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Public confidence and cardiac surgical outcome

Cardiac surgery: the fall guy in medical quality assurance

The General Medical Council has recently been grappling with the problem of measuring and comparing surgical outcomes after complex surgery in a heterogeneous patient population with differing severities of illness.[1] Cardiothoracic surgery, with its immediate, and sometimes catastrophic outcomes, is the first surgical specialty to come under such scrutiny. Inevitably the media coverage has dented public confidence in the ability of the medical profession to police itself, and in particular this has been focused on cardiothoracic surgery.[1] Yet, the irony is that in the United Kingdom cardiothoracic surgery has better data and is more subject to internal scrutiny than perhaps any other specialty.

The Society of Cardiothoracic Surgeons has a long history of audit. In 1977 Sir Terence English established the United Kingdom cardiac surgical register,[2] which collects activity and mortality data on all cardiac surgical procedures performed in each NHS cardiac surgical unit, amounting to 35 000 procedures a year. Although apparently simple in concept, the process represented the first attempt in Britain by any specialty to collect national activity and outcome data.

All data are anonymised, since this was a prerequisite for encouraging voluntary data submission from all units. Similarly the United Kingdom heart valve registry has collected national valve surgery data since 1986. Linkage of this registry to the Office for National Statistics means we now have unique 10 year survival data following heart valve replacements in the NHS.[3 18]

Both registries return aggregated data to each member of the society as an annual report containing national activity and mortality data for a wide range of cardiac operations. Since inception the presumption has been that access to national information would draw each surgeon's attention to his or her own performance and encourage local introspection and action. So what has gone wrong? Why have we apparently failed to identify those few surgeons whose performance has fallen below acceptable standards?

Firstly, the data in the cardiac surgical register relate to individual units, not individual surgeons. Hence, a unit's figures can easily camouflage an errant performer. Secondly, poor individual performance could be dismissed as a casemix problem, since risk stratification algorithms were not available. Thirdly, reliable data collection facilities have not been available in every unit, and failure to track every death may have resulted in the reporting of unrealistically low operative mortalities for some procedures.

Nevertheless, the register represented a spearhead endeavour both internationally and within Britain and provided a reasonable indication of national activity and mortality. Even so, the Society of Cardiothoracic Surgeons recognised the shortcomings of the system, particularly in the light of transatlantic developments. The Freedom of Information Act in the United States had forced individual cardiac surgeons' outcomes into the public domain,[4 5] and the release of raw mortality data by public health agencies had caused considerable alarm within the specialty. This stimulated interest in understanding outcome measures and developing risk stratification algorithms[6 7] and prompted a reappraisal of our own national system.

Acknowledging the need to be able to measure casemix and severity of illness, the society established a national database in 1994, to run in parallel with the existing, simpler, register. This database collects some 150 datapoints on all adults undergoing cardiac surgery in selected units across Britain, with the aim of developing reliable comparative UK oriented risk stratification models in conjunction with the MRC Biostatistics Unit in Cambridge. This year the national database accepted data from just over half of all British units. It now provides a unique repository of comprehensive data on 30 000 patients for risk stratification modelling and which is available to contributing units. At present the database does not collect surgeon identifiers, since in 1993-4 this would have been an insurmountable stumbling block to its launch.

However, the tide of public and professional opinion is changing rapidly and the society has this year added a paediatric surgical database to its endeavours. The chief medical officer has made it clear that the public have a right to know that standards are under scrutiny and that the profession cannot hide behind anonymity. The society supports this stance but believes that measurement and interpretation should be governed by the specialty, and most members consider that comparisons between surgeons should be risk stratified to take account of casemix. At the same time the society recognises a conflict. A mechanism for professional assurance needs to be put in place promptly to reassure the public, but not all units have the information technology or staff to collect the detailed information required for risk stratification. To force these units to collect complex data in the absence of adequate facilities would either dilute the reliability of the data or risk reducing the dataset to the lowest common denominator and thereby reduce its value.

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To balance these apparently conflicting aspirations the society has asked all NHS units to return annual, raw, surgeon specific mortality data on marker operations for adult cardiac surgery, thoracic surgery, and paediatric cardiac surgery from 1 April 1997 as an extension to the cardiac surgical register. These data will be analysed independently and the results scrutinised through an internal mechanism within the society. Individual surgeons will be notified and required to respond if their performance appears to be outside predetermined limits. This will provide an effective, specialty driven, early warning system at little or no additional cost to individual units.

The comprehensive data collection required for risk stratification may be intimidating to some. However, surgeons from a unit with risk stratification in place will find themselves in a stronger position to respond to the society's new early warning system. Herein lies an inequity even for those committed to good data collection. The standard NHS patient management systems are generally not sophisticated enough to process these types of data. Most cardiac surgical units have already demonstrated commitment by either developing a bespoke system or purchasing a proprietary system capable of performing benchmarking against national standards by both simple[8 9] and complex risk modelling[10] with logistic regression,[11] Bayesian analyses,[12 13] and individual risk adjusted CUSUM.[14 15] The changing climate is encouraging the remaining units to do the same and submit comprehensive data to the national database. The limiting feature is that good data collection requires local resources in the form of appropriate software and staff together with commitment from consultants.

In parallel with the society's initiative the department of health is exploring the feasibility of centralised online data collection and warehousing for all interventional cardiology and cardiac surgical procedures through the central cardiac audit database project. This is entering its third year, in six pilot centres, and will be reporting soon.[16]

Most cardiac surgeons have long recognised their responsibility to collect reliable and comprehensive data on their performance. This will be facilitated by the development of an international cardiac surgical dataset currently being drawn up between the Society of Thoracic Surgeons in the United States and the European Association for Cardiothoracic Surgery. This will help to standardise risk factor data collection and facilitate the development of robust comparative risk modelling between populations, procedures, institutes, and individual surgical teams.

Evidence based medicine indicates that those patients most likely to benefit from cardiac surgery are usually the sickest, with the most damaged hearts, who therefore have the greatest surgical risk. So auditing performance without correction for casemix will subject the surgeon to unfair comparisons and ensure that some patients who might otherwise benefit will be denied surgery.[17] Good risk stratification, however, will reduce the chances of high risk patients being turned down for surgery and encourage fully informed preoperative consent. Furthermore, although operative mortality is always attributed to the surgeon, this ignores the subtle but important influences of cardiological management and referral, anaesthetic care, and intensive care resources.

Although the climate is changing, these remain complex and sensitive issues, but these new mechanisms should go some way to restoring public confidence. Our outcome statistics have been in the public domain for many years and are now published on our web page[18] along with American outcome data.[19] We will soon be adding a coronary surgery risk calculator based on UK data which will introduce the concept of operative risk calculation into the public domain. This year the Society of Cardiothoracic Surgeons has gone a stage further and democratically assumed responsibility for quality control of individual surgical practices—a new role for any specialist society within the United Kingdom. However, our specialty represents the tip of the iceberg in medical quality assurance, and the major challenge will be determining realistic, measurable, and auditable outcomes for other medical and surgical specialties, where poor outcomes also occur but the process is less transparent.

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1 Treasure T. Lessons from the Bristol case. *BMJ* 1998;316:1685-6.
2 English TAH, Bailey AR, Dark JF, Williams WG. The UK Cardiac Surgical Register 1977-82. *BMJ* 1984;289:1205-8.
3 Taylor KM. The United Kingdom heart valve registry: the first 10 years. *Heart* 1997;77:295-6.
4 Chassin MR, Hannan EH, De Buono BA. Benefits and hazards of reporting medical outcomes publicly. *N Engl J Med* 1996;334:394-8.
5 New York State cardiac surgery reporting system. www.health.state.ny.us/nysdoh/consumer/heart/homehear.htm
6 Daley J, Grover Fl and Hammermeister K. Using outcomes data to improve clinical practice: building on models from cardiac surgery. *Ann Thorac Surg* 1994;58(suppl):1809-84.
7 Wechsler A. Risk management in CABG: a continuing perspective. *Ann Thorac Surg* 1996;62 (suppl);S1-32.
8 Nashef SAM, Carey F, Silcock MM, Oommen PK, Levy RD, Jones MT. Risk stratification for open heart surgery: trial of the Parsonnet system in a British hospital. *BMJ* 1992;305:1066-7.
9 Treasure T. Risks and results of surgery. *Br Heart J* 1995;74:11-12.
10 Bridgewater B, Neve H, Moat N, Hooper T, Jones M. Predicting operative risk for coronary artery surgery in the United Kingdom: a comparison of various risk prediction algorithms. *Br Heart J* 1998;79:350-5.
11 Society of Thoracic Surgery. 1995 Coronary artery bypass risk model: the Society of Thoracic Surgeons adult cardiac surgery national database. *Ann Thoracic Surg* 1998;65:879-84.
12 Edwards FH, Albus RA, Zajtchuk R, Graeber GM, Barry MJ, Rimisek JD, et al. Use of a Bayesian statistical model for risk assessment in coronary artery surgery. *Ann Thoracic Surg* 1988;45:437-40.
13 Marshall G, Shroyer L, Grover F, Hammermeister K. Bayesian-Logit model for risk assessment in coronary artery bypass grafting. *Ann Thoracic Surg* 1994;57:1492-500.
14 Lovegrove J, Valencia O, Treasure T, Sherlaw-Johnson C, Gallivan S. Monitoring the results of cardiac surgery by variable life adjusted display. *Lancet* 1997;350:1128-30.
15 Poloniecki J, Valencia O, Littlejohns P. Cumulative risk adjusted mortality chart for detecting changes in death rate: observational study of heart surgery. *BMJ* 1998;316:1697-1700.
16 UKCCAD Web site. http://ccad3.biomed.gla.ac.uk/ccad
17 Omoigui NA, Miller DP, Brown KJ, Annan K, Cosgrove D, Lytle B, et al. Outmigration for coronary bypass surgery in an era of public dissemination of clinical outcomes. *Circulation* 1996;93:27-33.
18 Society of Cardiothoracic Surgeons. Surgical outcomes. www.ctsnet.org/section/outcome/
19 United States Society of Thoracic Surgeons. Surgical outcomes. www.sts.org/outcomes/othcardb.html

Hospital at home: from red to amber?

Data that will reassure advocates—but without satisfying the sceptics

General practice pp 1786, 1791, 1796, 1802

Hospital at home schemes providing care in the patient's home that is traditionally provided in hospital have grown in importance in health services in both Europe and North America and are seen as a possible substitute for inpatient care in the National Health Service.[1] The limited experience of hospital at home developments in the United Kingdom suggests that savings can be made when such services are substituted for usual hospital care, at least for some patient groups,[2] but a recent systematic review of the English language literature provides little evidence to support this innovatory approach to acute care.[3] Few trials of hospital at home services have, however, been done, and most have been small, with no consistency in outcome measures and little attempt at economic evaluation.

The many purchasers and providers planning hospital at home schemes[4] have had little guidance on how to proceed, with the result that many recent attempts to create this type of service have been unplanned experiments. Economic evaluation of some new hospital at home services in London found them to be more expensive than usual care,[5] and several services have been decommissioned as a result. The separate trials reported in this issue (pp 1786, 1796)[6 7] are therefore important contributions to our understanding of the potential for developing hospital at home schemes in the NHS, not least because they incorporated economic evaluations in their designs (pp 1791, 1802).[8 9]

The results of these trials will reassure advocates of hospital at home schemes without satisfying sceptics. In both centres hospital at home seems as effective and as acceptable to patients as routine hospital care, although in the Northamptonshire study the trial did not have the power to detect differences in mortality and morbidity.[6] The exceptions to effectiveness and acceptability seem to be patients who had undergone knee replacements and those with chronic obstructive airways disease—and will not surprise clinicians. Hospital at home patients had more days of care than their inpatient counterparts, but this finding is difficult to interpret. Were hospital at home teams having difficulty discharging patients, perhaps with perverse incentives to hold on to them during periods of underutilisation? Or is discharge from inpatient care sometimes premature, so that recipients of hospital at home services get longer, but more appropriate, care?

The economic evaluations of the two services come to opposing conclusions, with reduced costs for hospital at home patients in Bristol,[9] despite their greater lengths of stay, and higher costs in Northamptonshire for elderly medical patients and those with obstructive airways disease.[8] However, the sensitivity analyses are crucial, because hospital at home costs in Bristol would exceed usual inpatient care costs only if the latter were reduced by 50%, while in the Northamptonshire study a reduction in hospital at home care of only one or two days could alter the study's conclusion, at least for some patient groups.

Where does this leave providers and commissioners hopeful that hospital at home services could solve some of their service delivery problems? Paediatric hospital at home schemes are well established, as are some forms of highly focused, high technology medical care,[1] but new services aimed at older patients with a wide range of medical and surgical problems remain problematic. These two trials do not and could not answer fundamental questions about the value of hospital at home as a substitute for usual inpatient care. They are too small, and (despite the efforts of a research group hosted by North Thames region to coordinate trial development) they are difficult to compare and combine because they use different outcome measures.

More importantly, the results of these studies seem to be contingent on characteristics of local services that may have influenced the application of eligibility criteria, recruitment to the study, and length of stay in and timing of discharge from hospital at home. Previously untried features of an innovative service, like the special payments to general practitioners for caring for hospital at home patients in the Northamptonshire study,[6] may have unforeseen effects on care pathways. Descriptive studies of the organisational culture and practice of innovative services are needed to place their findings in context and might be useful components of future studies, since pragmatic randomised controlled trials alone seem to be necessary but insufficient guides for service development.

Nevertheless, the two trials reported in this issue do provide useful pointers for service developers. It seems that hospital at home can substitute for usual hospital care for some diagnostic groups, without adverse effects on patients, and potentially with release of resources. Resources are not always released, however, and the outcome may be supplementation of existing hospital services, at overall greater cost to the local health service. Supplementary services may be desirable for those commissioners who can afford them, but knowing whether an innovation will supplement or substitute for existing services matters greatly. The size of hospital at home schemes and their case mix are clearly important factors that influence the impact of these schemes on other services.

More trials are about to report, and in a year or so the picture may be very different. Commissioners and providers impatient with academic conservatism and the quest for evidence may scorn suggestions that "more research is needed," but they might be wise to wait just a little longer before giving hospital at home the green light.

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1 Marks L. *Home and hospital care: redrawing the boundaries.* London: King's Fund Institute, 1990.
2 Knowelden J, Westlake L, Wright KG, Clarke SJ. Peterborough hospital at home; an evaluation. *J Pub Health Med* 1991;13:182-8.

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3 Shepperd S, Iliffe S. Hospital at home compared with in-patient care. In: Bero L, Grilli R, Grimshaw J, Oxman A, eds. *The Cochrane library*. The Cochrane Collaboration, issue 1, Oxford, Update Software, 1998.
4 Iliffe S. Hospital at home: buyer beware. *J Royal Soc Med* 1997;90:181-2.
5 Hensher M, Fulop N, Hood S, Ujah S. Does hospital at home make economic sense? Early discharge versus standard care for orthopaedic patients. *J R Soc Med* 1996;89:548-51.
6 Shepperd S, Harwood D, Jenkinson C, Gray A, Vessey M, Morgan P. A randomised controlled trial comparing hospital at home with inpatient hospital care (1): three month follow up of health outcomes. *BMJ* 1998;316:1786-91.
7 Richards SH, Coast J, Gunnell DJ, Peters TJ, Pounsford J, Darlow M-A. A randomised controlled trial comparing the effectiveness and acceptability of an early discharge hospital at home scheme with acute hospital care. *BMJ* 1998;316:1796-801.
8 Shepperd S, Harwood D, Jenkinson C, Gray A, Vessey M, Morgan P. A randomised controlled trial comparing hospital at home with inpatient hospital care (2): a cost minimisation analysis. *BMJ* 1998; 316:1791-96.
9 Coast J, Richards SH, Peters TJ, Gunnell DJ, Darlow M-A, Pounsford J. Hospital at home or acute hospital care? A cost minimisation analysis. *BMJ* 1998;316:1802-6.

Can an economic case be made for investing in health?

No, but it's the wrong question

Social insurance for health services grew out of voluntary schemes to ensure access to care for workers, especially to provide treatment for industrial injuries.[1] At least part of the reason was a desire to help workers back to work. Implicit in some of the pronouncements from the World Bank is a belief that health services in developing countries should be used to treat and thus restore the productivity of workers.[2 3] Increasing output can be used as one measure of benefits in cost benefit analysis,[4] but this gets no mention in some recent texts on health economics,[5] and it is now rare to value benefits in economic evaluation in terms of improved productivity. As government services are increasingly being judged on their ability to contribute to economic growth—for example, crudely testable skills seem to be the main objectives of primary education—it is interesting to consider if a similar case can (or should) be made for health services.

For health services to contribute to economic growth certain conditions must apply. Firstly, treatment must contribute to health status in such a way that the person's productivity is increased (or restored). Secondly, that person working must increase overall output in the economy. The first is not guaranteed, since the treatment may improve quality of life or survival without increasing productivity, and the person treated may not be in the workforce. The second depends either on there being no unemployment (and in Britain there are up to three million reasons for questioning that) or the person having exclusive skills (only sometimes the case). If someone being sick allows a previously unemployed person to work then there may be no loss in production and no gain when the person returns to work. In practice there is likely to be some loss owing to lower productivity of temporary or inexperienced staff.

In a recent Office of Health Economics lecture, Baumol pointed out that health service provision is a handicraft industry, which will always be labour intensive. This means that relatively little scope exists for improved productivity, and costs are likely to rise more quickly than in manufacturing. He pointed out that this is a normal and desirable state of affairs. Of course, this does not mean that potential efficiency improvements should not be pursued,[6] but expansion of handicraft industries tends to slow economic growth.

Clearly, productivity and growth (as conventionally measured) are unlikely to be sufficiently increased by health services for this to be the main justification of healthcare expenditure. In any case, this is not really the right question. The proper objective should not be higher growth in itself but more generally increased welfare of the population. The economic case for health services is made when this is the use of resources that has the greatest impact on welfare. An important lesson of the 1970s and 1980s is that economic indicators can show a large improvement without an equivalent improvement being felt widely in the population. All economists agree that gross domestic product is at best a crude measure of welfare, and its continued use reflects the difficulty of agreeing to use anything else.

In assessing priorities for development the United Nations Development Programme has advocated a wider definition of welfare that has a strong focus on health.[7] Since the measures of national income currently used do not include health directly, and since the indirect effects of better health on measured gross domestic product are probably weak, it is difficult to see how this kind of economic case for investing in health and health care can be made. Equally, since health (along with other important indicators of welfare) is not part of the broad measure of national income, we can question the pursuit of this narrow objective. There is no point in increasing measured national income unless this helps to improve national welfare. Indeed, growth that lowers health may lower national welfare. Perhaps the question should not be, Can we justify investment in health on the basis of contribution to growth? but rather, Can we justify growth on the basis of its contribution to health?

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1 Ron A, Abel-Smith B, Tamburi G. *Health insurance in developing countries: the social security approach*. Geneva: International Labour Office, 1990.
2 World Bank. *World development report 1993: investing in health*. Washington, DC: World Bank,1993.
3 Jamison D, Mosley WH, Measham A, Bobadilla JL. *Disease control priorities in developing countries*.New York: Oxford University Press, 1993.
4 Drummond MF, O'Brien B, Stoddart GL, Torrance GW. *Methods for the economic evaluation of health care programmes*. 2nd ed. Oxford: Oxford University Press, 1997.
5 Getzen T E. *Health economics: fundamentals and flow of funds*. New York: John Wiley, 1997.
6 Maynard A. *Table manners at the health care feast: the case for spending less and getting more*. London: London School of Economics, 1996.
7 United Nations Development Programme. *Human development report 1994*. New York: Oxford University Press, 1994.

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Ethnicity, social inequality, and mental illness

In a community setting the picture is complex

The relative prevalence and treatment of mental illness among different ethnic groups in Britain is probably one of the most controversial issues in the field of health variations. The Policy Studies Institute, in a study commissioned by the Department of Health, has tackled these complexities and openly addressed the difficulties in the cross cultural assessment of mental illness.[1]

The study is based on a national community survey of 5196 people of Caribbean or Asian origin and 2867 white Britons. Ethnicity was assigned on the basis of country of family origin, though the limitations of this approach are acknowledged.[2] In a two stage interviewing process, initial assessment of mental health relied on structured questionnaires: a cut down clinical interview schedule[3] for neurotic disorders and the psychosis screening questionnaire[4] for psychotic disorders. Second stage interviewing was conducted by ethnically and linguistically matched interviewers using the appropriate translation of version 9 of the present state examination.[5] A major omission was the absence of the somatisation section of the clinical interview schedule. Similarly, no account was taken of non-Western categories of distress.[6] However, inclusion criteria were as wide as possible in an attempt to minimise false negatives. The psychosis screening questionnaire has a high sensitivity and specificity but its positive predictive value is poor because the prevalence of psychosis is low and it misses people with a psychotic illness in remission.[6]

Studies of ethnicity and mental illness have previously focused on rates of treated mental illness, primarily in hospital settings, and with an inevitable emphasis on psychosis. Relatively little work has been done in primary care (where 95% of mental illness is treated) and even less in community settings. Hospital based research has consistently shown raised rates of schizophrenia among African Caribbeans compared with the white population.[8–10] In the Policy Studies Institute survey Caribbeans again had a higher rate of psychosis (13 per 1000) than any other group but less than twice that found among whites (8 per 1000). All the differences in rates of psychotic mental illness in this survey were found among women. Caribbean men had the same rate as white men. This finding might accurately reflect community prevalence rates or it may be due to systematic underenumeration and higher attrition rates among Caribbean men, differences in validity and reliability of screening, or differences in pathways to care and treatment of white and Caribbean men.

For the first time Caribbeans were confirmed to have higher rates of depression than whites. However, Caribbeans with depression were far less likely to report receiving medication from their general practitioner. This suggests that depression among this group needs to be better identified and treated within primary care.[11]

Rates of mental illness among Asians were low, particularly for Bangladeshi and Chinese people, which may be due to the cultural limitations of Western measures of mental illness. Among Asians who were born or received secondary school education in Britain, rates of mental illness were similar to those in their white counterparts. Although young Asian women are more likely to die from suicide than other groups, this study found that they were no more likely to feel suicidal.

Crucially, after adjustment for social status, those in lower social classes had higher rates of mental illness across all groups. Differences in material standard of living made at least some contribution to higher rates of depression and psychosis among Caribbean respondents. White and South Asian single mothers had particularly high rates of mental illness, with a 10% prevalence of depression. Those who were married or cohabiting had the lowest rates. Caribbean single mothers did not, however, have raised rates and the lowest rates were found among single women without young children. These findings suggest that further modelling of the data is required to investigate the effects of socioeconomic and sociodemographic variables and to confirm the findings on psychosis. Such analyses are under way (J Nazroo, personal communication). Further research will be needed to establish the best methods of addressing the role of racism.

Frank Dobson, the secretary of state for health, has stated his commitment to improving the health of black and minority communities and to creating health action zones to tackle health inequalities. The Policy Studies Institute study provides much of the basic epidemiological data to underpin policymaking in these areas. Further research is needed into the recognition and treatment within primary care of common mental disorders among ethnic minorities. Finally, these data suggest that too narrow a focus on ethnicity alone might lead to a downplaying of the important relations between mental illness, ethnicity, gender, and social inequality.

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1 Nazroo JY. *Ethnicity and mental health: findings from a community survey.* London: Policy Studies Institute, 1997.
2 McKenzie KJ, Crowcroft N. Race, ethnicity, culture and science. *BMJ* 1994;309:286-7.
3 Lewis G, Pelosi AJ, Araya R, Dunn G. Measuring psychiatric disorder in the community: a standardized assessment for use by lay interviewers. *Psychol Med* 1992;22:485-6.
4 Bebbington PE, Nayani T. The psychosis screening questionnaire. *Int J Methods Psychiatr Res* 1995;5:11-20.
5 Wing JK, Cooper JE, Sartorius N. *Measurement and classification of psychiatric symptoms.* Cambridge: Cambridge University Press, 1974.
6 Kleinman A. Anthropology and psychiatry: the role of culture in cross-cultural research on illness. *Br J Psychiatry* 1987;151:447-54.
7 Jenkins R, Bebbington P, Brugha T, Farrell M, Gill B, Lewis G, et al. The national psychiatric morbidity surveys of Great Britain: strategy and methods. *Psychol Med* 1997;27:765-74.
8 Harrison G, Owens D, Holton A, Neilson D, Boot D. A prospective study of severe mental illness among Afro-Caribbean patients. *Psychol Med* 1988;18:643-57.
9 Littlewood R, Lipsedge M. Psychiatric illness among British Afro-Caribbeans. *BMJ* 1988;296:950-1.
10 King M, Coker E, Leavey G, Hoare A, Johnson-Sabine E. Incidence of psychotic illness in London: comparison of ethnic groups. *BMJ* 1994;309:1115-9.
11 Lloyd K. Depression and anxiety among Afro-Caribbean general practice attenders in Britain. *Int J Soc Psychiatry* 1993:39:1-9.

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Targeting subclinical atherosclerosis

Has the potential to reduce coronary events dramatically

A fifth of coronary deaths occur in those with no history of ischaemic heart disease, and the absolute number of coronary events is greater in the low risk population than in high risk groups. Risk scores cannot predict nearly half the future episodes of coronary heart disease.[1] The prevention of these acute events remains a major challenge.

Primary prevention, including health promotion in the community and multiple risk factor screening, has generally been disappointing[2]—a major problem has been that people have found it difficult to change their lifestyles. On the other hand, some trials of single risk factor screening followed by medical treatment, rather than lifestyle changes, have shown a significant reduction in vascular events. For example, in the West of Scotland Coronary Prevention Study screening and treating high serum cholesterol concentrations in 45-64 year old men led to a 31% reduction in cardiovascular events.[3] Such an approach, however, is of less value in preventing events in individuals with low risk factor levels. In those with established clinical disease secondary prevention has proved more successful: interventions such as antiplatelet agents can achieve a 25-33% reduction in events.[4] From a population perspective, however, secondary prevention has a limited effect because most vascular events occur in those without pre-existing clinical disease.

In attempting to prevent first time events a strategy which has been largely ignored is targeting and treating individuals with asymptomatic atherosclerosis. One difficulty is the need for an accurate marker of subclinical disease. Measurement of the ratio of the ankle to arm systolic pressure (ankle-brachial pressure index) has potential. It is easily, quickly, and reproducibly measured with a portable Doppler probe and sphygmomanometer.[5] In hospital the ankle-brachial pressure index has been related inversely to the degree of atherosclerotic disease in the leg, and a cut off point of 0.9 is over 90% sensitive and specific in detecting angiographically defined disease. In the general population the index has been related inversely to measures of generalised atherosclerosis, including the prevalence of angina, previously diagnosed myocardial infarction, and stroke.[6]

Most importantly, a low ankle-brachial pressure index ($\leqslant 0.9$) has been associated with a substantially increased risk of mortality and major cardiovascular events. Population studies in Belgium, Sweden, Scotland, and America have found a twofold to fivefold increased relative risk of fatal and non-fatal cardiovascular events in men and women with a low ankle-brachial pressure index.[6–10] In men and women aged 55-74 in Edinburgh much of the increased risk associated with a low ankle-brachial pressure index occurred independently of conventional risk factors (cigarette smoking, hypertension, and hypercholesterolaemia), and thus measurement of the index improved the prediction of events based on these risk factors alone.[10]

In adults aged under 55 the prevalence of an ankle-brachial pressure index less than 0.9 is below 5%,[9] but it increases sharply in older age groups. Around 1 in 7 healthy adults aged 55-74 without clinical disease have a low index, increasing to about 1 in 3 in those aged over 85. If such individuals with subclinical disease and high risk of future cardiovascular events were identified, it might be possible to reduce their risk. In addition to control of risk factors, treatment with antiplatelet drugs is likely to prove beneficial, as is the case in overt cardiovascular disease.[4] In asymptomatic disease, aspirin may be as effective as in symptomatic disease because the event rate in subjects with a low ankle-brachial pressure index is similar to that in those with clinical disease.[10] Assuming a 25% reduction in major cardiovascular events,[4] the five year incidence in 55-74 year olds without a history of cardiovascular disease, based on Edinburgh data, would fall from 120 to 90/1000 treated individuals.[10]

If these assumptions are correct an approach that entailed simple screening of people over 50 could potentially prevent around 60 000 major cardiovascular events in Britain over the following five years. About 85 000 new cases of angina and intermittent claudication would also be prevented, so about 1 in 13 treated individuals would derive some benefit. Although more events might be prevented by the additional use of other agents, such as antioxidants, these benefits are more hypothetical. In due course, however, the aspirin for asymptomatic atherosclerosis (AAA) trial in Lanarkshire, a high risk area for coronary mortality, will provide evidence on whether targeting subclinical disease is effective.

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1 Shaper AG, Pocock SJ, Phillips AN, Walker M. Identifying men at high risk of heart attacks: strategy for use in general practice. *BMJ* 1986;293:474-9.
2 National Heart Forum. *Preventing coronary heart disease in primary care. The way forward.* London: HMSO, 1995.
3 Shepherd J, Cobbe SM, Ford I, Isles CG, Lorimer AR, Macfarlane PW, et al. Prevention of coronary heart disease with pravastatin in men with hypercholesterolaemia. *N Eng J Med* 1995;333:1301-7.
4 Antiplatelet Trialists' Collaboration. Collaborative overview of randomised trials of antiplatelet therapy. I. Prevention of death, myocardial infarction, and stroke by prolonged antiplatelet therapy in various categories of patients. *BMJ* 1994;308:81-106.
5 Fowkes FGR, Housley E, Macintyre CCA, Prescott RJ, Ruckley CV. Variability of ankle and brachial systolic pressures in the measurement of atherosclerotic peripheral arterial disease. *J Epidemiol Commun Health* 1988;42:128-33.
6 Kuller LH, Shemanski L, Psaty BM, Borhani NO, Gardin J, Haan MN, et al. Subclinical disease as an independent risk factor for cardiovascular disease. *Circulation* 1995;92:720-6.
7 Criqui MH, Langer RD, Fronek A, Feigelson HS, Klauber MR, McCann TJ, et al. Mortality over a period of 10 years in patients with peripheral arterial disease. *N Engl J Med* 1992;326:381-6.
8 Ogren M, Hedblad B, Isacsson S-O, Janzon L, Jungquist G, Lindell S-E. Non-invasively detected carotid stenosis and ischaemic heart disease in men with leg arteriosclerosis. *Lancet* 1993;342:1138-41.
9 Kornitzer M, Dramaix M, Sobolski J, Degre S, DeBacker G. Ankle/arm pressure index in asymptomatic middle-aged males: an independent predictor of ten-year coronary heart disease mortality. *Angiology* 1995;46:211-9.
10 Leng GC, Fowkes FGR, Lee AJ, Dunbar J, Housley E, Ruckley CV. Use of ankle brachial pressure index to predict cardiovascular events and death: a cohort study. *BMJ* 1996;313:1440-4.

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