Kinmonth Lecture

Clinical outcomes audit in vascular surgery: a shield for our profession

JJ Earnshaw

Gloucestershire Vascular Group, Gloucestershire Royal Hospital, Gloucester, UK

Surgeons are under pressure from both patients and politicians to supply outcome data. The reporting of crude mortality rates by third parties is both unfair and divisive. Validated methods exist to describe risk-adjusted outcomes in arterial surgery, but surgeons will need to become more involved in data collection and analysis. The Vascular Surgical Society of Great Britain and Ireland has started a process of data collection – the National Vascular Database – that could be used by individuals to collate and compare their surgical outcomes. Monitoring outcomes and managing the results could become one of the principal roles of a specialist society.

Key words: Arterial surgery – Audit – Outcomes research

There are three principal stakeholders in the management of any surgical disease: the patient, the surgeon and the management team involved with organisation of care. Modern patients are professional consumers and expect to have more involvement in decisions about their care and treatment. Managers and their political masters are employed to ensure that surgeons who work in their hospitals are safe and effective, and use treatments for which there is evidence-based justification and where cost benefit can be demonstrated. It is easy for a surgeon to feel threatened by the evolution of modern surgical practice, particularly as the media have fuelled a degree of suspicion and distrust amongst both other stakeholders. It seems as if surgeons are scrutinised from every angle (Fig. 1).

League tables: comparison of surgical performance

The recent publication in a national newspaper and on the website Dr Foster (<www.drfooster.co.uk>) of outcome results from individual cardiac surgeons has sent a shiver of alarm through the profession. These results were generated from

data already in the public domain and it is only a matter of time before the exercise is repeated for surgeons in other specialties*. The current UK Government is keen on league tables and has established a number of agencies that will be interested in outcome data.¹ The responsibility for the

Figure 1 Surgeons are under scrutiny as never before.

performance of individual surgeons has been placed squarely at the door of the employing Trust – the Chief Executive is now directly answerable for surgical standards. Surgeons cannot escape scrutiny of their surgical performance, but they could become more closely involved. It is no longer acceptable to have a 'head in the sand' ignorance of the outcomes of surgical procedures; surgeons must seize the initiative and take charge of collecting and reporting their own outcome data.²

Surgical performance is generally judged crudely on mortality rates. This results in considerable inequity as it depends on the case mix seen. Surgeons in tertiary referral centres who operate on high-risk patients and those in inner cities working with the malnourished and deprived may be considerably disadvantaged in comparison with surgeons who perform the same surgery in affluent shire towns on well-nourished patients. Worse, this may result in a change in the indications for operation: a surgeon worried about results may choose not to offer surgery to a high-risk patient.³ To a government concerned about variations in health care across the country, this should be a cause for alarm.

The solution to this problem is that a fair scrutiny of surgical performance should include an adjustment for patient fitness or case mix.

Cardiac surgeons' response to the Bristol enquiry

The catalyst to the current attitude to surgical outcomes was the paediatric surgery scandal in Bristol. The subsequent report into paediatric cardiac services identified many problems with the delivery of surgical treatment.⁴ One of many conclusions in the report was that 'patients and the public must be able to obtain information as to the relative performance of the Trust...and consultant units within the Trust'. The government has decreed that cardiac surgeons in the UK should publish individual outcome data by 2004. It is likely that other surgical disciplines will have to follow suit. In response, the cardiac surgeons have joined together to collect risk-adjusted outcome data and have produced a booklet describing the results of the individual units.⁵

Vascular surgery is next

It is likely that vascular surgeons will be near the top of the list for scrutiny after cardiac surgeons. Two out of three of our principal procedures are preventive (carotid endarterectomy and abdominal aortic aneurysm repair) where bad outcomes are measured easily (stroke/death). The value of these preventive procedures is justified by evidential studies. However, population advantages can be

Table 1 Number of arterial procedures done per year by the average surgeon member of the VSSGBI: taken from the 1999 Registry

Aortic aneurysm repair	25
Elective	16
Ruptured	9
Carotid endarterectomy	18
Femorodistal bypass	28

nullified if adverse outcomes become frequent. Humphreys *et al.*⁶ have shown that crude outcomes can be affected by adjusting the indications for aortic aneurysm repair. Finally, where cardiac surgeons do a relatively large number of only a few different operations, the average vascular surgeon performs a smaller number of the index operations (Table 1). It could be hard to gather enough information to compare the performance of individual vascular surgeons for each of these conditions.

Risk-adjusted outcomes in vascular surgery

For the last few years, the Audit and Research Committee of the Vascular Surgical Society of Great Britain and Ireland (VSSGBI) has investigated methods of comparing case mix in vascular patients. Two statistical techniques have been explored in detail – POSSUM scoring and Bayes analysis.⁷

In the first study which included 1480 different arterial procedures reported by 121 vascular surgeons from 93 different hospitals, it was shown that it was possible to predict death and complication rates using standard POSSUM physiology and operative outcome data and employing POSSUM regression analysis and Bayes analysis.⁸ It was then decided to focus data collection on just three index procedures (aortic aneurysm repair, carotid endarterectomy, and femorodistal bypass).

The second study included over 2000 further patients who had an index procedure by one of 67 different vascular surgeons. As the database has expanded for these three operations, it has been necessary to analyse each procedure separately to get the best prediction of outcome.⁹ It was once again shown that using standard POSSUM data items, good outcome prediction models could be produced (Fig. 2). It has been possible to create a single page report for each vascular surgeon who has contributed more than 20 cases to the database that compared their own performance with the rest of the database, taking case mix into account.

National Vascular Database

There is now sufficient confidence in the methods of comparing case mix in vascular surgery to create a National

***Note added in proof:** In November 2002, after this article was written, Dr Foster did indeed produce a comparative report on aortic aneurysm surgery in the UK, that caused heated debate amongst vascular surgeons.

Figure 2 Standardised risk-adjusted mortality ratios for aortic aneurysm repair using Bayes model for consultants with more than 14 procedures on the National Vascular Database. Observed: expected mortality ratios for individual (anonymised) surgeons. Average (standard) mortality rate = 1, marked with thick black line. As long as the error bars cross the SMR of 1, the performance of the individual surgeon is within acceptable limits.

Vascular Database. The aim is to include data from all vascular surgeons in the UK and Ireland. Three components are necessary: electronic data collection, central comparison, and management of the results. Members of the VSSGBI will need to agree how the results from the National Vascular Database should be handled, but cardiac surgeons have already created a process that could be used as a model.¹⁰ The roles of the VSSGBI and of the Council of the Royal Colleges of surgeons will need to be explored in more detail.³ In addition, it will be necessary to decide whether these data could be used as part of a review by any interested government agencies and form the basis for national publication.

There remain significant problems with a National Vascular Database; joining requires considerable effort by the individual vascular surgeon. The data required for POSSUM scoring are not collected routinely and there is no funding for this to be done. However, it is widely acknowledged that information technology services in the National Health Service are deficient and this is a good time for surgeons to press for more accurate and comprehensive methods of data collection. Vascular surgeons who do not get help but wish to join may consider reducing their clinical activity to free the required time.

The Audit Committee of the VSSGBI has created several different types of database that could be used to collect the information, including an Access database and a spreadsheet, so that it can be returned electronically for central analysis. Help from the professional teams who manage the cardiac surgery database has been enrolled.

Unfortunately, neither POSSUM nor Bayes analysis work well for low-risk procedures, such as varicose vein surgery, wherein lies much of the litigation in surgery.¹¹ New processes may be necessary to evaluate outcomes in low risk procedures. Finally, it is said that those who are prepared to enrol patients into a major database are often the surgeons

who least need scrutiny. The cardiac surgeons have noted an exponential increase in the number of surgeons involved in their database as the requirement for comparison has become mandatory.⁵ Information is powerful and even those who perform poorly should prefer this to become evident within their specialist society where support systems will exist, rather than to be detected by an outside agency.

Towards national outcomes audit

This article principally concerns vascular surgery, but other specialties have similar requirements and could be included. The upper gastrointestinal¹² and colorectal¹³ surgeons have explored the possibility of using POSSUM and Bayes.

Surgeons often complain that POSSUM scoring does not include patients treated medically, but it has been shown that pre-operative POSSUM physiology scoring can predict outcome in both surgery⁸ and medical¹⁴ patients, and could be used to compare physicians too.

It is also often forgotten that, although it is the surgeon who appears to be judged when clinical performance is measured, the surgeon is only one part of a clinical team, and others may also affect surgical outcomes.¹⁵ Outcome performance, both good or bad, is the responsibility of the whole team, rather than just the named consultant surgeon.³

Undoubtedly, any use of comparative outcome performance will bring its own set of problems. In Gloucester, the two vascular surgeons have very similar outcomes for aortic surgery (Table 2); what might be the situation if one surgeon had a 5% mortality rate after aortic aneurysm surgery and one a 10% mortality rate? The modern surgeon must be aware of these challenges and has to be prepared to deal with them. Perhaps one of the most important future roles of any specialist society will be to organise and deal with adverse results of outcome analysis.

Table 2 Ten-year individual surgeon data for elective aneurysm repair in Gloucester. Right hand column shows cumulative 5-year results that have been available to our patients since 1995. Only after 10 years are there sufficient numbers to be able to report outcome data for each surgeon separately.

	BPH:		JJE:		TOTAL:		5 Year:	
	mortality	cases	mortality	cases	mortality	cases	cumulative	
1991	3	25	0	0	3	25		
1992	0	12	2	5	2	17		
1993	0	15	0	16	0	31		
1994	2	27	0	12	2	39		
1995	2	24	1	7	3	31		
1996	3	22	0	11	3	33		
1997	1	17	0	17	1	34	5.4%	1993-97
1998	1	17	2	19	3	36	6.9%	1994-98
1999	0	21	1	10	1	31	6.7%	1995-98
2000	1	26	0	12	1	38	5.2%	1996-00
2001	1	13	1	12	2	25	4.9%	1997-01
2002	1	19	0	20	1	39	4.7%	1998-02
TOTAL	15	238	7	141	22	379		
	6.3%		5%		5.8%			

Conclusions

Methods now exist that can be used to compare the risk-adjusted performance of an individual vascular surgeon. Collection of high quality clinical data is a vital part of the activity of a responsible surgeon and should provide a shield against invalid criticism.

Acknowledgements

This article is based on the Kinmonth Lecture delivered at the Annual Meeting of the Vascular Surgical Society of Great Britain and Ireland, Brighton, November 2001.

I would like to thank the VSSGBI President, Roger Baird, for asking me to deliver the Kinmonth Lecture and the membership of the Society for supporting me and the Audit Committee in this outcome research. The National Vascular Database has been progressed by Jon Beard, Simon Ashley, and database co-ordinator Biddy Ridler. The various analyses have been done with the expertise of Mr David Prytherch and the staff from Dendrite Clinical Systems Ltd. I wish to acknowledge the help and support of all my colleagues at Gloucestershire Royal Hospital, who are of course equally responsible for our outcome results, and in particular my colleague Brian Heather who gave permission to show our data, and Karen Ferry for typing the manuscript. Finally, I would like to acknowledge the unstinting support of my family and especially my daughter Charlotte who was responsible for audiovisual material for this article and the Kinmonth Lecture. Further information for those who wish to know more about the National Vascular Database, including previous reports and all the contact details of the organisers are available on the VSSGBI website (<www.vssgbi.org>).

References

1. Walshe K. The rise of regulation in the NHS. *BMJ* 2002;**324**: 967-70.
2. Hertzner N. Presidential address: outcome assessment in vascular surgery – results mean everything. *J Vasc Surg* 1995;**21**: 6-15.
3. Humphreys WV. Audit of the surgeon: problems and perspectives. *Br J Surg* 1998;**85**: 1169-70.
4. Learning from Bristol: the report of the public inquiry into children's heart surgery at the Bristol Royal Infirmary 1984-95. <www.bristol-inquiry.org.uk>.
5. The Society for Cardiothoracic Surgery of Great Britain and Ireland. *National Adult Cardiac Surgical Database Report 2000-2001*. London: The Society for Cardiothoracic Surgery of Great Britain and Ireland, 2002.
6. Humphreys WV, Byrne J, James W. Elective abdominal aortic aneurysm operations – the results of a single surgeon series of 243 consecutive operations from a district general hospital. *Ann R Coll Surg Engl* 2000;**82**: 64-8.
7. Jones HJ, de Cossart L. Risk scoring in surgical patients. *Br J Surg* 1999;**86**: 149-57.
8. Prytherch DR, Ridler BMF, Beard JD, Earnshaw JJ on behalf of the Audit and Research Committee of the Vascular Surgical Society of Great Britain and Ireland. A model for national outcome audit in vascular surgery. *Eur J Vasc Endovasc Surg* 2001;**21**: 477-83.
9. The Vascular Surgical Society of Great Britain and Ireland. *National Vascular Database Report 2001*. London: The Vascular Surgical Society of Great Britain and Ireland, 2001.
10. Treasure T. Lessons from the Bristol case. *BMJ* 1998;**316**: 1685-6.
11. Campbell WB for the Audit and Research Committee of the Vascular Surgical Society of Great Britain and Ireland. Medico-legal claims for vascular problems. *Ann R Coll Surg Engl* 2002;**84**: 181-4.
12. Griffin SM, McCulloch P, Davies S, Kinsman R. *Database Report 2002*. The Association of Upper Gastrointestinal Surgeons of Great Britain and Ireland.
13. The Association of Coloproctology of Great Britain and Ireland. *National Audit of Bowel Obstruction due to Colorectal Cancer*. London: The Association of Coloproctology of Great Britain and Ireland, 2000.
14. Whitely MS, Prytherch DR, Higgins B, Weaver PC, Prout WG, Powell SJ. A P-POSSUM type risk model that includes non-operative patients. *Br J Surg* 2001;**88**: A752.
15. Buggy D. Can anaesthetic management affect surgical wound healing? *Lancet* 2000;**356**: 355-7.