

Cir. Cardiov. 2005;12(3):203-8

Artículos especiales

Assessing quality in cardiac surgery

Samer A.M. Nashef

Consultant Surgeon, Papworth Hospital, Cambridge, UK
Chairman, EACTS Audit and Guidelines Committee
Joint Leader, the EuroSCORE Project

Evaluando la calidad en cirugía cardíaca

Existe una fuerte relación temporal, si no causal, entre la intervención y los resultados en cirugía cardíaca, y, por lo tanto, se establece una relación entre la mortalidad operatoria y la medición de la capacidad y resultados quirúrgicos. En el Reino Unido, la ley estipula que los resultados obtenidos en cualquier institución pública o utilizando fondos públicos deben ser hechos públicos y disponibles en cualquier momento. Las herramientas y mecanismos que diseñamos y desarrollamos es posible que lleguen a formar parte de los modelos con los que se evalúa la calidad del cuidado médico en otras especialidades médicas y quirúrgicas. La medición de la capacidad profesional debe ser hecha en la misma profesión. Para medir el riesgo existe un número de sistemas de puntuación, ya que la mortalidad cruda no es suficiente. Un beneficio muy importante de la evaluación del riesgo de muerte es utilizar este conocimiento para determinar la indicación para una intervención. El segundo beneficio reside en la evaluación de la calidad del cuidado médico, ya que la predicción del riesgo proporciona un punto de comparación frente a los resultados de los hospitales y de los cirujanos. La revisión por pares y el «nombrar y criticar» son dos mecanismos para la monitorización de la calidad. Existen dos resultados potencialmente peligrosos de la publicación de resultados en forma de tabla de clasificación ligera: el primero es el daño al hospital; el segundo es el rechazo a operar a pacientes de riesgo elevado. Existe una necesidad real de monitorizar la calidad en la medicina en general y en la cirugía

There is a the strong temporal, if not causal, link between the intervention and the outcome in cardiac surgery and therefore a link becomes established between operative mortality and the measurement of surgical performance. In Britain the law stipulates that data collected by any public body or using public funds must be made freely available. Tools and mechanisms we devise and develop are likely to form the models on which the quality of care is assessed in other surgical and perhaps medical specialties. Measuring professional performance should be done by the profession. To measure risk there are a number of scores as crude mortality is not enough. A very important benefit of assessing the risk of death is to use this knowledge in the determination of the indication to operate. The second benefit is in the assessment of the quality of care as risk prediction gives a standard against performance of hospitals and surgeons. Peer review and “naming and shaming” are two mechanisms to monitor quality. There are two potentially damaging outcomes from the publication of results in a league-table form: the first is the damage to the hospital; the second is to refuse to operate on high-risk patients. There is a real need for quality monitoring in medicine in general and in cardiac surgery in particular. Good quality surgical work requires robust knowledge of three crucial variables: activity, risk prediction and performance. In Europe, the three major specialist societies have agreed to establish the European Cardiovascular and Thoracic Surgery Institute of Accreditation (ECTSIA). Performance monitoring is soon to

«Presentado en el XII Congreso de la Sociedad Catalana de Cirugía Cardíaca. Barcelona, 26-28 de Mayo de 2005»

Correspondencia:
S.A.M. Nashef
Papworth Hospital
Cambridge, CB3 8RE
United Kingdom
E-mail: sam.nashef@papworth.nhs.uk

Recibido 6 mayo 2005
Aceptado 10 julio 2005

cardíaca en particular. El trabajo quirúrgico de calidad requiere un conocimiento profundo de tres variables cruciales: actividad, predicción del riesgo y resultados. En Europa, las tres principales sociedades de especialidad han acordado establecer el Instituto Europeo de Acreditación en Cirugía Torácica y Cardiovascular (ECTSIA). La monitorización de los resultados será pronto imperativa. Si los cirujanos no estamos a bordo, acabaremos por no tener el control sobre su destino final, y las consecuencias pueden ser igualmente dañinas para nosotros y para nuestros pacientes.

Palabras clave: Evaluación de la calidad. Cirugía cardíaca. Estratificación del riesgo. Monitorización de la calidad.

Usually, doctors do their best for their patients. For physicians, if medical treatment fails and the patient dies, we blame the disease, not the treatment or the doctor. It is different for surgeons. This is not surprising because of the strong temporal, if not causal, link between the intervention and the outcome. As cardiac surgery began to stake its rightful claim in the field of treatment of heart disease, surgeons had to justify their aggressive and high profile intervention by showing that they could achieve cure or palliation for the majority with an "acceptable" risk of death for the minority. It was inevitable that a link would become established between operative mortality and the measurement of surgical performance.

In January 2005, the "Freedom of Information" Act became law in Britain. It stipulated is that data collected by any public body or using public funds must be made freely available, to anyone who asks, within 20 days. Data collected by cardiac surgical audit departments fall within this group, as they are gathered using National Health Service resources. Within days of the act becoming law, *The Guardian* national newspaper contacted all cardiac surgical units in the country and requested the mortality figures for all cardiac surgeons, by name, for isolated coronary surgery and aortic valve replacement over the past 3 years. Units complied (they had no choice) and submitted the data: some did so willingly, some under protest and many were worried about how the newspaper will present the data. Some units (Papworth included) submitted risk-stratified data with 95% confidence limits and statistical analyses. Some submitted crude risk stratification (low and high risk). Others submitted crude data. *The Guardian* treated the data very responsibly: they published in alphabetical order (not in order of mortality), explained risk stratification and, where available, published risk data and confidence lim-

become imperative. If we surgeons are not on board, we shall have no control on its final destination, and the consequences may be equally damaging to us and to our patients.

Key words: Quality assessment. Cardiac Surgery. Risk stratification. Quality monitoring.

its¹. This was exceptional: whenever other newspapers dealt with these issues in the past, they tended to sensationalise the reports with headlines like "the worst hospital in Britain" and statements like "scores of patients are dying needlessly..." appearing out of reports of unreliable, unadjusted crude data.

Freedom of information is a growing trend. Cardiac surgical outcome data will not be confidential for long. When that happens in your part of the world, will your newspapers be responsible like *The Guardian* or sensationalist like the others? My bet is that it will be the latter.

Measuring professional performance should be done by the profession, before the newspapers do it for us. We are on the threshold of a brave new world in which the measurement of cardiac surgical performance will no longer be peripheral to our work, but an integral part of it: as important as the indication for surgery, the choice of procedure, the skill with which it is performed and the postoperative care. Moreover, the tools and mechanisms we devise and develop are likely to form the models on which the quality of care is assessed in other surgical and perhaps medical specialties.

DOES OPERATIVE MORTALITY MATTER?

Governments and health authorities care much about cost and possibly not enough about clinical outcomes. Surgeons and their patients care more about outcomes (and possibly not enough about cost). Sometime in the late 1980s, a health authority paid a large sum of money to a famous firm of accountants and management consultants to examine the performance of the two cardiac surgical centres in its area. After a

TABLE I. COST OF CARDIAC SURGERY

	Hospital A	Hospital B
Simple CABG	£ 5600	£ 6800
Simple valve	£ 6400	£ 8700
Redo or complex	£ 9950	£ 4800

TABLE II. OUTCOME OF CARDIAC SURGERY (MORTALITY)

	Hospital A	Hospital B
Simple CABG	1%	3%
Simple valve	3%	6%
Redo or complex	9%	48%

*Most of whom died during operation.

long and exhaustive study the firm reported its findings, summarised in table I.

The accountants concluded that centre A was more efficient at routine procedures and should therefore be restricted to simple operations. Centre B, however, was found to be more efficient in complex and redo surgery and should therefore be expanded as a quaternary referral centre for such cases. Sadly, however, the accountants did not examine clinical outcomes. Had they done so, even to a minimal extent, they would have found that mortality rates tell a different story: the “efficiency” of Centre B in complex surgery was due to the high death rate during operation (Table II).

Operating room deaths cost very little. A long and difficult hospital stay is more expensive, but the outcome of survival is undoubtedly desirable for the patient, the family and the surgeon. It should also be the desired outcome for the (intelligent) health care purchaser. This example illustrates, admittedly in simplistic terms, the dangers of entrusting surgical performance assessment to accountants. Operative mortality is important. Of course, it is only one of many outcomes that determine the success of a procedure, others being morbidity, functional outcome, long-term survival and freedom from re-intervention. Surviving the operation, however, is the *sine qua non*, without which none of the other parameters can be measured. It is also the first step in establishing performance assessment, and until we have a robust method of measuring it correctly and meaningfully, attention to other areas as performance measure may be premature (Fig. 1).

CRUDE MORTALITY IS NOT ENOUGH

When operative mortality is mentioned, surgeons are quick to claim that they operate on higher risk patients than their colleagues. When mortality for a specific procedure is higher for one surgeon (or hospital) than an-



your husband is guaranteed 100% freedom from future complications, adverse cardiac events and further intervention. He's dead.

Figure 1.

other, this can be due to one of three reasons, or a combination of the three:

- The difference is due to chance.
- The difference is due to variation in the predicted risk (different casemix).
- The difference reflects better and safer service.

The problem with crude procedural mortality is that it takes no account of the first two factors. The first factor can be eliminated by the appropriate use of statistical methods and the second can be taken into account by using a measure of casemix, or risk stratification. Few people realise that the predicted risk for first-time CABG can vary by a factor of over 50. A low-risk elective CABG has a risk of less than 1%, whereas emergency CABG in a 90-year-old with unstable postinfarction angina on an intra-aortic balloon is over 50%. Despite the substantial knowledge base on risk assessment in cardiac surgery, one London newspaper published league tables of CABG mortality in the United Kingdom without proper risk stratification. Having established a range of mortality between of 1-4% across the country, the accompanying article began: “scores of patients are dying unnecessarily...”. The lesson from this is that if cardiac surgeons themselves do not carry out outcome analysis well, others will do it for them, and do it badly.

HOW DO WE MEASURE RISK?

Many risk models are available to us. They range from simple additive scoring systems, such as Parsonnet² and EuroSCORE³ to complex Bayesian and logistic models such as the Society of Thoracic Surgeons (STS) database model⁴, the UK Bayesian model⁵ and the Eu-

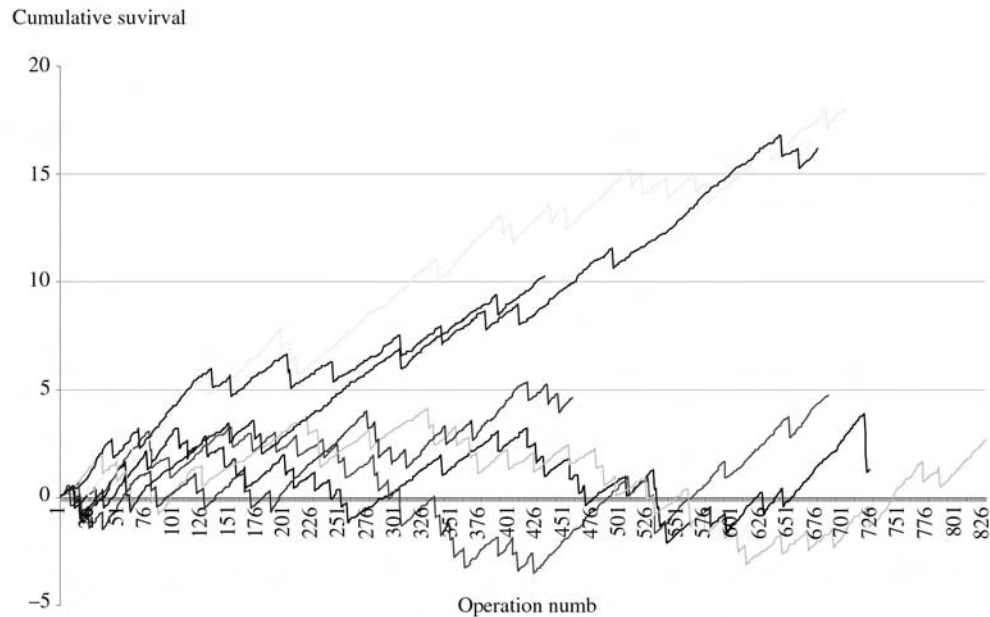


Figure 2. Variable life-adjusted displays (VLAD) graph showing the performance of seven cardiac surgeons over time. Each rise in the graph represents an actual survivor corrected for risk (1 minus the likelihood of survival). Each drop in the graph represents an actual death corrected for risk (1 minus the likelihood of death).

roSCORE logistic model⁶. Additive models are easy to use, require no specialised equipment and are sufficiently simple to remember so that a quick mental calculation can be made at the bedside “on the back of an envelope”. They are effective for quality control in large series of patients as well as for inter-institutional comparison. Their main weakness is in the specific prediction of risk in some patient categories, especially very high-risk patients where there is a tendency to underestimate risk. More complex models can be more accurate for individual risk assessment but require specialised tools. This becomes less of a problem with the exponential growth in the availability of information technology. EuroSCORE now offer a full logistic calculator, which can be used on-line or downloaded from the web for use on local computers or personal organisers⁷. There is even a calculator in layman’s terms for patients, and surgeons may soon see patients present at their clinic with a better idea of risk assessment than some of their doctors. The author naturally favours the EuroSCORE risk models, but it does not matter too much which model we use, as long as risk is properly assessed.

THE VALUE OF PREDICTING MORTALITY

A very important benefit of assessing the risk of death is to use this knowledge in the determination of the indi-

cation to operate. Where operation is contemplated on symptomatic grounds, this knowledge is helpful in weighing the symptomatic benefits against the mortality risk. If the operation is purely on prognostic grounds, possession of this knowledge becomes mandatory: we must never offer an operation which carries a greater risk than the risk it seeks to avoid. The corollary of this is informed consent: if the surgeon needs this information to determine whether there is an indication for surgery, then the patient needs it before agreeing to surgery.

The second benefit is in the assessment of the quality of care: risk prediction gives a standard, corrected for casemix, against which the performance of hospitals, units and surgeons can be measured. Comparisons may be made for overall cardiac surgery, specific operation types and specific periods of activity. Clever use of variable life-adjusted displays or Cusum curves allows for a massive amount of information about the performance of a surgeon or unit over time to be displayed in a simple one-line graph (Fig. 2) and may act as an early warning system of deteriorating performance.

TWO APPROACHES TO QUALITY MONITORING

There are two ways by which the quality of a surgical service can be observed. The first is by peer review mechanisms, formalised into quality accreditation and

the issue of good practice certificates by peers. The second is by “naming and shaming” or in other words, public disclosure of outcome data, with hospitals lined up in a “league table” or “hit parade” according to their clinical outcomes.

LEAGUE TABLES OR “HIT PARADE”

When journalists and politicians have access to information about hospital procedure numbers and mortality, they usually present the information as a league table or “hit parade”, with one hospital at the top (lowest mortality) and one at the bottom (highest mortality). Much of this information is already in the public domain and easily accessible. Where it is not available, it is generally easy to obtain after a relatively small search effort. The acute interest that the media and politicians are developing in health care outcomes means that we shall soon see league tables of hospitals and surgeons readily published and available to the public. Having begun in New Jersey and New York, this has already happened in much of the United States and has recently spread to the United Kingdom through the work of an organisation called “Doctor Foster”⁸. Naturally, the first surgeons in the spotlight were cardiac surgeons, but other specialities will soon follow. Freedom of information is good and desirable, provided those who use that information interpret it intelligently and come to the correct conclusions. Simplistic league tables carry a substantial risk of misinterpretation for the following reasons:

- Firstly, data may not be validated and contain errors sufficiently large to affect the true position of hospitals in the tables.
- Secondly, differences perceived by the layman may be due to chance and may vary with time.
- Thirdly, unless the tables take account of risk stratification, any conclusions from them may be invalid as a reflection of the true quality of surgical work.

Even if all the above factors are dealt with, there are two potentially damaging outcomes from the publication of league tables. The first is the damage to the hospital at the “bottom” of the table: if it is perceived to be “the worst”, it will close or stop working, with the inevitable result of the next hospital becoming “the worst”. Taken to its logical conclusion, we will end up with the absurd situation of only unit (even one surgeon?) continuing to operate. The second outcome is more real and more alarming: there is no doubt that the easiest way to move up a league table is to refuse to operate on high-risk patients. Since these are often the patients who stand to gain most from cardiac surgery, the human cost of such a trend will be exorbitant.

League tables or, as they are known in the United States, “report cards” have already caused problems for surgeons, institutions and patients alike. Shahian, et al. have identified gaming, refusal to operate on high-risk patients and referral to distant centres as some of these problems in their excellent overview on the experience with report cards⁹. Grunkemeier even casts doubt on the validity of existing measures of casemix to deal with the statistical and medical complexity of cardiac surgical practice¹⁰. Nevertheless, the keen interest in medical outcomes displayed by the governments, the media and patients is likely to increase in the foreseeable future. As a profession, we must set the standards for the measurement of quality of care and implement the systems by which such measurement is carried out. Risk modelling is essential for this. Our risk models may not be perfect, but they are like a candle: a source of some light in the blind darkness of crude data collection. We must not reject the candle on the pretext of waiting for a future floodlight! In the meantime, all efforts continue to refine and improve risk modelling, now recognised as a scientific discipline with exciting potential.

QUALITY ACCREDITATION AND GOOD PRACTICE: ECTSIA

There is a real need for quality monitoring in medicine in general and in cardiac surgery in particular. It is now totally unacceptable for a unit or a surgeon to continue to operate in complete ignorance of their performance. Good quality surgical work requires robust knowledge of three crucial variables: what is the unit or surgeon doing (activity), what is the expected outcome (risk prediction) and what is the actual outcome (performance). In addition, there must be a preset level or band of acceptable performance, and a robust mechanism for dealing with situations where the actual performance is below target. In Europe, the three major specialist societies have agreed to establish the European Cardiovascular and Thoracic Surgery Institute of Accreditation (ECTSIA). The mission of ECTSIA will be to pioneer and implement a pan-European quality monitoring exercise in cardiac, thoracic and vascular surgery with the award of good practice certificates to units with robust clinical quality monitoring¹¹. Mechanisms for this are already well developed in cardiac surgery. ECTSIA will work towards developing similar mechanisms in thoracic and vascular surgery. On another level, some European hospitals are applying to the International Standards Organisation (ISO) for recognition of quality systems in their services. This is an alternative approach which has been proven in industry and which, with some

lateral thinking and innovative management, may serve surgical units well.

THE FUTURE

Performance monitoring is soon to become imperative. Achieving this using quality accreditation as planned by ECTSIA will be good for patients and surgeons. It is important to remember that this approach does not seek to compare institutions and surgeons, but simply to ensure that robust quality monitoring is present in every surgical service in our specialty, and that units which offer cardiac surgery do so to an acceptable standard. The alternative approach, favoured by media and governments, is to publish outcomes in league table form. This will almost certainly damage both surgeons and patients. We are at the quayside and the quality assessment boat is signalling its imminent departure. If we surgeons are not on board, we shall have no control on its final destination, and the consequences may be equally damaging to us and to our patients.

REFERENCES

1. The Guardian. London and Manchester, March 16, 2005.
2. Parsonnet V, Dean D, Bernstein AD. A method of uniform stratification of risk for evaluating the results of surgery in acquired heart disease. *Circulation* 1989;79 Suppl I:3-12.
3. Nashef SAM, Roques F, Michel P, Gauducheau E, Lemes-show S, Salamon R, and the EuroSCORE study Group. European System for Cardiac Operative Risk Evaluation (EuroSCORE). *Eur J Cardiothorac Surg* 1999;16:9-13.
4. Shroyer AL, Coombs LP, Peterson ED, Eiken MC, DeLong ER, Chen A. The Society of Thoracic Surgeons: 30-day operative mortality and morbidity risk models. *Ann Thorac Surg* 2003;75:1856-64.
5. Keogh BE, Kinsman R. The complex Bayes score. Fifth national adult cardiac database report. Oxfordshire: Dendrite Clinical Systems; 2004. p. 230.
6. Roques F, Michel P, Goldstone AR, Nashef SA. The logistic EuroSCORE. *Eur Heart J* 2003;24:881-2.
7. www.euroscore.org
8. www.drfooster.com
9. Shahian DM, Normand SL, Torchiana DF, et al. Cardiac surgery report cards: comprehensive review and statistical critique. *Ann Thorac Surg* 2001;72:2155-68.
10. Grunkemeier GL, Zerr KJ, Jin R. Cardiac surgery report cards: making the grade. *Ann Thorac Surg* 2001;72:1845-8.
11. www.ectsia.org