Optimising the use of virtual and conventional simulation: a clinical and economic analysis

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
The costs of virtual simulation (VS) were compared with conventional simulation (CS) for patients undergoing radical radiotherapy. The authors concluded that there was no significant difference between CS and VS in terms of verification quality or costs. They suggested that CS could be replaced with VS for the patient groups studied. The methodology of the study appears to have been appropriate and was clearly reported on the whole. The conclusion reached by the authors reflects the scope of the study.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
This study compared the cost and accuracy of virtual simulation (VS) with conventional simulation (CS) for patients undergoing radical radiotherapy.

Interventions
The patients, who required radical treatment at one of four major sites (breast, head and neck, pelvis and thorax), underwent an identical treatment process except for the verification, where either CS or VS was used. Deviations of less than 5mm for immobilised patients and less than 10mm for mobile patients were acceptable.

Location/setting
UK/Hospital

Methods
Analytical approach:
The economic analysis was based on effectiveness data from a single study. The time horizon and the follow-up period were unclear. The authors did not state the study perspective.

Effectiveness data:
The data were derived from a randomised controlled trial (RCT) conducted on an intention-to-treat basis. Of the 260 patients recruited, 36 withdrew during the study, and eight had significant missing data. The remaining patients were randomised to VS or CS. The primary outcomes were the setup accuracy at verification and the number of unsatisfactory verifications.

Monetary benefit and utility valuations:
None.

Measure of benefit:
The authors did not derive a summary measure of benefit.

Cost data:
Micro-costing was undertaken alongside the RCT. The costs included technicians, radiographers and doctors costs for their presence at each episode, and the costs of the various pieces of equipment used. The unit costs for the year 2004 to 2005 were obtained from the authors’ institutions. Mean costs for CT scanning, planning, verification, and treatment were calculated.
Analysis of uncertainty:
The full treatment costs were modelled probabilistically based on the mean costs and the associated distributions of each cost, but the methods used were not reported.

Results
In the VS group, the percentages of patients returned to CS following unsatisfactory verification were 20.5% for head and neck, 4.3% for breast, 21.1% for thorax, and 7.4% for pelvis treatment. The percentages in the CS group were 5.2% for head and neck, 8.7% for breast, 5.0% for thorax, and 0% for pelvis treatment.

The image registration results were of similar quality of verification for each group.

When the full treatment schedule of 30 fractions was modelled, the total costs were £1,320 for CS and £1,316 for SV, with a mean difference of £4 (95% confidence interval: -£1,070, £1,043).

Authors’ conclusions
The authors concluded that there was no significant difference between CS and VS in terms of verification quality and total costs. They suggested that verification by CS could be omitted and replaced with VS for the patient group studied.

CRD commentary
Interventions:
Both interventions were described in full. The rationale for conducting the verification by VS was clearly stated.

Effectiveness/benefits:
The effectiveness data were derived from a single-centre RCT. The study design and patient selection criteria were well reported, as was the primary outcome. However, the time framework of the study was not reported. In addition, although the study was a RCT, a report of patient baseline characteristics would have been preferable in terms of facilitating comparisons between the study groups. A summary measure of benefit was not derived. Instead, clinical effect parameters were used as outcomes in the economic evaluation.

Costs:
The perspective was not reported, making it impossible to assess which cost categories should have been considered in the study. The unit costs and sources of the cost data were well reported. The cost analysis was well reported and the price year was given. A statistical modelling approach was applied to generate total costs. However, details of the modelling methods were not reported.

Analysis and results:
The analytical approach was well reported on the whole. The outcomes were not synthesised with costs and thus a cost-consequence analysis was performed. In addition, the results were fully and clearly reported. The uncertainty in costs was appropriately assessed. Although it was stated that this was done by means of probabilistic modelling, no details were reported. Additionally, uncertainty in the effectiveness data was not considered. The level of reporting was adequate.

Concluding remarks:
The methodology of the study appears to have been appropriate and was, on the whole, clearly reported. The conclusion reached by the authors reflects the scope of the study.

Funding
Supported by the Weston Park Research Fund.

Bibliographic details
Other publications of related interest


Indexing Status
Subject indexing assigned by CRD

MeSH
Computer Simulation; Cost-Benefit Analysis; Humans

AccessionNumber
22007002582

Date bibliographic record published
01/09/2008

Date abstract record published
02/03/2009