Comparing the cost-effectiveness of the triple test score to traditional methods for evaluating palpable breast masses

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
Two management alternatives for palpable breast masses were considered. The traditional scheme was based on physical examination, mammography and ultrasonography, followed by aspiration for cystic masses and fine-needle aspiration (FNA) biopsy for solid masses. The new approach named the triple test score (TTS), was based on physical examination, mammography and FNA to guide further management of palpable breast masses, thus limiting open biopsy of benign masses.

Type of intervention
Screening and diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised a hypothetical cohort of patients. No specific inclusion or exclusion criteria were reported.

Setting
The setting was unclear, but it appears to have been the community. The economic analysis was carried out in Seattle (WA), USA.

Dates to which data relate
The effectiveness and resource data were gathered from studies published between 1981 and 2001. Year 2000 prices were used.

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

Modelling
A decision analytic model was created to simulate the costs and the health outcomes assigned to each strategy. The patients were assumed to follow up, once with the surgeon coordinating the breast mass evaluation, and after that with the primary care provider. The time horizon was not reported clearly, but it was likely to have been less than one year.

Outcomes assessed in the review
The outcomes assessed in the review and used as model inputs were:
the probability of masses scoring less than 5 and the probability of them being benign on clinical follow-up;

the probability of masses scoring more than 5 and the probability of them being malign on open biopsy;

the probability of masses scoring 5 and the probability of them being benign or malign on open biopsy;

the probability of cystic lesion after traditional evaluation;

the probability of positive cyst aspiration;

the probability of persistent mass, bloody fluid or more than 3 recurrences after aspiration and evaluation of the cyst;

the probability of malignancy on open biopsy after cyst aspiration;

the probability of positive FNA on solid mass;

the probability of suspicious or non-diagnostic FNA on solid mass;

the probability of negative FNA on solid mass;

the probability of malignancy on clinical follow-up after cyst aspiration was 0.10;

the probability of malignancy on intra-operative biopsy after positive FNA;

the probability of malignancy on open biopsy after suspicious or non-diagnostic FNA;

the probability of malignancy on open biopsy after negative FNA;

the frequency of missed malignancy;

the rate of open biopsy performed for benign mass; and

the efficiency at directing malignant masses to a single operation (combining tissue diagnosis and definitive treatment).

**Study designs and other criteria for inclusion in the review**

Not reported.

**Sources searched to identify primary studies**

MEDLINE was searched for primary studies delineating appropriate work-up of palpable breast masses, and for studies of sensitivity and specificity of relevant diagnostic tests or patient outcomes.

**Criteria used to ensure the validity of primary studies**

Not specified.

**Methods used to judge relevance and validity, and for extracting data**

Not specified.

**Number of primary studies included**

Approximately 18 studies were included in the review.

**Methods of combining primary studies**
Investigation of differences between primary studies
Differences between the primary studies were not investigated.

Results of the review
The probability of masses scoring less than 5 was 0.65 and the probability of them being benign on clinical follow-up was 1.

The probability of masses scoring more than 5 was 0.27 and the probability of them being malign on open biopsy was 1.

The probability of masses scoring 5 was 0.08 and the probabilities of them being benign or malign on open biopsy were, respectively, 0.51 and 0.49.

The probability of cystic lesion after traditional evaluation.

The probability of persistent mass, bloody fluid or more than 3 recurrences after aspiration and evaluation of the cyst was 0.1.

The probability of positive cyst aspiration was 0.0363.

The probability of malignancy on open biopsy after positive cyst aspiration was 0.0526.

The probability of positive FNA on solid mass was 0.2980.

The probability of suspicious or non-diagnostic FNA on solid mass was 0.2896.

The probability of negative FNA on solid mass was 0.4124.

The probability of malignancy on clinical follow-up after negative cyst aspiration was 0.

The probability of malignancy on intraoperative biopsy after positive FNA was 0.9972.

The probability of malignancy on open biopsy after suspicious or non-diagnostic FNA was 0.2598.

The probability of malignancy on open biopsy after negative FNA was 0.058.

The frequency of missed malignancy was 0 with either the TTS or traditional strategy.

The rate of open biopsy performed for benign mass was 13% when using the TTS and 88% when using the traditional strategy.

The efficiency at directing malignant masses to a single operation was 87% when using the TTS and 75% when using the traditional strategy.

Measure of benefits used in the economic analysis
The summary measure of benefit used was the number of breast malignancies diagnosed. This measure appears to have been obtained from the effectiveness analysis.

Direct costs
The third-party payer perspective was adopted. The direct costs included the costs of clinic visits, physical examination, mammography, FNA, FN cytopathology, inpatient and outpatient open biopsy, physicians’ fees and medication. Given the focus on diagnosis, the costs of treatment for malignancy after a definitive diagnosis were not included.
associated with adverse outcomes of open biopsy (only infection) were included. The resource quantities were not given separately from the costs. The costs reflected Medicare reimbursement rates at the authors' institution. Physicians' fees were derived from the Medicare fee schedule. A cost-to-charge ratio was used to derive the anaesthesiologist professional costs. The source of the quantities was not reported. Therefore, the costs appear to have been estimated on the basis of both actual data and authors' assumptions. Discounting was not performed, but it was not necessary because of the short study period considered at analysis (i.e. less than 2 years). All the costs were adjusted to year 2000 US dollars. The total costs per mass evaluated were reported.

**Statistical analysis of costs**
No statistical analysis of the costs was performed.

**Indirect Costs**
The indirect costs were not included.

**Currency**
US dollars ($).

**Sensitivity analysis**
One-way sensitivity analyses were performed on resource costs (range +/- 50%). The influence of TTS misclassification of masses was also assessed. Three misclassification scenarios were analysed:

reclassifying all masses with a score of 6 to a score of 5;

reclassifying all masses with a score of 4 to a score of 5; and

reclassifying 50% of masses with a score of 5 to a score of 6.

In addition, the impact on diagnostic accuracy was evaluated in the event that up to 50% of masses with a score of 5 were misclassified as a score of 4.

**Estimated benefits used in the economic analysis**
The authors did not report the number of breast malignancies diagnosed using the TTS or the traditional strategy.

**Cost results**
The initial work-up required to establish a TTS was more costly than the initial traditional strategy ($627 versus $377).

The total cost per mass evaluated was $925 using the TTS and $1,793 using the traditional strategy. TTS provided savings of $868 per mass evaluated.

**Synthesis of costs and benefits**
The expected total cost per breast malignancy diagnosed was lower when the TTS was employed ($2,925 versus $5,670).

In sensitivity analyses, the cost of the TTS varied most with changes in the cost of the initial evaluation, whereas the cost of the traditional strategy varied most with changes in the cost of open biopsy. The misclassification analyses showed that the TTS was less costly than the traditional strategy, even when a substantial rate of misclassification occurred.
Authors' conclusions
The triple test score (TTS) provides equivalent diagnostic effectiveness, but reduces the need for open breast biopsy, thus achieving substantially lower costs than the traditional strategy.

CRD COMMENTARY - Selection of comparators
A justification was given for the comparator used. It represents a published standard of care for evaluating palpable breast masses. You should decide if these are widely used health interventions in your own setting.

Validity of estimate of measure of effectiveness
The authors performed an adequate review of the literature, identifying studies through MEDLINE. It would appear that the review was conducted systematically in order to identify all relevant research and minimise biases. However, the authors did not report the methodology they used for the review, such as the search strategy and the inclusion criteria. In addition, no details on how the results of the primary studies were combined, or on whether differences between the primary studies might impact on the results of the model, were provided. Therefore, it is difficult to assess the validity of the estimates.

Validity of estimate of measure of benefit
The number of breast malignancies diagnosed was used as the measure of benefit in the economic analysis. This was taken from the model that provided the clinical effectiveness data.

Validity of estimate of costs
All the categories of cost relevant to the perspective adopted were included in the analysis. No relevant costs appear to have been omitted. The costs and the quantities were not reported separately, which will limit the generalisability of the authors' results. The authors did not report very clearly the sources used to obtain estimates of each type of cost. However, a sensitivity analysis of the costs was conducted, using appropriate ranges. Since the costs were incurred during less than one year, discounting was not relevant and was not performed. The price year was reported, which will aid any possible inflation exercises.

Other issues
The authors reported that no cost-effectiveness studies of TTS versus the traditional strategy for breast mass evaluation had been undertaken. However, they compared the results from their study with those from one study that compared the utility of FNA with open biopsy (Layfield et al., see Other Publications of Related Interest). Layfield et al. found that replacing open biopsy with FNA could yield savings of $714 per mass evaluated, with a 0.1% decrease in 10-year overall survival. The issue of generalisability to other settings was partially addressed in the sensitivity analysis. The authors do not appear to have presented their results selectively and their conclusions reflected the scope of the analysis. The authors reported one further limitation of their study. The data used to evaluate the TTS were obtained by four general practitioners within a single institution, which may limit the reproducibility of the results.

Implications of the study
The authors did not make any recommendations for further research or changing practice. However, the authors suggested that the characteristics of the TTS as a diagnostic test need to be confirmed in other settings.

Source of funding
None stated.

Bibliographic details
the triple test score to traditional methods for evaluating palpable breast masses. Medical Care 2003; 41(8): 962-971

PubMedID
12886175

DOI
10.1097/01.MLR.000078152.26867.6D

Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
Biopsy, Needle; Breast Neoplasms /diagnosis /economics; Cost-Benefit Analysis; Data Interpretation, Statistical; Decision Support Techniques; Female; Humans; Mammography; Palpation; United States

AccessionNumber
22003008222

Date bibliographic record published
31/07/2005

Date abstract record published
31/07/2005