Hospital success rate: a multidimensional indicator of prognosis

There is worldwide interest in using routinely collected statistics to construct indicators to measure the outcomes of hospital care. Typically, interest in any particular condition tends to focus on the review of comparative performance as assessed by individual measures such as mortality, emergency readmission, or excessive lengths of stay. There is thus a set of indicators to review.

Consideration should also be given to the development of multidimensional outcome indicators, derivable from routinely collected data, that summarise the outcomes of a hospital admission and can be used to provide prognostic information. With the universal implementation of the NHS number in England, it will be possible to link data about hospital admissions for each individual with their subsequent admissions and with mortality data. National indicators based on linked data are now starting to be published. Using linked data, “success” can be considered in various ways and, as an illustration, in this study it has been defined at 90 days after admission as being alive, being out of hospital, and not having been re-admitted after discharge. We have calculated success rates for two conditions—stroke and fractured femur—highlighted as key priorities in the National Service Framework for older people.

Routine data linked in the former Oxford health region were used (population 2.5 million) for the period 1 January 1994 to 31 March 1999. The denominators were emergency admissions for people aged 65 years and over with a principal diagnosis of stroke (ICD-9 431–434, and 436, ICD-10 I61–I64) or fractured neck of femur (ICD-9 820.821.0 and 821.1; and ICD-10 S72.0, S72.1, S72.2 and S72.9). An admission was defined as a continuous stay in hospital, regardless of any change in consultant or hospital. Thus, admissions linked by a transfer were counted as a continuous stay. For each condition a second admission for the same condition within 90 days of the first was counted as a re-admission rather than a new fracture or stroke. The status of the patients was measured within 90 days of admission and classified as (a) dead, (b) re-admitted, (c) still in hospital with no break in inpatient care, or (d) none of these. If a patient had both a re-admission and died, only the death was included in the results. If a patient was re-admitted more than once, he/she was counted once as a person re-admitted. The results presented in table 1 show that, at 90 days, the hospital success rate was 39 per 100 patients with stroke and 65 per 100 patients with fractured neck of femur.

We suggest that work might be undertaken in each clinical specialty to derive dimensions of outcomes from linked routine data. Key issues include the choice of conditions to be considered, the choice and definition of adverse events following care for the conditions (for example, whether to restrict analysis of re-admissions to those for certain types of complication); and time frames (for example, 30 or 90 days). If the indicator is to be used for making comparisons, consideration will have to be given to weighting the adverse events to reflect their relative importance. Whether weighted or not, we suggest that the components of the indicator are presented alongside the multidimensional measure.

Once the definition of “success” has been agreed for a given condition, it will be necessary to evaluate its usefulness in informing doctors and patients about the prognosis. However, any “success” indicator derived from routine statistics will be only a partial measure of outcome and will need to be supplemented by other clinician-assessed or patient-assessed measures.

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<th>Table 1 Outcome at 90 days following admission for stroke and fractured neck of femur: number and percentage of patients in each outcome category</th>
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<tr>
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Mohammed and colleagues have suggested the use of Shewhart control charts as a means of presenting performance indicator results without spurious ranking into “league tables”. They choose to plot the observed number of events against the volume of cases on a square root scale; unfortunately this choice appears unintuitive, obscures the observed event rates, and leads to rather approximate control limits. A small adjustment—plotting the event rate against the volume of cases—leads to the “funnel plot” which is widely used in meta-analysis to check for publication bias and has also been used to compare mortality rates in paediatric cardiac surgery. An example is shown in fig 1 for emergency re-admission rates following treatment for a stroke in large acute or multi-service hospitals in England and Wales in 2000–1; exact 95% and 99.9% binomial control limits (essentially corresponding to 2 and 3 standard deviations) around the overall event rate of 7.4% are superimposed to control limits (essentially corresponding to 2 and 3 standard deviations) around the overall event rate of 7.4% are superimposed and the related centre, a logistic regression shows a non-significant relationship.

Funnel plots discourage inappropriate ranking while providing a strong visual indication of “divergent” performance or “special cause” variation. Advantages over the specific suggestion of Mohammed and colleagues include the display of the observed event rates, an informal check of the relationship between event rate and volume of cases, an emphasis on the increased variability expected from smaller...
centres, intuitive choice of axes and hence easy plotting, and exact binomial control limits obtained from the most popular spreadsheet package. I suggest that funnel plots could provide a useful adjunct to any performance monitoring system.

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References

Cleveland Health Quality Choice was a failure, not a martyr

We read with interest the article entitled “too good to last: did Cleveland Health Quality Choice leave a legacy and lessons to be learned?” published recently in QUHQC. One perhaps relevant in this regard is our study of the claim, repeated by Neuhauser and Harper, that the Cleveland Health Quality Choice (CHQC) project may have improved mortality rates in Cleveland at a faster rate than they were improving elsewhere. Using OHA data we found that not to be the case. The rate of improvement in inpatient mortality in Cleveland was the same as that in the rest of the state and would therefore have to be attributed to other factors.

CHQC’s bright promise unfortunately went largely unfulfilled as it never got much beyond mortality and length of stay, neither of which is a very good surrogate for quality. Although CHQC’s risk adjustment may have been the best available, it was only marginally better than simpler, far less expensive methods. That was just one of the many problems with this project, which seemed incapable of improvement almost from the moment it began releasing reports.

In their article Neuhauser and Harper allude to the Cleveland Clinic’s intent to focus the money previously being spent on CHQC to improve quality in its system of hospitals. We have been doing that on a disease-by-disease basis through the Cleveland Clinic Health System’s Quality Institute, actually spending about the same amount as on CHQC. This program measures well proven indicators of quality care, producing demonstrable, credible, timely results that lead to productive actions. The Joint Commission recognized this activity with the 2001 Codman Award.

Although we certainly agree that CHQC was a pioneering project, we disagree that anyone ever used the data for its original purpose—to influence the medical marketplace. We were able to find no evidence that this ever occurred. The “business model” as it applies to health care did not work in Cleveland, nor has it worked in other areas such as Pennsylvania and New York where report cards have been published. The production of academic articles was never the purpose, and research grants rather than operational money should support such activities.

We are aware of another 5 year ongoing study in Dayton, where a collaboration of business and hospital leadership has led to substantial improvement in both outcomes and processes of care. The Dayton project has been successful because its goal is to improve health care in the community, not to reward or punish providers based on their outcomes. We doubt that the loaded word “martyrdom” accurately describes the fate of this failed program. We need, either as communities or as individual institutions, to move on to new approaches as we learn from the failures of the past.

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Figure 1 “Funnel” plot of emergency readmission rates following treatment for a stroke in large acute or multi-service hospitals in England and Wales in 2000-1.
Principles for Best Practice in Clinical Audit


After over a decade of investment in clinical audit in the NHS, it might seem a little late for the National Institute for Clinical Excellence (NICE) to be publishing a book on how to do it. In the foreword by NICE there is a clue to the reason why. It says, rather charitably, that audit has a “mixed record”, and then goes on, less charitably, to list its flaws and shortcomings. A litany of problems is recited—including poor project design, inadequate data, bad project management, lack of commitment, poor change management, patchy follow up, and inadequate support. With such a track record, the continuing policy commitment to clinical audit looks like a triumph of hope over experience, or an admission that no hope over experience, or an admission that no hope, or an admission that no evidence, which this book might help to address. NHS organisations is not a failure of knowledge, which this book might help to address. It is primarily a failure of leadership and organisational culture, something which this book cannot really help to solve.

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Evaluation has never been higher on the agenda. Policies and programmes in health care change faster than ever, yet the methodological demands of rigorous evaluations lead to them becoming more complex, time consuming, and often distant from everyday service experience. Too often, by the time evaluation information becomes available, things have moved on and the information lacks saliency. What distinguishes this text is both its plurality of approaches and its focus on the end users of evaluation information. In this sense, the book concentrates on what it terms “action evaluation”—evaluations designed to inform, in realistic time scales, policy, managerial and practice questions.

The text is in three parts. First, Øvretveit discusses the overall design requirements for evaluations of policies and programme changes, then he introduces the tools needed to develop evaluations, before finally exploring some of the specific issues that arise in evaluation implementation—for example, data gathering or ethics. The book fills an obvious need by offering a very practical step by step guide at each stage. Each section is highly structured, with good use being made of tables and figures. A bulleted summary rounds off each chapter, enabling quick review of the material covered. The book is completed by a handy glossary of terms complete with definitions.

This is an undoubtedly practical book, and Øvretveit does a good job in positioning his action evaluation approach compared with pure research or more standard evaluation methods. Being relentlessly pragmatic, however, the book is rather light in two inter-related areas—qualitative methods receive fairly scant attention and there is almost no mention of how theory can help develop more meaningful evaluations of wider applicability. This is disappointing when the complexity of healthcare policies and programmes, and the ways in which they interact with the social context of their delivery, provides great scope for theory driven approaches. Work such as that described in Realistic Evaluation by Pawson and Tilley (Sage, 1997) provides a nice counterpoint to this text. Nonetheless, for would-be evaluators, Øvretveit’s book provides clear and practicable guidance on evaluation, highlighting both the potential and the pitfalls.

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