What can the UK learn from the USA about improving the quality and safety of healthcare?

Charles RV Tomson and Donald M Berwick

ABSTRACT – The US healthcare system provides evidence that spending more on healthcare does not result in better care, but also offers many lessons and surprises on how the quality and safety of healthcare can be improved. The US Institute of Medicine has clearly articulated what needs to be achieved. A series of US agencies, including the Joint Commission on Accreditation of Healthcare Organizations, the Centers for Medicare and Medicaid Services (CMS), other major players, and the Hospital Quality Alliance, routinely collect and report on numerous measures of the quality and safety of inpatient and outpatient healthcare. Most attention to improving care in the UK has focused on vertically integrated, closed healthcare systems, but the US experience provides additional models from the work of Quality Improvement Organizations and of numerous voluntary organisations that sponsor collaborative improvement.

KEY WORDS: accreditation, patient satisfaction, quality improvement, quality of care, safety

Introduction

Most UK physicians are aware of serious problems in the USA's healthcare system, including over-investigation and unnecessary operations, parallel underprovision of care (especially amongst the 45 million uninsured Americans), the costly and bureaucratic reimbursement system, and the enormous malpractice premiums. The USA certainly illustrates that spending more money is no guarantee of better quality or safer healthcare. The USA spends 2.4 times more of its gross national product on healthcare than the UK,[1,2] yet important health outcomes are no different. Within the USA, there is even evidence of an *inverse* relationship between spending on healthcare and outcome[3] – and between specialist supply and outcome.[4] At the same time, much is being done within the NHS to improve quality (Table 1). In theory, the NHS, as an integrated, population-minded system of care, has many advantages that should put us far ahead in the race to improve the safety and quality of healthcare,[5] and that hold lessons for the USA.[2] However, the 'First Law of Improvement' – 'Every system is perfectly designed to achieve exactly the results it gets'[6] – applies on both sides of the Atlantic. Both systems require redesign if they are to improve, and each can learn from the other. Here we review some lessons and surprises from the US healthcare system that may have relevance in the UK. We have used the three questions from the Model for Improvement as a framework (Fig 1).[7,8]

What are we trying to accomplish?

Any improvement project requires a well-articulated statement of its aims and objectives. In the case of quality improvement within the healthcare system, this requires clarity about what we mean by the quality and safety of healthcare. Change is also unlikely to happen without clear evidence of the need for improvement – the 'tension' for change. In the USA, this tension has come from both rocketing, burdensome costs of care, and ground-breaking research into the epidemiology of harm caused by medical interventions and error.[9–12] The Institute of Medicine (IOM) has produced a number of enormously influential reports, including *To err is human*[13] and *Crossing the quality chasm*,[14] which triggered further research and action to improve safety and quality. The six aims for improvement defined by the IOM are listed in Table 2. Although the NHS has produced the report, *An organisation with a memory*,[15] on safety and medical error, there is no equivalent, comprehensive report on quality in the NHS, and professional bodies, including the Academy of Royal Colleges and the Royal Society, have been largely silent on the issue.[16] Some

Table 1. UK organisations that set standards, or measure or reward quality in healthcare.

- Audit Commission
- Parliamentary Select Committee on Health
- National Institute for Health and Clinical Excellence
- NHS Institute for Innovation and Improvement
- Healthcare Commission
- National Patient Safety Agency
- Quality and Outcomes Framework
- Clinical Negligence Scheme for Trusts

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individual Colleges, including the Royal College of Physicians (RCP), have done much work to promote quality improvement. While this contrast may be attributable to differences in structure and funding, it also raises the question of whether clinicians and academics in the UK believe that quality and safety of healthcare are as important, for both scientists and policymakers, as 'pure' scientific issues. This begs the question: 'Who, in the UK, advises the nation on the quality and safety of healthcare?'

With the arrival of the Labour Government in 1997, the UK began an unprecedented expansion of investment in the NHS, increasing funding by 35% in real terms in the subsequent five years. In parallel to the financial commitment, the Government promised 'modernisation' of the service in England, with a series of National Service Frameworks designed to improve clinical care and service, with hundreds of clearly articulated goals for improvement of access, for cardiac care, mental health care, and other areas. This was followed by a blueprint articulated in the 2000 NHS Modernisation Plan. The Department of Health created the NHS Modernisation Agency as a means of providing technical support and advice to the field on improvement, and the National Institute for Clinical Evidence to help set scientifically based standards of care. A separate National Patient Safety Agency was established, largely due to the leadership of the Chief Medical Officer of the English NHS, and a public system of 'star ratings' of NHS Trusts began, with serious consequences for the leaders of Trusts that earned low ratings. Overall, the NHS Modernisation Plan may have been the largest investment in the improvement of a system ever seen in healthcare, or perhaps in any industry. Measurable improvements in many dimensions of care occurred. Parallel changes have occurred, to a greater or lesser extent, in the other UK countries.

Nearly a decade later, the shape of the NHS Plan has shifted quite a bit. The Modernisation Agency is gone, and its mission in part devolved to strategic health authorities and the Trusts themselves. The Agency has been replaced by a new NHS Institute for Innovation and Improvement, smaller in scale and with a mission now embracing improvement, leadership development, and innovation for the NHS. Political leaders in the Labour Government have become more enamoured of the use of market forces and choice as an engine for change, rather than planned, centrally coordinated technical support.

The surprising aspect of this enormous investment in the quality and safety of the NHS is the extent to which it lacks clinical or academic endorsement. Many clinicians view all management targets as politically motivated interference in their clinical freedom; we read and hear plenty about the distortion of clinical priorities caused by managers' attempts to ensure that the targets are met – for instance, in prioritising 'long waiters' for minor surgery over patients waiting for major surgery, or by manipulation of the 'trolley wait' target by making patients wait in ambulances – but little about the spectacular reductions in overall waits and delays within the system. What clinician, after all, would defend a four-hour wait on a trolley awaiting triage in an emergency department, a nine-month wait for hernia surgery, or some of the highest rates of hospital-acquired infections in the world? Similarly, there is a dearth of research articles documenting the effects of these investments. In the next section of this article we discuss some possible reasons for this apparent lack of engagement and support for change from clinicians and academics – and suggest that part of the reason is a lack of publicly accessible *measurements* of the effects of the changes.

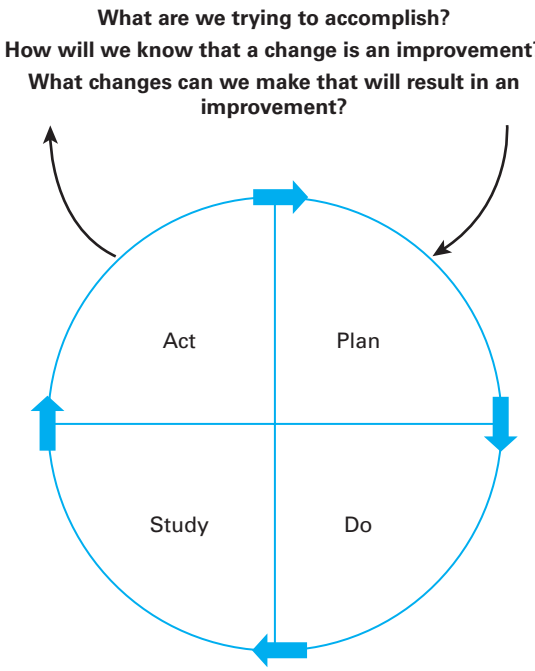

Fig 1. The Model for Improvement developed by Associates in Process Improvement, and adopted by the Institute for Healthcare Improvement. Reprinted from www.ihi.org with permission of the Institute for Healthcare Improvement © 2006.

How will we know that a change is an improvement?

All improvement requires change, but not all change is an improvement. Guiding proper improvements in the safety and quality of healthcare requires robust, reproducible *measurement* of relevant outcomes. The surprise here is the extent of measurement of markers of quality within the US system, especially compared with the UK. Although the lack of coordination between these overlapping measurement systems can cause unnecessary confusion, there has been increasing convergence over the last few years. Overall the USA seems to have much more publicly available information on the quality and safety of

Table 2. The six aims for improvement for healthcare as defined by the Institute of Medicine.

- Safe
- Timely
- Effective
- Efficient
- Equitable
- Patient-centred

care than the NHS does at present.[17] In addition, at least some of this measurement effort appears to have driven quality improvement efforts in the USA, as well as allowing researchers to continue to document variations in quality of care and ethnic disparities in outpatient[18] and inpatient[19] settings.

The federal government's Centers for Medicare and Medicaid Services (CMS) provide Medicare coverage to Americans over 65 years old and to those with certain chronic conditions, including end-stage renal disease (ESRD). CMS routinely collect data on 20 markers of the quality of inpatient and outpatient care, based on evidence-based process measures relating to prevention or treatment of breast cancer, diabetes, myocardial infarction, heart failure, pneumonia, and stroke.[20] Several large datasets based on CMS administrative and billing data are publicly available, and are widely used not only by researchers but also by agencies and companies to study patterns of care and to derive measures of quality and safety. The Hospital Quality Alliance is a collaboration between CMS and numerous other organisations that has developed a robust set of markers of the quality of hospital care. Seventeen measures relating to the quality of care of acute myocardial infarction, heart failure, and pneumonia are currently reported publicly on www.hospitalcompare.hhs.gov, and further measures are to be added over time. Data on hospital quality are also provided by a commercial company, HealthGrades, using publicly available CMS and state-level data supplemented by telephone surveys. The Ambulatory Quality Alliance (AQA) has also issued a set of 26 clinical performance measures for ambulatory care, with some striking similarities to the UK Quality and Outcomes Framework.

CMS also funds care for patients with ESRD, and helps providers of care by supporting a system of 18 multi-state Networks. The Networks collect a large dataset of markers of the quality of care and are responsible for helping with quality improvement.[21,22] The National Vascular Access Improvement Initiative ('Fistula First'), run by the Networks in conjunction with the Institute for Healthcare Improvement, aims to increase the use of arteriovenous fistulae in place of polytetrafluroethylene grafts for haemodialysis.[23] Although the USA remains a long way behind most European countries in provision of fistulae for haemodialysis,[24] this quality improvement programme is already showing promising results, and the USA now has much better recording and reporting of vascular access than the UK.

The Agency for Healthcare Research and Quality (AHRQ) is the federal agency funding much of the publicly supported health services research in America. It has produced an evidence-based set of 26 inpatient quality indicators, 29 patient safety indicators, and 16 prevention quality indicators, all of which can be extracted from administrative data. AHRQ also supported the development of the Consumer Assessment of Health Plans Survey (CAHPS), a questionnaire-based assessment tool to assess patient satisfaction with outpatient care; 75% of health plans, and 100% of plans that include Medicare beneficiaries, report these measures. Similar assessment tools have now been developed for inpatient and ambulatory care, and a tool for assessing outpatient dialysis is under development.

The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) is a non-government, private body providing a voluntary accreditation system based on inspection and data on safety and quality. Accreditation costs an average 500-bed hospital around $29,000 every three years; all but a minority of small, community hospitals participate in the scheme. JCAHO has recently moved to unannounced surveys that can occur at any time within the three-year accreditation cycle. JCAHO collects and reports data on sentinel events and measures attainment of National Patient Safety Goals and National Hospital Quality Measures. Fewer than 1% of hospitals fail to gain accreditation, a low fraction due in part to an iterative process whereby faults are identified and hospitals are given time to rectify them. Members of the public can download quality reports on any hospital by ZIP code or name by visiting the JCAHO website. JCAHO inspection appears to be one primary driver of hospitals' patient-safety initiatives.[25] There has been year-on-year improvement in the achievement of JCAHO measures of quality of hospital care.[26]

The National Committee for Quality Assurance (NCQA) is a private, not-for-profit organisation that accredits health plans and also provides the Health Plan Employer Data and Information Set (HEDIS), which captures the technical quality of outpatient care by health plans (Table 3). More than 90% of American health plans, and 100% of those providing care to Medicare beneficiaries, report HEDIS measures. As its name suggests, HEDIS was initiated by large employers, whose major motivation is to ensure value for money spent on insurance premiums.

Key Points

We cannot expect to improve the quality and safety of healthcare without measuring quality and safety

Despite, or possibly because of, the disparate, market-led healthcare system in the USA, there are many more examples of routine measurement of quality and safety by hospitals in the USA than in the UK

Much of the research on quality of healthcare comes from the USA. The paucity of such research from the UK does not mean that healthcare in the UK is of higher quality

Specific regulatory requirements to report safety indicators and adhere to safety goals can improve safety in hospitals

Statutorily required public reporting of markers of the quality of care in combination with collaborative quality improvement can help induce progressive improvement in the measured quality of care

What changes can we make that will result in an improvement?

Publication of data documenting disparities in the quality of care provides – or should provide – the necessary tension for change. How does the fragmented, market-driven US healthcare system respond to evidence of poor quality? Here is another surprise: the system contains several examples of extraordinary

commitment to quality, again providing a startling contrast to top-down attempts to improve quality of care within the NHS.

Closed, integrated systems

Many American observers are surprised to hear about the lack of full integration in the NHS; they do not expect the organisational divide between primary and secondary care, and the lack of coordination between hospital care and social services. The recent introduction of 'Payment by Results' for elective hospital care creates additional barriers to the planning of integrated chronic disease management, as it provides incentives for hospitals to encourage admission of low-risk patients and a disincentive to organising community-based outreach care[27,28] so as to reduce hospitalisation rates. Recognition of these problems has led to renewed interest from NHS leaders in fully integrated systems of care in the USA, such as the Kaiser Permanente system[29,30] and the Veterans Health Administration.[31,32] One of the major lessons from these systems is that vertical integration between community-based and hospital-based care, supported by investment in electronic medical records and decision support systems, encourages and supports rational delivery of care, in particular for chronic disease. It is also notable that these systems require that physicians work only for them, reducing potential conflicts of interest.

Collaborative improvement

Another surprise for the UK observer is the extent to which US healthcare organisations, whether for-profit or not-for-profit, engage in collaborative improvement efforts. The collaborative model is based on the simple idea that healthcare organisations can learn from each other more efficiently and quickly than they can learn on their own, especially when it comes to learning how to implement changes in the healthcare delivery system. This challenge – how to translate existing knowledge into reliable practice across a range of settings – poses far more problems than the translation from bench to bedside that so much attention has been paid to recently.[33] Initially developed by the Institute for Healthcare Improvement (IHI)[34] in the USA, the collaborative model usually involves an initial learning session where participants are taught both the techniques of rapid cycle improvement,[35] and a package of clinical interventions, known as change concepts, that have been developed by an expert faculty familiar with the best available knowledge in how to achieve breakthrough improvement in a particular clinical area. Two or more further meetings follow over the course of 12–18 months; between each meeting, participants use the internet and email to exchange reports on the results of rapid cycle tests of implementation of these concepts in their own organisations, and seek advice from each other on how to overcome the barriers to implementing the new ideas. This exchange is supported by monthly conference calls facilitated by improvement advisors and subject matter experts.

Numerous healthcare organisations across the USA, both for-profit and not-for-profit, have participated in 'collaboratives'. A good recent example is the reduction of surgical site infections (wound infections) using a collaborative approach to improve antibiotic selection and timing and duration, maintenance of normothermia, oxygenation, and euglycaemia, and avoidance of razors for hair removal.[36] All of these interventions are based on evidence; however, the challenge has been to work out how to implement systems to ensure full delivery of this 'bundle' of interventions in the context of each individual hospital's arrangements for pre-operative care – including details such as the length and temperature of the corridors that the patient has to travel between the ward and the operating theatre.

The collaborative methodology has been widely adopted by Quality Improvement Organizations (QIOs). These are private organisations that work under contract to Medicare to improve the quality of care of Medicare beneficiaries in hospitals, offices, nursing homes, and home health agencies. The remit of these organisations has changed considerably from the inception of the programme in the 1970s, evolving from 'utilization review' to facilitating collaborative quality improvement. Approximately 1% of the Medicare budget goes to pay for the work of QIOs. The contract is in the form of a three-year 'Scope of Work' (Table 4). The 'Scope of Work' is revised with each new contract to reflect changing priorities and successes; for instance, the requirement for avoidance of sublingual nifedipine in the treatment of acute stroke has been dropped, following a reduction from 77% to 1% in this measure.[37] QIOs have few 'teeth', but despite this there is evidence that they have been instrumental in driving up the quality of care for Medicare beneficiaries.[38,39] The benefits of participation in a QIO programme have recently been challenged,[40] but the simple comparisons

Table 3. HEDIS Effectiveness of Care Measures defined in the NCQA State of Health Care Quality report, 2003.

- Childhood immunisation status
- Adolescent immunisation status
- Cervical cancer screening
- Chlamydia screening in women
- Controlling high blood pressure
- Cholesterol management
- Beta-blocker use after myocardial infarction
- Comprehensive diabetes care
- Asthma medication use
- Breast cancer screening in women
- Antidepressant medication management
- Follow-up after hospitalisation for mental illness
- Prenatal and postpartum care
- Medical assistance with smoking cessation
- Treatment for children with upper respiratory infection
- Testing for children with pharyngitis
- Osteoporosis management in women who have had a fracture
- Influenza immunisation in adults

HEDIS = Health Plan Employer Data and Information Set; NCQA = National Committee on Quality Assurance.
Source: National Committee on Quality Assurance. *State of health care quality: 2003*. Washington, DC: NCQA, 2003.

made in that study between participating and non-participating hospitals are methodologically questionable. A recent Institute of Medicine report on the QIO programme[41] gave cautious endorsement, while advocating changes in future organisation. Dramatically successful results have recently been obtained by a collaborative seeking to increase organ donation from deceased donors (www.organdonationnow.org).

Table 4. Components of the 8th Scope of Work for Quality Improvement Organizations (to improve quality of care for Medicare beneficiaries).

Home health agencies
- Reduce acute care hospitalisations
- Increase immunisation screening for flu and pneumonia
- Change organisational culture to support quality improvement
- Implement telehealth technology

Hospitals
- Improve care for patients with:
  - acute myocardial infarction
  - heart failure
  - pneumonia
- Improve care through the Surgical Care Improvement Project
- Implement computer physician order entry
- Implement bar coding system
- Change organisational culture to support quality improvement
- Improve care in rural and critical access hospitals

Nursing homes
- Reduce high-risk pressure ulcers
- Decrease the use of physical restraints
- Improve depression management
- Improve chronic pain management
- Survey resident and staff satisfaction
- Change organisational culture to support quality improvement

Physician offices
- Promote information technology and electronic health records
- Redesign processes to support quality improvement
- Quality improvement related to prescription drug benefits
- Improve care for patients with:
  - diabetes
  - coronary artery disease
  - heart failure
  - hypertension
  - end-stage renal disease
- Increase preventive care
- Adult immunisation
  - blood pressure measurement
  - breast cancer screening
  - colorectal cancer screening
  - LDL cholesterol level
  - tobacco use counselling

LDL = low-density lipid.
The full contract describing each of the above components in detail is available at www.cms.hhs.gov/QualityImprovementOrgs/Downloads/8thSOW.pdf

Face-to-face collaboratives are expensive, as they include the costs of travelling, accommodation, and conference facilities; whether they are cost-effective remains uncertain. However, the underlying principle – that of active sharing of best practice and comparison of the results of tests of change – can be delivered in other ways, including purely web-based information exchange.

More recently the IHI has also explored the use of a 'Campaign', similar to a political election campaign, to drive the adoption of six evidence-based interventions in a large number of hospitals, with the aim of reducing hospital mortality by 100,000 lives over an 18-month period.[42]

Patient-centredness

Although it is difficult to quantify, the USA appears to show a greater commitment to listening to the voice of the patient than the UK. This could be caricatured as the difference between a consumer-oriented commitment to customer service on the one hand, and a nationalised, monopoly provider 'take it or leave it' attitude on the other. This may reflect a deeper national difference in attitudes to consumer service standards. However, some US healthcare organisations have gone much further than superficial attempts to improve patient satisfaction scores, putting patient representatives on the Board and on every committee in the hospital, and transforming the language and culture of healthcare.[43] Many organisations routinely measure patient satisfaction using the Consumer Assessment of Healthcare Providers and Systems instruments (*see* Further Resources below).

Learning from mistakes in the USA

So far we have concentrated on positive examples in US healthcare, from which the UK might learn. There are also, of course, important lessons for policy-makers to learn from the failures of the US system. Perhaps the most relevant to the current policy debate is the observation that hospitals and specialists appear to create the demand for their services, without evidence of consequent benefits in quality or outcomes. Across the USA, specialist supply is positively correlated with mortality, whereas the supply of primary care physicians is associated with reduced mortality.[4] These observations hold warnings for policy-makers in the UK as we see a move to increased independence for Foundation Trusts and privately run Diagnostic and Treatment Centres. Driving supply upward may raise costs without raising quality.

Financial incentive schemes

It is not surprising that a market-led healthcare economy might seek to achieve better quality and safety by tying performance in these areas to reimbursement. This is perhaps one area in which a true market, including real choice among providers, might offer an advantage over the NHS, where historically it has been very difficult to create incentives for high quality care. While it can be argued that payment for performance at the level of the individual doctor is de-motivating and 'toxic',[44] the same

arguments do not necessarily apply to healthcare organisations. In the USA, large employers, in particular, have a vested interest in improving the quality – as well as the financial efficiency – of the healthcare that they pay for, via insurance premiums, for their employees.

The Leapfrog Group is an organisation that represents many big employers and publishes consensus-based standards that can be used as a basis for pay-for-performance agreements. The group started with three 'leaps', each incorporating a small set of evidence-based safe practices; the fourth 'leap' included 30 high-priority practices with the expectation that these would be universally applied in relevant clinical care settings. A recent analysis of quality incentive programmes that involved payments by health plans or purchasers found 31 such programmes in the USA, covering more than 20 million enrollees. Most targeted a mixture of process and structural measures, mostly based on HEDIS measures, with a smaller role for measures of patient satisfaction; few, if any, specifically rewarded improvement from baseline.[45]

What is the UK doing?

In the UK, the NHS has introduced the Quality and Outcomes Framework as part of the GP contract, but there are currently no plans to introduce financial incentives for the quality of care delivered by secondary care.

The NHS organisation responsible for quality is the Healthcare Commission, which has recently issued its criteria for assessing core standards.[46] This report refers extensively to other reports produced by other government bodies and to primary legislation, and gives extensive guidance on the processes that NHS healthcare organisations should have in place. However, the only criterion that could be measured numerically in the entire document is the rate of MRSA (methicillin-resistant *Staphylococcus aureus*) infection, where a year-on-year reduction is required. The National Patient Safety Agency (NPSA) is responsible for safety, but the data it collects are not (to date) available publicly. This is a policy decision, based on a judgement that the NPSA will be more effective in working with reporting Trusts and clinicians if the reports it receives are kept confidential – but this contrasts to the approach taken by JCAHO in the USA.

As in the USA, collection of hard, measurable data is left to outside organisations, including:

- the national audits performed by the RCP[47]
- specialty-specific registries, such as the national cardiac surgical register and the UK Renal Registry
- the National Confidential Enquiries[48]
- the Picker Institute, which collects data on patient satisfaction[49]
- the Dr Foster Unit at Imperial College, now financially supported by the NHS, which calculates hospital standardised mortality ratios for all UK hospitals, enabling identification of outliers and appropriate corrective action.[50]

Perhaps these organisations are best placed to drive the improvement of quality of care within the NHS, particularly if adequately supported. The NHS National Programme for Information Technology promises to drive the adoption of nationally defined datasets and to allow (with appropriate safeguards for the confidentiality of individuals) linking of different sources of data both for the purposes of quality improvement and for research.[51]

Conclusions

The American healthcare system provides valuable examples for those interested in improvement of the quality and safety of healthcare within the NHS. These include:

- well articulated, nationally endorsed aims, based on high-quality research
- a well developed measurement system, albeit with wasteful overlap between the various agencies that measure quality and safety
- some instructive strategies, not all requiring massive investment, on how to encourage and support translating the best knowledge into reliable, uniform, everyday clinical practice.

We are well aware of numerous examples of excellent practice within the UK, but we also hope and believe that learning from one another on how best to transform our immensely complex healthcare systems will accelerate this process.

References

1 Reinhardt UE, Hussey PS, Anderson GF. US health care spending in an international context. *Health Aff (Millwood)* 2004;23(3):10–25.
2 Ham C. Money can't buy you satisfaction. *BMJ* 2005;330(7491):597–9.
3 Welch WP, Miller ME, Welch HG, Fisher ES, Wennberg JE. Geographic variation in expenditures for physicians' services in the United States. *N Engl J Med* 1993;328(9):621–7.
4 Starfield B, Shi L, Grover A, Macinko J. The effects of specialist supply on populations' health: assessing the evidence. *Health Aff (Millwood)* 2005; Jan–Jun; Suppl Web Exclusives: W5–97–W5–107.
5 Berwick DM. The improvement horse race: bet on the UK. *Qual Saf Health Care* 2004;13(6):407–9.
6 Berwick DM. A primer on leading the improvement of systems. *BMJ* 1996;312(7031):619–22.
7 Langley GJ, Nolan KM, Nolan TW, Norman CL, Provost LP. *The improvement guide: a practical approach to enhancing organizational performance*, 1st edn. San Francisco: Jossey-Bass, 1996.
8 Berwick DM, Nolan TW. Physicians as leaders in improving health care: a new series in *Annals of Internal Medicine*. *Ann Intern Med* 1998; 128(4):289–92.
9 Brennan TA, Leape LL, Laird NM *et al.* Incidence of adverse events and negligence in hospitalized patients. Results of the Harvard Medical Practice Study I. *N Engl J Med* 1991;324(6):370–6.
10 Leape LL, Brennan TA, Laird N *et al.* The nature of adverse events in hospitalized patients. Results of the Harvard Medical Practice Study II. *N Engl J Med* 1991;324(6):377–84.
11 Brennan TA, Hebert LE, Laird NM *et al.* Hospital characteristics associated with adverse events and substandard care. *JAMA* 1991; 265(24):3265–9.
12 Thomas EJ, Studdert DM, Burstin HR *et al.* Incidence and types of adverse events and negligent care in Utah and Colorado. *Med Care* 2000;38(3):261–71.

13 Corrigan J, Kohn LT, Donaldson MS (eds). *To err is human: building a safer health system,* 1st edn. Washington, DC: National Academies Press, 2000.
14 Institute of Medicine. *Crossing the quality chasm: a new health care system for the 21st century.* Washington, DC: National Academies Press, 2001.
15 Department of Health Expert Group. *An organisation with a memory: report of an expert group on learning from adverse events in the NHS.* London: DH, 2000.
16 What is the Royal Society for? *Lancet* 2005;365(9473):1746.
17 Leatherman S, Sutherland K. *The quest for quality in the NHS: a mid-term evaluation of the 10-year quality agenda.* London: Nuffield Trust, 2003.
18 Trivedi AN, Zaslavsky AM, Schneider EC, Ayanian JZ. Trends in the quality of care and racial disparities in Medicare managed care. *N Engl J Med* 2005;353(7):692–700.
19 Jha AK, Li Z, Orav EJ, Epstein AM. Care in U.S. hospitals – the Hospital Quality Alliance program. *N Engl J Med* 2005;353(3):265–74.
20 Jencks SF, Cuerdon T, Burwen DR *et al.* Quality of medical care delivered to Medicare beneficiaries: A profile at state and national levels. *JAMA* 2000;284(13):1670–6.
21 McClellan WM, Frankenfield DL, Frederick PR *et al.* Improving the care of ESRD patients: a success story. *Health Care Financ Rev* 2003; 24(4):89–100.
22 Sugarman JR, Frederick PR, Frankenfield DL, Owen WF, Jr, McClellan WM. Developing clinical performance measures based on the Dialysis Outcomes Quality Initiative Clinical Practice Guidelines: process, outcomes, and implications. *Am J Kidney Dis* 2003;42(4):806–12.
23 Institute for Healthcare Improvement. *Vascular access; national vascular access improvement initiative.* Fistula First, 2005. www.ihi.org/IHI/Topics/ESRD
24 Rayner HC, Besarab A, Brown WW *et al.* Vascular access results from the Dialysis Outcomes and Practice Patterns Study (DOPPS): performance against Kidney Disease Outcomes Quality Initiative (K/DOQI) Clinical Practice Guidelines. *Am J Kidney Dis* 2004;44(5 Suppl 3):22–6.
25 Devers KJ, Pham HH, Liu G. What is driving hospitals' patient-safety efforts? *Health Aff (Millwood)* 2004;23(2):103–15.
26 Williams SC, Schmaltz SP, Morton DJ, Koss RG, Loeb JM. Quality of care in U.S. hospitals as reflected by standardized measures, 2002–2004. *N Engl J Med* 2005;353(3):255–64.
27 Audit Commission for Local Authorities and the National Health Service in England and Wales. *Introducing payment by results: getting the balance right for the NHS and taxpayers.* London: Audit Commission, 2004.
28 Berwick DM. Measuring NHS productivity. *BMJ* 2005;330(7498): 975–6.
29 Ham C, York N, Sutch S, Shaw R. Hospital bed utilisation in the NHS, Kaiser Permanente, and the US Medicare programme: analysis of routine data. *BMJ* 2003;327(7426):1257.
30 Ham C. Lost in translation? Health systems in the US and the UK. *Soc Policy Admin* 2005;39(2):192–209.
31 Asch SM, McGlynn EA, Hogan MM *et al.* Comparison of quality of care for patients in the Veterans Health Administration and patients in a national sample. *Ann Intern Med* 2004;141(12):938–45.
32 Jha AK, Perlin JB, Kizer KW, Dudley RA. Effect of the transformation of the Veterans Affairs Health Care System on the quality of care. *N Engl J Med* 2003;348(22):2218–27.
33 Lenfant C. Shattuck lecture: clinical research to clinical practice – lost in translation? *N Engl J Med* 2003;349(9):868–74.
34 Institute for Healthcare Improvement. *The breakthrough series: IHI's collaborative model for achieving breakthrough improvement.* IHI Innovation Series. Boston: IHI, 2003.
35 Berwick DM. Developing and testing changes in delivery of care. *Ann Intern Med* 1998;128(8):651–6.
36 Dellinger EP. Hospitals collaborate to decrease surgical site infections. *Am J Surg* 2005;190:9–15.
37 Jencks SF, Huff ED, Cuerdon T. Change in the quality of care delivered to Medicare beneficiaries, 1998–1999 to 2000–2001. *JAMA* 2003;289(3): 305–12.
38 Marciniak TA, Ellerbeck EF, Radford MJ *et al.* Improving the quality of care for Medicare patients with acute myocardial infarction: results from the Cooperative Cardiovascular Project. *JAMA* 1998;279(17): 1351–7.
39 Bradley EH, Carlson MD, Gallo WT. From adversary to partner: have quality improvement organizations made the transition? *Health Serv Res* 2005;40(2):459–76.
40 Snyder C, Anderson G. Do quality improvement organizations improve the quality of hospital care for Medicare beneficiaries? *JAMA* 2005;293(23):2900–7.
41 Institute of Medicine. *Medicare's Quality Improvement Organization Program: maximizing potential.* Washington, DC: National Academies Press, 2006.
42 Berwick DM, Calkins DR, McCannon CJ, Hackbarth AD. The 100,000 lives campaign: setting a goal and a deadline for improving health care quality. *JAMA* 2006;295(3):324–7.
43 Ponte PR, Conlin G, Conway JB *et al.* Making patient-centered care come alive: achieving full integration of the patient's perspective. *J Nurs Adm* 2003;33(2):82–90.
44 Berwick DM. The toxicity of pay for performance. *Qual Manag Health Care* 1995;4(1):27–33.
45 Rosenthal MB, Fernandopulle R, Song HR, Landon B. Paying for quality: providers' incentives for quality improvement. *Health Aff (Millwood)* 2004;23(2):127–41.
46 Healthcare Commission. *Assessment for improvement. The annual health check. Criteria for assessing core standards.* London: Commission for Healthcare Audit and Inspection, 2005:32.
47 Pearson M. Lessons from the management of acute myocardial infarction. *Heart* 2005;91 Suppl 2:ii28–30; discussion ii31, ii43–8.
48 Lunn JN. The history and achievements of the National Confidential Enquiry into Perioperative Deaths. *J Qual Clin Pract* 1998;18(1):29–35.
49 Picker Institute. *Annual report 2003/2004. Through the patient's eyes.* Oxford: Picker Institute, 2005.
50 Jarman B, Bottle A, Aylin P, Browne M. Monitoring changes in hospital standardised mortality ratios. *BMJ* 2005;330(7487):329.
51 Academy of Medical Sciences. *Personal data for public good: using health information in medical research.* London: AMS, 2006.

Further resources: US organisations with a focus on quality and safety in healthcare

Agency for Healthcare Research and Quality (www.ahrq.gov) is a federally funded body that promotes research and assessments on the quality and safety of healthcare.

Ambulatory Care Quality Alliance (www.ambulatoryqualityalliance.org) was formed by the American Academy of Family Physicians, the American College of Physicians, America's Health Insurance Plans, and the Agency for Healthcare Research and Quality to determine how to improve performance measurement, data aggregation and reporting in the ambulatory care setting. A 'starter set' of 20 measures has been issued.

American Health Quality Association (www.ahqa.org) is the professional organisation for Quality Improvement Organizations.

Associates in Process Improvement (www.apiweb.org) is an organisation dedicated to developing methods for quality improvement in a wide range of settings, including healthcare.

Centers for Medicare & Medicaid Services (CMS) (www.cms.hhs.gov)
Consumer Assessment of Healthcare Providers and Systems (www.cahps.ahrq.gov/default.asp) develops and collates the results of consumer surveys of healthcare. This was initially confined to ambulatory care, but a hospital survey is now also being developed.
CMS Hospital Compare (www.hospitalcompare.hhs.gov) allows comparison of providers' attainment of markers of the quality of hospital care developed through the Hospital Quality Alliance national project.
Doctor's Office Quality Information Technology (www.doqit.org) is a two-year demonstration project designed to improve the care of Medicare beneficiaries by promoting the adoption of electronic medical records.
HealthGrades (www.healthgrades.com) is a commercial company that reports quality of hospital care and assigns star ratings by specialty, using publicly reported data including the MedPAR dataset provided by CMS.
Hospital Quality Alliance (www.aamc.org/quality/hospitalalliance/start.htm) is led by the Association of American Medical Colleges, American Hospital Association, and the Federation of American Hospitals and is a national effort in which hospitals publicly report quality performance data on the CMS Hospital Compare website (see above).
Institute of Medicine (www.iom.edu) is a component of the National Academy of Sciences with the mission of serving as an adviser to the nation to improve health.
Institute for Safe Medication Practices (www.ismp.org)
Institute for Healthcare Improvement (www.ihi.org) is a not-for-profit organisation driving the improvement of health by advancing the quality and value of healthcare.
Joint Commission on Accreditation of Healthcare Organizations (www.jcaho.org)
Leapfrog Group for Patient Safety (www.leapfroggroup.org)
Medicare Quality Improvement Community (www.medqic.org) is the official website describing the remit of the Quality Improvement Organizations.
National Committee for Quality Assurance (www.ncqa.org) provides details of the Health Plan Employer Data and Information Set (HEDIS) measures used for outpatient care (Table 4).
National Coordinating Council for Medication Error Prevention and Reporting (www.nccmerp.org)
National Patient Safety Forum (www.npsf.org)
National Quality Forum (www.qualityforum.org) is a private, not-for-profit organisation created to develop and implement a national strategy for healthcare quality measurement and reporting.