Fine-needle aspiration biopsy versus ultrasound-guided fine-needle aspiration biopsy: cost-effectiveness as a frontline diagnostic modality for solitary thyroid nodules

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**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.

**CRD summary**
This study examined the cost-effectiveness of ultrasound-guided (UG) fine-needle aspiration biopsy (FNAB) versus conventional FNAB for the initial diagnosis of solitary thyroid nodules. The authors concluded that the use of UG-FNAB was more cost-effective than traditional FNAB, with an incremental cost of $289 per additional correct diagnosis. The analysis appears to have been based on a valid methodology, although the clinical part was poorly reported. The authors’ conclusions appear to be valid.

**Type of economic evaluation**
Cost-effectiveness analysis

**Study objective**
The objective was to carry out a comparative cost-effectiveness analysis of ultrasound-guided (UG) fine-needle aspiration biopsy (FNAB) versus conventional FNAB for the initial diagnosis of solitary thyroid nodules.

**Interventions**
UG-FNAB was compared with traditional, palpation-guided, FNAB. A conclusive pathologic finding was followed by either observation or surgery. If the initial biopsy was inconclusive, a UG-FNAB was performed regardless of the technique used for the first biopsy.

**Location/setting**
USA/outpatient setting.

**Methods**
**Analytical approach:**
A decision model was developed to assess the costs and accuracy of the two diagnostic approaches. The time horizon of the analysis was not reported. The authors stated that the perspective of the health care provider was adopted.

**Effectiveness data:**
The clinical data on the diagnostic accuracy of the two strategies were derived from the current literature. The search methods and the characteristics of the primary sources were not reported. The method used to select the baseline estimates for the model was not described. The primary clinical input for the decision model was the accuracy (sensitivity and specificity) of the two diagnostic strategies.

**Monetary benefit and utility valuations:**
Not relevant.

**Measure of benefit:**
The summary benefit measure was the rate of correctly diagnosed cases in terms of the correct classification of malignant or benign disease.

**Cost data:**
The economic analysis considered the costs of FNAB, UG-FNAB, and hemithyroidectomy. These costs were presented as macro-categories. All the economic data were derived from samples of patients receiving the tests and the
procedures at a single, mid-Atlantic academic medical centre. A cost-to-charge ratio was applied when relevant. All costs were in US dollars ($) and the price year was not reported.

Analysis of uncertainty:
A deterministic, univariate, sensitivity analysis was undertaken for key model inputs including the cost of FNAB, the cost of UG-FNAB, the cost of hemithyroidectomy, and the sensitivity and specificity of FNAB. Reasonable ranges of values were considered.

Results
The expected costs per patient were $1,311.50 with FNAB and $1,328.80 with UG-FNAB.

The rate of correctly diagnosed cases was 0.92 with FNAB and 0.98 with UG-FNAB.

The incremental cost per correctly diagnosed case with UG-FNAB over FNAB was $288.82.

The sensitivity analysis showed that the UG-FNAB became more cost-effective, or even dominant (more effective and less costly), in the following scenarios: when the cost of surgery increased; with a lower prevalence of disease; when the specificity of the repeat test exceeded 75%; or with a reduced specificity of FNAB.

Authors' conclusions
The authors concluded that the use of UG-FNAB was more cost-effective than traditional FNAB for the diagnosis of thyroid nodules, with an incremental cost of $289 per additional correct diagnosis. They stated that these findings should be validated in prospective clinical studies.

CRD commentary
Interventions:
The selection of the comparators was appropriate because they reflected the two available approaches for the diagnosis of thyroid nodules in the authors' setting, where UG-FNAB was usually performed after an inconclusive FNAB.

Effectiveness/benefits:
The authors did not provide any information on the methods used to select the sources of evidence. Furthermore, the characteristics of the primary studies, such as the patient samples, the study design, and the follow-up, were not described. This precludes the possibility of judging the validity of the clinical estimates. Only the sensitivity and specificity of FNAB was varied in the sensitivity analysis. The benefit measure (the number of correctly identified cases) is commonly used for diagnostic studies, but it is disease-specific and therefore difficult to compare with the benefits of other health care interventions.

Costs:
The analysis of costs was consistent with the perspective. The three main cost categories were reported as macro-data and a breakdown of cost items was not provided. This is consistent with the source used to derive these costs, but it limits the transparency of the cost estimates. The price year was not reported, which limits the possibility of making reflation exercises in other time periods. The authors acknowledged that their costs reflected those borne by a large tertiary care centre and might not be transferable to other medical centres.

Analysis and results:
The use of an incremental analysis to synthesise the costs and benefits was appropriate. The issue of uncertainty was only partially investigated as the sensitivity analyses focused on single model inputs which were varied individually. The results of both the base-case and the sensitivity analyses were clearly presented. The decision model was described. The use of a disease-specific measure for the cost-effectiveness ratio raises the question of what the value of a correctly diagnosed case is to society.

Concluding remarks:
The analysis appears to have been based on a valid methodology, although the clinical part was poorly reported. The authors’ conclusions appear to be valid.
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