The use and accuracy of cross-sectional imaging and fine needle aspiration cytology for
detection of pelvic lymph node metastases before radical prostatectomy

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
Cross-sectional imaging with computerised tomography or magnetic resonance imaging and fine needle aspiration for the detection of pelvic lymph node metastases before radical prostatectomy.

Type of intervention
Diagnosis and treatment.

Economic study type
Cost-effectiveness analysis.

Study population
A hypothetical cohort of patients at increased risk of pelvic lymph node metastases from prostate cancer.

Setting
Hospital. The economic study was carried out in California, USA.

Dates to which data relate
The effectiveness analysis was based on studies published between 1980 to 1994. Resource data was not dated and prices were based on 1994.

Source of effectiveness data
The evidence for final outcomes was based on a synthesis of completed studies.

Modelling
A decision analytic model was used to estimate final benefits.

Outcomes assessed in the review
Test sensitivity and specificity; complication rates due to the diagnostic procedures and surgery.

Study designs and other criteria for inclusion in the review
No criteria were used to determine the type of study designs included in the review. Only studies with pathological confirmation were included when the sensitivity and specificity of imaging, fine needle aspiration and frozen section were calculated.
Sources searched to identify primary studies
A MEDLINE literature search was undertaken, supplemented by a bibliographic search of all the articles obtained to identify primary studies.

Criteria used to ensure the validity of primary studies
No criteria were used to ensure the validity of the primary studies.

Methods used to judge relevance and validity, and for extracting data
No methods were specified to judge the relevance, validity or methods used to extract data from the studies.

Number of primary studies included
Overall, 46 studies were used to calculate the baseline probabilities of the model.

Methods of combining primary studies
The weighted mean of each parameter, which was similar to the median and unweighted mean, was used as the baseline variable.

Investigation of differences between primary studies
The paper did not report whether any investigation between the primary studies was undertaken when this would have been applicable.

Results of the review
The sensitivity of imaging, fine needle aspiration and frozen section was 36%, 70% and 67% respectively. The specificity rates for these parameters were 97%, 100% and 100% respectively. The major morbidity rates of fine needle aspiration, lymph node dissection and radical prostatectomy were 0.5%, 7% and 16% respectively.

Measure of benefits used in the economic analysis
The estimated benefits used were the percentage of patients who would benefit with a strategy of imaging. Expected utility values were also calculated. They were based on authors’ assumptions. The highest utility value (1.0) was assigned to the most desirable outcome of an uncomplicated radical prostatectomy without imaging in a patient without lymph node metastases. This same value was also assigned to the outcome of a patient with lymph node metastases that were correctly detected with imaging and fine needle aspiration cytology without complications. All other utility values were determined by deducting constant factors for each adverse outcome based on the authors’ assumptions.

Direct costs
Some costs and quantities were reported separately. Direct costs were based on charges at the institution. The charges included professional fees and all hospital costs for a pelvic CT, a fine needle aspiration, uncomplicated radical retropubic prostatectomy with pelvic lymphadenectomy, and open pelvic lymph node dissection alone. 1994 prices were used.

Currency
US dollars ($).

Sensitivity analysis
A sensitivity analysis was performed by varying utility values and baseline probabilities. In particular, the probability of
lymph node metastases was varied to determine the threshold value above which imaging becomes beneficial overall.

**Estimated benefits used in the economic analysis**
From an estimated total of 50,000 men a year who are currently considered for radical prostatectomy, a policy of imaging in all patients would benefit 1,260 (2.5%) patients. If a policy of selective imaging were used, based on clinical criteria, 504 of 5,000 men (10%) would benefit.

**Cost results**
Imaging in a cohort of 50,000 men a year who are currently considered for radical prostatectomy was estimated to incur costs of $912.1 million in total charges for radical prostatectomies, lymph node dissections, cross-sectional imaging and fine needle aspirations. The total charges would be $873.4 million if imaging were not performed in all patients. Therefore, the total costs of imaging alone were estimated to be $38.7 million.

**Synthesis of costs and benefits**
Costs and benefits were combined by examining incremental costs per patient who benefits from imaging. The incremental costs for the 756 patients who would have benefited from all imaging rather than selective imaging was estimated to be $50,661 per patient. The incremental cost for the 504 patients who would have benefited from selective imaging rather than no imaging would be $794.

**Authors’ conclusions**
Cross-sectional pelvic imaging before radical prostatectomy, for the sole purpose of detecting pelvic lymph node metastases, does not appear to be cost-effective. The cost-effectiveness is improved with a policy of selective cross-sectional imaging for the detection of nodal metastases rather than with a policy of no imaging at all. Selection could be based on PSA, Gleason biopsy score and clinical stage.

**CRD Commentary**
It was not stated whether the baseline probabilities were derived from a comprehensive literature search. The utility values which are used to determine the expected utility values from a policy of imaging or no imaging appear to have been estimated by the authors. Insufficient evidence is presented regarding the validity of these utility values and the mechanism by which they were valued. While these issues are indirectly addressed by the sensitivity analysis performed, the paper does not fully report the results of the analysis based on utility values. The use of hospital charges means that the results of the study are not directly applicable to the UK.

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