

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.

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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 Brewer¹ 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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Analysis of hospital activity analysis recorded splenectomies with or without lymph node mapping procedures 1975-80

Year	Total No of cases	Correctly documented on HAA	Incorrectly documented on HAA	Error breakdown			
				HMRI fault	S + M as S only	S/S + M as M only	Other procedures as S + M
1975	8	5	3	1	2	—	—
1976	22	20	2	1	1	—	—
1977	19	11	8	1	—	6	1
1978	26	14	12	—	12	—	—
1979	25	17	8	1	6	1	—
1980	9	7	2	1	—	1	—
Total	109	74 (68%)	35 (32%)	5 (5%)	21 (19%)	8 (7%)	1 (1%)

Source: Compiled from hospital activity analysis ad hoc inquiry printouts and patients' notes.

S = Splenectomy (code 540).
M = Mapping (code 905).
S + M = Splenectomy and mapping.

node mapping for the years 1975 to 1980 was examined and all cases where splenectomy was not the major operation performed were discarded. This produced 109 suitable cases for study (notes were unavailable in a further seven) with only two possible input codes, 540 for splenectomy and 905 entitled "lymphatic biopsy" that covered the staging procedures.

Despite the simplicity of the operation codings, the correct information was shown only in 74 cases (68%) on the hospital activity analysis printout. Further, as the table illustrates, in only five instances (5%) were hospital activity analysis coding staff working from incomplete or incorrectly completed operation codings. In three of these cases, although the operation had not been recorded on the HMRI, a state of affairs often encountered by hospital activity analysis coding clerks, a typed operation note was available in the case sheet but it had not been correctly interpreted. Thus in 27% of cases inaccurate information had been entered from clearly stated operation details. Breakdown of the annual error rate once again showed a pattern of repeated mistakes. While this may not always affect longitudinal series to a significant degree it can produce grossly inaccurate year-by-year data—for example, the figures for splenectomy in 1977 are almost 25% understated.

More disturbingly, analysis of unit records showed a total of 121 instances of splenectomy as a major procedure. Investigation of the discrepancy showed that each of the 12 case sheets not recorded in the hospital activity analysis printout included a completed HMRI correctly showing the operation undertaken. The case load for the unit was thus understated by almost 10%, and the hospital activity analysis was inaccurate in 39% of cases.

In both studies only one error resulted from misspelling of the patient number. Accuracy in this area, which appears to be of a high order, is crucial for no monitoring procedures exist to validate this information, and errors at the input stage are unlikely to be detected and amended.

Discussion

Shortcomings within the hospital activity analysis system and its Scottish equivalent are widely recognised. Lennox *et al*² found an error rate of up to 42% in the coding of salivary gland tumour diagnosis in Glasgow. In a larger series reported by George and Maddocks³ the error rate in the coding of infectious disease diagnosis was almost 20%. In neither instance did the authors report the accuracy of subsequent treatment codings even though accuracy in this area is important for both research and planning. The levels of error showed by our studies lead us seriously to doubt the statistical validity of any random sampling exercise undertaken on the basis of hospital activity analysis operation codings. The frequency of the errors and their distribution make it most unlikely that an accurate sampling frame could be established, thus compromising the randomness of the exercise. This is a serious shortcoming, for hospital activity analysis is often advocated as a data base for research. Of arguably greater long-term harm is the possibility that decisions on resource allocation, both financial and physical, are being made without accurate knowledge of current case-load. As our studies showed the hospital activity analysis data understated the departmental work load by 20% for ileostomy

and ileorectal anastomosis, and by 10% for splenectomy. While planning decisions will probably take account of perceived failures in coverage by hospital activity analysis the resulting output can at best only be informed guesswork.

Both in Rowe and Brewer's original model system¹ and in subsequent correspondence the importance of coding of the diagnosis and treatment by clinicians has been emphasised.^{4 5} Thus the most worrying aspect of our findings is that error levels in the order of 40-50% were occurring despite the routine completion of the HMRI by medical staff and the checking of this by the unit consultants. In only five instances was the error attributable to a failure of the clinicians to complete the relevant sections of the HMRI, and on only two occasions was misleading information supplied to the coding clerks.

We suggest that despite the willingness of clinicians to provide basic diagnostic and treatment data, and a commitment at all levels among regional statisticians to provide an efficient service, the inaccuracies within hospital activity analysis show properly kept internal records to be more reliable both as a research tool and case-load indicator.

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Does chewing gum increase the likelihood of developing aphthous ulcers?

There is no published evidence on the relation between chewing gum and aphthous ulceration. Minor trauma to lips or cheeks during chewing may, however, precipitate attacks in susceptible individuals. If the habit of chewing gum is taken up in order to break the habit of smoking non-sugar-containing gum should be chewed, otherwise a sudden rise in the incidence of new carious cavities in the teeth will occur. A contact allergy to a constituent of chewing gum may possibly develop,¹ but this would be uncommon.—R B O SUTTON, senior lecturer in oral medicine, London.

¹ Rickles NH. Allergy in surface lesions of the oral mucosa. *Oral Surg* 1972;33: 744-54.