Cost-effectiveness of hair apposition technique compared with standard suturing in scalp lacerations

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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
The study compared use of the hair apposition technique (HAT), a noninvasive new technique for repairing simple scalp lacerations using tissue adhesives, with the traditional treatment of wound cleansing and standard suturing (SS).

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients admitted to the emergency department (ED) with scalp lacerations.

Setting
The setting was secondary care. The parent clinical study was carried out in the emergency medicine departments of two tertiary-level hospitals in Singapore.

Dates to which data relate
The parent clinical study was published in 2002 (Hock et al. 2002). The clinical and resource use data dated from December 1999 to March 2001. The price year was 2004.

Source of effectiveness data
A decision model was used. This was based on the parent single study (Hock et al. 2002).

Link between effectiveness and cost data
The costing was undertaken retrospectively on the same patient sample as that used in the parent effectiveness study (Hock et al. 2002).

Study sample
Little information was reported. The authors only referred to the parent study (Hock et al. 2002).

Study design
The study was a prospective, randomised, multi-centre, clinical trial (Hock et al. 2002).
Analysis of effectiveness
The study outcomes reported were the probabilities of each of the complications associated with scalp lacerations.

Effectiveness results
The probabilities of events for the HAT were 0.02 (95% confidence interval, CI: 0.002 to 0.055) for infection, 0.01 (95% CI: 0.000 to 0.037) for bleeding and for wound breakdown, 0.07 (95% CI: 0.029 to 0.127) for scarring alone, and 0.89 (95% CI: 0.822 to 0.943) for no complications.

The probabilities of events for SS were 0.02 (95% CI: 0.003 to 0.056) for infection and for bleeding, 0.05 (95% CI: 0.017 to 0.102) for wound breakdown, 0.15 (95% CI: 0.089 to 0.230) for scarring alone, and 0.76 (95% CI: 0.666 to 0.835) for no complications.

Clinical conclusions
The authors reported that significant subjective and objective differences in favour of the HAT for patients with suitable scalp lacerations were found in the parent randomised controlled trial (RCT). Little information was reported as the authors only referred to the parent study (Hock et al. 2002).

Modelling
A decision analytic model was built. This was based on a decision tree that estimated the proportion of patients who would have the three major complications associated with scalp lacerations (i.e. infection, bleeding, and wound breakdown), scarring alone, and no complications. To account for global uncertainty in the model, a probabilistic model using Monte Carlo simulation was applied.

Measure of benefits used in the economic analysis
The outcome measure used in the economic analysis was the number of cases with complications. Effectiveness was assessed by deriving the probability of each of the complications associated with scalp lacerations.

Direct costs
All health care costs related to each method were calculated. These included equipment and staff time, differential costs caused by complications, the cost of using procedure trays (including labour, materials and sterilisation costs for reprocessing the tray), costs charged to the ED by the hospital for the use of floor space and facilities, and departmental costs such as ancillary staff. Resource use was derived from the clinical trial. The material costs were derived from the purchase price charged to the hospital. Physician and nursing services were valued by using their respective hourly wage. Since the consultation costs of the ED, the cost of any diagnostic tests (including radiographs and scans performed in the ED) and the cost of any observation period, nursing, or follow-up treatment for head injury were considered to be equal for the two methods, they were explicitly excluded. Discounting was not necessary. The quantities and the costs were analysed separately, and the estimations of them were derived through modelling. The quantity of resources was taken from the parent clinical study. The price year was 2004.

Statistical analysis of costs
The costs were treated in a probabilistic way. A Monte Carlo simulation was performed with the cost parameters, according to their distributions (see next section).

Indirect Costs
No indirect costs were reported.

Currency
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US dollars ($) and Singapore dollars (SGD). The conversion rate was $1 = SGD 1.68.

**Sensitivity analysis**
A probability distribution was estimated for each input parameter in the model. Expected values were estimated through Monte Carlo simulation with 5,000 replications by random sampling of values for each input parameter.

For the HAT and SS costs, the time taken for each procedure was taken from the RCT and was considered uncertain based on the mean and standard error of the mean (SEM) from the trial. These times characterised the uncertainty over procedural costs. All other procedural costs were uncertain. For the costs of complications, it was assumed that uncertainty was characterised by a gamma distribution. Given the great uncertainty concerning the true value of these costs, an SEM equivalent to 50% of the expected value was assumed.

**Estimated benefits used in the economic analysis**
The probability of a complication was 0.11 (95% CI: 0.06 to 0.18) for the HAT and 0.24 (95% CI: 0.15 to 0.37) for SS, giving an incremental value of 0.13 (95% CI: 0.02 to 0.27).

**Cost results**
The total additional costs were SGD 30.91 (95% CI: 28.79 to 35.42) for the HAT and SGD 78.84 (95% CI: 58.49 to 103.96) for SS, giving a saving of SGD 47.93 (95% CI: 27.33 to 72.91).

**Synthesis of costs and benefits**
The HAT dominated SS. Overall, the HAT resulted in cost-savings of $28.50 (95% CI: 16.30 to 43.40) per patient compared with SS, with an estimated reduction in complications of 13% (95% CI: 2 to 27). In 98.9% of replications, the HAT was shown to be more effective and less costly.

For all sensitivity analyses, individually or combined, the HAT remained cost-saving.

**Authors’ conclusions**
The hair apposition technique (HAT) was found to be a more cost-effective technique than standard suturing (SS) for closing suitable scalp lacerations.

**CRD COMMENTARY - Selection of comparators**
The choice of the comparator was explicitly justified. The justification given for the choice of two of these procedures was based on the results of the HAT study. You should judge whether these techniques are relevant in your own setting, or whether other comparators from other treatment procedures could have been relevant as well.

**Validity of estimate of measure of effectiveness**
The authors used data from a published, multi-centre RCT. There was little information on the methods of this trial, so it is difficult to comment on the validity of the effectiveness data derived from it. The authors stated that the sample size was a little small. These estimates were investigated in sensitivity analyses using Monte Carlo simulation.

**Validity of estimate of measure of benefit**
The measure of health benefit (complications avoided) was proxied directly by a single effectiveness estimate. The choice of estimate was justified following a recommendation from the literature. The measure chosen is context specific and can only be compared with other scalp laceration studies (and not other economic evaluations).
Validity of estimate of costs
The authors reported that the costs were estimated from the perspective of a health care system, therefore the indirect costs were appropriately not included. Although some costs could have been excluded from the analysis, these were unlikely to have affected the authors' conclusions since they were common to both treatment procedures. To estimate the total health care costs, the authors considered all relevant categories. No discounting was reported, which was appropriate given the short term horizon of the study. The resource use quantities were taken from the RCT that supplied the effectiveness data. The authors said that the sample size was a little small. The prices were taken from published sources and sensitivity analyses of the costs and procedure times were conducted.

Other issues
The authors did not compare their findings with those of other studies, although the issue of generalisability to other settings was addressed. The authors' conclusions reflected the scope of the analysis. The authors reported limitations imposed by the data used in the model, which was based on the parental RCT, and its small sample size. In addition, the resource use assumptions of the cost analysis might be different for other EDs.

Implications of the study
The HAT could lead to large cost-savings given the common occurrence of scalp lacerations in most health systems. No shaving or trimming of hair is necessary with this technique, making it cosmetically acceptable to patients. Patients also liked the fact that it is a needle-less technique, and that there is no removal of sutures because the glue drops off after a few weeks with normal hair washing. These advantages might account for its popularity and acceptance by the general public and EDs around the world.

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