Comparison of a modified double-lumen endotracheal tube with a single-lumen tube with enclosed bronchial blocker

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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
Modified double-lumen endotracheal tube and a single-lumen tube with enclosed bronchial blocker.

Type of intervention
Supportive care; Anaesthesia.

Economic study type
Cost-effectiveness analysis.

Study population
Patients aged between 21 and 78 years and with a weight range of 50-103 kg, undergoing either a thoracic or oesophageal procedure where OLV was required.

Setting
The practice setting was a hospital. The economic analysis was performed at the College of Medicine, Iowa, US.

Dates to which data relate
No dates were provided.

Source of effectiveness data
The evidence/estimate for final outcomes was derived from a single study.

Link between effectiveness and cost data
The costing exercise was undertaken retrospectively on the effectiveness study sample.

Study sample
40 patients were randomly allocated into 2 groups: 20 subjects received a left side modified BronchoCath double-lumen tube (DLT) and the other 20 received a Univent tube with bronchial blocker. No power calculations were reported.

Study design
The study was a randomised controlled trial. No follow-up after the end of the surgical procedure (when two-lung ventilation was re-established and the chest closed) was reported.
Analysis of effectiveness
The primary health outcomes in the study were as follows:

1. time required to position each tube until satisfactory placement was achieved;
2. number of times that the fibre optic bronchoscope was required;
3. frequency of malpositions after initial placement with fibre optic bronchoscopy;
4. time required until lung collapse;
5. surgical exposure ranked by surgeons blinded to type of tube used.

The latter outcome was measured after surgery by asking surgeons to rate surgical exposure by selecting one of three possible answers: a) excellent exposure; b) fair exposure; and c) poor exposure. At analysis, the authors stated that the groups were comparable in age, weight and gender.

Effectiveness results
The time required to position each tube until satisfactory placement was achieved for DLT was 6.2 (+/- 3.1) minutes and for Univent was 5.4 (+/- 4.5) minutes, (p>0.05). The number of times that the fibre optic bronchoscope was required was as follows: DLT median 2, range 1-3; Univent median 3, range 2-5. The frequency of malpositions after initial placement with fibre optic bronchoscopy were 5 (DLT) and 15(Univent), (p<0.003). The time required until lung collapse, was 7.1 minutes for DLT (+/- 5.4) and 12.3 minutes for Univent (+/-10.5). Excellent surgical exposure, was achieved in 18 out of 20 patients for DLT and 15 out of 20 patients for Univent, (p>0.05).

Clinical conclusions
In the Univent group the incidence of malposition was sufficiently greater than the DLT group to recommend that no justification could be found for its regular use.

Measure of benefits used in the economic analysis
The measure of benefits was the reduced risk of having an ill-positioned surgical device.

Direct costs
The information provided in the study report on the methods used in the costing exercise was minimal. It seems, however, that only acquisition costs associated with the devices were measured. Therefore, although quantities of resource use (e.g. time required to position each tube until satisfactory tube placement was achieved) were reported, they would not be included in the costing exercise. The perspective was unclear. No price date was stated.

Currency
US dollars ($).

Sensitivity analysis
Not performed.

Estimated benefits used in the economic analysis
The DLT group was associated with 5 of the 20 cases of malpositions, whilst the Univent group had 15.
Cost results
The total acquisition cost per group was $1,360.00 for DLT and $2,600.00 for Univent.

Synthesis of costs and benefits
Since the authors considered that the DLT group was associated with a dominant strategy (lower costs and higher health-related benefits), costs and benefits were not combined.

Authors' conclusions
Based on the incidence of malposition and cost considerations, the authors could not find any clinical or economic justification for the routine use of Univent.

CRD COMMENTARY - Selection of comparators
The justification given for the choice of comparators was unclear.

Validity of estimate of measure of benefit
Given that no power calculations were reported, it may be that the study lacked sufficient power to detect clinically significant differences in clinical outcome between the comparators. Data do not appear to have been selectively chosen to prove a particular point.

Validity of estimate of costs
Costing information lacked adequate detail (sources of unit costs, cost categories included, etc.). From the limited information provided in the report, it seems that the costing exercise may have been incomplete (i.e. the cost figure was calculated on materials only and did not appear to include other items associated with the time incurred in carrying out the surgical procedure, e.g. professionals’ time).

Other issues
The sensitivity analysis was carried out to investigate the possible effects on the results of the ranges of uncertainty observed in the data, particularly on the cost side of the analysis.

Implications of the study
Further studies are warranted to validate the study findings on the efficiency of using DLT during anaesthesia with one-lung ventilation (OLV).

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