Though these figures do not show absolute accuracy in data collection, they suggest that the quality of the data is much better than the reputed norm for data collected routinely in the NHS. We believe that a system of data collection based close to the clinical team and well integrated with the process of care (both attributes of the system in North West Thames) offers a better opportunity for accuracy than a centralised system covering a whole hospital. Although it is inappropriate to consider database analysis as some sort of replacement for prospective research, we believe that our results show that routine data collection can be made sufficiently reliable for such studies to be of value to clinicians.

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1 Thorpe-Beeston JG, Banfield PJ, Saunders NJStG. Outcome of breech delivery at term. *BMJ* 1992;305:746-7. (26 September.)
2 Griffiths M. Outcome of breech delivery at term. *BMJ* 1992;305:1091. (31 October.)
3 Atherton A. Outcome of breech delivery at term. *BMJ* 1992;305:1092. (31 October.)

EDITOR,—We are surprised that only one of the correspondents commenting on the paper by J G Thorpe-Beeston and colleagues¹ pointed out a major error in the paper: analysis should have been based on the intention to treat.² Thus the neonatal death rate for vaginal delivery should be grouped with that for emergency caesarean section. Assuming, as do Anne C Deans and colleagues,³ that the neonatal death in the group who had caesarean section occurred after an elective operation, the excess of deaths consequent on an intention to deliver by the vaginal route was 3.3 per 1000, in line with our estimate of 2.4 per 1000.¹

The main conclusion of our decision analysis was, however, that a policy of elective caesarean section for breech presentation might not necessarily increase maternal mortality and morbidity. This is because maternal death and serious morbidity are more common after emergency surgery than elective surgery by a ratio of between 4 and 2 to 1.⁴ If all the emergency caesarean sections included in Thorpe-Beeston and colleagues' series were for failed trial of vaginal delivery (that is, none of these operations were performed for breech presentation in labour) their rate for failed trial of vaginal delivery was 52%. This is well above the 30% "break even" point we calculated at which maternal mortality associated with trial of vaginal breech delivery might equal mortality associated with elective caesarean section.

Several correspondents argue that vaginal breech delivery with a poor outcome that was not supervised by a senior doctor should be excluded from analysis.⁵ Apart from agreeing that such births should be adequately supervised, we contend that the value of the analysis lies in the fact that it reflects current clinical practice.

Many correspondents criticise the use of routine data and several acknowledge that a randomised controlled trial of sufficient size is impractical, but none suggest a way forward.⁵ We believe that the use of routine data, for which structured questions are asked, is valuable, and validity can be high if the data are used in the day to day management of patients.

The purchaser-provider split has potential for improving the quality of data, but purchasers will have to collaborate if the uniformity of data collection shown in this study is to be achieved. Without this investment, audit and research will suffer.

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1 Thorpe-Beeston JG, Barfield PJ, Saunders NJStG. Outcome of breech delivery at term. *BMJ* 1992;305:746-7. (26 September.)
2 Deans AC, Allman ACJ, Steer PJ. Outcome of breech delivery at term. *BMJ* 1992;305:1091. (31 October.)
3 Bingham P, Lilford RJ. Management of the mature selected breech presentation: assessment of the risks of selective vaginal delivery versus caesarean section for all cases. *Obstet Gynaecol* 1987;69:965-78.
4 Lilford RJ, Van Coeverden de Groot HA, Moore PJ, Bingham P. The relative risks of caesarean section (intrapartum and elective) and vaginal delivery: a detailed analysis to exclude the effects of medical disorders and other acute pre-existing physiological disturbances. *Br J Obstet Gynaecol* 1990;97:883-92.
5 Correspondence. Outcome of breech delivery at term. *BMJ* 1992;305:1090-2. (31 October.)

Risk stratification for open heart surgery

EDITOR,—Samer A M Nashef and colleagues recommend use of the Parsonnet index for assessing results of cardiac surgery in Britain.¹ Though this scoring system might well produce reasonable ranking with respect to risk of death, the actual predicted risks given by the system may be unreliable.

Nashef and colleagues grouped the predictions made by the index according to the classes good, fair, poor, high, and extremely high, and their data allow observed and expected deaths to be calculated (table). There is a 42% reduction

Numbers of deaths observed and expected by Parsonnet risk group

Risk group	Observed deaths	Expected deaths by Parsonnet index
Good	7	8.0
Fair	10	15.8
Poor	10	19.1
High	3	8.2
Extremely high	6	11.2
Total	36	62.3

($p < 0.001$) in observed compared with expected deaths. Put simply, either Nashef and colleagues have achieved a considerable reduction in mortality compared with that predicted by the Parsonnet index or the index substantially overstates risk. Inspection of Parsonnet *et al*'s paper¹ suggests that the index overstates risk: it is derived in an unconventional and unclear way that does not use multivariate analysis, and the agreement between its predictions and outcomes is evaluated with an inappropriate measure of correlation.¹

Numerical risks obtained from the Parsonnet index should not be taken literally and certainly should not be used for audit.

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1 Nashef SAM, Carey F, Silcock MM, Oommen PK, Levy RD, Jones MT. Risk stratification for open heart surgery: trial of the Parsonnet system in a British hospital. *BMJ* 1992;305:1066-7. (31 October.)
2 Parsonnet V, Dean D, Bernstein AD. A method of uniform stratification of risk for evaluating the results of surgery in acquired adult heart disease. *Circulation* 1989;70(suppl):13-12.
3 Bland JM, Altman DG. Statistical methods for assessing agreement between two methods of clinical measurement. *Lancet* 1986;i:307-10.

EDITOR,—The mortality in Samer A M Nashef and colleagues' study of risk stratification for open heart surgery looks impressive compared with the predictions of the Parsonnet system¹ but may simply reflect the inherent inaccuracy of the model. The Parsonnet model has several weaknesses, not least that it fails to take into account important advances in cardiac surgery over the past five to 10 years. Furthermore, the model is

based on clinical data from a small cohort of American patients, who are not necessarily representative of the usual case mix in Britain.

Notwithstanding these problems, the concept of collecting risk stratification data on a national basis is already well developed. At the Royal Postgraduate Medical School we are collecting data on risk factors from six major cardiac surgery centres in Britain. The intention is eventually to involve every cardiac centre in Britain, with each contributing such data to a national cardiac registry for every patient referred for open heart surgery. This project has the support of both the Society of Cardiothoracic Surgeons of the United Kingdom and Ireland and the Department of Health.

An initiative called PANECAN—the pan-European cardiovascular network—has already been established to extend risk stratification comparisons across Europe. The project will use specialised software, the patient analysis and tracking system, to link centres to a central pan-European registry. The programme runs in line with proposals set out in both *The Health of the Nation* and European Community directives.

Initial comparisons of the Parsonnet model with bayesian analysis, an alternative risk stratification model,^{2,3} suggest that bayesian analysis may be more accurate and offers the advantage that surgeons can compare local results against aggregated data. Bayesian analysis also offers the opportunity to look at other key performance indicators in cardiac surgery, such as length of stay, long term survival, and risk of reoperation, all adjusted for severity of illness and comorbid conditions.

The importance of risk stratification extends well beyond simply identifying clinical risk at operation: it could be used for prioritising selection from waiting lists, advising referring doctors and patients of the expected outcome of different treatment options, analysing resource use, and identifying and promulgating the most effective clinical protocols both nationally and internationally.

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1 Nashef SAM, Carey F, Silcock M, Oommen PK, Levy R, Jones MT. Risk stratification for open heart surgery: trial of the Parsonnet system in a British hospital. *BMJ* 1992;305:1066-7. (31 October.)
2 Edwards F. The theorem of Bayes as a clinical research tool. *Surg Gynecol Obstet* 1987;165:127-9.
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4 Edwards FH, Albers RA, Zajchuk R, Graeber GM, Barry M. A quality assurance model of operative mortality in coronary artery surgery. *Ann Thorac Surg* 1989;47:646-9.

EDITOR,—Samer A M Nashef and colleagues show¹ that the Parsonnet risk stratification system² can be applied to a British cardiac surgical practice. At King's College Hospital we have used the Parsonnet system prospectively since April as part of a computer based audit system. Analysis of our current data on 398 patients confirms Nashef and colleagues' assertions, mortality in the five groups, by ascending risk, being 3.3%, 5.9%, 14.1%, 19.1%, and 41.2% respectively.

The Parsonnet system has the advantage of simplicity. It is based on clinical data about which there can be little difficulty in interpretation and can be calculated rapidly in an outpatient clinic or at the time data are entered into a computer system. (A simple computer program calculated our scores automatically.) Risk scoring has several advantages. It can be used in audit to assess the results of an individual surgeon or unit against a general standard, but, more importantly, it allows a comparison of results between different centres