Clinical utility of hygroscopic heat and moisture exchangers in intensive care patients

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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
Heat and moisture exchangers (HMEs) and hot water (HW) humidifier circuits in intensive care.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Subjects were those admitted to a general intensive care unit between October 1994 and April 1995 requiring mechanical ventilation for over 48 hours.

Setting
The practice setting was a metropolitan teaching hospital in Brisbane, Australia. The economic analysis was carried out at the same hospital.

Dates to which data relate
Effectiveness and resource data were obtained between October 1994 and May 1995 (approximately). No price year was stated.

Source of effectiveness data
Circuit colonisation figures were obtained from a single randomised controlled trial.

Link between effectiveness and cost data
It was not clear whether costings were undertaken on the study sample.

Study sample
No power calculations were stated to determine sample size.
Subjects were allocated into 3 treatment groups using:

(1) 41 patients (mean age 49 years; 63% male) to a HW circuit with a 2-day circuit change

(2) 42 patients (mean age 52 years, 64% male) to bacterial-viral filtering HME in the circuit with a 2-day circuit change

(3) 44 patients (mean age 53 years, 65% male) to bacterial-viral filtering HME in the circuit with a 4-day circuit
change.

**Study design**
Prospective randomised controlled trial. Patients with asthma, airway burns, or pulmonary hemorrhage were excluded from the trial. Removal of subjects from the trial was also permitted for endotracheal tube obstruction or for sudden changes in airway pressure thought to be the result of increased HME resistance. No follow-up or loss to follow-up was stated. Further factors assessed included Acute Physiology and Chronic Health Evaluation (APACHE) II scores, modified acute organ systems failure scores, and chronic obstructive pulmonary disease (COPD) presence. Note: having smoked in the previous 2 years was considered to be a significant smoking history.

**Analysis of effectiveness**
It was not clear whether study analysis was based on intention to treat or treatment completers only. The primary outcomes assessed were circuit colonisation, frequency of VAP, character of respiratory secretions, rewarming of hypothermic patients and airflow resistance.

**Effectiveness results**
Percentage contamination figures per group were 67% (group 1), and 12% (groups 2 and 3) (p<0.0001). Median colony counts were lower in HME groups (p<0.0001). The frequency of VAP, time to resolution of admission hypothermia and volume and fluidity of secretions were similar for both groups.

**Clinical conclusions**
Circuits with a bacterial-viral filtering HME are less readily colonised by bacteria than HW circuits. Humidification technique has no influence on the frequency of VAP, the effectiveness of rewarming, nor the character of the respiratory secretions.

**Measure of benefits used in the economic analysis**
The authors did not combine the effectiveness results into one summary benefit. As such costs were treated as the economic outcome measure.

**Direct costs**
Direct costs included HME and HW cost per day (sources unknown).

**Currency**
Australian dollars (Aus$). No conversion was supplied.

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

**Estimated benefits used in the economic analysis**
Benefits were expressed in terms of costs.

**Cost results**
HME cost Aus$6.72 per day and HW cost Aus$8.20 per day.
Synthesis of costs and benefits
Costs and benefits were not synthesised.

Authors' conclusions
Disposable costs fall with HME usage.

CRD COMMENTARY - Selection of comparators
The selection of the comparators was justified.

Validity of estimate of measure of benefit
The estimate of the measure of benefit (i.e. costs) is unlikely to be internally valid.

Validity of estimate of costs
Inadequate details of cost information were provided.

Other issues
The authors' clinical conclusions appear to be justified although the absence of a sensitivity analysis did not allow the randomised controlled trial's assumptions to be tested. The authors' economic conclusions were not justified. The methodology of the study was incomplete.

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