Percutaneous versus conventional tracheostomy in burned patients with inhalation injury
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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
Percutaneous dilational tracheostomy performed at the bedside was compared with conventional tracheostomy performed in an operating room.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised burn patients with inhalation injury admitted to the study setting. There were no specific exclusion criteria.

Setting
The setting was secondary care. The economic study was carried out in Athens, Greece.

Dates to which data relate
The effectiveness and resource use data referred to patients treated in the burn unit between January 1997 and June 2004. A price year was not reported.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was carried out prospectively on the same sample of patients as that used in the effectiveness study.

Study sample
The authors included the total number of burned patients with inhalation injury who underwent tracheostomy in their burn unit during the dates of the study. There was no report that power calculations were estimated at the outset. Nevertheless, the authors were able to carry out statistical hypothesis tests and detect statistically significant differences. Thirty-seven patients (25 male; age range: 18 to 75) underwent percutaneous tracheostomy between February 2000 and June 2004. These patients were compared with 22 patients (16 male; age range: 21 to 78) who underwent conventional tracheostomy between January 1997 and January 2000. There was no evidence that the study sample was representative of the study population.
Study design
A comparative study with historical controls was used to ascertain effectiveness, although the two groups were studied consecutively (i.e. patients studied in the earlier period received conventional tracheostomy and patients studied in the later period received percutaneous tracheostomy). It was unclear if there was a shift in policy in the study setting that caused the change in treatments, or whether the change in treatments occurred specifically in order to allow the study to take place. The analysis took place at a single centre, the Burn Centre, General State Hospital of Athens, Greece. The duration of follow-up was unclear, although the patients were followed for at least 7 months, thus enabling a cosmetic outcome to be assessed.

Analysis of effectiveness
The patients were analysed according to the treatment they received. The primary health outcomes were:

- postoperative complications,
- incision length,
- infection,
- time to closure of stomata,
- colonisation of the sputum,
- cosmetic outcome, and
- mortality.

The authors reported that the study groups were comparable in terms of their age and severity of burn injury.

Effectiveness results
There were statistically significant differences between the two groups in terms of the postoperative complications. Two patients (9%) developed tracheal stenosis and one patient (4.5%) developed tracheoesophageal fistula in the conventional tracheostomy group, whereas there were no postoperative complications in the bedside percutaneous tracheostomy group, (p=0.047).

Incision length was approximately 15 mm in percutaneous tracheostomy, extending to the burn in 8 out of 25 cases, and 40 mm for conventional tracheostomy, extending to the burn in 16 out of 17 patients. Therefore, percutaneous tracheostomy significantly reduced the possibility of avoiding the burn in comparison with conventional tracheostomy, (p<0.0005).

There were no infections in the percutaneous tracheostomy group and 10 stomal infections in the conventional tracheostomy group, (p<0.0005).

Closure of the stomata occurred in 1 to 3 days for the percutaneous tracheostomy group and in 6 to 7 days for the conventional tracheostomy group.

There were significant differences in the increase of pre-postoperative colonisation of the sputum in patients between the study groups. The increase was from 54% preoperatively to 76% postoperatively in the percutaneous tracheostomy group, and from 47% preoperatively to 98% postoperatively in the conventional tracheostomy group, (p=0.042).

Mortality was not significantly different between the study groups. Eighteen patients in the percutaneous tracheostomy group and 11 in the conventional tracheostomy group died, (p=0.92).

The cosmetic outcome was assessed as being superior and of better quality in the percutaneous tracheostomy group, compared with the conventional tracheostomy group, owing to the shorter scar length, (p<0.05), and better texture and...
Clinical conclusions
Percutaneous tracheostomy in burned patients with associated inhalation injury resulted in lower complication and infection rates in comparison with conventional tracheostomy. In addition, it can be safely performed at the bedside.

Measure of benefits used in the economic analysis
The authors did not estimate a summary measure of health benefit. The study was therefore categorised as a cost-consequences analysis.

Direct costs
The authors did not report the perspective from which the costing was carried out. The costs of the surgical procedure and those of transporting the burned patient were the focus of the analysis, suggesting that either the perspective of the hospital or that of the health care provider was adopted. The authors noted that the operating time was recorded for each patient treated, and average times were reported, although overall resource quantities were not reported separately from the costs. Although not explicitly stated, the analysis seems to have taken the unit costs for an operating room and bedside from the study setting and multiplied by the operating time. An average was then derived for each group of patients. Discounting was not required given the short-term horizon for the costing analysis that seemed to focus on the immediate costs of treatment. A price year was not reported.

Statistical analysis of costs
The costs were treated stochastically since the mean and standard deviation (SD) were reported.

Indirect Costs
The indirect costs were not estimated.

Currency
Euros (EUR).

Sensitivity analysis
There was no report of a sensitivity analysis being carried out.

Estimated benefits used in the economic analysis
Not relevant; see the 'Effectiveness Results' section.

Cost results
The average costs per patient were EUR 250 (SD=20) for percutaneous tracheostomy versus EUR 1,250 (SD=50) for conventional tracheostomy, (p<0.0005).

Synthesis of costs and benefits
Not relevant as a cost-consequences analysis was undertaken.

Authors' conclusions
"Percutaneous tracheostomy in burned patients with associated inhalation injury demonstrates a lower complication rate
than the conventional tracheostomy and can be safely and more rapidly performed at the bedside at a lower cost than a conventional tracheostomy."

CRD COMMENTARY - Selection of comparators
The authors compared the well-established conventional tracheostomy with the relatively newly available percutaneous tracheostomy following increasing evidence that the latter is a more effective treatment. The groups were compared consecutively over time, suggesting that a change in treatment policy in the authors' setting might have prompted the study. Knowing if this was the case might have provided a more thorough background for the reader.

Validity of estimate of measure of effectiveness
The authors designed a comparative study with an historical (consecutive) control. This design was appropriate to the setting and the change in treatment practice in the authors' setting, and was also suitable for analysing a technology where randomisation proves difficult. However, such a design does not help to reduce potentially confounding factors between the two patient groups. Despite this, the authors compared patients in the two groups and were unable to detect any significant differences at the outset that might be confounding factors in the results. In addition, the authors carried out a statistical analysis of the results that enabled them to demonstrate statistically significant differences between the two treatment groups, despite the relatively small sample size.

Validity of estimate of measure of benefit
The authors did not estimate a summary measure of health benefit. The study was therefore categorised as a cost-consequences analysis. Please refer to the comments in the 'Validity of estimate of measure of effectiveness' field (above).

Validity of estimate of costs
The authors carried out a very basic costing analysis, perhaps from the perspective of the health care provider. This enables a rough understanding of the main influences on the costs of each treatment. An estimate of the indirect costs in terms of lost productivity might have been of interest, especially if survival and morbidity are influenced by the procedure. Further details of this analysis, such as the source of the estimates, whether overheads were included in the estimate, and a price year, would have given readers a clearer understanding of the costs and whether the estimates might transfer to alternative settings.

Other issues
The authors compared their results with those of the only other paper to consider percutaneous tracheostomy in burn patients (Caruso et al. 1997, see 'Other Publications of Related Interest' below for bibliographic details), and reported accordance between estimates. The issue of generalisation to other populations and settings was not addressed. As mentioned already, the ability to transfer the costs results is limited; if the treatment procedures and patients characteristics were similar in alternative settings then the effectiveness results may be generalisable, although further work would help support this suggestion. The results and conclusions were well presented and clear to understand, and the conclusions were an accurate reflection of both the scope of the analysis and the results presented. The authors highlighted the different time periods in which patients were treated as a potential limitation, but also noted that the effect of this was minimised by ensuring that the strategy for treating burned patients remained the same between periods.

Implications of the study
The authors reported that percutaneous tracheostomy is their treatment of choice.

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Other publications of related interest


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