Inpatient management of epistaxis: outcomes and cost
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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
Three treatments for epistaxis were examined. Specifically, nasal packing, arterial ligation, and embolisation.

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised patients requiring treatment for epistaxis.

Setting
The setting was a hospital. The economic study was carried out in the USA.

Dates to which data relate
The effectiveness, resource use and cost data were gathered between 1998 and 2000. The price year was not stated.

Source of effectiveness data
The effectiveness evidence was derived from a single study.

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

Study sample
Power calculations, if performed, were not reported. The patients were retrospectively identified from the 1998, 1999 and 2000 Nationwide Inpatient Sample (NIS), a publicly available database of hospital admissions from 980 hospitals in 28 states. The patients were identified from records listing a primary admitting diagnosis of epistaxis. Records containing more than one of the three procedures were excluded. Overall, 9,778 patients who had undergone hospital treatment for epistaxis were identified. However, 5,042 records were excluded because no procedures were listed (1,698), the procedures listed were not one of the three procedures of interest (2,547), and more than one of the procedures of interest were listed (797). There were 94 patients (54.3% men) in the embolisation group, 454 patients (59.0% men) in the ligation group, and 4,188 patients (53.4% men) in the packing group. The mean age of the patients was 60.1 years in the embolisation group, 61.5 years in the ligation group, and 66.5 years in the packing group.
Study design
This was a retrospective cohort study that was carried out at several hospitals across the USA. The patients appear to have been followed up until hospital discharge. No patient was lost to follow-up since complete medical records were extracted from the NIS.

Analysis of effectiveness
All of the patients included in the initial study sample were considered in the analysis of effectiveness. The primary outcome measures were the length of stay (LOS), mean time from admission to treatment, proportion of patients who died during hospitalisation, transfusion rates, and complication rates. At baseline, the packing group had a significantly higher mean age than both the embolisation and ligation groups. The epistaxis group had a higher proportion of males than the NIS population. All three treatment groups had similar gender and racial distributions, although there was a trend towards higher proportions of African Americans and Hispanics in the embolisation group. There was a higher proportion of Medicare and a lower proportion of private insurance in the packing group, and slightly higher proportions of Medicaid and private insurance in the embolisation group. The embolisation group had a significantly higher proportion of elective admissions than the other two groups. A sub-group analysis was performed in the packing group.

Effectiveness results
The average LOS was 3.24 days in the embolisation group, 3.25 days in the ligation group, and 3.20 days in the packing group.

The mean time from admission to treatment was 0.82 days in the embolisation group, 0.49 days in the ligation group, and 0.12 days in the packing group.

The proportion of patients who died during hospitalisation was 0% in the embolisation group, 0.2% in the ligation group, and 0.5% in the packing group.

The transfusion rate of whole blood or packed cells was 7.4% in the embolisation group, 10.6% in the ligation group, and 9.8% in the packing group.

The transfusion rate of serum or platelets was 5.3% in the embolisation group, 2.4% in the ligation group, and 3.1% in the packing group.

In terms of complications:
the rate of stroke was 0% in the embolisation group, 0.2% in the ligation group, and 0.1% in the packing group;
the rates of myocardial infarction were 0% in all groups;
the rate of pneumonia was 2.1% in the embolisation group, 1.8% in the ligation group, and 1.5% in the packing group;
the rate of aspiration pneumonia was 0% in the embolisation group, 0.7% in the ligation group, and 0.4% in the packing group;
the rate of angina pectoris was 0% in the embolisation group, 1.5% in the ligation group, and 1.1% in the packing group; and
the rate of blindness was 0% in the embolisation group, 0% in the ligation group, and 0.3% in the packing group.

Most of the differences in the outcome measures did not achieve statistical significance. Only differences in mean time from admission to treatment were significantly different between the groups, but all were less than one day.

The packing group was also subdivided into admissions for anterior or posterior nasal packing The mean LOS was 2.75 days for the anterior packing group and 3.53 days for the posterior packing group, (p<0.001).
Clinical conclusions
The effectiveness analysis showed that the three treatments were equivalent in terms of the clinical end points.

Measure of benefits used in the economic analysis
No summary benefit measure was used in the economic analysis because the three interventions were equally effective. In effect, a cost-minimisation analysis was carried out.

Direct costs
The perspective adopted in the cost analysis was not explicitly stated. It appears to have been that of the hospital since only those hospital resources billed by the admitting hospital were included in the study. A detailed breakdown of the cost items was not provided. The unit costs were not presented separately from the quantities of resources used. The estimation of both the costs and resources used was based on data derived from the NIS database for 1998 - 2000. Discounting was not relevant since the costs were incurred during a short timeframe. The price year was not reported.

Statistical analysis of costs
The costs were analysed using a one-way analysis of variance followed by Tukey's post hoc test.

Indirect Costs
The indirect costs were not included in the economic evaluation.

Currency
US dollars ($).

Sensitivity analysis
Sensitivity analyses were not performed.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

Cost results
The mean charges were $17,517 in the embolisation group, $12,805 in the ligation group, and $6,282 in the packing group.

The differences in total charges between the packing and ligation groups and between the packing and embolisation groups were statistically significant, (both p<0.05). The difference between the ligation and embolisation groups did not reach statistical significance.

The mean total hospital charges were $1,269 less for the anterior packing group than for the posterior packing group, (p<0.001).

Synthesis of costs and benefits
A synthesis of the costs and benefits was not relevant since a cost-minimisation analysis was carried out.

Authors' conclusions
Nasal packing was associated with lower hospital charges and similar complication rates and length of hospital stay as embolisation and ligation. Therefore, more invasive and costly treatments such as arterial ligation and embolisation should be reserved for epistaxis refractory to packing.

**CRD COMMENTARY - Selection of comparators**
The selection of the comparators was appropriate as the most commonly used treatment strategies for epistaxis were considered. The authors stated that the decision to select nasal packing, embolisation and ligation was based not only on the relative frequency with which these three treatments were employed, but also on the possibility of creating homogeneous treatment groups using the coding available in the NIS database. You should decide whether they are valid comparators in your own setting.

**Validity of estimate of measure of effectiveness**
The effectiveness evidence came from a retrospective review of patient charts. The retrospective nature of the study and the lack of random allocation of patients to the study groups represent two limitations of the analysis. The method used to allocate patients to the treatment groups was not described clearly. The authors stated that the type of payer or the type of admission might have influenced the choice of treatment. Thus, selection bias and confounding factors might have affected the results of the analysis. The study groups were not well matched at baseline, but the authors controlled for the potential impact of co-morbidities. The evidence came from several centres, thus enhancing how representative the patient sample was. No formal justification for the size of the sample was provided, and power calculations were not reported. These issues tend to limit the internal validity of the analysis.

**Validity of estimate of measure of benefit**
No summary benefit measure was used in the analysis because a cost-minimisation analysis was conducted. Please refer to the comments in the ‘Validity of estimate of measure of effectiveness’ field (above).

**Validity of estimate of costs**
The perspective adopted in the study was unclear. Hospital charges were used to derive the costs, although the use of charges as proxies for costs is controversial. The costs were presented as macro-categories and a breakdown of the cost items was not reported. This limits the possibility of replicating the cost analysis in other settings. Statistical analyses were carried out to test the statistical significance of differences in the costs. However, the cost estimates were specific to the study setting. The period during which the costs and resource use data were gathered was stated. However, the price year was not reported, which will hinder reflation exercises in other time periods.

**Other issues**
The authors reported the results of other published studies. They did not explicitly address the issue of the generalisability of the study results to other settings. Sensitivity analyses were not performed, which limits the external validity of the study. The authors noted some limitations of their analysis. First, the database contained data from 28 US states, and it was pointed out that regional preferences in medical practice or patient demographics could alter the conclusions of the analysis. Second, the validity of the administrative database relies on proper coding of all entries, although any errors are expected to have been similar in all groups. Finally, the use of charges to derive treatment costs might not have captured the full economic impact of the three treatments.

**Implications of the study**
The study results support the use of nasal packing for the treatment of epistaxis. The authors stated that most of the limitations of the current study could be overcome by a well-designed prospective clinical trial. However, a more feasible approach would be the analysis of a large multi-centre retrospective series with a chart review focusing on the specific data required to compare the efficacy and safety of the three treatments.
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Other publications of related interest


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