Radiation dose and image quality of double-loaded cassettes
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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.

Health technology
Using double-load X-ray cassettes versus single loaded cassettes for portable ICU and ER films.

Type of intervention
Diagnosis.

Economic study type
Cost-effectiveness analysis.

Study population
Patients requiring chest X-ray examination.

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

Dates to which data relate
Not stated.

Source of effectiveness data
Effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was undertaken on the same patient sample as that used for the effectiveness study.

Study sample
Power calculations were not used to determine the sample size. The sample consisted of 38 consecutive double-loaded chest examinations.

Study design
Cohort study, carried out in a single centre.

Analysis of effectiveness
The analysis of the clinical study was based on intention to treat. The primary outcome used was image quality (in terms of resolution in C/mm, optical density and contrast) and radiation exposure. The instrument used for measuring doses
was a calibrated Victoreen NERO model 6000 M dosimeter, while the quality of the images was assessed using a Rando chest phantom and a standard quality assurance test tool (Nuclear Associates model 07637).

**Effectiveness results**
With respect to exposure, the phantom experiments showed that there was an increase in the average dose-equivalent from 10 microSv (1 mrem with single-loading) to 30 microSv (3 mrem) when double loaded cassettes were used. In terms of quality of image, resolution and optical density were very close between single and double loaded cassette and, within the latter, between the front and back film. With double loaded cassettes, contrast decreased by 5% in the front film (the closest to the patient), and by 14% for the back film (the one furthest from the patient).

**Clinical conclusions**
The authors concluded that "Double-loading cassettes is a compromise solution to a problem of image availability, rapid patient care, and efficient generation of radiology reports".

**Measure of benefits used in the economic analysis**
No summary benefit measure was identified in the economic study and only separate clinical outcomes were reported.

**Direct costs**
Quantities were not reported. The extra costs of film resulting from the intervention and the actual hospital cost for the comparator for taking a portable X-ray were reported. The cost boundary adopted was that of the hospital. The grounds upon which the estimation of costs was carried out were not reported. No dates were reported for the price data.

**Indirect Costs**
Not considered.

**Currency**
US dollars ($).

**Sensitivity analysis**
No sensitivity analysis was performed.

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

**Cost results**
The additional cost of the intervention was $2.50 per portable X-ray performed. This represented an additional 15% over the "actual hospital cost", $15.70, per portable X-ray performed. This extra cost "is offset by the fact that clinicians do not spend valuable time going to and from the radiology department and that reports are generated promptly".

**Synthesis of costs and benefits**
Costs and benefits were not combined.

**Authors’ conclusions**
The double-loading of cassettes to provide dual imaging results in reduced image quality and increases the effective dose equivalent by a factor of 2-3. The cost effectiveness of this strategy must be judged in the context of each institution.

CRD COMMENTARY - Selection of comparators
The reason for the choice of the comparator is clear.

Validity of estimate of measure of benefit
The internal validity of the results may have been weakened by the lack of randomisation and lack of proper control group.

Validity of estimate of costs
The resource utilisation was not reported separately from the costs. Insufficient details of the methods of cost estimation were given. No dates were reported. No combination of costs and benefits was carried out.

Other issues
The side effects of both strategies (radiation effects on health) were discussed briefly as not being significant. In view of the lack of randomisation and proper controls, sensitivity analysis, and statistical analysis of the costs, the results need to be treated with some caution.

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