

# Why is there such variation in nasal cautery rates for childhood epistaxis: deprivation or clinician behaviour? National data from Scotland 2000-2019\*

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## To the Editor:

Nosebleeds in children are very common <sup>(1)</sup>, but surprisingly little has been published on their management within health services. Only two treatments have been shown in randomised controlled trials to be effective: antiseptic cream <sup>(2)</sup> and silver nitrate cautery <sup>(3)</sup>. We used routinely-collected health service data for nasal cautery in children over the last 20 years to determine the intervention rate, and to characterise any variation in between geographical areas. Scotland is ideal for this kind of research as it has a stable population with only a small amount of private health care provision <sup>(4)</sup> alongside a single, uniform, taxpayer-funded National Health Service with centralised data collection.

Public Health Scotland provided data from mandatory hospital episode reporting forms (Scottish Morbidity Record forms SMR00 "Outpatient attendance" for procedures performed in the outpatient clinic under topical anaesthesia, and SMR01 "General/acute inpatient and daycase" for procedures performed under general anaesthesia). These are known to be at least 99% complete <sup>(5)</sup>. Data were provided for all mainland Scottish hospitals in the period 2000-2019 for nasal cautery procedures (OPCS code E05 and all of its sub-categories) in patients aged 0-16 years. Data from three small island health board areas (Orkney, Shetland and Western Isles) were excluded. Population data are freely available on the website of the National Records Office for Scotland <sup>(6)</sup> and these were used for calculating intervention rates. We used the Scottish Index of Multiple Deprivation (SIMD) to compare socio-economic deprivation between different areas.

Between 2000 and 2019, a total of 3331 children underwent nasal cautery under general anaesthesia. The mean number of children in the Scottish population was 976706, giving a rate of 0.17 procedures per 1000 children in the population per year.

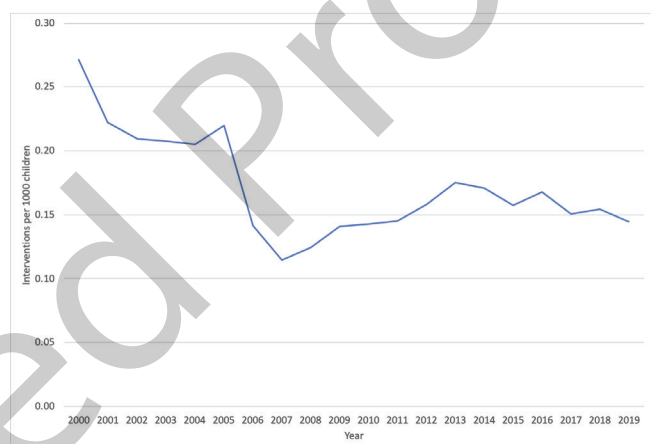


Figure 1. Number of nasal cautery procedures performed under general anaesthesia in the 11 mainland Health Boards of Scotland each year from 2000-2019, expressed as the rate of interventions per 1000 children aged 0-16 in the population. There is a significant fall in the intervention rate over time ( $R=-0.61$ ,  $p=0.004$ ).

There has been a small but significant fall in this rate over the 20 years of the study (Figure 1). This may reflect a true fall in the incidence of paediatric epistaxis over time, a change in the proportion of procedures performed in outpatients rather than under general anaesthesia, or a reduction in the proportion of children with epistaxis requiring cautery due to an increase in the use of effective conservative measures such as antiseptic cream.

Figure 2 shows the relationship between cautery rate and socio-economic deprivation. Children living in the most deprived areas undergo nasal cautery under general anaesthesia more often than those in the most affluent areas (Cochran-Armitage test for trend, chi squared=224.5,  $df=1$ ,  $p<0.001$ ). As far as we know this is the first time such an association has been reported. It may reflect an increase in nasal colonisation with *Staphylo-*

Table 1. Each of the 11 mainland Health Boards of Scotland is shown, along with the total number of children aged 0-16 years resident in that Health Board who underwent nasal cautery under general anaesthesia during the period 2000-2019. The final column shows the proportion of children within each Health Board who live in Scotland's most deprived postcode areas (Scottish Index of Multiple Deprivation 1st and 2nd quintiles). There is no correlation between intervention rate and the proportion of deprived children in each Health Board.

Health Board	total nasal cautery procedures under GA	mean per year	mean population of children (0-16 years)	rate per 1000 children	% children in SIMD quintiles 1 and 2
Ayrshire & Arran	230	11.5	70110	0.16	57%
Borders	149	7.45	20884	0.36	18%
Dumfries & Galloway	63	3.15	27120	0.12	35%
Fife	211	10.55	69450	0.15	42%
Forth Valley	58	2.9	57128	0.05	40%
Grampian	336	16.8	104505	0.16	18%
Greater Glasgow & Clyde	763	38.15	213121	0.18	56%
Highland	83	4.15	59059	0.07	29%
Lanarkshire	401	20.05	128989	0.16	53%
Lothian	944	47.2	152302	0.31	35%
Tayside	93	4.65	74039	0.06	36%
<b>Total for mainland Scotland</b>	<b>3331</b>	<b>166.55</b>	<b>976706</b>	<b>0.17</b>	

*coccus aureus* <sup>(7)</sup> due to larger family size, overcrowding homes and more time in day care. Shay and colleagues <sup>(8)</sup> found an association between low income and more frequent emergency department attendance with epistaxis, but it is unclear whether this is due to disease incidence or differences in access to health care in the USA.

Table 1 shows the nasal cautery rate for each of the 11 mainland Health Board areas of Scotland. There is a more than 7-fold variation in the intervention rate between the Health Boards (range 0.05-0.36/1000/year). The socio-economic profile within each Health Board varies considerably. However, there is no correlation between intervention rate and the proportion of deprived children in each Health Board. In any event, it is difficult to imagine such a large difference being due to any genuine difference in the population prevalence of such a common disorder: differences in clinician behaviour must be more likely.

Day-case and inpatient procedures performed in the operating theatre are coded reliably well on SMR01 forms across Scotland <sup>(5)</sup>. Those performed in the outpatient clinic under topical anaesthesia, however, are not. In theory, the SMR00 form should be coded and returned for every outpatient visit, but SMR00 data show very low levels of reported procedures and clinicians report that coding is not done consistently.

An electronic patient record was introduced in Greater Glasgow and Clyde (Scotland's largest health board) between 2011 and 2013, requiring clinicians to record an outcome from every

consultation including any procedure performed. Figure 3 shows that after 2013, the number of outpatient nasal cautery procedures rose rapidly. Over the period 2014-2019, there were 1677 nasal cautery procedures, a mean rate of 1.35 per 1000 children in the population per year. This is more than 7 times the number of procedures performed under general anaesthesia in this Health Board over the same time period (234 procedures, 0.19/1000/year). Even if outpatient coding is incomplete, we can see that at least 88% of all nasal cautery procedures are done under topical anaesthesia and no more than 12% require general anaesthesia.

It is possible that some Health Boards have higher rates of nasal cautery under general anaesthesia because they perform fewer procedures in the outpatient clinic. Successful cautery in a young, anxious child requires patience, rapport, time and skill on the part of the clinician: perhaps some clinicians feel that arranging the procedure under general anaesthesia is the easier option. This would be a fruitful area for quality improvement: more procedures done in clinic means fewer visits to hospital, fewer children exposed to the risks of general anaesthesia and reduced costs for the health service.

Studies of population prevalence and better outpatient data are required, but our data would be consistent with variation in clinician behaviour as one cause for the large variation in nasal cautery rates for children in Scotland.

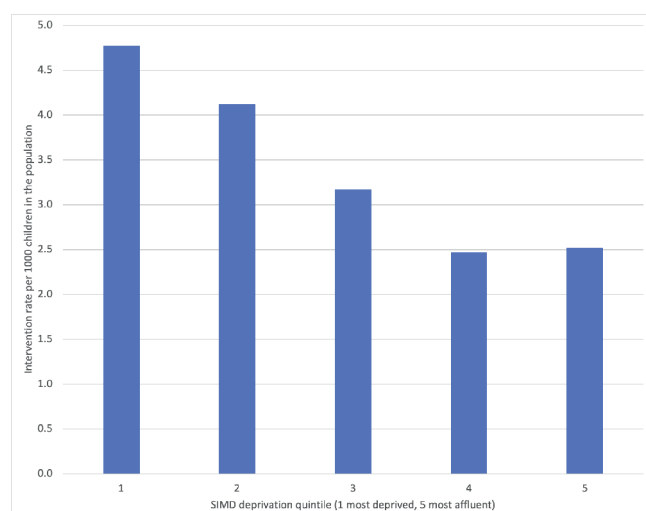


Figure 2. The relationship between socio-economic deprivation and the rate of nasal cautery under general anaesthesia for children aged 0-16 years in the 11 mainland Health Boards of Scotland, 2000-2019. Deprivation is shown as the Scottish Index of Multiple Deprivation (SIMD) quintiles. The intervention rate is calculated from the number of procedures performed and the mean population of children aged 0-16 in each of the quintiles of the SIMD. Children living in the most deprived postcode areas undergo nasal cautery under general anaesthesia more often than those in the most affluent postcodes (Cochran-Armitage test for trend, chi squared=224.5, df=1,  $p<0.001$ ).

### Authorship contribution

LSD provided the data and edited the paper. HK performed the analyses and drafted the paper.

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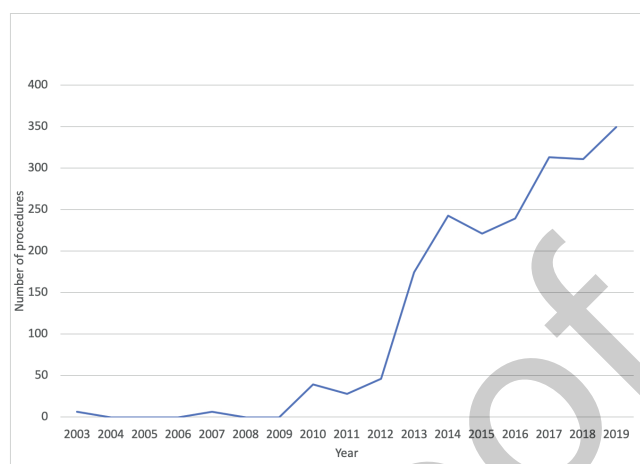


Figure 3. Nasal cautery procedures performed under topical anaesthesia in the outpatient clinic in Greater Glasgow & Clyde Health Board, 2000-2019. The electronic medical record was introduced between 2011 and 2013 replacing manual paper-based systems, after which it became mandatory for outpatient procedures to be recorded and coded. Data for outpatient procedures prior to 2014 are therefore thought to be unreliable.

### Conflict of interest

Neither of the authors has any conflict of interest.

### Data availability

All data are available from the corresponding author upon reasonable request.

### Ethical considerations

This work is based on anonymised data which is routinely collected by the NHS and which is freely available on reasonable request to the Information Services Division of NHS Scotland. Research ethics committee approval is not required for access to the data. No specific ethical considerations arise.

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