

Cardiac service provision in the United Kingdom

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ABSTRACT – Cardiac conditions account for at least half of acute medical admissions. The provision of a comprehensive and responsive cardiological service in the UK is therefore pivotal to the manner in which the NHS continues to modernise. This article reviews recent developments in cardiology, describes the current provision of cardiac services for the more commonly encountered conditions, and explores future developments that will impact on the care patients presenting with heart disease receive.

KEY WORDS: cardiac disease, service provision, United Kingdom

Background: where have we come from?

Coronary artery disease (CAD) is responsible for most of the cardiology burden that weighs heavily on Western health economies. The UK has enjoyed an

unenviable position in international comparisons of deaths from CAD (Fig 1).¹ When the author was training in cardiology 25 years ago it was seen as a specialty in which successful acquisition of a consultant post was unlikely; it was often remarked that there were more cardiologists on the staff of the Mayo Clinic (Rochester, Minnesota, USA) than there were in England and Wales. There were then approximately 200 cardiologists in the UK (1 per 275,000 head of population), which equated to a single physician with a cardiac interest for every district hospital.

More likely than not, if a patient presented to hospital with an acute cardiac condition, they would have been admitted under the care of a consultant physician who did not have specific cardiological training. Waiting times for coronary artery bypass grafting (CABG) were in excess of 18 months, while percutaneous coronary intervention (PCI or coronary angioplasty) had only just emerged as a potential alternative to surgery in selected patients

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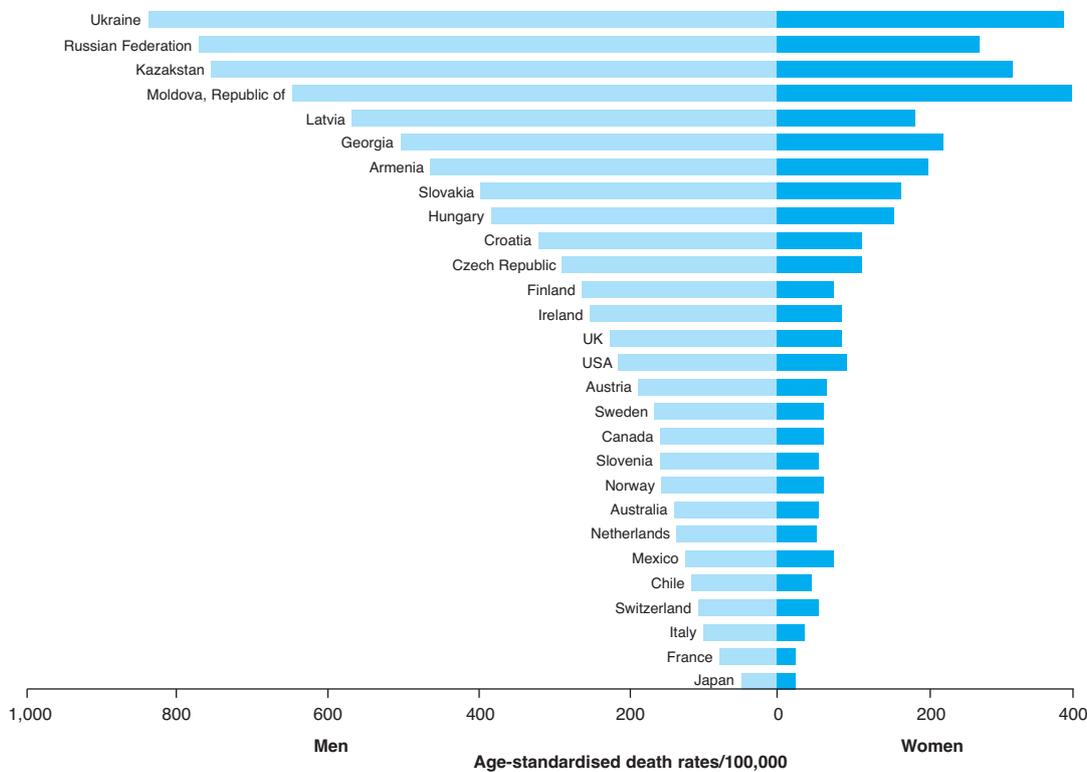


Fig 1. Death rates from coronary heart disease in men and women aged 35–74 in selected countries in 2000. Reproduced with permission from the World Health Organization.¹

with symptomatic coronary disease.² Furthermore, cardiac catheterisation and coronary angiography were considered to be mysterious and high-risk investigations, only pursued after perhaps repeated admissions with myocardial infarction (MI), severe ischaemia, or if symptoms of angina were refractory to maximal medical measures.

In terms of coronary revascularisation, low rates are still noticeable (Figs 2 and 3) representing evidence that service delivery in the UK is woefully short of levels undertaken in comparable western European nations, let alone those in North America. This is also the case with permanent pacemaker implantation.

The British Cardiac (now Cardiovascular) Society, has been at the forefront of monitoring consultant cardiologist posts and, in

its fifth report on cardiac service provision in the UK,³ continued to highlight deficiencies in staffing and facilities, making recommendations as to where further resource could be focused. The production of a National Service Framework (NSF) for coronary heart disease (CHD)⁴ and appointment of a national director to oversee its implementation, acted as a spur to galvanise the service further. Lessons learned from the Cancer Services Collaborative prompted the establishment of a system of local CHD partnerships, incorporating primary, secondary and tertiary care elements. These were subsequently modified and, via a phase of collaborative structures, formed networks designed to ensure that any cardiac developments would be managed equitably across the geographical areas for which they were responsible.

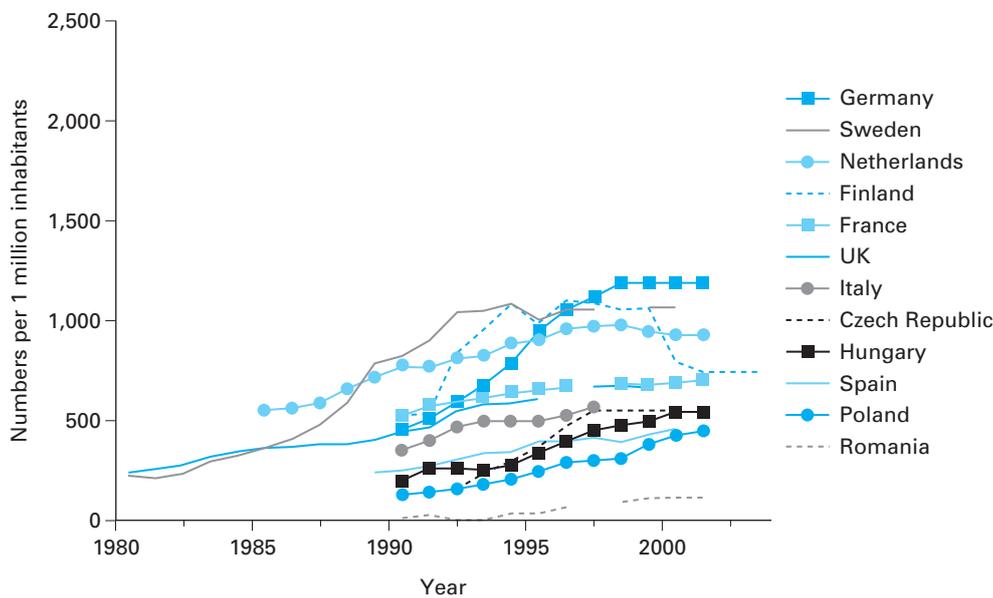


Fig 2. Time trends in the annual use of coronary artery bypass grafting.

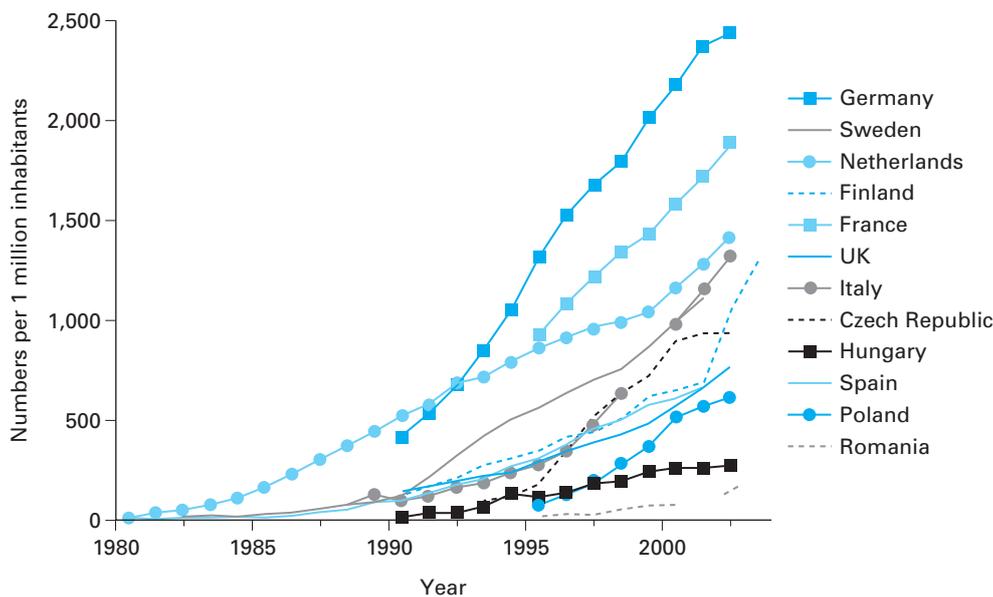


Fig 3. Time trends in the annual use of percutaneous coronary intervention.

The evidence base

There is little doubt that landmark randomised trials throughout the 1970s, 1980s and 1990s provided a platform from which enhanced service delivery could be launched, together with the justification for the funding that would be required.

In acute MI (AMI), the value of beta blockers⁵ and fibrinolytic therapy⁶ are just two examples, not forgetting the role of aspirin⁷ in this setting and the importance of the rapid delivery of all these treatments. Major trials in heart failure demonstrated that prognosis was improved if, instead of relying on digoxin and diuretics alone, we focused more on manipulating the ventricular loading conditions with vasodilators⁸ and angiotensin converting enzyme inhibitors (ACEI).⁹ More recently, cautious beta blockade¹⁰ and spironolactone¹¹ have also emerged as important adjuncts to heart failure care.

Studies in coronary disease comparing CABG with medical therapy, demonstrated prognostic (as well as symptomatic) benefit in patients with particular patterns of coronary anatomy.¹² As the applicability of PCI expanded, randomised data showed that surgical and percutaneous revascularisation were equivalent in terms of both survival and future risk of MI.¹³ The latter strategy, however, would incorporate a greater likelihood of requiring a further intervention because of restenosis, but the introduction of routine stenting¹⁴ – particularly with drug-eluting devices¹⁵ – soon eroded this difference.

After much debate around the value of cholesterol-lowering strategies major trials, using more potent but nevertheless well-tolerated agents, confirmed that this was indeed a worthwhile endeavour. Far from courting an increased chance of adverse events, such treatment translated into clear benefit for patients both with a high risk of as yet undeclared CAD,¹⁶ as well for those with established disease.¹⁷

The NSF was never intended to provide new information for practising cardiologists. Instead it laid down a foundation upon which a structure of comprehensive cardiological care could be planned, funded and delivered. It thereby supplied a tool which clinicians and their teams could use in discussions with managers and commissioners in order to bring about much needed service enhancements.

What is available now?

The many advances in cardiological care described above can appear bewildering to the non-cardiologist, let alone to colleagues working in primary care. The following therefore describes those current developments in cardiac services relevant to more common conditions, these being generally accessible at either secondary or tertiary care level.

Stable and unstable coronary artery disease

Coronary disease registers in primary care now enable the easier identification of patients and can ensure that optimum medications, particularly statins, are prescribed, and that other concurrent

risk factors are addressed. Coronary artery disease often presents in an unpredictable manner. Rapid access chest pain clinics, focusing specifically on patients with recent onset symptoms, are now well established in most units, and are mandated to assess appropriate referrals within two weeks. Often nurse led, and with the immediate availability of exercise testing as necessary, they can quickly triage outpatients and thereby admit, investigate further or reassure as appropriate. They have superseded hospital-based electrocardiogram (ECG) reporting which, although previously commonplace, represented less than ideal practice.¹⁸

Unstable CAD is a frequent cause of hospital admission and while AMI might be well recognised, more subtle presentations may not be so easily appreciated. In addition to the history, other clinical features and resting ECG appearances, estimation of serum troponin (a sensitive indicator of myocardial damage) has allowed high-risk patients to be better identified, and in many ways has become the 'key to the cardiological door'. Clear evidence is now available that supports the early investigation of such patients, with coronary angiography during the same admission leading to either surgical or percutaneous revascularisation as appropriate.¹⁹

Myocardial infarction

For nearly 15 years, the Myocardial Infarction National Audit Project has provided an immense amount of data about this important manifestation of CAD.²⁰ Management of AMI was revolutionised by thrombolytic therapy, and as minimising any delay from symptom onset to treatment became appreciated, door to needle times have become a prime benchmark by which the performances of accident and emergency departments have been judged. Paramedic-administered pre-hospital analysis is given in many parts of the country, particularly in rural or remote areas, where journey time to hospitals may be prolonged.

In addition to hospital outcomes, the proportion of patients discharged home taking evidence-based treatments (aspirin, beta blockers, statins, ACEI), or offered a formal cardiac rehabilitation programme, can also be monitored and comparisons between units can be made.

Percutaneous coronary intervention can offer an alternative for many patients who are either ineligible for thrombolytic therapy or in whom it is shown not to have produced ECG evidence of reperfusion. In addition to these so called 'rescue' procedures, evidence indicates that using PCI as the 'primary' treatment (ie instead of thrombolysis), yields better outcomes and shorter inpatient stays.²¹ Clearly the applicability of this approach is limited to the specialist centres that can offer such an immediate service. A 2005 survey by the British Cardiovascular Intervention Society revealed that of 77 PCI centres, 28 offered routine primary PCI but this was confined to office hours, while only 13 were able to provide a comprehensive 24/7 service.²²

Coronary angiography and revascularisation

Non-invasive cardiac assessment using exercise ECG, pharmacological stress echo testing or nuclear scanning techniques, can

quantify any ischaemic burden and thereby infer the severity of underlying disease. Coronary angiography, however, remains the gold standard in terms of delineating the severity and distribution of obstructive lesions, and is a necessary prerequisite to any form of revascularisation.

The number of cardiac catheterisation laboratories in the UK has increased considerably and this routine procedure is now often available in district hospitals. In 2005, 160 UK centres undertook in excess of 200,000 diagnostic angiograms.²²

It is clear that CABG activity has been static over the last decade and has been overtaken by an exponential rise in PCI, with over 70,000 procedures undertaken in the UK in 2005 (Fig 4). The reasons behind this phenomenon are many; it is not simply that patients who used to be managed surgically are now being treated percutaneously. Our more proactive approach to patients with unstable coronary syndromes has uncovered a new population of patients at an earlier phase in their disease, which makes them more suitable for PCI. Furthermore, the nature of their presentations may incur higher surgical risk, and with recent public and media focus on outcomes following CABG, there is an understandable tendency to manage these patients with PCI instead.

The increasing use of drug-eluting stents, and therefore a lower likelihood of restenosis after PCI, has further expanded the applicability of PCI into more complex subsets of coronary disease which had traditionally been the domain of the surgeon. Importantly, however, the revascularisation strategy is tailored to individual patients, and is increasingly the result of multi-disciplinary discussions involving surgeons, interventional cardiologists, patients and their carers.²³

Heart failure

This area of cardiological practice represents an enormous disease burden for the UK. It is estimated that 900,000 people in

this country have the condition and an annual increase of 10% is suggested.²⁴

Echocardiography is a pivotal investigation in the diagnosis and management of these patients. Predictably, this investigation is requested increasingly and has become almost as ubiquitous as a resting ECG recording. It is a labour intensive procedure, however, with its results reliant on the procedural and interpretive skills of ultrasonographers.

The chronic nature of heart failure, together with the need to monitor response to any therapeutic manoeuvre, lends itself to dedicated clinics which are often nurse led. Supervised by a consultant with a special interest in left ventricular dysfunction, they allow non-medical staff to assess patients and titrate or adjust evidence-based therapies.

More recent developments in this area include the utilisation of other imaging modalities, particularly magnetic resonance imaging. This can identify the presence of dysfunctional but nevertheless viable myocardium, and therefore highlight patients with underlying CHD in whom ventricular performance might be improved with revascularisation. In selected patients, permanent pacing techniques which particularly incorporate left ventricular stimulation have been shown to be beneficial.²⁵ Biventricular pacing or so-called cardiac resynchronisation therapy is therefore an expanding area.

Heart rhythm management

This chapter of the NSF was launched only recently but has nevertheless become a major focus of cardiological activity. Whereas this may have been viewed previously as predominantly a pharmacological field involving the use of antiarrhythmic agents supplemented by pacemaker implantation for various degrees of heart block, non-drug intervention is now as much a part of this subspecialty as it is with coronary revascularisation. In addition to ablative techniques designed to address re-entrant tachycardias and atrial arrhythmias,²⁶ a growing and important area is in both the primary and secondary prevention of ventricular arrhythmias.²⁷ In the UK, it is clear that the utilisation of implantable cardioverter/defibrillator devices – like that of permanent pacemakers – continues to lag behind other comparable European countries. It is anticipated that the attention which the NSF will stimulate should generate more activity in this field. Public awareness and nurse-led arrhythmia clinics, supported by the National Institute for Health and Clinical Excellence (NICE) guidance, will enhance the identification of patients who are likely to benefit from these therapies.

Audit

The UK Central Cardiac Audit Database was conceived more than a decade ago with the

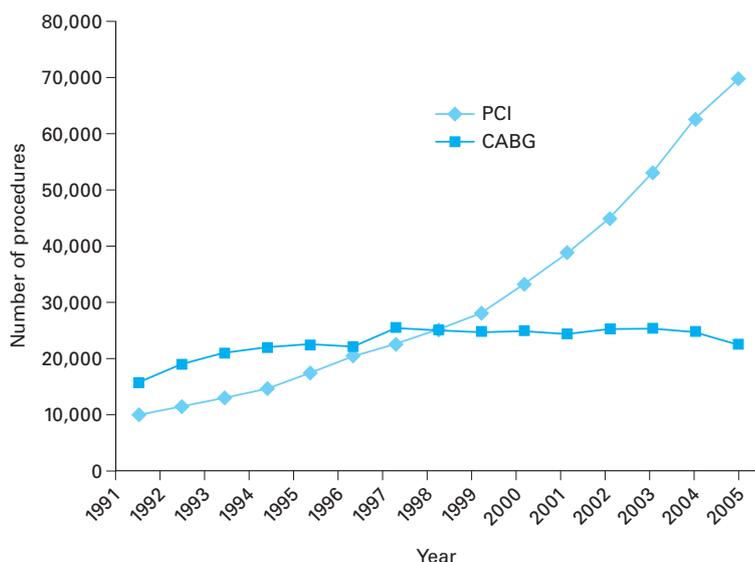


Fig 4. UK percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG) activity, 1991–2005.

vision that patients identified with cardiac disease would exist on a single information repository rather than be entered into any number of separate registries.²⁸ As a result, information collected by various professional bodies and societies has been collated so that the long-term outcome of patients with cardiac disease can be tracked as they undergo investigations or interventions, or sustain adverse outcomes such as MI or death. Cardiac units can now directly access this database, share their patient outcomes and compare their data anonymously with national averages.²⁹

What are the future problems?

The NSF for CHD was introduced alongside increased financial investment that was channelled into many other elements of the NHS. Currently, organisations are under significant financial pressure and so, along with other specialties, cardiological departments have also to deliver plans that will contribute to their trust's overall cost savings. This demand is heightened by the introduction of national tariffs, patient choice and Payment by Results which will necessitate all services having to function more efficiently. Furthermore, the move towards an 18-week wait from referral to definitive therapy will also require departments to focus on the timely delivery of cardiac investigation and treatment. This, together with the perhaps understandable wish for units to achieve foundation status will increase the degree of competition already evident in the delivery of quality cardiac care.

Training of specialist registrars is also an area which gives cause for some concerns in many specialties. This is particularly the case in cardiology where addressing the needs of both the specialist and general medical curricula can conflict with acquiring the necessary experience in procedures essential to subspecialty training such as PCI and electrophysiology.

Equity of care is an essential requisite to the modernised NHS. It can no longer be acceptable that the management of a particular patient depends on the day of the week they present or their postcode. This philosophy forms the cornerstone of the cardiac network structure. Agreed clinical pathways and guidelines, which transcend the traditional boundaries of individual trusts, have done much to make this concept a reality.

From a national perspective there are major discrepancies as initiatives or recommendations generated in England are not necessarily embraced in the devolved nations that form the UK. Despite the burden of cardiac disease being just as great, if not greater, in our neighbouring countries there are clear shortcomings when certain aspects of cardiac service provision are compared.³⁰ For example, coronary angioplasty activity has been consistently lower in Wales, and the use of drug-eluting stents during PCI continues to be at a lower level in Scotland than in other UK countries.

These, and other, discrepancies have been highlighted in two reports by a working group of the British Cardiovascular Society which represents cardiological practice throughout the UK.^{30,31} It will continue to annually review various aspects of national cardiac service provision in order to identify differences in

activity between the devolved nations and use its influence to address these inequalities.

Summary

Cardiological services in the UK have grown considerably over the last two decades. Supported by data from numerous robust randomised trials, as well as appraisals derived from the NICE guidelines, many new treatments and technologies have been introduced which have improved symptoms and prognosis for our patients with cardiac disease. The National Service Framework has used this evidence base in order to enshrine agreed concepts of best practice. Cardiac networks function to ensure that unified protocols, clinical pathways and guidelines operate right across their geographical area of responsibility and thereby promote equity of care.

References

- 1 World Health Organization and the British Heart Foundation. Death rates from CHD, men and women aged 35–74, 2000, selected countries. www.heartstats.org/temp/PFigspl1.5aspweb06.ppt
- 2 Gruentzig A. Results from coronary angioplasty and implications for the future. *Am Heart J* 1982;103:779–83.
- 3 Fifth report on the provision of services for patients with heart disease. *Heart* 2002;88(Suppl 3):iii1–56.
- 4 Department of Health. *Coronary heart disease: national service framework for coronary heart disease – modern standards and service models*. London: DH, 2000.
- 5 Randomised trial of intravenous atenolol among 16 027 cases of suspected acute myocardial infarction: ISIS-1. First International Study of Infarct Survival Collaborative Group. *Lancet* 1986;2:57–66.
- 6 Long-term effects of intravenous thrombolysis in acute myocardial infarction: final report of the GISSI study. Gruppo Italiano per lo Studio della Streptochi-nasi nell'Infarto Miocardico (GISSI). *Lancet* 1987;2:871–4.
- 7 Randomized trial of intravenous streptokinase, oral aspirin, both, or neither among 17,187 cases of suspected acute myocardial infarction: ISIS-2. ISIS-2 (Second International Study of Infarct Survival) Collaborative Group. *J Am Coll Cardiol* 1988;12(6 Suppl A):3A–13A.
- 8 Cohn JN, Archibald DG, Ziesche S *et al*. Effect of vasodilator therapy on mortality in chronic congestive heart failure. Results of a Veterans Administration Cooperative Study. *N Engl J Med* 1986;314:1547–52.
- 9 Effects of enalapril on mortality in severe congestive heart failure. Results of the Cooperative North Scandinavian Enalapril Survival Study (CONSENSUS). The CONSENSUS Trial Study Group. *N Engl J Med* 1987;316:1429–35.
- 10 Lechat P, Escolano S, Golmard JL *et al*. Prognostic value of bisoprolol-induced hemodynamic effects in heart failure during the Cardiac Insufficiency Bisoprolol Study (CIBIS). *Circulation* 1997;96:2197–205.
- 11 Effectiveness of spironolactone added to an angiotensin-converting enzyme inhibitor and a loop diuretic for severe chronic congestive heart failure (the Randomized Aldactone Evaluation Study [RALES]). *Am J Cardiol* 1996;78:902–7.
- 12 Alderman EL, Bourassa MG, Cohen LS *et al*. Ten-year follow-up of survival and myocardial infarction in the randomized Coronary Artery Surgery Study. *Circulation* 1990;82:1629–46.
- 13 Chaitman BR, Rosen AD, Williams DO *et al*. Myocardial infarction and cardiac mortality in the Bypass Angioplasty Revascularization Investigation (BARI) randomized trial. *Circulation* 1997;96:2162–70.
- 14 Coronary artery bypass surgery versus percutaneous coronary intervention with stent implantation in patients with multivessel coronary artery disease (the Stent or Surgery trial): a randomised controlled trial. *Lancet* 2002;360:965–70.

- 15 Serruys PW, Lemos PA, van Hout BA. Sirolimus eluting stent implantation for patients with multivessel disease: rationale for the Arterial Revascularisation Therapies Study part II (ARTS II). *Heart* 2004;90:995–8.
- 16 West of Scotland Coronary Prevention Study: implications for clinical practice. The WOSCOPS Study Group. *Eur Heart J* 1996;17:163–4.
- 17 Randomised trial of cholesterol lowering in 4444 patients with coronary heart disease: the Scandinavian Simvastatin Survival Study (4S). *Lancet* 1994;344:1383–9.
- 18 Norell M, Lythall D, Coghlan G *et al*. Limited value of the resting electrocardiogram in assessing patients with recent onset chest pain: lessons from a chest pain clinic. *Br Heart J* 1992;67:53–6.
- 19 Fox KA, Poole-Wilson P, Clayton TC *et al*. 5-year outcome of an interventional strategy in non-ST-elevation acute coronary syndrome: the British Heart Foundation RITA 3 randomised trial. *Lancet* 2005;366:914–20.
- 20 Myocardial Infarction National Audit Project. *How the NHS manages heart attacks*. London: RCP, 2007.
- 21 Keeley EC, Boura JA, Grines CL. Comparison of primary and facilitated percutaneous coronary interventions for ST-elevation myocardial infarction: quantitative review of randomised trials. *Lancet* 2006;367:579–88.
- 22 Ludman P. British Cardiovascular Intervention Society: national audit of percutaneous coronary intervention activity. www.bcis.org.uk
- 23 Norell MS, Khogali SS, Cotton JM, Cusack MR. Delivering a modern PCI service: can we change with the times? *Br J Cardiol* 2005;12: AIC27–30.
- 24 Peterson S, Rayner M, Wolstenholme J. *Coronary heart disease statistics: heart failure supplement*. London: British Heart Foundation, 2002.
- 25 Jarcho JA. Biventricular pacing. *N Engl J Med* 2006;355:288–94.
- 26 Earley MJ, Schilling RJ. Catheter and surgical ablation of atrial fibrillation. *Heart* 2006;92:266–74.
- 27 Moss AJ, Zareba W, Hall WJ *et al*; Multicentre Automatic Defibrillator Implantation Trial II investigators. Prophylactic implantation of a defibrillator in patients with myocardial infarction and reduced ejection fraction. *N Eng J Med* 2002;346:877–83.
- 28 Rickards A, Cunningham D. From quantity to quality: the central cardiac audit database project. *Heart* 1999;82(Suppl 2):II18–II22.
- 29 UK Central Cardiac Audit Database (CCAD). www.ic.nhs.uk
- 30 Brooks N, Norell MS, Hall J *et al*. National variations in the provision of cardiac services in the United Kingdom. *Br J Cardiol* 2005;12:192–8.
- 31 Boon N, Norell M, Hall J *et al*. National variations in the provision of cardiac services in the United Kingdom: second report of the British Cardiac Society Working Group, 2005. *Heart* 2006;92:873–8.