National Audit of Myocardial Infarction (MINAP): a project in evolution

The National Audit of Myocardial Infarction (MINAP) is a national online electronic reporting and analysis system developed to monitor the process of care of patients with acute coronary syndromes (Birkhead et al, 2002). This project differs from a simple prospective registry of coronary heart disease, as it is designed primarily to provide hospitals with continuously updated contemporary analyses of the care of their patients.

MINAP permits collaborating hospitals, and shortly the ambulance service, to make immediate comparisons of local performance with up-to-date national aggregate analyses. This is a continuous data collection and analysis system capable of examining care of all aspects of acute coronary heart disease. It now covers all English hospitals involved in the acute care of patients with myocardial infarction, and the majority (17 out of 18) of Welsh hospitals.

WHY MINAP WAS SET UP

MINAP was conceived in 1999 as a response to the emerging findings of the *National Service Framework (NSF) for Coronary Heart Disease* (Department of Health, 2000), specifically to allow hospitals to examine their performance in relation to the targets set in the NSF against the national aggregate performance. Data collection began in October 2000, and the last English hospital was linked into the project early in 2003. More than 260 000 patient records have been entered since October 2000.

The project uses a dataset which now covers all aspects of the prehospital and hospital care of patients with acute coronary syndromes. The dataset has approval of the National Information Standards Board, and is aligned with the datasets used by the British Cardiac Interventional Society and the Society of Cardiothoracic Surgeons (2004). Alignment will allow the linking of patient events with subsequent interventions by means of the NHS number, regardless of where these take place.

The project is a close collaboration between MINAP and the Central Cardiac Audit Database (CCAD) group. The MINAP team has responsibility for liaison with hospitals, strategic health authorities and the Department of Health. CCAD are responsible for the technological and security aspects of the project. They have overcome the considerable technical and security challenges of transferring encrypted data across the open internet between hospitals and to the central servers where collation and analysis of data takes place (Rickards and Cunningham, 2000).

Data are entered on a local password-protected computer. Hard identifiers such as date of birth, postcode of residence and the unique NHS number are then encrypted before transfer. These data remain encrypted on the central servers, until the NHS number is decrypted for mortality tracking at the National Office of Statistics. CCAD has approval from the Patient Information Advisory Group, a committee appointed by the English Secretary of State for Health under Section 60 of the English Health and Social Care Act 2001, to use patient identifiable information essential to the project, specifically the NHS number, without individual patient consent.

USE OF ANALYSES BY HOSPITALS

At present hospitals can compare their performance with the national aggregate for door-to-needle and call-to-needle times, and use of secondary prevention medication. These analyses are available on-line at the point of data entry, and can also be seen using a password-protected web browser elsewhere within the hospital. These analyses are updated every 24 hours. The vital status of patients is updated quarterly.

The analyses presented will evolve as new requirements arise. The increasing use of primary coronary angioplasty for myocardial infarction will result in the development of new analyses and online views to accommodate this. The increasing numbers of records for patients with other acute coronary syndromes will lead to provision of analyses relevant to the care of these patients such as the use of angiography and intervention.

Hospitals can see data relating to their individual patients, and aggregate analyses based on these. Strategic health authorities can see quarterly aggregate analyses of the hospitals within their area, and the Department of Health has access to quarterly aggregate data for all hospitals. MINAP also provides some analyses for the Healthcare Commission. Hospital trusts are always advised when their data are used in this way and MINAP takes great care to assist the Healthcare Commission in interpreting the data.

FUTURE USES OF MINAP

Although the original object of MINAP was as an audit tool for myocardial infarction it was clear that limiting analysis of care of patients to patients with infarction, while ignoring the large numbers of other troponin-positive acute coronary syndromes which also have a significant morbidity and mortality, was inappropriate.

In order to examine all aspects of acute coronary syndromes the original dataset was augmented. However, collecting data on all patients with acute coronary syndromes is not simple as these patients may be admitted widely throughout a hospital, rather than to a single cardiological facility. This inevitably makes data collection difficult. While some hospitals are able to record all acute coronary syndromes in others facilities are more limited and comprehensive data collection more difficult. Complete coverage of all acute coronary syndromes is unlikely to occur until a time in the future when effective information technology facilities allow these data to be collected as part of an electronic patient record.

The CCAD group have also developed links with all other cardiac domains, including interventional cardiology, cardiothoracic surgery, pacing and electrophysiology. These represent the treatment modalities which are commonly used for the MINAP patient population. Events recorded in any of these domains can be linked using the unique NHS number so that it will shortly be possible to provide an audit trail of the details of care for patients with coronary heart disease, regardless of where events take place.

The link already established with the Office of National Statistics now provides quarterly updates of mortality outcome for patients entered into MINAP for whom an NHS number has been provided. As interventional cardiologists and other groups begin to return data, a record of events for individual patients can be generated. This will be of great value in examining some of the broader issues of equity of care across the country. The similarities between the structure of the CCAD system and the National Project for Information Technology make cardiology a potential candidate for early inclusion in the national data spine.

RESULTS OF MINAP ANALYSES

The results that have emerged from MINAP analyses over the first 3 years of the project are remarkable, and a tribute to the hard work of colleagues in hospitals throughout the country. As an example, 81% of eligible patients with ST elevation infarction now have thrombolytic treatment within 30 minutes of arrival in hospital, compared with about 40% in 2000 (Birkhead et al, 2004). The results indicate the potential of the system to improve other aspects of cardiac care by means of contemporary audit.

While surveys of national and international performance by registries can describe quality of care and variation within and between countries and over time, the extent to which registries can effect immediate change in current practice is less clear, as feedback to clinicians is inevitably delayed by analysis and distribution of results.

In order to allow clinicians and others involved in the immediate care of patients to respond to targets or evidence-based recommendations, it is essential to provide contemporary feedback on local performance, ideally with a comparison of contemporary national or other aggregate performance. This is the achievement of MINAP, and is an exemplar which can be copied in other areas of medicine where early feedback is required to modify performance.

CONCLUSIONS

Overcoming the technical challenge of providing immediate comparative analyses of individual hospital performance and the development of a reliable and secure electronic system for the transmission of data for analysis has been crucial to the success of the project. This has been achieved on the remarkable technological platform of the CCAD.

The successful evolution of MINAP would not have been possible without the visionary contribution of one man. It is a sad conclusion to this article that it is written in tribute to the memory of Dr Tony Rickards, who conceived and developed the CCAD, and who died on 28 May 2004. He described the electronic linkage of all the domains of cardiology as his holy grail, and this he achieved in the last months of his life. **HM**

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KEY POINTS

- MINAP, the National Audit of Myocardial Infarction, was developed as a response to the audit requirements of the National Service Framework for Coronary Heart Disease.
- MINAP provides valuable contemporary online analyses of hospital performance and comparisons with the national aggregate data.
- Links to other cardiac domains such as cardiac surgery and percutaneous coronary angioplasty have been developed. These will allow linkage of both interventional and mortality outcomes for patients having acute coronary syndromes.
- The success of MINAP is largely based on the powerful information technology infrastructure developed by the Central Cardiac Audit Database group.