Immediate tracheal extubation after liver transplantation: experience of two transplant centers

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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
Early tracheal extubation after liver transplantation.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Eligible patients for immediate postoperative tracheal extubation. These required, when patients were awake and able to follow commands, a positive gas response, tidal volume more than 8 mL, respiratory rate less than 20 breaths per min, normocarbia as judged by end-tidal carbon dioxide analysis, and clinical evidence of neuromuscular reversal.

Setting
Hospital. The study was carried out in Colorado, USA.

Dates to which data relate
The effectiveness and resource use data corresponded to the period 1994-1995 (data for the control were collected in 1994). The price year was not clearly reported.

Source of effectiveness data
The estimate for the incidence of reintubation was derived from a single study.

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

Study sample
A total of 16 out of 67 liver transplant patients from one centre (centre 1) represented the intervention group, with 12 patients (out of 44 liver transplants performed in the institution the year before the intervention) constituting the control group. The control group of uncomplicated cases was retrospectively analysed and served to develop the criteria mentioned in the study population section above. Twenty-five of 106 patients in a second centre were tracheally extubated immediately postoperatively (no economic analysis was undertaken on them and they are not, therefore, considered in this critical review). No power calculations determined the sample size.
Study design
Nonrandomized study with historical controls from a single centre. The duration of follow-up was not clearly reported.

Analysis of effectiveness
The principle used in the analysis was not clearly reported (intention to treat or treatment completers). The primary health outcome was incidence of reintubation.

Effectiveness results
There were no reintubations in the intervention group (two reintubations occurred in centre 2 (8%); in none of these cases did the patients meet the study's early extubation criteria, although 17 patients from the second group did not require reintubation whilst not meeting all the extubation criteria).

Clinical conclusions
Wider limits on age and severity of illness did not preclude successful extubation.

Measure of benefits used in the economic analysis
Since the effectiveness study showed no difference in clinical benefit between the groups, the economic analysis was based on the difference in costs only.

Direct costs
The costs measured were those associated with ICU services, with the associated quantities being analysed separately from the costs. The source of costs was the institutional records. The price year was not clearly reported. The quantity/cost boundary adopted was the hospital. Discounting was not applied.

Statistical analysis of costs
Student's t-tests were performed on the difference in costs between groups, with standard deviations being reported alongside the mean figures.

Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was performed.

Estimated benefits used in the economic analysis
Not applicable.

Cost results
The cost savings associated with reduced ICU services in the intervention group (relative to the control group of uncomplicated cases from one year before) were $2,709 ($1,705 (+/− 628) versus $4,414 (+/− 1,032), p<0.05)

Synthesis of costs and benefits
Not applicable.
Authors' conclusions
Immediate postoperative tracheal extubation of selected liver transplantation patients is safe and cost-effective.

CRD COMMENTARY - Selection of comparators
The reason for the choice of comparator was clear. The standard practice of no specific policy of early tracheal extubation (i.e. ventilated patients) after liver transplantation was the comparator chosen. You, as user of this database, should consider whether these are widely used health technologies in your own setting.

Validity of estimate of measure of benefit
The internal validity of the study results is questionable, given the biases likely to arise from the historical nature of the control used in the study and the small study size.

Validity of estimate of costs
Although quantities of resource use were analysed separately, the cost analysis lacked adequate detail, and the price date was not clearly reported.

Other issues
The conclusions were justified given the uncertainties in the data. The issue of generalisability was not properly addressed. Nevertheless, the authors reported evidence from other surgical procedures in which early extubation protocols have been used successfully.

Implications of the study
Further studies are needed in order to clearly define valid criteria to select liver transplant patients at low risk of respiratory failure after extubation. Prospective studies using concurrent controls are desirable to this purpose.

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