

## Contemporary Themes

# Accuracy of hospital activity analysis data in estimating the incidence of proximal femoral fracture

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Lewis<sup>1</sup> has recently used hospital activity analysis (HAA) data to suggest that the incidence of proximal femoral fracture has been increasing in recent years. Problems in interpreting HAA-based hospital admission rates as incidence rates are known to arise from the transfer of patients from one hospital to another during treatment.<sup>2,3</sup> Less is known about the accuracy of the diagnostic classification of proximal femoral fracture in HAA data. A study in Newcastle<sup>3</sup> suggested that HAA-based studies would miss 7% of cases allocated to multiple fracture codes but include 9% to 10% of incorrect codes or late complications of fracture. Numerically these errors are not great enough to vitiate the use of HAA for epidemiological studies of proximal femoral fracture, provided that the errors are consistent from place to place and over time. We have carried out a study to ascertain to what extent variations from place to place in the incidence of proximal femoral fracture apparent in HAA in the Northern Region are genuine or due to varying error rates in processing HAA.

### Methods and results

Northern Region HAA data for 1977 and 1978 were searched for patients aged over 60 admitted during 1977 with a diagnosis of proximal femoral fracture (N820) occurring anywhere on the discharge HMR1 form. Linkage procedures based on hospital unit number and source of admission code (previously validated against other possible procedures<sup>4</sup>) were used to reduce 4609 discharges to 3500 individual placement records. These were then distributed by patient address codes to nine areas of the Northern Region for which population estimates were available. The number of HAA records per patient admitted averaged 1.3 but showed significant variation among the nine areas ranging from 1.1 to 1.8.

Sex-specific and age-specific incidence rates were then calculated, and using multivariate (GLIM) procedures statistically significant between-area differences in incidence rates were detected. Standardised for age and sex annual incidence rates ranged from 4.5 per thousand (for Newcastle) down to 0.3. Five hospitals outside Newcastle serving three areas with incidence rates of 0.3, 2.3, and 4.0 were then selected for further study. For three of the hospitals a sample of cases was drawn from HAA and using unit numbers case records were sought and the diagnosis examined. Eighty per cent of notes were retrievable comprising 69%, 87%, and 95% of the samples at the three hospitals. The diagnosis of proximal femoral fracture was correct in 90% of the total sample retrieved, a finding similar to that made in the earlier study in Newcastle.<sup>3</sup> As a converse procedure, an

HAA-independent sampling frame for cases of proximal femoral fracture was identified at each hospital. This comprised operation records at two (A and B) and ward admission books at the remainder (C, D, and E). These alternative sampling frames were validated by retrieving the records of a random sample of patients identified from them. This allowed an estimate of the number of cases of proximal femoral fracture based on the HAA-independent sampling frame to be compared statistically<sup>4,5</sup> with the number as recorded by HAA for each hospital. In deriving these estimates an additional assumption was made (where the sampling frame comprised only the operation book) that the proportion of patients not operated on was as recorded in HAA—that is, that the chance of a particular patient being recorded in HAA was independent of whether she was treated operatively or conservatively. The results are presented in the table. Clearly there is wide variation among hospitals in the

*HAA cases of proximal femoral fracture compared with estimated true numbers*

Hospital	HAA cases	Estimated true number	Significance difference
A	1	75	<0.01
B	107	114	NS
C	120	164	<0.01
D	115	117	NS
E	43	89	<0.01

accuracy with which HAA reflects their intake of patients with proximal femoral fracture. These differences are of a magnitude sufficient to account for most of the between-area differences in estimates of incidence of proximal femoral fracture derived from our original HAA data. Further inquiry at the hospitals suggested that an important contribution to the loss of data arose through inaccurate diagnostic coding by clerical officers associated with failure of clinical staff to complete the diagnostic information on form HMR1.

### Comment

Clearly in some centres HAA provides an accurate diagnostic index for cases of proximal femoral fracture but needs to be combined with some linkage procedure because of significant variation between centres in the number of case records generated per patient admitted. In other centres there are gross errors in the generation of HAA data relating to patients with proximal femoral fracture. This is unfortunate since there is a possibility of regional differences in the incidence of proximal femoral fracture that might provide valuable information on aetiological factors.<sup>6</sup> Our study suggests that at present HAA diagnosis would not provide a reliable source for identifying regional differences. Supplementary use of operation codes would be unlikely to help since any increase in sensitivity would be at the cost of reduced specificity and might introduce bias due

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to regional differences in treatment policy. Our findings must also call into question the validity of temporal changes in the incidence of proximal femoral fracture apparent in HAA, since the accuracy of diagnostic recording may change over time. A further conclusion of our study is that more involvement of clinical staff and better training of hospital clerical officers in completing diagnostic information could greatly improve the accuracy of HAA data on proximal femoral fracture. This surely would be a good investment.

I thank Dr I T Russell, senior lecturer in medical statistics, and Professor J Grimley Evans, both of the University of Newcastle upon Tyne, for advice.

## References

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(Accepted 5 May 1982)

# Accuracy of hospital activity analysis operation codes

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## Abstract

**The accuracy of operation codes on hospital activity analysis printouts has been compared with unit and patient records. Inaccurate information is being provided by the hospital activity analysis in a significant number of cases. The same mistake is often repeatedly made, suggesting deficient monitoring procedures. These lapses occurred despite a unit policy of medical staff entering the operation and diagnostic details on the HMRI(IP) sheet and the checking of all entries by a consultant.**

## Introduction

Hospital activity analysis has been in use nationally for about a decade, and the HMRI (IP) originating document has been standard throughout the country since 1970. As Rowe and Brewer<sup>1</sup> have observed the data produced should be of use in research and planning and of great benefit to clinicians, hospital administrators, and research teams alike. Previous studies, however, have shown defects in the collection of diagnostic information, especially when coding was left to non-medically qualified personnel. The present study was stimulated by finding, during the course of a research study, that several hospital activity analysis codes for operations were inaccurate despite the entry of correct information on the HMRI form by unit members.

## Methods

Two separate hospital activity analysis printouts were requested in late 1980 and the early part of 1981. The first contained over 300 cases of proctocolectomy, ileostomy, and ileorectal anastomosis performed in the North Western Regional Health Authority during the previous decade for ulcerative colitis, Crohn's disease, or polyposis

coli. A second request was for an analysis of all splenectomies with or without lymph node mapping undertaken on the professorial surgical unit at Hope Hospital. These lists were compared with those from internal unit records and the HMRI in the patients' case notes.

## Results

In the study of proctocolectomy and ileostomy and ileorectal anastomosis hospital activity analysis records suggested that 17 patients had undergone 19 operations on the professorial unit at this hospital in the period under study. Comparison with unit records kept on Paramount punch cards suggested a total of nine errors in operation codings, a finding confirmed in each case by reference to the patient's notes, which contained in every instance an HMRI form correctly completed by a member of the unit. Analysis of the errors showed that in all but three cases the operation of total colectomy and ileostomy with rectal preservation had been entered by the clerk as proctocolectomy and on two occasions this error had been repeated within the same year. The source of the error was almost certainly a failure by non-medically qualified hospital activity analysis staff to appreciate that the word "total" prefixing colectomy was to distinguish it from subtotal resections and was not a synonym for proctocolectomy. In some cases this mistake led to patent absurdities, one patient being recorded as having undergone proctocolectomy in 1977 and ileorectal anastomosis (correctly) the next year. The error rate of nine in 19 recorded operation codings (47%) was itself important. Analysis of internal record cards, however, suggested that 21 patients had undergone 25 operations. Further investigation showed that in five cases a correctly completed HMRI for ileorectal anastomosis or ileostomy with or without rectal preservation had been allocated incorrect operation codes on three occasions and none whatsoever in the other two. There was therefore an overall total of 14 errors in 25 codings in the hospital activity analysis records, an error rate of 56%. Furthermore, the number of patients treated on the professorial surgical unit was understated by roughly 20% on the hospital activity analysis printout.

While these results were disturbing, it was thought that there were two factors present which may have been working to overstate the degree of inaccuracy experienced. Firstly, the numbers in the series were relatively small. Although the case load seen by the unit in four years accounted for 5% of the reported operative procedures in the region for the whole decade, comparatively minor fluctuations in the actual levels of miscoded cases would have had disproportionate repercussions on the percentages reported. Secondly, the classifications for this form of surgery are complex, particularly for non-medically qualified individuals. These objections should not apply to a relatively straightforward procedure such as splenectomy. The hospital activity analysis printout for splenectomy with or without associated lymph

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