Cellule Interrégionale d'Epidémiologie d'Intervention, Direction Rägionale des Affaires Sanitaires et Sociales du Nord Pas-de-Calais, Lille, France
D Ilef, *regional epidemiologist*
Centre National de Réference pour les Fièvres Hemorragiques et les Arbovirus, Institut Pasteur, Paris, France
B Le Guenno, *director*
Belgian Zoonosis Workgroup, National Reference Center for Hantavirus Infections, Queen Astrid Military Hospital, B-1120, Brussels, Belgium
J Clement, *head*
Correspondence to: Dr N S Crowcroft, Immunisation Division, Public Health Laboratory Service, Communicable Disease Surveillance Centre, London NW9 5EQ ncrowcro@ogks, co.uk

Conditional logistic regression model for infection with hantavirus. Adjusted odds ratios for activities undertaken by cases and controls

Exposure	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)	P value
Significant exposure in a forest (spent >16 hours in a forest; fetched, picked up, carried, or worked with wood; or exposed to dust or earth in a forest)	3.1 (1.6 to 6.0)	6.1 (1.9 to 19.5)	0.003
Interaction term between living <50 m from forest and seeing rodents	—	19.4 (1.2 to 308.2)	0.04
Lives <50 m from forest	3.5 (1.5 to 7.9)	1.9 (0.4 to 9.2)	0.43
Saw rodents at home	2.2 (1.1 to 4.3)	1.8 (0.5 to 6.1)	0.34
Entered a building where there may be rodents	2.7 (1.4 to 5.0)	3.0 (1.0 to 9.1)	0.046
Carries out rodent control at home	0.7 (0.3 to 1.4)	0.3 (0.1 to 1.1)	0.06
Home is cleaned more than once a week	2.9 (1.1 to 7.3)	3.8 (0.9 to 16.3)	0.07
Had been digging earth	3.6 (1.5 to 8.9)	3.1 (0.8 to 11.8)	0.09

P = 0.04 and raised dust there (15.7, 2.4 to 651; P = 0.01.) Two variables were constructed to refine the logistic regression analysis. For forests the variable was defined by those who spent more than 16 hours a month in forests, who went to forests for wood, or who picked up wood or were exposed to dust or earth during a leisure visit. For exposure in buildings where they may have been rodents the variable was defined by those who spent more than 2 hours there and who cleaned, raised dust, or made a vigorous physical effort. In the final model of the conditional logistic regression analysis, cases were more likely to live less than 50 metres from a forest and have seen rodents in or around their home, to have been digging, to have spent long periods in forests and been in contact with wood or disturbed earth or dust (table). Rodent control was more common among controls. Cases were more likely than controls to both live near a forest and see rodents at home (66.1, 5.7 to 768.9).

Comment

We did not test controls to ensure that they had never been infected subclinically, but in a previous case-control study in Belgium all 69 controls were seronegative[4] and the general population of the French Ardennes has a seroprevalence of only 0.45%.[5] The interaction between living near a forest and seeing rodents at home has not been previously reported—bank voles are thought to prefer empty buildings. Rodent control at home was protective. This simple, cheap measure can be recommended to those living near forest in an endemic area.

We thank all the participating clinicians for their contribution to the study.

Contributors: NSC, AI, DI, and BleG contributed substantially to conception and design, analysis and interpretation, drafts of the article, and final approval of the version to be published. NSC led the writing of the paper and acts as guarantor for the study. J-CD contributed substantially in supervising the project at design stage, discussion of results and in revising the manuscript. FVL had the idea to do a study, supervised NSC during the study, and carried out some telephone interviews. JC provided his support for the study and the reference laboratory results for Belgium. Dr D Kadi, Dr Van Hoof, Mrs I Thomas, and Ms S Ghoos assisted with telephone interviews.

Funding: AI and NSC were fellows in the European programme for intervention epidemiology training funded by the European Community under agreement number SOC 96 202584 05GF01.

Competing interests: None declared.

1 Le Guenno B, Camprasse MA, Guilbaut JC, Lanoux P, Hoen B. Hantavirus epidemic in Europe, 1993 *Lancet* 1994;343:114-5.
2 Clement J, Heyman P, McKenna P, Colson P, Avsic-Zupanc T. The hantaviruses of Europe: from the bedside to the bench. *Emerging Infect Dis* 1997;3:205-11.
3 Le Guenno B, Coudrier D, Camprasse MA. Les hantavirus: aspects virologiques et diagnostiques. Données sur l'épidémiologie de la fièvre hémorragique avec syndrome rénal en France. *Méd Mal Infect* 1994;24 (spécial):512-6.
4 Van Loock F, Thomas I, Clement J, Ghoos S, Colson P. A case-control study after a hantavirus outbreak in the south of Belgium: who is at risk? *Clin Infect Dis* (in press).
5 Le Guenno B. Les hantavirus. *Méd Mal Infect* 1997;27:703-10.

(Accepted 18 December 1998)

Improvement in clinical work through feedback: intervention study

Rolf Jorde, Arne Nordøy

Department of Internal Medicine, University Hospital of Tromsø, 9038 Tromsø, Norway
Rolf Jorde, *professor*
Arne Nordøy, *professor*

continued over

BMJ 1999;318:1738–9

We have frequently found an unacceptable number of hospital records and discharge reports lacking even the most basic information. To improve on this, we reviewed our hospital records and discharge reports on a regular basis, and we sent out questionnaires on quality of care to patients shortly after discharge. The hospital's medical staff received the results as a summarised report every other week. We deliberately disclosed only half of the variables studied. At the end of one year, the results were compared with those obtained before the intervention.

Subjects, methods, and results

Our study took place from September 1994 to October 1995 at the Department of Internal Medicine, University Hospital of Tromsø (120 beds and 45 doctors). We reviewed the hospital records for two sets of information: variables that were disclosed to the staff (past or present occupation, smoking habits, general physical condition, and blood pressure) and variables that were not disclosed (marital status, alcohol consumption, glandular enlargements, and

pulse). We noted whether a copy of the initial discharge letter was in the hospital record and, although not disclosed to staff, whether the discharge letter had information on drugs prescribed and time and place for next follow up. Similarly, we reviewed the final discharge reports for information on drugs prescribed and, not disclosed, for time and place for next follow up.

In September 1994 and October 1995 we sent out 500 questionnaires to discharged patients. Questions included (*a*) at discharge, were you given time to speak with your doctor alone? (If so, for how many minutes?) (*b*) (did your doctor give you a discharge letter that included which drugs to use?) (*c*) considering politeness, respect, and humaneness, was the behaviour of the doctors and nurses excellent, very good, good, fair, or poor? Answers to the questions in parentheses were not disclosed to staff.

We analysed the data with two sided Pearson χ^2 and Fisher's exact tests.

The table shows the effects of intervention on the hospital records, discharge letters, and reports, and on the doctors' and nurses' behaviour.

Of the 500 patient questionnaires sent out in September 1994 and October 1995, 323 (65%) and 330 (66%) were returned respectively. There was no significant change between whether the patients had a chance to talk alone with their doctor before discharge (85.6% versus 88.4%) or the time allotted to them (<10 minutes in more than 50% of patients).

Number of variables found in hospital records, discharge letters, and final reports, and patients' evaluation of doctors' and nurses' behaviour, in September 1994 before intervention and again in October 1995

	September 1994		October 1995		
	No evaluated	No (%) found	No evaluated	No (%) found	P value*
Hospital record					
Occupation†	324	121 (37)	500	264 (53)	<0.001
Marital status‡	324	201 (62)	500	325 (65)	0.41
Smoking	324	172 (53)	496	343 (69)	<0.001
Alcohol‡	324	74 (23)	496	165 (33)	<0.01
General physical condition	338	211 (62)	532	379 (71)	<0.01
Glandular enlargement‡	338	208 (62)	532	221 (42)	<0.001
Blood pressure	338	307 (91)	532	487 (92)	0.71
Pulse‡	338	310 (92)	532	482 (91)	0.63
Initial discharge letter					
Copy in hospital record:	447	166 (37)	601	424 (71)	<0.001
Information on drugs‡	166	138 (83)	424	397 (94)	<0.001
Next follow up‡	166	107 (65)	424	267 (63)	0.81
Final discharge report					
Information on drugs	444	345 (78)	606	521 (86)	<0.01
Next follow up‡	444	274 (62)	606	356 (59)	0.34
Behaviour of doctors	322		328		0.059
Excellent		133 (41)		163 (50)	
Very good		127 (39)		113 (35)	
Good		53 (17)		49 (15)	
Fair		4 (1)		3 (1)	
Poor		5 (2)		0 (0)	
Behaviour of nurses	322		328		0.395
Excellent		189 (59)		191 (58)	
Very good		103 (32)		103 (31)	
Good		30 (9)		31 (10)	
Fair		0 (0)		3 (1)	
Poor		0 (0)		0 (0)	

*September 1994 *v* October 1995.
†Fewer records evaluated for history taking than for physical examination as some patients gave inadequate information.
‡Not disclosed to staff during intervention.

Comment

For an intervention to work, the methods used must be acceptable to the target group.[1] We therefore gave feedback in such a way that individual doctors could not be identified, and the variables studied were such that no one could argue their relevance. When feedback was given to the doctors every other week, we found a highly significant improvement in almost all variables relating to hospital records, initial discharge letters, and final discharge reports.

The results, however, could not be considered satisfactory. Almost 15% of the final discharge reports had no information on drugs, and 12% of the patients had not talked to their doctor alone before they left. Furthermore, no significant change was seen in doctors' behaviour, although there was a potential for improvement. This shows the difficulty in inducing changes that are considered time consuming or that involve personal conduct.[2]

If substantial improvement in quality of clinical work is to be achieved then perhaps there is a need for information,[3] administrative interventions, incentives, and penalties.[1 4] Furthermore, patients should be made aware of their rights about talking to their doctor and getting a proper discharge letter before they leave hospital.

We looked at only a small aspect of work done in our department. Despite this, the study was very time consuming. Therefore if improvements in the quality of clinical work are to be achieved the necessary investments must be made and costs must be met.

Contributors: RJ had the initial idea for the study. Both authors designed the protocol, collected and analysed the data, and wrote the paper. Both will act as guarantors for the paper.

Funding: University Hospital of Tromsø and the Norwegian Medical Association.

Competing interests: None declared.

1 Greco PJ, Eisenberg JM. Changing physicians' practices. *N Engl J Med* 1993;329:1271-3.
2 Robertson N, Baker R, Hearnshaw H. Changing the clinical behaviour of doctors: a psychological framework. *Qual Health Care* 1996;5:51-4.
3 Mugford M, Banfield P, O'Hanlon M. Effects of feedback of information on clinical practice: a review. *BMJ* 1991;303:398-402.
4 Stocking B. Promoting change in clinical care. *Qual Health Care* 1992;1:56-60.

(Accepted 3 December 1998)

Correspondence to:
Professor R Jorde, Centre for Clinical Epidemiology and Biostatistics, David Maddison Clinical Science Building, Royal Newcastle Hospital, Newcastle, NSW 2300, Australia
rjorde@cceb.newcastle.edu.au

Correction

Oral contraceptives and myocardial infarction: results of the MICA case-control study

An editorial error occurred in this paper by Nicholas Dunn and colleagues (12 June, pp 1579-84). The first sentence of the results under the heading incidence rate should have read: "On the basis of 1224 cases identified from source data (see figure), the incidence rate of myocardial infarction was 0.05 per 1000 women years [not 0.5 per 1000 women years, as published]."