proposed different diagnostic criteria according to age, sex, and methods of collection. Diagnosis according to their criteria would have resulted in 15 (10.5%) false-positives and 6 (3.6%) false-negatives.

The commonest infecting organism was *E coli*. Proteus infection was found in three boys. A predilection of this organism for the male urinary tract has been described by others.^{6 17 18} The one boy whose urine was repeatedly found to contain *Staphylococcus albus* had pus cell counts in excess of 1500/ml and investigation showed scarring of his left kidney. Urinary infection with this organism has been described elsewhere in general practice.^{19 20}

Only one new case of infection was found in a child under the age of 2 years, most presenting at 3-8 years. This contrasts with results of hospital studies. Both Stansfeld¹⁵ and Smellie *et al*²¹ found the highest incidence in those aged under 1 year. The overall recurrence rate was 35% within the first two years, but the long-term outlook in this small group, with careful follow-up and treatment, was good.

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Hospital Topics

Accuracy of diagnostic content of hospital activity analysis in infectious diseases

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Summary and conclusions

Hospital activity analysis (HAA) was used to identify 2151 patients in whom the diagnostic code fell within the infectious disease categories of the International Classification of Disease. The clinical notes of these patients were examined by a doctor and in 414 (19.2%) the diagnostic coding was incorrect. Diarrhoea and viral infections were miscoded most often.

The possibility of inaccuracy must be considered when HAA aggregated data are used for planning purposes. Accuracy could be improved if clinicians routinely completed the diagnostic sections of the HAA form.

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Introduction

Hospital activity analysis (HAA) is a computer-based information system that allows the administrative, personal, and clinical details of patients to be brought together for analysis. The objectives of HAA were outlined by Benjamin.¹ The Department of Health and Social Security made suggestions for its introduction and operation.² Rowe and Brewer have described the development and applications of the system.³ Martini *et al*⁴ studied the accuracy of HAA data in Nottingham and concluded that the HAA system in that area is almost as good as the clinical notes from which it is derived. They also listed the few studies that have been published on the accuracy of HAA.

The HAA system in Wales covers all discharges from hospital, including those from maternity wards. The patients' notes are used as the source of data. Form HMR 1 serves as the "front sheet" in the patients' notes and as the input document for the computer. The operative and diagnostic sections are completed when the patient has been discharged. Unless medical staff are interested in data capture, these sections have to be completed by HAA clerks at hospital level. This is a source of potential error because of the difficulty a lay person may have in extracting accurate and relevant information from medical notes. The coding is undertaken at hospital level. Validation exercises on the accuracy of information noted on form HMR 1 are undertaken by the Welsh Office, but unless a medically qualified

officer is responsible for validating the diagnostic detail, the same limitations apply as at hospital level. Access to the clinical details of an identifiable patient is limited to the consultant under whose care the patient was admitted. Aggregated and non-identifiable data are, however, readily available in the National Health Service and play an increasingly important part in planning and resource allocation.

We decided to use aggregated data from HAA as a basis on which to decide how many beds for infectious diseases were required in South Glamorgan. Section I of the *International Classification of Diseases (ICD)*⁵ concerns infectious and parasitic diseases. Because adequate arrangements existed for treating patients with tuberculosis, syphilis and other venereal diseases, and the mycoses and helminthiases they were excluded from our study, but patients with meningitis and serum hepatitis, classified in other sections of the ICD, were included. As a part of this exercise we decided to examine the accuracy of the diagnostic category for patients discharged from hospitals in the area whose condition had been coded as being within the ICD categories described. We needed to decide whether we were justified in using retrospective, aggregated data about patients who were admitted to hospital because of an infectious disease as a basis on which to estimate bed needs.

Method

An HAA printout was obtained listing all patients discharged from South Glamorgan hospitals for 1972 and 1973 in whom the diagnosis was classified under one of the following ICD groupings. 000-009, Intestinal infectious diseases; 020-027, zoonotic bacterial diseases; 030-039, other bacterial diseases; 040-046, poliomyelitis and other enteroviruses of CNS; 050-057, viral diseases accompanied by exanthem; 060-068, arthropod-borne viral diseases; 070-079, other viral diseases; 080-089, rickettsioses and other arthropod-borne diseases; 320, meningitis; N999.2 serum hepatitis.

The clinicians who had cared for the patients in hospital were asked for permission to study the case notes. Each patient's notes were then examined by one of us (GBM) and allocated a diagnostic code. These codes were then compared with those listed on the form HMR 1 for that patient. Altogether 2151 records were examined, of which 871 concerned adults and 1280 children.

Results

The table summarises our results and shows the difference between the codes allocated by the HAA clerks and those allocated by a doctor. The doctor considered that diagnoses were miscoded in 414 patients in the infectious disease categories of the ICD. The table also shows how the error rates varied between adults and children, both showing a strikingly different pattern.

Discussion

The results show a considerable difference between the coding for this group of diagnoses by the HAA clerk and the doctor. The differences were mainly confined to a few diseases. The errors were due to the inability of a non-medical person to appreciate the difference between a symptom and a diagnosis, to select the key diagnoses from the notes, or to appreciate the reason for admission. This discrepancy indicates that HAA did not provide an accurate estimate of need for beds for infectious diseases.

Among those whose condition was incorrectly coded were 76 patients with intermittent diarrhoea or an alteration in bowel habit who had been admitted for investigation, the main diagnoses being carcinoma of the bowel, ulcerative colitis, or Crohn's disease. A similar problem arose with gastroenteritis and colitis in adults, which were miscoded in 61 patients. These miscodings have implications on the accuracy of using an HAA-based system for cancer registration, and West has commented on this.^{6,7} The inaccuracies in the coding of septicaemia arose because it was mentioned in the notes and the clerk considered it so important that he listed it as the first diagnosis. In this category were patients with postoperative wound infections, those receiving terminal care, and patients with leukaemia.

Herpes zoster and herpes simplex in adults (those over 13 years) were correctly coded in only nine cases out of 115. The confusion arose almost exclusively because patients admitted for ophthalmic surgery were noted as having a history of herpes zoster or herpes simplex and the diagnoses should have been coded as the late effects of such disorders. These diagnoses were coded instead as the primary cause for admission to hospital. In

Diagnosis of patients discharged from hospital according to Hospital Activity Analysis (HAA) clerk and doctor

Diagnosis	Adults			Children		
	HAA Clerk	Doctor	Difference	HAA Clerk	Doctor	Difference
Typhoid/paratyphoid	5	5		4	4	
Other salmonella infections	29	28	-1	15	15	
Bacillary dysentery	7	7		44	43	-1
Amoebiasis	2	2		0	0	
Protozoal intestinal infection	2	2		3	3	
<i>E. coli</i> enteritis	6	6		24	22	-2
Diarrhoea (009.1)*	90	14	-76	117	111	-6
Gastroenteritis and colitis (009.2)*	145	84	-61	486	471	-15
Leprosy	1	1		0	0	
Whooping cough	0	0		2	2	
Scarlet fever	9	10	+1	8	7	-1
Brucellosis	0	0		2	2	
Erysipelas	5	4	-1	0	0	
Glanders	2	2		0	0	
Tetanus	1	3	+2	1	1	
Septicaemia	71	13	-58	31	12	-19
Necrobacillosis	6	3	-3	8	6	-2
Aseptic meningitis	34	33	-1	75	75	
Chickenpox	5	5		16	16	
Herpes zoster	71	5	-66	3	3	
Herpes simplex	44	4	-40	18	15	-3
Measles	3	3		95	95	
Rubella	7	7		13	12	-1
Viral exanthem	1	1		1	1	
Viral encephalitis	11	9	-2	6	7	+1
Infective hepatitis	56	55	-1	25	23	-2
Mumps	11	12	+1	38	37	-1
Psittacosis	2	2		1	1	
Coxsackie virus	8	2	-6	0	0	
Glandular fever	51	51		17	17	
Viral warts	32	32	0	2	4	+2
Lymphocytic choriomeningitis	5	5		4	5	+1
Viral infection, unspecified (079.9)*	86	60	-26	106	79	-27
Malaria	6	6		5	5	
Serum hepatitis	22	22		0	0	
Bacterial meningitis	35	35		110	110	
Total	871	533		1280	1204	

*ICD code (8th revision).⁵

the group of viral infections 26 patients were included because the possibility of a virus infection was mentioned on admission to hospital; 22 were children with vague abdominal symptoms, who were admitted for observation by the surgeons.

In the study, case notes of every patient admitted to all the hospitals in South Glamorgan in 1972 and 1973 in whom the diagnosis was coded as an infectious disease were considered. Errors of miscoding were identified by a doctor who checked whether each patient was indeed suffering from an infectious disease, and these differences were absolute and immediately apparent to him. The results show that a clinician should indicate which diagnosis should be recorded on the HAA form, but they take no account of underrecording of infectious diseases because of misdiagnosis in other sections of the ICD classification; such an exercise would have been too time-consuming. If underrecording exists it is another reason why HAA cannot truly reflect the demand for beds for infectious diseases.

The accuracy of the coding for children was greater than that for adults, and this is reassuring. It may reflect the smaller number of clinicians with whose notes the clerks have to be familiar or a greater interest among the paediatricians, many of whom have, through the British Paediatric Association, produced the Cardiff Diagnostic Classification.⁸ Despite these miscodings, 1737 out of the 2151 records showed complete agreement—that is, 80.8% of cases. We suggest that this could be improved if medical staff completed the diagnostic sections of HMR 1 routinely when writing the discharge letter to the general practitioner.

HAA forms a data base not only for the administrator and the planner but for the clinician. It can aid him in research and in

the better use of resources, but its accuracy depends on the interest and care he is prepared to take in data capture. Our results show that the data base was not accurate in the case of infectious diseases in South Glamorgan. The possibility of such inaccuracies must be considered when such data bases are used for planning, and validation is essential. A continuing dialogue with clinicians about their use of the system seems to be critical in persuading them that ensuring its accuracy is valuable. The other factors considered when the bed needs were assessed are outside the remit of this paper.

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Are there any hazards in making and storing home-made wines in coloured plastic containers?

Coloured plastic containers were heavily criticised some years ago because their pigmentation necessitated using cadmium for yellow and orange colours and molybdenum, and even traces of mercury, for blue colours. Tests designed to simulate the action of stomach acids on these containers were reassuring in so far as they showed that only very low concentrations were leached out. It has been known for containers to be used which were originally designed for storing dairy hypochloride, which added an interesting but harmless flavour of TCP to the vintage. Fortunately coloured containers are now less readily available because the use of them to store wine introduces the hazards of a solvent action by alcohol over a prolonged period. This can cause release of levels of up to 0.1 to 0.2 ppm of cadmium. This is generally regarded as acceptable in normal circumstances, and there are no specific regulations to cover the hazard, but clearly it would be inadvisable to drink large quantities of wine that had been contaminated in this way. The rule must be to conduct fermentations in colourless containers.

Is it possible to develop an immunity to insect stings? Why do beekeepers sometimes develop an allergy to stings after many years of trouble-free bee-keeping? Is it unwise for a woman beekeeper who is pregnant to risk being stung?

Acute hypersensitivity reactions to stings by bees or wasps are relatively common, occurring in from 0.4 to 0.8% of different populations. Few, however, are fatal. These reactions are mediated by IgE antibodies, which provoke the release of histamine and other vasoactive substances from eosinophils.¹ The propensity to produce antibodies of this variety is in part genetically determined.² In common with other allergens repeated exposure to insect allergens provokes increasing titres of IgE and hence anaphylactic reactions in susceptible individuals. Obviously, beekeepers are particularly at risk. The symptoms are systemic—that is, they include sweating, dizziness, and palpitations. Fatal reactions, however, may follow a single sting, although it is not certain that these are anaphylactic. Entirely local reactions to stings may also not be truly anaphylactic and the prognosis

is not generally so serious. Hypersensitivity to bee stings can be diagnosed by skin-testing with a commercially available reagent (Bencard). This is a crude preparation of whole body extracts, however, and false-negative reactions undoubtedly occur. Skin-testing with purified venom from wasp or bees or their major antigen, phospholipase A, may prove more specific,³ but these reagents are not generally available. Similarly, highly sensitive laboratory tests have been devised that will detect specifically reactive IgE, but these are not performed in routine laboratories. Thus for practical purposes the history is of overriding importance.

Two aspects of treatment need to be considered; firstly, the management of the acute attack and, secondly, the possibility of desensitising susceptible individuals. Patients who have shown systemic reactions to stings should be instructed in the use of adrenaline. They must have this drug readily available so that they can inject themselves with 0.3 ml of a 1:1000 solution subcutaneously without delay. Relatives of young children require suitable instruction. Local reactions to stings rarely need such measures and, although there is no harm in keeping this drug at hand, such treatment will not usually be necessary. Susceptible patients will of course need practical advice about reducing the risks of being stung. This applies particularly to pregnant beekeepers, to whom adrenaline should be given if necessary but in whom this drug carries the slight risk of disturbing the placental circulation. Prevention of anaphylaxis depends on the preferential stimulation of IgG rather than IgE antibodies to venom by the repeated injection of suitably antigenic preparations ("desensitisation"). Although success has been claimed with the crude whole-body extracts that are commercially available,⁴ there is a strong argument favouring their eventual replacement by antigens isolated from pure venom.¹ Moreover, desensitisation can be attempted only under close medical supervision. As with many such problems, information about the diagnosis and management of allergy to insect stings must be collected under controlled conditions, and doctors with patients who pose problems of this sort could contact the Guy's Hospital Allergy Clinic, which has a special interest in the subject and has purified antigens available.

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