Is routine chest X-ray following mediastinal drain removal after cardiac surgery useful?  
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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
The objective was to assess whether routine radiography following mediastinal drain removal was unnecessary and the clinical signs and symptoms could indicate the presence of air collection that merited intervention. The authors concluded that the decision to obtain an X-ray could be based on clinical judgement alone and that this could produce cost savings without compromising patient safety. Given that the study was based only on a single group of patients, the results should be treated with caution.

Type of economic evaluation
Cost-effectiveness analysis

Study objective
The objective was to assess whether the routine use of radiographs in patients following mediastinal drain removal was unnecessary and whether the clinical signs and symptoms were a sensitive indicator of the presence of any significant air collection which merited intervention.

Interventions
This study investigated the use of chest radiographs or X-rays in patients following mediastinal drain removal after cardiac surgery. This intervention was implicitly compared with no chest X-ray.

Location/setting
UK/secondary care.

Methods
Analytical approach:
The effectiveness and resource use data were derived from a single clinical study. The time horizon was four hours post drain removal. The economic perspective was not reported.

Effectiveness data:
The effectiveness data were derived from a single prospective cohort study. The sample was a convenience one of 151 consecutive patients undergoing various cardiac surgical procedures over a 10-week period. Four hours after the drain removal all patients received a chest X-ray to investigate the presence of pneumothorax. For those patients with pneumothorax, the authors determined whether or not the condition could have been diagnosed by observing the clinical signs or symptoms.

Monetary benefit and utility valuations:
None.

Measure of benefit:
The measure of benefit was the number of pneumothorax cases detected by chest X-ray, which would otherwise have been missed.

Cost data:
Only the direct costs of performing the chest X-rays were included. The cost of a portable chest X-ray was calculated by taking into consideration the radiographer’s time and the cost of an X-ray film.
Analysis of uncertainty:
No analysis of uncertainty was conducted.

Results
In 148 (98%) patients, the chest X-ray did not provide any additional information of clinical significance to alter the patient management. In the other 3 (2%) patients, the chest X-ray showed a pneumothorax of variable size. In two of these patients there were physical signs and symptoms, which would have warranted a chest X-ray on clinical grounds. Only in one patient, was the moderate pneumothorax asymptomatic.

The authors reported that, given that 750 cardiac procedures were carried out every year in the author's institution, the cost saving of omitting a single chest X-ray was estimated to be about £10,000 every year.

Authors' conclusions
The authors concluded that the clinical signs and symptoms almost always identified those few patients requiring further intervention, and that the decision to obtain an X-ray could be based on clinical judgement alone. In addition, they concluded that this approach could result in cost savings without compromising patient safety.

CRD commentary
Interventions:
The interventions were reported in detail. The use of chest X-ray was investigated as this was routine practice at the time.

Effectiveness/benefits:
The effectiveness data were derived from a prospective study of one group of patients. Therefore, the results presented were not derived from either a randomised controlled trial or prospective study with two or more groups of patients. As a result, the impact of the intervention was compared implicitly with the effects of providing no chest X-ray, rather than explicitly comparing both interventions.

Costs:
Only a very limited cost analysis was undertaken and very brief details were reported. The authors did not report the perspective of this analysis. In addition they did not report the source for the unit costs for either the physician time or the X-ray film. The resource use and cost data were not reported separately and the price year was not reported.

Analysis and results:
The costs and benefits were not combined, and the uncertainty in the results was not investigated. Both the efficacy and cost analyses were very limited and many details were not reported. The authors, however, compared their results with those from other studies and found them to be similar.

Concluding remarks:
Given that the study was based only on a single group of patients, with the use of chest X-ray being implicitly, rather than explicitly, compared with the use of no chest X-ray the results should be treated with caution.

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Other publications of related interest
McCormick JT, O’Mara MS, Papasavas PK, et al. The use of routine chest X-ray films after chest tube removal in

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