Diagnostic evaluation of the adrenal incidentaloma: decision and cost-effectiveness analyses

Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
Comparison of different diagnostic strategies to discriminate benign from malignant adrenal incidentalomas.

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
Hypothetical cohort of patients with incidentally discovered unilateral, non-hypersecretory adrenal masses.

Setting
Hospital. The economic evaluation was conducted in Michigan, USA.

Dates to which data relate
Data were retrieved from studies published in the period 1985-1997 and from institutional charge data.

Source of effectiveness data
The effectiveness data were derived from a review of previously completed studies.

Modelling
A decision tree was constructed using TreeAge (DATA 3.0) to simulate the consequences of diagnostic strategies of incidentally discovered unilateral non-hypersecretory adrenal masses.

Outcomes assessed in the review
The outcomes assessed were prevalence of non-hypersecretory adenomas, adrenocortical carcinomas, and adrenal metastases in adrenal incidentaloma. Additionally the diagnostic performance of biopsy and imaging procedures, and the morbidity of invasive modalities were considered.

Study designs and other criteria for inclusion in the review
No specific study design criteria were identified by the authors. Only articles published in English were included in the study.
Sources searched to identify primary studies
MEDLINE was searched, a hand search of current issues of specific journals was undertaken (general medicine, diagnostic imaging, surgical and endocrinology) and a review of bibliographies of selected articles was made.

Criteria used to ensure the validity of primary studies
Not stated.

Methods used to judge relevance and validity, and for extracting data
Not stated.

Number of primary studies included
Effectiveness data were retrieved from 13 different studies.

Methods of combining primary studies
Primary studies were combined by constructing contingency tables and weighted averages when sufficient information regarding test sensitivity and specificity was available.

Investigation of differences between primary studies
Not stated.

Results of the review
The prevalence of adrenal incidentalomas was as follows:

- non-oncologic and general population, 6% - 30%;
- known or suspected extra-adrenal primary malignancy, 32% - 73%.

The sensitivity and specificity of each test were reported as follows:

- FNA (0.83, 0.99),
- MRI (0.99, 0.89),
- NP-59 (0.93, 1.00),
- CT using a cut-off attenuation value of =>0HU (CT0) (1.00, 0.54),
- CT using a cut-off attenuation value of =>10HU (CT10) (0.96, 0.73).

Measure of benefits used in the economic analysis
The measure of benefits used in the economic analysis was diagnostic utility: the probability-weighted sum of the utilities of the 4 test outcomes. Diagnostic accuracy was measured in terms of the fraction of correctly identified masses.

Direct costs
Cost of diagnostic procedures was reported as applied to hospital charges and professional fees. Quantities/costs were not reported separately and discounting rates were not applied. The perspective adopted was that of the payer of health care services.
Statistical analysis of costs
Cost were not treated in a stochastic way.

Indirect Costs
Not included in the study.

Currency
US dollars ($).

Sensitivity analysis
Sensitivity analysis was performed on sensitivity, specificity and cost values of each test as well as on the probability of nonadenoma. Multi-way simple sensitivity analysis and threshold analysis were also performed.

Estimated benefits used in the economic analysis
Benefits were estimated in terms of diagnostic utility and diagnostic accuracy.

Estimates per test (utility, accuracy) were reported as follows:
CT0 (0.310,0.655),
CT10 (0.575,0.788),
MRI (0.83, 0.915),
NP-59 (0.965,0.983),
FNA (0.9,0.95),
CT0-FNA (0.908,0.954),
CT10-FNA(0.894,0.947),
MRI-FNA (0.761,0.88),
and NP-59-FNA (0.886, 0.943).

Cost results
The average costs per diagnostic strategy were:
CT0 & CT10$880,
MRI $1,369,
NP-59 $746,
FNA $1,138,
CT0-FNA $1,157,
CT10-FNA $1,384,
Synthesis of costs and benefits
Incremental cost effectiveness ratios were calculated for 4 alternative strategies, CT0 +/- FNA vs CT0, CT10 +/- FNA vs CT10, MRI +/- FNA vs MRI, NP-59 +/- FNA vs NP-59. Two incremental cost-effectiveness ratios per compared alternatives were estimated: cost/diagnostic utility and cost/diagnostic accuracy. Both approaches confirmed NP-59 as the dominant alternative. The cost-effectiveness of NP-59 was sensitive to:

a) variations in the cost of the diagnostic test
b) specificity of NP-59, CT0 and CT10 when cost/diagnostic utility was the cost-effectiveness measure.
c) specificity of NP-59, when cost/diagnostic accuracy was the cost-effectiveness measure

Cost, utility, and accuracy threshold values required for NP-59 to remain cost effective were:

cost/diagnostic utility: cost < $1,180 and specificity >0.68;
cost/diagnostic accuracy: cost < $1,155 and specificity >0.63.

Authors' conclusions
NP-59 is the most cost effective diagnostic tool for evaluating adrenal incidentalomas over a wide range of malignancy rates. Further comparative clinical studies are required to confirm the cost-effectiveness of NP-59.

CRD COMMENTARY - Selection of comparators
Four of them must commonly used diagnostic techniques for identification of malignant adrenal masses were included in the study. Nevertheless, no further explanation for the consideration of these, and no other diagnostic evaluation, was provided.

Validity of estimate of measure of benefit
No attempt to justify possible sources of heterogeneity among the studies was provided. The generalisability of the results is debatable although the authors undertook sensitivity analyses to test for variability in their data.

Validity of estimate of costs
The authors did not clearly state either the source or the year for the cost data. Sensitivity analysis was performed on cost although no justification for the range of variation was provided.

Other issues
There is no evidence of a systematic review of the literature to obtain the effectiveness data. The computation of base line estimators is rather obscure. The authors did not include in their discussion of the results any of the limitations associated with the use of modelling techniques in economic evaluations. The authors made reference to other studies which generally supported their own findings.

Implications of the study
There is a need for clinical studies to confirm the cost-effectiveness of NP-59 in the identification of malignant adrenal masses.
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