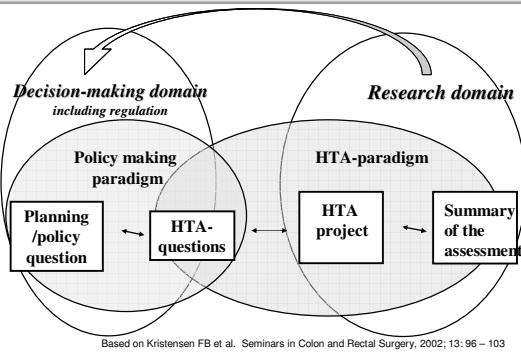


**Cost Effectiveness Table**

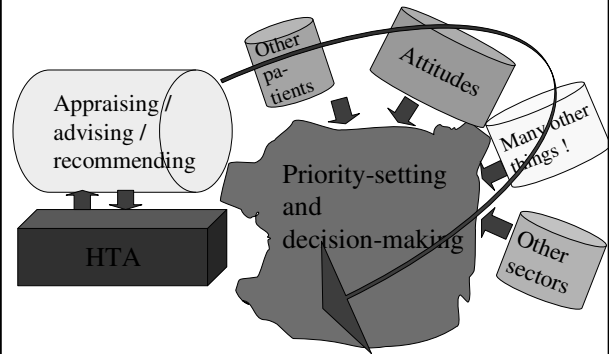
After adjusting for disability and discounting, we get...

| Decision Alternatives | Average Costs (\$) | Average Life Expectancy | Incremental Costs (\$) | Incremental Effectiveness | ICER            |
|-----------------------|--------------------|-------------------------|------------------------|---------------------------|-----------------|
| Do Nothing            | -                  | 0.91 yrs.               | -                      | -                         | -               |
| Medical Management    | \$2,179.73         | 9.81 yrs.               | 2,179.73               | 8.90 yrs.                 | \$244.92/QALY   |
| Surgery               | \$13,224.87        | 11.93 yrs.              | \$11,045.14            | 2.12 yrs.                 | \$5,201.21/QALY |

**Decision Making**



**HTA as an input to priority-setting and decision-making II**



**HTA in the UK**

- NCCHTA:
- Based in Wessex.
  - Commissions a wide range of empirical and theoretical projects.
  - Administers contracts for NICE Technology Assessment Reviews (TARs).
- NICE:
- Programmes in Technology Appraisals, Clinical Guidelines and Public Health.
- SMC:
- Produces evaluations of all new medicines launched in Scotland.

**Sources of HTA Information**

- The website of the International Network of Agencies for Health Technology Assessment ([www.inahta.org](http://www.inahta.org)) provides useful contact information on its members (43 HTA organisations in 21 countries), and downloadable HTA publications.
- Accessible through the INAHTA website is the HTA database maintained by the NHS Centre for Reviews and Dissemination in England ([www.york.ac.uk/inst/crrd](http://www.york.ac.uk/inst/crrd)). This is a useful resource when searching for assessments that have been undertaken on particular technologies.
- US – Blue Cross and Blue Shield Association. Technology Evaluation Center (TEC) (<http://www.bcbs.com/tec>): Includes assessment reports and information on assessments in progress.
- The EuroScan network provides information on new and emerging health technologies for a subset of its publications that are available to non-members (<http://www.euroscan.bham.ac.uk>).
- A publication from the Alberta Heritage Foundation for Medical Research, Health Technology Assessment on the Net: a guide to internet sources of information, includes a range of information on HTA publications ([www.ahfmr.ab.ca/hta/hta-publications/Infopapers/Internet\\_sources\\_of\\_information.pdf](http://www.ahfmr.ab.ca/hta/hta-publications/Infopapers/Internet_sources_of_information.pdf)).
- The International Journal of Technology Assessment in Health Care, published by Cambridge University Press, includes papers dealing with recent assessments and a wider range of HTA issues.

### Other HTA Players in the UK

- NHS methodology programme
- Activities in Wales and Northern Ireland
- MRC and ESRC projects/fellowships
- Private research foundations
- Manufacturers of drugs and devices
- Health authorities

### Key Features of HTA in Policy I

- Selection of Procedures
- Maintaining international links
- Implementation of HTA findings
- Transparency in decision-making

### Cross National Comparisons

Comparison of VATAP (USA), NICE (UK), CCOHTA (Canada) and AETS (Spain)  
Considered:

- (i) the reasons for the choice of topics,
- (ii) the types of technologies assessed,
- (iii) the methods of assessment and
- (iv) the outcomes of assessments

García-Altés et al, *Int. J. Tech. Assess. Health Care* 2004

### Selection of Topics in the UK

- In England the Department of Health sets NICE's agenda
- In Scotland the SMC considers every new drug
- The NCCHTA and NHS Methodology Programme consult widely on topics, but then commission projects.

### Assessment Procedures

- The majority of HTA agencies undertake assessments in-house, although probably all commission some work outside (e.g. in Canada, CCOHTA spends 25% of its budget outside).
- In England, NICE places considerable emphasis on independent review by academic groups
- By-and-large the independent review groups apply 'Cochrane-style' methods.

### NICE's Single Technology Appraisals

- 'Head to head' studies do not universally exist
- A new 'fast track' procedure introduced in response to concerns over the time taken by NICE's standard approach.
- So far applies to drugs, in the main cancer drugs.
- Will place more emphasis on analyses submitted by the manufacturer and incorporate less external review
- May suffice in situations where the number of comparators is limited

### Independent Review

- More transparent and may help resolve disputes when multiple products are being considered
- The Scots claim they reach the same decisions at a fraction of the (assessment) cost

### NICE - NIHR

- NICE & NIHR HTA are key strategic partners, the latter feeding the former.
- Introduction of Technology Assessment Reports (TARs) - aim to produce reviews for NICE within six months of commissioning through the NIHR HTA programme.
- TAR teams are delivering assessments of single technologies within eight weeks (7 university teams commissioned)
- In response to the public health white paper and the Wanless Report, the department of Health established a new HTA panel to feed into the NIHR HTA programme.

### Funding of Reports

- >£80 million due for investment in trials and TARs
- HTA Pragmatic Clinical Trials funding stream
- The NIHR HTA programme currently operates mainly by open calls for proposals following topic identification and prioritisation, which will continue – 'Pragmatic Clinical trials concept'.
- The NIHR HTA programme publishes around 50 monographs a year in the internationally acclaimed series Health Technology Assessment (see HTA website at [www.hta.ac.uk](http://www.hta.ac.uk)). The journal's 2007 Impact Factor of 3.87 (received in June 2008) ranks it in the top 10% of health and medical related titles.

### Implementation Of NICE Guidance

- Biggest problem is funding
- Variable by technology and location (PCG funding)
- Local professional involvement and good financial systems are important
- Almost half of GPs are welcoming of NICE
- NICE is perceived (by GPs) as being independent of industry but not of government

### Implementation Of HTA Findings: what can be done?

- Develop an implementation plan for each HTA
- Produce more advice on what to discontinue, as well as what to adopt
- Link funding streams more closely to guidance (although not easy in the NHS)
- Increase the monitoring of the adoption of guidance

### Transparency in Decision-Making

- In general all HTA increases transparency
- NICE is considered among the most transparent of HTA agencies

## Conclusion

- HTA is now well established as a tool for healthcare-policy makers to make decisions about new technology
- It incorporates many aspects of EBM, with HTA reports including a systematic appraisal and synthesis of available evidence.
- HTA provides a pragmatic approach using economics, decision analysis, ethics and medical knowledge

Thank You & Questions