assume that people in coastal retirement areas are automatically healthier than those in inner city areas.

The current allocation of resources already provides extra money for inner cities. Here in the north west the district allocation to Blackpool for 1991-2 was £107m for a population of 321 000, while central and north Manchester received £163m for a population of 260 000. In a review of capitation funding Raftery noted a projected continuing population drift away from inner cities to coastal retirement areas.³ I suggest that the capitation funding formula should remain as simple as possible, without any sociological tinkering. Charlton concluded, "redistribution of income and other resources has little to offer in improving the national health: it is merely robbing Peter to pay Paul."⁴

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- 1 Sheldon TA, Davey Smith G, Bevan G. Weighting in the dark: resource allocation in the new NHS. *BMJ* 1993;306:835-9.
- 2 Williams ES, Scott CM, Brazil R. Resource allocation. *BMJ* 1993;306:1415.
- 3 Raftery J. Capitation funding: population, age, and mortality adjustments for regional and district health authorities in England. *BMJ* 1993;307:1121-4.
- 4 Charlton BG. Is inequality bad for the national health? *Lancet* 1994;343:221-2.

BMA's reply

EDITOR,—P J N Howorth misses the point in two important respects. Firstly, the Health Policy and Economic Research Unit exists not only to promote and expand the BMA's policy but, more importantly, to stimulate debate by research into issues of health policy and thereby to allow the association and others to come to a considered view on these important matters. The paper on resource allocation formulas therefore seems to be succeeding in its stated aim of stimulating just such a debate and should not be censured for this reason.

Secondly, as the paper makes clear, the review of the Resource Allocation Working party formula in 1986 specifically included a factor for the regional Jarman score, which is an indirect measure of social deprivation based on several census variables. Despite the criticisms levelled at it there is no doubt that this score provides a measure of use of health services as measured by the perceived workload of general practitioners. This is presumably one of the factors underlying the disparity in the resources allocated to Blackpool and to Manchester quoted in Howorth's letter. This point is dealt with more fully in the briefing note. As the paper concludes, "there has been much criticism of the current weighted capitation formula." Howorth's letter is further testimony to the truth of this statement. The Health Policy and Economic Research Unit's document is a valuable contribution in advancing this debate.

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Long term psychotherapy

EDITOR,—Isaac Marks's arguments against the cost effectiveness of long term psychotherapy could equally well be applied to the long term and often purely palliative treatments available for patients with intractable somatic disease. These patients' needs are not yet neglected because the drugs and surgery involved are unlikely to effect an outright cure or be proved to be cost effective in the terms of reference of the profession of accountancy as contrasted to that of medicine.

Perhaps we should bear in mind that the purpose

of medicine is to cure sometimes, to ameliorate often, to comfort always.

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- 1 Holmes J, Marks I. Psychotherapy—a luxury the NHS cannot afford? *BMJ* 1994;309:1070-2. (22 October.)

Moderate drinking and loss of brain cells

Factor converting imperial to metric measures was wrong

EDITOR,—Pekka J Karhunen and colleagues' thought provoking paper on moderate alcohol consumption and loss of cerebellar Purkinje cells seems to provide a further basis on which to advise our patients (and ourselves) on safe drinking limits.¹ Those familiar with imperial measures may, however, have become alarmed that the loss of cerebellar Purkinje cells was significantly increased above a daily alcohol consumption quoted as 2 fluid ounces (fl oz) of wine or 0.5 fl oz of spirits.

A useful tool in interpreting research is to place results in an everyday context: 1 fl oz is only 1.6 tablespoons full. The Finns may, however, be less familiar with imperial than with metric measures. Karhunen and colleagues seem to have applied a conversion factor to their metric data that was incorrect by a multiple of 7.75—1 fl oz is equivalent to 28.4 ml, not 220 ml.

To set the results of this study in a more accurate (and reassuring) everyday context, the authors' suggested safe level of drinking of 40 g absolute alcohol a day is in fact equivalent to 15.5 fl oz of wine, or three generous wine glasses. This adds up to four bottles of wine a week. For spirits this is 4 fl oz a day, or half a tumbler, and adds up to just over one 750 ml bottle a week (the standard size of spirit bottles in Britain, rather than the 500 ml referred to by Karhunen and colleagues).

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Author's reply

EDITOR,—We did make a mistake in our conversion from millilitres to fluid ounces, and the calculations of Mark L Tattersall and Sally White are correct. Luckily, our conversion from millilitres to pints seems to be correct.

We are indeed not familiar with imperial measures. Moreover, if we apply American measures then 1 fl oz is 29.6 ml. We used grams, millilitres, or litres throughout our paper, mentioning fluid ounces and pints only once to make the results more familiar to British readers. In Finland we do not use fluid ounces, preferring grams, so called restaurant units (one unit contains 12 g ethanol), centilitres, millilitres, or, simply, bottles of beer, wine, or spirit. In Finland the standard size of a beer bottle is 330 ml, that of a wine bottle 750 ml, and that of a spirit bottle 500 ml. Although we respect the long history of national measures, we hope that some standardisation will take place in the future. The concept of units of alcohol seems promising—if

agreement can be reached on how many grams of alcohol one unit contains. Maybe we Finns will also have to change the standard size of spirit bottles when Finland joins the European Union next year.

However, the message of our paper does not change. Further evidence also suggests that the safe limit of drinking for men is somewhere around 40 g of absolute alcohol daily.² The beneficial effect of alcohol on mortality seems to be obtained by smaller doses,^{1,3} mainly by reducing the rate of deaths due to myocardial infarction. It is also obvious that the effects of alcohol show no clear dose dependence and that some people can safely drink more than others. The reasons for this individual variation are largely unknown and subject to further research.

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- 1 Doll R, Peto R, Hall E, Whitley K, Gray R. Mortality in relation to consumption of alcohol: 13 years' observations on male British doctors. *BMJ* 1994;309:911-8.
- 2 Savolainen VT, Liesto K, Männikkö A, Penttilä A, Karhunen PJ. Alcohol consumption and alcoholic liver disease—evidence of a threshold level of effects of alcohol. *Alcohol Clin Exp Res* 1993;17:1112-7.
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Health promotion

Sensitive outcome measures are needed

EDITOR,—N C H Stott and colleagues succinctly summarise arguments for the sensitive application of health promotion interventions that are matched to individuals' readiness to change.¹ They point out, however, that research into the practice of health promotion at an individual level is in its infancy. In the same issue the study by M E Cupples and A McKnight shows the difficulties in persuading patients to alter their health related behaviour even when they have strong medical reasons to do so.² The study was designed to detect decreases in the severity of patients' angina. The sample size was determined accordingly, and the study showed that the intervention applied could significantly reduce the severity of self reported angina.

Among the other outcomes considered in the study no significant differences were shown in the distribution of smoking habit, systolic or diastolic blood pressure, cholesterol concentration, or body mass index between the control and intervention groups. The lack of change in physiological outcome measures possibly reflects the fact that, in the absence of any other influences, these can alter only when a person has made a decisive, consistent effort to improve his or her lifestyle. The interventions that were applied obviously did not have such a great effect on people.

Similarly, smoking cessation can be considered to be the end point of a lengthy process in which a person progresses from being a smoker who does not question his or her habit to becoming a non-smoker. This process can entail repeated attempts to stop smoking over several years.³

The evaluation of health promotion may perhaps have suffered from the use of outcome measures that are insensitive to change and therefore unlikely to be responsive to the interventions applied. If the study of health promotion at an individual level is to advance then, in addition to exploring ways of measuring patients' "readiness to change,"¹ researchers need to develop sensitive outcome measures, perhaps reflecting changes in patients' attitudes or health related behaviours. For example, it has been suggested that in

studies of smoking cessation smokers' activities in attempting to stop smoking should be measured in tandem with more conventional measures of the rate of cessation.⁴ Attempts to stop are associated with the final goal of continuous abstinence. Changes in the number of attempts to stop may thus be more sensitive to intervention than the dichotomous outcome of smoking cessation.

This is just one suggestion, and much work is required to validate any new outcome measures.⁵ The results of Cupples and McKnight's study² suggest, however, that careful consideration of appropriate outcomes is vital to improving our knowledge about how we should approach health promotion.

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- 1 Stott NCH, Kinnersley P, Rollnick S. The limits to health promotion. *BMJ* 1994;309:971-2. (15 October.)
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Target all risk factors

EDITOR,—Like M E Cupples and A McKnight, we are interested in health promotion in general practice for patients with a high cardiovascular risk.¹ We surveyed 34 patients one year after coronary artery bypass grafting.

In relation to exercise, as might be expected, more patients walked over one mile (1.6 km) a day after the operation than they had done before (24 v 20, P=0.07) and fewer patients took no exercise at all (10 v 14). Most, especially those attending diabetic clinics, had greatly improved their diets, reducing their overall intake and saturated fat intake. The mean number of units of alcohol consumed by men had dropped from 42 to 11 (P=0.002). Cholesterol concentrations were being monitored in all the patients, 13 of whom were taking lipid lowering drugs. Only five patients did not know their last result. There were no changes in body mass index postoperatively. No patient had restarted smoking, although four continued to smoke but at greatly reduced levels. Blood pressure was being checked regularly in 28 patients; nine were receiving hypotensive treatment.

All patients were questioned about information given to them about lifestyle modification. They had received help from a range of sources: their general practitioner, hospital factsheets, personal contact in hospital at the time of surgery, other hospital clinics (especially the diabetic clinic), and the hospital dietitian. Most information had been on diet and the least on exercise. Eleven patients would have liked more information on some aspect of lifestyle modification. Those from ethnic minorities fared as well as the rest, although they volunteered that they had obtained most of the information from their general practitioner.

Thus, like Cupples and McKnight, we found that our patients' diet had been greatly influenced by the information provided perioperatively and that cholesterol and blood pressure monitoring by general practitioners was common. Obesity, however, had not been influenced, and exercise had increased, although most probably as a direct effect of the operation.

Emphasis must continue to be placed in the

community on counselling patients with ischaemic heart disease and on treating all their cardiovascular risk factors.

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Doctors' right to refuse to perform abortions

Law doesn't include GPs and junior doctors

EDITOR,—C G B Simpson believes that doctors' right to refuse to perform abortions should be curtailed.^{1,2} This right is enshrined in section 4 (paragraph 1) of the Abortion Act 1967. Although this section says that no person need participate in an abortion if he or she has a conscientious objection, the House of Lords ruled that this applied only to people performing abortions. In two cases it made clear that neither secretaries nor nurses had a legal right to refuse to participate in abortions.³ Despite this general practitioners and junior doctors still believe that this paragraph of the act applies to them; this is probably not the case.

With regard to general practitioners, is there a legal obligation to sign the relevant green form? General practitioners' terms of service state that "a doctor shall render to his patients . . . services of the type usually provided by General Practitioners . . . arranging for the referral of patients as appropriate."⁴ It has been argued that this means that the general practitioner has a legal obligation to pass on the patient to a consultant gynaecologist with a view to obtaining a termination of pregnancy.⁵ (This would be the service normally provided by general practitioners.) Provided that the conditions on the green form are met, the general practitioner can take no refuge in the clause of the Abortion Act permitting conscientious objection and has a legal duty to sign the form.

As far as junior doctors are concerned, their position is similar to that of the secretary in the Janaway case; provided that they are not taking direct responsibility for performing the abortion they probably have a duty to clerk and deal with the patient as they would any other.

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- 1 Simpson CGB. Doctors' right to refuse to perform abortions. *BMJ* 1994;309:1090. (22 October.)
- 2 Dooley D. Conscientious refusal to assist with abortion. *BMJ* 1994;309:622-3. (10 September.)
- 3 Janaway v Salford Health Authority [1989] AC, [1988] 3 All ER 1079 (HL).
- 4 NHS (general medical services) regulations 1992. London: HMSO, 1992:schedule 2, paragraph 12 (1) and (2).
- 5 Kennedy I, Grubb A. *Medical law*. 2nd ed. London: Butterworths, 1994:896.

Antiabortion views are not incompatible with gynaecology

EDITOR,—C G B Simpson's proposal to curtail doctors' right to conscientious objection to performing abortion is not new¹ and was championed by Sturatt, who believed that doctors holding a strict pro-life view should not specialise in obstetrics and gynaecology.² Is this because the

going will be tough for the doctor (for it will be) or to protect the patient from the doctor? Admittedly, if Dr X will not carry out abortions Dr Y has to do them all. Yet is this sufficient reason to force conscientious male and female clinicians against abortion out of gynaecology?

It is important to remember that gynaecologists are also obstetricians. There is an increasing demand on the part of many women opposed to abortion to be looked after by doctors who are not going to do an abortion in the morning and deliver their baby in the afternoon. The doctor "may think he can keep the two functions separate in his mind, but the unconscious influence will be insidious."³ Interestingly, some doctors have become disillusioned with abortion in the course of medical practice. Noteworthy is Nathanson, who stopped performing abortions after running one of the largest abortion clinics in the United States.⁴ Should the public be denied the clinical acumen of such professionals?

Finally, while there is no such thing as a right to become a gynaecologist, doctors are not required to acquiesce to all their patients' wishes in any branch of medicine. Surely our dilemma is whether abandonment of the spirit of the Geneva declaration—"utmost respect for human life from the time of conception"—is compatible with being what our patients need.

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- 1 Simpson CGB. Doctors' right to refuse to perform abortions. *BMJ* 1994;309:1090. (22 October.)
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Hyperbaric oxygen in crush syndrome

EDITOR,—Andrew D Shaw and colleagues emphasise the urgent need for orthopaedic referral for the underlying problem of the compartment syndrome—namely, impending muscle necrosis.¹ They do not mention the role of adjuvant hyperbaric oxygen in this condition.

Pathophysiologically, in the compartment syndromes ischaemia and oedema create a vicious circle in which hypoxia plays a central part. Partially viable tissues may recover if hypoxia is relieved. Treatment with hyperbaric oxygen can increase tissue oxygen tensions to values higher than those achieved by any other method. 100% Oxygen at 304 kPa (3 atmospheres absolute) can produce arterial oxygen tensions of up to about 250 kPa by direct solution in plasma.² The resultant diffusion gradient into tissues is also clearly increased. Red cells become more deformable at such pressures, facilitating transport through constricted microcirculation.

Hyperbaric oxygen also produces arteriolar vasoconstriction. While this effect might seem undesirable, the hyperoxygenation itself counteracts any short term decrease in blood flow. Subsequent reduction in transcapillary flow of fluid and increased capillary resorption of extravascular fluid rapidly decrease tissue oedema. The fall in intracompartmental pressure that follows is clearly beneficial, specifically in the compartment syndrome.³ Animal models suggest a particularly effective role for hyperbaric oxygen in the compartment syndrome complicated by haemorrhagic hypotension.⁴

In the compartment syndrome hyperbaric oxygen should be given as adjuvant treatment with general resuscitation and surgery. We agree with Shaw and colleagues that surgical decompression should be considered urgently. Hyperbaric oxygen is conventionally given after surgery, using