Health promotion priorities for general practice: constructing and using "indicative prevalences"

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Abstract

Objective—To construct indicative prevalences for a range of diseases and risk markers and use them in planning health promotion interventions in primary health care.

Design—Indicative prevalences comprised point prevalence, incidence, and mortality measures. Use of data from Office of Population Censuses and Surveys, Northern Regional Health Authority, and Newcastle health and lifestyle survey 1991, and research papers to determine prevalence adjusted for age and sex in a hypothetical practice with a list of 10 000 patients.

Setting—Newcastle upon Tyne, England.

Results—Indicative prevalences were highest for common risk markers such as failure to achieve exercise targets (6871), moderate to extreme obesity (2785), and smoking (2689); moderate for overt disease such as angina (175) and stroke (20/year); and low for events such as suicide (1/year) and deaths from malignant melanoma (2/10 years).

Conclusions—Given limited time and resources, brief interventions to reduce smoking and the systematic case finding and management of patients with hypertension, angina, and previous myocardial infarction are likely to be the highest priorities for health promotion in primary care.

authority and family health services authority are coterminous with the city boundary). Indicative prevalences are measures of point prevalence, incidence, and mortality rates generated for disease and risk markers. Conditions were drawn from the national priorities defined by the 1993 modifications to the general practitioner contract and key areas in the *Health of the Nation*.¹⁴ Newcastle upon Tyne is of particular interest because the district is the major urban centre of population in the Northern health region. The region has the highest prevalence of coronary heart disease and stroke and also the worst all cause standardised mortality ratio in England.¹⁵ Furthermore, the recently published Newcastle health and lifestyle survey has generated a unique database for this community.^{16 17}

Methods

We derived data for indicative prevalences from three main sources: the Newcastle health and lifestyle survey 1991^{16 17}; mortality data from the Office of Population Censuses and Surveys death tapes for 1988-92; and admissions for asthma, accidental injury, and coronary artery bypass surgery from Northern Regional Health Authority 1990-2. These data were supplemented with data from other published sources if local figures were not available (box). We used 1991

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Introduction

In recent years health promotion has become an increasingly important part of primary health care.^{1 2} This trend is part of a movement towards the integration of public health responsibilities into general practice.³⁻⁷ Primary health care teams have had to assume broad new strategic responsibilities for maintaining and promoting the health of patients on the practice list as well as continuing to provide 24 hour clinical services. With limited time and resources it is essential to set priorities.

The 1990 general practitioner contract incorporated several public health elements: population monitoring through child health surveillance, three yearly health checks for adults and screening for people over 75; assessment of health needs through recording referrals to consultants; and health promotion clinics.¹ The changes were criticised,⁸⁻¹² and payments for health promotion clinics turned out to be much higher than expected. Furthermore, the quality and uptake of clinics was uneven and not related to the needs of the population.¹³ The public health role has been further expanded by the new arrangements for health promotion and chronic disease management in primary health care introduced in July 1993.²

To show how practice data might be used to set priorities we generated "indicative prevalences" for a hypothetical average general practice with a list size of 10 000 in Newcastle upon Tyne (the district health

Data sources for calculating indicative prevalences

- Newcastle health and lifestyle survey 1991^{16 17}—sex specific prevalences in 10 year age bands for people aged 16-74
- Office of Population Censuses and Surveys—death tapes for Newcastle upon Tyne District Health Authority 1988-92 used to calculate average annual age and sex specific mortality
- Northern Regional Health Authority—Mean annual number of admissions calculated and used to derive age and sex specific admission rates with population of Newcastle in 1991 census¹⁸ as denominator
- Annual report of Newcastle genitourinary medicine clinic¹⁹—Number of new cases of gonorrhoea in 1992 used to calculate crude incidence with 1991 census population as denominator
- Cannon *et al*²⁰—Crude prevalence of angina applied directly to hypothetical practice
- Health and lifestyle survey²¹—sex specific prevalences of hypertension for 10 year age bands in adults over 18 applied to hypothetical population
- NHS Management Executive²²—crude incidence of ischaemic attacks and prevalence of stroke
- Dennis *et al*²³—crude rates of transient ischaemic attack
- Bamford *et al*²⁴—crude incidence of stroke

census data¹⁸ to calculate incidence of prevalence when these were not already determined.

We created a hypothetical average general practice population to reflect the demographic structure of the population of Newcastle upon Tyne. The proportion of men and women in each 10 year age group of the Newcastle population, derived from the 1991 census, was multiplied by 10 000 to give the number in each age and sex band of the hypothetical practice population. Direct standardisation was used in most cases to adjust data from the original sources to provide indicative prevalences for the hypothetical practice.²⁵ We applied age specific rates for men and women to 10 year age and sex groups of the hypothetical practice to give the expected numbers of people with the condition or risk factor in the practice population. The numbers in each age and sex group have been summed and overall practice figures are presented for each indicator.

Indicative prevalences are approximate and we have therefore rounded them to the nearest whole number and presented them without confidence intervals to avoid any spurious sense of accuracy. Where age specific rates were not available we estimated the number of expected cases without standardisation. For data from the Newcastle health and lifestyle survey indicative prevalences were calculated only for the ages 16 to 74 years.

Results

Table I lists the indicative prevalences for conditions covered by the new arrangements for health promotion and chronic disease management in general practice. Table II lists prevalences for the other key areas in cancer, sexual health, accidents, and mental illness. We have used incidence of gonorrhoea as a proxy measure for new cases of AIDS and suicide rate as an index of psychiatric illness as suggested in the *Health of the Nation*.¹⁴

TABLE I—Indicative prevalences for problems identified as priority areas for health promotion and management of chronic disease in general practice for a hypothetical general practice in Newcastle upon Tyne with a list of 10 000 patients. Diseases are defined according to International Classification of Diseases, ninth edition²⁶

Condition	Scale of problem
Smoking:*	
Never smoked	2830 people at any one time
Former smoker	1969 people at any one time
Smoker	2689 people at any one time
Cardiovascular disease:	
Angina	175 people at any one time
Family history of premature myocardial infarction*	1715 people at any one time
Myocardial infarction deaths	18 deaths/year
Myocardial infarction survivors*	347 people at any one time
Coronary artery bypass grafts	3 operations/year
Hypertension	1145 people at any one time
Transient ischaemic attack incidence	4 new cases/year
Stroke incidence	20 people/year
Stroke deaths	18 deaths/year
Exercise target: *†	
Achieved	617 people at any one time
Not achieved	6871 people at any one time
Body mass index (weight (kg)/(height (m) ²):*‡	
Normal	4703 people at any one time
Moderate obesity	2183 people at any one time
Extreme obesity	602 people at any one time
Alcohol consumption:*§	
Safe	5920 people at any one time
Hazardous	1285 people at any one time
Dangerous	283 people at any one time
Diabetes mellitus:	
Prevalence*	165 people at any one time
Deaths	1 death/year
Asthma:	
Admissions	41 people/year
Deaths	3 deaths/10 years

*Only people aged 16–74 years.

†≥ 12 occasions of vigorous activity in past four weeks for 16–34 year olds; ≥ 12 occasions of vigorous activity in past four weeks for 35–54 year olds; ≥ 12 occasions of moderate activity in past four weeks for 55–74 year olds.²⁷

‡Normal < 25, moderate obesity 25–39, extreme obesity > 39.

§Safe < 22 units/week (< 15 for women); hazardous 22–50 (15–35 for women); dangerous < 50 (< 35 for women).²⁸

TABLE II—Indicative prevalences for cancer, mental health, sexual health, and accidents for a hypothetical general practice in Newcastle upon Tyne with a list of 10 000 patients

	Scale of problem
Cancers:	
Breast	5 registrations/year, 3 deaths/year
Cervix	1 registration/year, 4 deaths/10 years
Lung	10 registrations/year, 11 deaths/year
Malignant melanoma	4 registrations/10 years, 2 deaths/10 years
Mental illness:	
Suicides	1 suicide/year
Sexual health:	
Gonorrhoea	3 new cases/year
Live births and stillbirths to teenagers:	
11–15	4 births/10 years
16 years	1 birth/year
17–19	11 births/year
Accidents	186 admissions/year, 3 deaths/year

Indicative prevalences varied widely. The highest prevalences were for risk markers such as failure to achieve the exercise target (6871), moderate to extreme obesity (2785), and smoking (2689). Common diseases had intermediate prevalences (angina 175; diabetes 165). Some of the diseases identified as key areas in *Health of the Nation* had low indicative prevalences, especially for mortality (cervical cancer four deaths/10 years; malignant melanoma two deaths/10 years; one suicide/year).

The figure represents the “iceberg” of coronary heart disease and stroke in primary care. The iceberg metaphor emphasises the relation between the relatively small burden of overt disease (above the water line) and the great mass of hidden risk markers that can lead to disease (below the water line). The figure shows how a group of related procedures, diseases, and risk markers can be summarised to give an impression of the scale of each problem and the possibilities for intervention by a primary health care team.

Discussion

We used data on a district of about 300 000 people to derive indicative prevalences for an average practice list of 10 000 patients. The indicative prevalences can be used, after adjustment for list size, to give an idea of prevalences for any practice. It should be remembered, however, that the data we used are of variable quality and completeness and most of the data refer to the Newcastle population, which has higher mortality and morbidity than many other districts.¹⁵

Primary health care teams can use indicative prevalences to modify national priorities in the light of the needs of their patients or to confirm that their current priorities are reasonable. As computerised information systems become more reliable and complete, specific information on prevalence, incidence, and mortality could be generated by each practice. Prevalences for ischaemic heart disease and its risk factors were generated for a Newcastle practice with a list size of 4100 which had a highly developed information system. The results were consistent with the indicative prevalences presented here (D L Whitford, personal communication).

PLANNING HEALTH PROMOTION

Health promotion activities should be planned on the basis of the prevalence of a particular risk marker or condition, its seriousness, and the cost effectiveness of intervention. Recent evidence has suggested that blanket health promotion may not be cost effective.²⁹ Indicative prevalences can also be used to select an intervention that can produce observable benefit

Coronary heart disease and stroke iceberg representing indicative prevalences for hypothetical practice in Newcastle upon Tyne with list of 10 000 patients. Below the water line are hidden risk markers for coronary heart disease and stroke; above the water line are overt clinical events

relatively quickly. One of the problems of health promotion is that people promoting health seldom see a return for their efforts, and this undermines motivation. One area where benefit would occur quickly is smoking. General practitioners can give brief advice and information opportunistically, which is cheap and effective, and the effect on risk of myocardial infarction and lung cancer is seen over just a few years.³⁰ There is preliminary evidence that similar brief interventions may be effective in reducing the harm associated with hazardous alcohol consumption.³¹ Moderate to severe obesity and lack of exercise are more common than smoking, but they do not seem to be such serious risk factors for disease and the effectiveness of intervention is largely unproved.³²

Hypertension is another serious common condition in which patients could benefit from intervention. Only about half of the patients with hypertension are currently detected in normal practice,³³ and a more systematic approach is required.³⁴ A recent meta-analysis has shown that aspirin can reduce mortality and morbidity in a wide range of cardiovascular diseases.³⁵ Primary health care teams could usefully concentrate on identifying and monitoring patients who would benefit from aspirin. For instance, our data suggest that practices might expect to find about 175 patients with angina in a population of 10 000; these could be identified by contacting patients who are prescribed nitrates.^{20,36} A similar process of case

finding, preventive treatment, and audit could be devised to prevent recurrence of myocardial infarction by prescribing prophylactic aspirin and β blockers.³⁷

ANTICIPATORY CARE

Indicative prevalences fit well with innovative models of primary health care. For instance, a model of preventive medicine through anticipatory care in general practice has been developed over several decades, based on opportunistic screening and interventions informed by epidemiological studies.³⁴ Focused and personal intervention can be more effective and cheaper than population based interventions or multiphasic screening and advice.^{4,38,39} However, it is probably not possible to cover all patients comprehensively and reliably without a team based practice organisation, efficient patient information systems, and an inbuilt audit cycle.⁴⁰

General practice has many advantages for pursuing health promotion since about 85% of patients will consult a member of the primary health care team each year.^{16,17} In the past general practitioners have mainly reacted to patients' problems rather than acting to prevent problems. The role of the general practitioner as personal physician and the gatekeeper to secondary care is vital and must be sustained. But anticipatory care is possible and effective if practices have high motivation, sufficient resources, trained staff, appropriate organisation, and a targeted approach based on research.⁴⁰ The expansion of the primary health care team to include practice nurses, health visitors, and other clinical professionals has brought anticipatory care closer.

Indicative prevalences may be useful in suggesting how to set priorities which make the most effective use of limited resources and are appropriate to the practice. The objective is to concentrate effort so as to produce an observable improvement in the health of patients over a reasonably short time. Our data suggest that brief interventions directed at reducing smoking and optimal management of patients with hypertension, angina, and myocardial infarction are good candidates.

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Public health implications

- The role of primary health care teams in health promotion is increasing
- In this study national and local data were used to determine indicative prevalences of mortality, morbidity, and risk markers for a hypothetical general practice population
- Indicative prevalences can be adapted to any general practice to help determine priorities for health promotion
- Brief interventions to reduce smoking and the optimal management of hypertension, angina, and previous myocardial infarction should be priorities

- 1 Department of Health and the Welsh Office. *General practice in the National Health Service: a new contract*. London: DoH and Welsh Office, 1989.
- 2 NHS Management Executive. *FHSL (93) 25 GP contract health promotion package: amendments to the statement of fees and allowances*. London: DoH, 1993.
- 3 Mant D, Anderson P. Community general practitioner. *Lancet* 1985;i:1114-7.
- 4 Tudor Hart J. *A new kind of doctor*. London: Merlin, 1988.
- 5 Paris JAG, Wakeman AP, Griffiths RK. General practitioners and public health. *Public Health* 1992;106:357-66.
- 6 Irvine D. General practice in the 1990s: a personal view on future developments. *Br J Gen Pract* 1993;43:121-5.
- 7 Hannay DR. Primary care and public health. *BMJ* 1993;307:516-7.
- 8 Chisholm JW. The 1990 contract: its history and its content. *BMJ* 1990;300:853-6.
- 9 Bain J. General practices and the new contract. 1. Reactions and impact. *BMJ* 1990;300:1183-6.
- 10 Bain J. General practices and the new contract. 2. Future directions. *BMJ* 1990;300:1247-50.
- 11 Fowler G, Mant D. Health checks for adults. *BMJ* 1990;300:1318-20.
- 12 Kelly MP, Charlton BG. Health promotion: time for a new philosophy. *Br J Gen Pract* 1992;42:223-4.
- 13 Gillam SJ. Provision of health promotion clinics in relation to population need: another example of the inverse care law? *Br J Gen Pract* 1992;42:54-6.
- 14 Secretaries of State for Health, Wales, Scotland, and Northern Ireland. *The health of the nation*. London: HMSO, 1992.
- 15 Department of Health. *Public health common data set: 1993. Vol 1. Mortality data*. London: HMSO, 1993.
- 16 Harrington B, White M, Foy C, Raybould S, Harland J. *Health and lifestyle in Newcastle*. Newcastle upon Tyne: Newcastle Health Authority, Department of Epidemiology and Public Health, University of Newcastle upon Tyne, 1993.

- 17 White M, Harrington B, Foy C, Raybould S, Harland J. *The Newcastle health and lifestyle survey 1991: user manual*. Newcastle upon Tyne: Newcastle Health Authority, Department of Epidemiology and Public Health, University of Newcastle upon Tyne, 1993.
- 18 Office of Population Censuses and Surveys. *1991 census. County report Tyne and Wear (part I)*. London: HMSO, 1993.
- 19 Newcastle Health Authority. *Annual report on sexually transmitted disease: 1992*. Newcastle: NHA, 1993.
- 20 Cannon PJ, Connell PA, Stockley IH, Garner ST, Hampton JR. Prevalence of angina as assessed by a survey of prescriptions for nitrates. *Lancet* 1988;i:979-81.
- 21 Cox BD. *Health and lifestyle survey*. London: Health Promotion Research Trust, 1987.
- 22 Wade DT. *Epidemiologically based needs assessment: report 3: stroke (provisional version)*. London: NHS Management Executive, 1992.
- 23 Dennis MS, Bainford JM, Sandercock PAG, Warlow CP. Incidence of transient ischaemic attacks in Oxfordshire, England. *Stroke* 1989;20:333-9.
- 24 Bamford J, Sandercock P, Dennis M, Warlow CP, Jones L, McPherson K, et al. A prospective study of acute cerebrovascular disease in the community. 1. Methodology, demography and incident cases for first ever stroke. *J Neurol Neurosurg Psychiatry* 1988;51:1373-80.
- 25 Mausner JS, Kramer S, eds. *Epidemiology—an introductory text*. Philadelphia: W B Saunders, 1985.
- 26 World Health Organisation. *International classification of diseases, 9th edition*. Geneva: WHO, 1977.
- 27 Sports Council and Health Education Authority. *Allied Dunbar national fitness survey: summary report*. London: HEA, Sports Council, 1992.
- 28 Health Education Authority. *That's the limit: a guide to sensible drinking*. London: HEA, 1992.
- 29 Stott N. Screening for cardiovascular risk in general practice. *BMJ* 1994;308:284-5.
- 30 Fowler G. The Indians' revenge. *Br J Gen Pract* 1993;43:78-81.
- 31 Freemantle N, Paramjit G, Godfrey C, London A, Richards C, Sheldon T, et al. *Effective health care: brief interventions and alcohol use*. Leeds: University of Leeds, 1993.
- 32 Mant D. Health checks—time to check out? *Br J Gen Pract* 1994;44:51-2.
- 33 Smith WCS, Lee AJ, Crombie IK, Tunstall-Pedoe H. Control of blood pressure in Scotland: the rule of halves. *BMJ* 1990;300:981-3.
- 34 Tudor Hart J, Edwards C, Hart M, Jones J, Jones M, Haines A, et al. Screen detected high blood pressure under 40: a general practice population followed up for 21 years. *BMJ* 1993;306:437-40.
- 35 Underwood MJ, More RS. The aspirin papers. *BMJ* 1994;308:71-2.
- 36 Juul-Moller S, Edvardsson N, Jahmatz B, Rosen A, Sorensen S, Omblus R. Double-blind trial of aspirin in primary prevention of myocardial infarction in patients with stable chronic angina pectoris. *Lancet* 1992;340:1421-5.
- 37 Eccles M, Bradshaw C. Use of secondary prophylaxis against myocardial infarction in the North of England. *BMJ* 1991;302:91-2.
- 38 OXCHECK Study Group. Effectiveness of health checks conducted by nurses in primary care: results of the OXCHECK study after 1 year. *BMJ* 1994;308:308-12.
- 39 Family Heart Study Group. Randomised controlled trial evaluating cardiovascular screening and intervention in general practice: principal results of British family heart study. *BMJ* 1994;308:313-20.
- 40 Tudor Hart J, Thomas C, Gibbons B, Edwards C, Hart M, Jones J, et al. Twenty five years of case finding and audit in a socially deprived community. *BMJ* 1991;302:1509-13.

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THE NOBEL PRIZES

Controversies about streptomycin and insulin

Prestige apart, Nobel prizes for science are now worth over £500 000 (\$750 000) apiece. So you might have expected that hard times and the ferocious competitiveness of modern science would have fostered increasingly acrimonious wrangles over these unique annual awards. Not a bit of it. Thanks to the diligence of the authorities in Stockholm, disputes are now markedly thinner on the ground that they were hitherto. Paradoxically, however, the absence of controversy today throws into even sharper relief the bitter recriminations of the past, the dogged persistence of received versions of those stories, and the difficulties faced by anyone anxious to reappraise or correct the conventional wisdom.

Two such stories are of particular medical interest—those of the 1952 prize for physiology or medicine, which went to Selman Waksman for the discovery of streptomycin, and that of the 1923 prize which was awarded to Frederick Banting and John MacLeod for the discovery of insulin. In the former case, the equal claim to fame and fortune of Waksman's colleague Albert Schatz has still barely modified the popular image of the doughty, selfless, Russian born Waksman as the sole destroyer of the tubercle bacillus. In the latter case, by contrast, the injustice done to Banting's collaborator Charles Best has allowed another legend to flourish—that MacLeod did not deserve a share of the award because he had done little more than provide the others with bench space.

In his autobiography *My Life with the Microbes* (Robert Hale, 1958) Waksman writes of a "sad development" in 1949 when he was given a "severe blow" by a (nameless) former student—"one in whom I had great confidence as a promising future scientist, one whose name I had placed side by side with mine on numerous scientific papers, one who I hoped would carry on in the same tradition and spirit of research as I have done myself. . . ." The student was in fact Albert Schatz, who went to court to restrain Waksman from representing himself as the sole discoverer of streptomycin and to secure a fair share of the royalties.

It has taken the concerted work of Milton Wainwright of the University of Sheffield to place firmly in the public domain the actual story of streptomycin, not least in his book *Miracle Cure* (Basil Blackwell, 1990). The real facts, in contrast to the maudlin self justification of several

passages in *My Life with the Microbes*, are that Schatz had a stronger claim than his senior collaborator to be recognised as the discoverer of streptomycin, that he won a lawsuit to be legally defined as codiscoverer, and that Waksman had to sign sworn affidavits accordingly. An out of court settlement gave Schatz 3% of the royalties—10% going to Waksman and 80% to Rutgers College of Agriculture, where the work was done. Yet despite Wainwright's repeated endeavours, Schatz's name does not yet appear alongside that of Waksman in many encyclopaedia entries and other historical accounts of the breakthrough.

The apparent injustice in the award of the 1923 prize to Banting and MacLeod alone is far more widely known and has indeed hardened into a myth that virtually denies any credit whatever to MacLeod. I have even repeated the story in print myself. MacLeod allegedly took no part whatever in the research of his University of Toronto colleagues Banting and Best and was on holiday at the time of the decisive experiments. So while delighted with the subsequent accolade, Banting was furious that the committee had overlooked his real collaborator—to whom he promptly gave half of his share of the money.

But this version of events is both incomplete and inaccurate and has to be measured against the account of the discovery of insulin written by MacLeod himself in 1922 though sadly not generally known until it was published in the *Bulletin of the History of Medicine* in 1978. That and Michael Bliss's *The Discovery of Insulin* (Faber and Faber, 1988) show that MacLeod did indeed make major contributions at all stages of the research and had not been on vacation at the crucial time. Bliss argues that without MacLeod's help Banting and Best were unlikely to have come up with insulin in a form suitable for clinical use. The essential part played by MacLeod has also been put in perspective in the *Aberdeen University Review* (Autumn 1990) by Michael Williams, who is currently working on a full biography of the man he calls "Aberdeen's forgotten Nobel prize winner."

Nobel prize battles may be less common nowadays, but there is still work to be done in correcting the myths and misapprehensions of the past.—BERNARD DIXON is a freelance science writer