hypertensive patients.⁵ In this study nifedipine plus diuretic lowered blood pressure more effectively than propranolol plus diuretic, which has previously been shown to be effective in black hypertensive patients.² Although comparisons of fixed doses of drugs have limitations, the doses of propranolol and nifedipine used were in the middle of their therapeutic ranges. Experience in Kenyan hypertension clinics confirms reports that black hypertensive patients have lower plasma renin activities than white patients. Perhaps because of this, we found nifedipine plus diuretic to be an excellent combination for treating hypertension among black Kenyan patients.

This study was sponsored by the Wellcome Trust. We thank Dr M Hills for his advice regarding analyses.

- Erne P, Bolli P, Bertel O, Hulthen L, Kiowski W, Muller FB, *et al*. Factors influencing the hypotensive effects of calcium antagonists. *Hypertension* 1983;5(suppl 11):S97-102.
- Seedat YK. Trial of atenolol and chlorthalidone for hypertension in black South Africans. *BMJ* 1980;281:1241-3.
- Hills M, Armitage P. The two-period cross-over clinical trial. *Br J Clin Pharmacol* 1979;8:7-20.
- Zing W, Ferguson RK, Vlasses PH. Calcium antagonists in elderly and hypertensive patients. *Arch Intern Med* 1991;151:2154-62.
- Poulter NR, Thompson AV, Sever PS. Do diuretics enhance the hypotensive effect of nifedipine? A double blind crossover trial. *J Hypertens* 1986;4:792-3.

(Accepted 21 September 1992)

Cancer mortality and atenolol treatment

A E Fletcher, D G Beevers, C J Bulpitt, E C Coles, C T Dollery, J G Ledingham, A J Palmer, J C Petrie, J Webster

In the Medical Research Council's randomised trial of elderly hypertensive patients, men receiving atenolol had a higher death rate from cancer than those receiving diuretic or placebo.¹ This was not observed in women receiving atenolol, whose mortality was similar to those receiving diuretic and lower than those receiving placebo. The extra cancer deaths were apparently from lung cancer. A randomised trial of elderly hypertensive patients in primary care reported a non-significant excess of fatal cancers of the bronchus in the group given atenolol compared with the control group (an excess risk of 1.89, 95% confidence interval 0.88 to 4.08).² We therefore examined the relation between atenolol treatment and cancer in a large study of hypertensive patients.

Methods and results

The Department of Health hypertension care computing project is a longitudinal study of patients who attended one of five hospital hypertension clinics (95%) or four general practices (5%) in the United Kingdom during 1971-86, with continuing mortality follow up.^{3,4} Our analyses are based on deaths until 31 October 1990. Patients were placed in mutually exclusive groups according to type of antihypertensive treatment: any record of atenolol treatment irrespective of other concomitant treatments; any record of another β blocker irrespective of other concomitant treatments except atenolol; any record of methyldopa treatment irrespective of concomitant treatments

except any β blocker; or any record of diuretic treatment irrespective of other concomitant treatments except any β blocker or methyldopa.

Patient years of observation were measured from the first date of a prescription up to the patient's death or 31 October 1990. Mortalities from cancer (cancer given as the underlying cause of death) were calculated for each treatment and were adjusted for age by the direct method. We compared the risks between treatments with the Cox proportional hazards model, adjusting for age and smoking. We performed a nested case-control study of deaths from lung cancer, matching 79 cases (58 men and 21 women: 68 with lung cancer given as the underlying cause of death and 11 with any mention of lung cancer on the death certificate) with 154 controls. We also calculated standardised mortality ratios for all hypertensive patients.

There was no evidence for an adverse relation between atenolol and all cancers or lung cancer (table). Adjustment of the relative risks for smoking made little difference. Women taking atenolol appeared to be at lower risk of lung cancer, but the number of deaths was small and confidence intervals wide. There was no evidence that treatment had different effects on men and women. Blood pressure (whether treated or untreated, systolic or diastolic) showed no relation with deaths from all cancers or lung cancer.

A conditional multiple logistic regression analysis of our case-control study gave a relative risk from smoking of 4.2 (95% confidence interval 1.9 to 9.0, $p < 0.0004$) and from atenolol treatment of 0.9 (0.4 to 2.1, $p = 0.7$). The only excess standardised mortality ratio was for renal cancer (ICD codes 1890-9) with a value of 196 (107 to 328, $p = 0.03$) for men and women combined.

Comment

We found no evidence to support previous suggestions of an excess of cancer in men treated with

Division of Geriatric Medicine, Royal Postgraduate Medical School, Hammersmith Hospital, London W12 0NN
A E Fletcher, senior lecturer in epidemiology
C J Bulpitt, professor of geriatric medicine
C T Dollery, dean
A J Palmer, research officer

Department of Medicine, Dudley Road Hospital, Birmingham B18 7QH
D G Beevers, reader in medicine

Department of Computing and Medical Statistics, University of Wales College of Medicine, Cardiff CF4 4XN
E C Coles, senior lecturer

Department of Medicine, John Radcliffe Hospital, Oxford OX3 9DU
J G Ledingham, professor of medicine

Clinical Pharmacology Unit, Department of Medicine and Therapeutics, University of Aberdeen, Aberdeen AB9 1FX
J C Petrie, professor of clinical pharmacology
J Webster, consultant physician
BMJ 1993;306:622-3

Death rates adjusted for age and relative risks from cancer for different antihypertensive treatments

			Deaths from all cancers		Deaths from lung cancer		Relative risk (95% confidence interval) compared to atenolol				All other treatments combined	
Treatment	Mean (SD) age	Patient years of observation	Total	No/1000 patient years	Total	No/1000 patient years	All cancers	All cancers adjusted for smoking	Lung cancer	Lung cancer adjusted for smoking	All cancers	Lung cancer
Men												
Atenolol (n=2313)	52 (11)	17 409	85	5.6	20	1.3	1.0	1.0	1.0	1.0	0.9 (0.7 to 1.3)	1.2 (0.7 to 2.3)
Other β blockers (n=706)	52 (11)	8 660	42	4.6	10	1.3	0.8 (0.5 to 1.2)	0.8 (0.5 to 1.2)	1.1 (0.5 to 2.3)	1.1 (0.5 to 2.4)		
Methyldopa (n=316)	57 (11)	3 335	35	7.3	8	1.7	1.5 (1.0 to 2.2)	1.4 (0.9 to 2.2)	1.7 (0.7 to 4.0)	1.6 (0.6 to 3.9)		
Diuretic (n=570)	54 (12)	5 231	32	5.5	11	1.9	1.0 (0.7 to 1.5)	1.0 (0.6 to 1.5)	1.5 (0.7 to 3.2)	1.6 (0.7 to 3.5)		
Women												
Atenolol (n=2199)	53 (13)	17 350	57	3.7	5	0.4	1.0	1.0	1.0	1.0	0.9 (0.7 to 1.4)	2.5 (0.8 to 7.9)
Other β blockers (n=797)	53 (13)	9 420	42	4.4	6	0.6	1.0 (0.7 to 1.6)	1.0 (0.6 to 1.6)	2.7 (0.8 to 9.0)	3.0 (0.8 to 10.7)		
Methyldopa (n=383)	57 (13)	4 765	24	4.1	5	1.0	0.9 (0.5 to 1.6)	1.1 (0.6 to 1.9)	2.8 (0.7 to 10.8)	3.6 (0.9 to 15.2)		
Diuretic (n=755)	55 (14)	7 286	27	3.5	4	0.6	0.9 (0.6 to 1.4)	0.8 (0.5 to 1.3)	1.4 (0.4 to 5.5)	1.3 (0.3 to 6.0)		

Correspondence to:
Dr A E Fletcher,
Department of
Epidemiology and
Population Sciences,
London School of Hygiene
and Tropical Medicine,
London WC1E 7HT.

atenolol, but in an observational study we cannot discount the possibility of confounding factors. Our model adjusted for the most obvious of these (age and smoking), but there may be other unidentified factors. The strength of experimental studies is that randomisation removes selection bias.

In the Medical Research Council's trial the relative risk of dying from cancer for men receiving atenolol was 1.9 compared with placebo (1.2 to 2.8) and 1.4 (0.9 to 2.2) compared with diuretic. In our study the 95% confidence intervals of the relative risks for all cancers and for lung cancer excluded a twofold excess risk from atenolol. We cannot exclude risks lower than this.

The following also participated in the DHCCP: L J Beilin, A Cohen, T A Jeffers, A D Munro-Faure, B E Rajagopalan, O J Robb, C Rossiter, and P B Rylance from hospitals and

J B Davies, A P Douglas Jones, D Grant, E Horder, and J M Kenworthy Browne from general practice. We thank A Butler, D Hunt, G Massey and P W O'Riordan for programming and advice on computing. The study is principally funded by the Department of Health. We are also grateful for support provided by Schering Plough Ltd. The views in this paper reflect those of the authors and are independent of sponsorship.

- 1 MRC Working Party. Medical Research Council trial of treatment of hypertension in older adults: principal results. *BMJ* 1992;304:405-12.
- 2 Coope J, Warrender TS. Randomised trial of treatment of hypertension in elderly patients in primary care. *BMJ* 1986;293:1145-51.
- 3 Beilin LJ, Bulpitt CJ, Coles EC, Dollery CT, Munro-Faure AD, Turner S. Computer based hypertension clinic records: a co-operative study. *BMJ* 1974;iii:212-6.
- 4 Bulpitt CJ, Beilin LJ, Coles EC, Dollery CT, Johnson BF, Munro-Faure AD, et al. Randomised controlled trial of computer-held medical records in hypertensive patients. *BMJ* 1976;ii:677-9.

(Accepted 12 November 1992)

Department of
Epidemiology and Social
Medicine, School of Public
Health, B-1070
Brussels, Belgium
P Buekens, research associate
M Boutsen, research fellow
F Kittel, lecturer
P Vandenbussche, research
fellow
M Dramaix, statistician

Correspondence to:
Dr Buekens.

BMJ 1993;306:623

Rates of caesarean section, epidural analgesia, and forceps and vacuum extractions in 17 maternity units in 1985 and 1989

Does awareness of rates of obstetric interventions change practice?

P Buekens, M Boutsen, F Kittel, P Vandenbussche, M Dramaix

Management awareness profiles may be used to present maternity units' statistics graphically.¹ They also provide a means of comparing units. It is generally thought that it is helpful for managers and clinicians to be aware of the variations between maternity units and knowing where their own unit stands. Whether management awareness profiles have any effect on decision making, however, is still unknown.¹ We evaluated their impact after five years of their use in Belgium.

Subjects, methods, and results

Since 1985 the Belgian French Speaking Association of Obstetricians and Gynaecologists has sent a questionnaire to maternity units annually. Perinatal deaths, birth weight, preterm deliveries, and selected obstetric interventions are recorded. Management awareness profiles are prepared and returned yearly to the heads of the obstetric departments. The profiles include each item's median value, range, and 10th and 90th centiles of the distribution and the position of the unit for which the profile has been prepared.

The number of participating maternity units increased from 34 in 1985 to 49 in 1989; they covered more than 80% of live births in Brussels and Wallonia. Our analysis is based on the 17 maternity units that sent data from 1985 until 1989 without interruption. The 17 units registered a total of 12 524 deliveries in 1989. Data on caesarean sections were available in all the units, on epidural analgesia in 16, and on forceps and vacuum extractions in 13. The rates of interventions are given as percentages—that is, per 100 deliveries. Variances of the distributions of intervention rates were computed and were compared by Hartley's $F_{\max}$ test.²

The caesarean section rates ranged from 3.8% (59/1536) to 18.5% (43/232) in 1985 and from 6.5% (58/898) to 22.1% (38/172) in 1989. The rates of epidural analgesia ranged from 1.3% (3/232) to 42.7% (487/1141) in 1985 and from 2.8% (16/580) to 65.1% (226/347) in 1989. Forceps and vacuum extractions

were performed in 8.1% (34/418) to 19.8% (226/1141) of the deliveries in 1985 and in 2.6% (15/580) to 24.7% (222/898) of the deliveries in 1989.

The variance of the distribution of the intervention rates did not change significantly during the study: the ratio of the largest variance to the smallest one ($F_{\max}$) was 1.7 for caesarean sections, 2.6 for epidural analgesia, and 3.3 for forceps and vacuum extractions. The figure shows that the rates of caesarean sections, epidural anaesthesia, and forceps and vacuum extractions went down in some maternity units but increased in most of them.

Comment

We found no change of practice in our study, but this does not seem to be due to a lack of use of management awareness profiles by the maternity units. In 1990 we sent a questionnaire to the heads of the 49 maternity units that participated in the voluntary registration system in 1989. This showed that management awareness profiles were circulated to the staff in 30 of the 34 units that answered the relevant question. The increasing number of units participating in the system also indicates an interest in the management awareness profiles.

Feedback of information has been shown to change operative procedures in some non-randomised studies but not all.³ The results of randomised controlled trials are less encouraging.^{4,5} Our results also suggest that awareness is not enough to change behaviour. Management awareness profiles are potentially useful, but mechanisms to make them effective in changing behaviour are still to be developed. Their long term effects will have to be evaluated.

We thank E Hemminki and M Mugford for their comments and suggestions. This study was supported by the Belgian French Speaking Association of Obstetricians and Gynaecologists. PB is a research associate of the National Scientific Research Fund (Belgium), which also supported the study.

- 1 Szepeura A, Mugford M, Stilwell JA. Information for managers in hospitals: representing maternity unit statistics graphically. *BMJ* 1987;294:875-80.
- 2 Winer BJ. *Statistical principles in experimental design*. 2nd ed. Tokyo: McGraw-Hill Kogakusha, 1971:205-10.
- 3 Mugford M, Banfield P, O'Hanlon M. Effects of feedback of information on clinical practice: a review. *BMJ* 1991;303:398-402.
- 4 Hemminki E, Teperi J, Tuominen K. Need for and influence of feedback from the Finnish birth register to data providers. *Qual Assur Health Care* 1992;4:133-9.
- 5 Lomas J, Enkin M, Anderson GM, Hannah WJ, Vayda E, Singer J. Opinion leaders vs audit and feedback to implement practice guidelines. *JAMA* 1991;265:2202-7.

(Accepted 31 December 1992)