Outpatient management of pneumothorax after fine-needle aspiration: economic advantages for the hospital and patient

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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
Outpatient management of post-fine-needle aspiration (FNA) pneumothoraces with small-calibre catheters in-patients undergoing fluoroscopically guided FNA biopsy of lung lesions.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population was patients undergoing fluoroscopically guided FNA biopsy of lung lesions and who experienced enlarging or symptomatic post-FNA pneumothoraces treated with a small-calibre catheter.

Setting
Hospital and community. The economic analysis was carried out in the USA.

Dates to which data relate
Effectiveness and resource use data were derived from patients treated during a 19-month period between January 1995 and July 1996. The price year was not explicitly specified.

Source of effectiveness data
The evidence for the final outcomes was based on a single study.

Link between effectiveness and cost data
Costing was retrospectively performed on the same patient sample as that used in the effectiveness analysis.

Study sample
Power calculations were not used to determine the sample size. Of the 405 patients who underwent fluoroscopically guided FNA biopsy of lung lesions during a 19-month period, 161 experienced post-FNA pneumothorax, 80 of whom underwent catheter placement (20% of the original lung biopsy population). Six of the patients with catheters were excluded from analysis because they were already inpatients at FNA biopsy. Thus, 74 patients with a median age of 65 years (range: 35 - 80) were included in the study; 40 were treated on an outpatient basis, 17 patients were treated on an inpatient basis, and 17 patients were monitored overnight in the emergency department. The age distribution of the study groups was plotted.
Study design
There was a retrospective cohort study, carried out in a single centre. The duration of the follow-up appears to have been until discharge or readmission. Loss to follow-up was not reported. To determine whether a pneumothorax occurred, chest radiographs were obtained immediately after FNA, and 3 hours later if the initial radiographs did not demonstrate a pneumothorax. Patients with stable, asymptomatic pneumothoraces during the 3-hour period were discharged with instructions to restrict their activities for the remainder of the day and to call or return to the emergency department if dyspnea or chest pain developed. Otherwise follow-up chest radiographs or visits were not required. Catheters were placed when pneumothoraces were:

(a) large (More than 35% apical or those smaller with a lateral thoracic component extending below the level of the hilum);
(b) progressive (increasing in size on hourly radiographs, which indicates an active leak); or
(c) symptomatic (causing severe pain or dyspnea).

Those patients meeting the admission criteria were set to be initially admitted to the emergency department; patients who required monitoring for more than 24 hours were subsequently admitted to the hospital.

Analysis of effectiveness
The principle used in the analysis of effectiveness appears to have been treatment completers only (since the data on one outpatient patient admitted on day 4 were included in the inpatient group). The health outcomes were the number of days the catheter remained in place, the number of outpatients developing pneumothoraces, and the number of patients who underwent repeated biopsy. The three study groups were found to be comparable in terms of age.

Effectiveness results
The median number of days for which the catheters remained in place were as follows: outpatients, 1 (range: 1 - 13); emergency department patients, 1 (range: 1 - 11); inpatients, 3 (range: 1 - 11). p=0.001 for the comparison between inpatient and outpatient procedures and between inpatient and emergency department (ED) procedures. However, the difference between ED and outpatient procedures were not significant. One patient, initially treated on an outpatient basis, underwent bilateral lung FNA and subsequently developed pneumothoraces that were treated with catheter placement; the catheters were in place for 1 day each. Four patients (two outpatients and two inpatients) underwent repeated biopsy the day after catheter placement, which meant that the catheters should remain in place for an additional day.

Clinical conclusions
Simple pneumothoraces can be safely managed on an outpatient basis both when they are asymptomatic and when they necessitate a small-calibre catheter for treatment.

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

Direct costs
Costs were not discounted because of the short time frame of the cost analysis. Some quantities were reported separately from the costs. Cost items were reported separately. Cost analysis covered the costs of the interventional procedure (supplies, fluoroscopic equipment use, and professional fees for biopsy and catheter placement), pharmacy (sedatives, analgesics, and intravenous fluids used during the procedure and during hospitalisation), cytology, follow-up radiology, additional monitoring in the radiology department, emergency department, and hospital room. The
perspective adopted appears to have been that of the patient's insurance company (reflecting the amounts submitted to the patient's insurance company and not the actual reimbursement to the hospital or the wholesale cost of supplies to the hospital). Charges were used, as opposed to true costs. The source of charge data was detailed hospital billing records. The price year was not explicitly reported.

**Statistical analysis of costs**
The Kruskal-Wallis test was used to determine statistical significance in each of the cost categories.

**Indirect Costs**
Indirect costs were not considered.

**Currency**
US dollars ($).

**Sensitivity analysis**
Sensitivity analysis was not conducted.

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

**Cost results**
The mean cost per patient was $1,689 (range: $1,042 - $2,234) for the outpatient procedure compared to $2,403 (range: $1,368 - $5,282), and $3,950 (range: $1,861 - $5,847) for the emergency department and inpatient procedures, (p=0.001 for pairwise comparisons).

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

**Authors' conclusions**
Outpatient management of simple pneumothoraces with placement of small-calibre catheters attached to one-way chest drain valves proved to be safe, efficient, and economical.

**CRD COMMENTARY - Selection of comparators**
An implicit justification was given for the choice of the comparators (emergency department and inpatient procedures). They represent the routine methods in the context in question. You, as a database user, should consider whether these are widely used health technologies in your own setting.

**Validity of estimate of measure of effectiveness**
The internal validity of the effectiveness results cannot be guaranteed due to the retrospective nature of the study design and the relatively small sample size. The study groups were comparable in terms of age, but no further comparisons were made regarding other baseline patient characteristics. The degree to which the study sample was representative of the study population cannot be objectively assessed as insufficient information was provided regarding the inclusion and exclusion criteria adopted in the study.
Validity of estimate of measure of benefit
The authors did not derive a measure of health benefit. The study may therefore be regarded as a cost-consequences analysis.

Validity of estimate of costs
Some quantities were reported separately from costs and adequate details of the methods of cost estimation were given. It appears that all relevant direct cost categories were included in the cost analysis. Using charge data rather than true costs may have adversely affected the external validity of the cost results. The effects of different procedures on indirect costs were not evaluated. Statistical analyses were performed on charge data. The price year was not specified. Cost results may not be generalisable to other settings or countries.

Other issues
Given the retrospective nature of the study design, the lack of sensitivity analysis, and the use of charges instead of true costs, some caution should be exercised in the interpretation of the study results. The issue of generalisability to other settings or countries was not addressed. Appropriate comparisons were not made with other studies. The representativeness of the study sample of the study population was not addressed.

Implications of the study
Although this concept is not original, outpatient management of a simple pneumothorax has not been universally adopted. The authors would like to encourage the management of post-biopsy pneumothoraces with catheters, on an outpatient basis.

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