Cost benefit of emerging technology in localized carcinoma of the prostate


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
Three dimensional conformal radiation therapy (3D CRT) in the treatment of localized prostate cancer.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Patients with clinical stage A2 (T1c) or B (T2) histologically confirmed carcinoma of the prostate.

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

Dates to which data relate
The effectiveness data were collected between 1992 and 1995, whilst the main resource use data were obtained for 1994. The price date was 1994.

Source of effectiveness data
Single study.

Link between effectiveness and cost data
The costing was undertaken retrospectively on a different patient sample from that used in the effectiveness study.

Study sample
A total of 257 patients were included in the study, without any power calculations being reported. Of these, 119 patients were treated with the 3D CRT and 138 with the SRT.

Study design
The study was a nonrandomised prospective cohort study performed at a single centre. The mean duration of follow-up was 1.4 years (range: 1 to 4 years).

Analysis of effectiveness
The analysis was based on treatment completers only. The primary outcome measure was clinical disease-free survival and toxicity. The former outcome measure was defined according to the criterion of a post-irradiation prostate-specific antigen (PSA) value of 1.5 or 2 ng/ml or less at all follow-up evaluations.

**Effectiveness results**
When a postirradiation PSA level of 1.5 ng/ml was used as a criterion, no difference was found, whereas when the 2 ng/ml criterion parameter was used, the 3 year survival rates were 90% with the 3D CRT and 80% with the standard bilateral arc rotation (P=0.01). The differences in most indicators of acute toxicity were not found to be statistically significant at conventional 5% level. The grade 2 rectal morbidity was 3% in the 3D CRT group in contrast to 12% in the SRT patient group (p=0.01).

**Measure of benefits used in the economic analysis**
Several outcome measures were analysed, but they were not combined into a single measure of effectiveness.

**Direct costs**
The cost estimation was based on Medicare reimbursement data for 1994. The authors reported both the average reimbursement for the initial therapy costs and an estimate which also included the projected costs of treatment for initial therapy failures. In order to illustrate the cost structure of 3D CRT therapy the authors reported an annual planning cost analysis (for 1995) including the estimated resource use (personnel, equipment, space, overheads, and variable operating costs). In spite of the time span covered in the analysis, no discount rate was reported. The price year was 1994.

**Currency**
US dollars ($).

**Sensitivity analysis**
One-way simple sensitivity and threshold analyses were reported. These analyses investigated the effect on the costs of 3D CRT of varying the number of procedures performed per year and identified the point in which the revenue from reimbursement was equal to that cost.

**Estimated benefits used in the economic analysis**
Not applicable.

**Cost results**
The average reimbursement for initial therapy costs was $13,823, $10,864, and $12,250 for the 3D CRT, the SRT, and the radical prostatectomy options, respectively. The average total cost of therapy per patient (including cost of treatment failures) was $15,173, $16,264, and $16,405, respectively.

**Synthesis of costs and benefits**
Not applicable.

**Authors’ conclusions**
Sophisticated 3D CRT can be carried out in a large number of patients at a reasonable cost. Further efforts are necessary, with the collaboration of radiation oncologists, physicists, and manufacturers, to develop more versatile and efficient 3D CRT systems. A reliable assessment of the impact of 3D CRT on the outcome of treatment in patients with cancer should come from prospective randomized studies in which the total cost of care for a patient population and
cost utility are determined in long-term longitudinal calculations.

CRD COMMENTARY - Selection of comparators
The reason for the choice of comparator was clear, the standard irradiation therapy (SRT) for the histologically proven adenocarcinoma of the prostate being used.

Validity of estimate of measure of benefit
The internal validity of the study results is questionable due to the lack of control for differences in patient characteristics between groups likely to be influential on the results. The conclusions of the study reflect these issues.

Validity of estimate of costs
The analysis was based on Medicare reimbursement data for a different patient sample than that used in the effectiveness study. Nevertheless, the issue of the representativeness of such a sample was not addressed by the authors. The quantities of resource use were reported separately from the costs in a separate illustration of annual costs for 3D CRT treatment planning.

Other issues
The conclusions about the feasibility of 3D CRT procedure seem to be justified. The study, however, does not offer any evidence for the cost-effectiveness of the examined procedures. The sensitivity analyses addressed the issue of the number of 3D CRT procedures required to be performed in a year in order to decrease the unit cost to the point at which the net reimbursement is positive. The results of the costs may not be generalisable to other hospitals in the USA due to demonstrated scale benefits achievable only in hospitals with adequate patient volume, and experienced staff. Due to differences in cost reimbursement schemes, the cost results can not be generalised in other countries.

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