A REGIONAL COMPUTERISED SURGICAL AUDIT PROJECT

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(First received 18 June 1990; accepted 20 June 1990)

This paper describes a computerised surgical audit project which has been developed in the North West Thames region of the British National Health Service. The need for such a project and the reasons for the approach adopted are explained. The key feature is the capacity both for local audit within hospitals and for global audit between hospitals. Progress with implementing the project is reported. The uses of global audit are described and possible future developments outlined.

Keywords: Surgical audit, microcomputers, global audit.

INTRODUCTION AND BACKGROUND

There were four principal reasons why in 1986 it was felt necessary to establish a region-wide computerised surgical audit project in the North West Thames region of the National Health Service (NHS) (Fig. 1). Firstly, in common with the rest of the United Kingdom, the only routine data collected in the NHS was for administrative purposes. Anyone who has attempted to use such data for audit or management purposes will be well aware of the severe limitations due to incompleteness, lack of validity and long delays in data processing [1–3]. Secondly, apart from a few enthusiasts, there was at that time little in the way of regular, systematic audit being carried out by clinicians. Thirdly, it was recognised that the local development of surgical audit within each hospital would inevitably be of limited scope and value because most clinicians had chosen to sub-specialise to some extent. This meant that in a typical district general hospital with three or four surgeons, the diagnostic mix of each surgeon’s patients differed significantly. This rendered many inter-surgeon comparisons within any hospital meaningless. To overcome this it would be necessary for clinicians to team-up with colleagues in other hospitals with whom they shared similar clinical interests. Finally there was concern about the limitations of traditional evaluative research in influencing and improving clinical practice. Even the most elegant, well-designed studies are destined to go no further than scientific journals and conferences. This is partly because of a general reluctance on the part of professionals to change their practice, but also because such research studies are often not seen to be relevant. Clinicians might dismiss the results either on the grounds that the study was carried out elsewhere (often in a teaching hospital) and on a group of patients who differed in some significant way from their own patients, or on the
OBJECTIVES OF THE PROJECT

Against that background the project set out to achieve five objectives (Table 1). The most important was to establish a high quality computerised clinical database.

<table>
<thead>
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<th>TABLE 1. Objectives of project</th>
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<td>1. To establish a high quality clinical database</td>
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<td>2. To provide clinical data for management</td>
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<td>3. To ensure that no additional revenue costs were incurred</td>
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<td>4. To establish a global database</td>
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<td>5. To involve clinicians in health services research</td>
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Earlier attempts in the NHS had been led by administrators and involved centralised computing facilities [4]. Clinicians were expected to supply clinical information on their patients to the administrators. The lack of any useful, reliable or timely output meant that few clinicians could be bothered to spend time and effort supplying good quality data.

Clearly managers have a legitimate right of access to some clinical data. Thus the second objective was to ensure that appropriate clinical information was available for managers whilst at the same time protecting the confidential nature of some of the data.

The third objective was to ensure that no additional revenue costs would be incurred by introducing the system. It was therefore necessary to ensure that the additional time required for running the system in the clinician's office was offset by improvements in administrative efficiency. Finally the project aimed to create a global database to enable clinicians to extend their audit activities outside their own hospital. In addition the database would enable even the busiest clinician to take part in health services research as the database would provide a foundation on which quick, clean and cheap ad hoc studies could be based.

**STRATEGY**

To meet the first objective it was decided that data collection must be clinician-led and be based on their perceived needs. This meant providing microcomputers for clinicians so that they felt a sense of ownership of the data and had immediate access to their database [5]. The software had to be robust and user friendly as most clinicians had had little if any computing experience. It also needed to be commercially available as the NHS had a poor record of producing and maintaining its own software. After enquiries into the requirements of the principal users (clinicians and managers) a minimum data set was devised (Table 2). Some flexibility was added by including free fields for collecting additional data on an ad hoc basis. Finally, to help clinicians run and maintain their systems, continuing technical support was to be provided by the hardware and software supplier while the project was to employ two peripatetic staff to provide training, advice and help if and when problems arose. The software chosen had originally been developed by some clinicians working in the region and subsequently produced commercially (Micromed) by a small software house (Medical Systems Limited).

To achieve the second objective it was necessary for the surgical audit systems to interface with other computer systems in the hospitals. This can be achieved either manually or automatically. In this way the clinicians are able to supply clinical data to the hospital management systems, coded to their requirements. Currently these are the International Classification of Diseases—9th revision (ICD-9) for diagnoses [6] and the Office of Population, Censuses and Surveys Classification of Procedures and Operations—4th revision (OPCS-4) [7].

To ensure that no additional revenue costs arose from introducing the system, it was necessary that the time involved in inputting data was offset by savings in other administrative tasks in the clinician's office. Thus the system can automatically produce admission letters, operating lists, discharge letters and discharge summaries. This saves a lot of secretarial time previously spent typing.
TABLE 2. Minimum data set for surgical audit system

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<tr>
<th>Category</th>
<th>Details</th>
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<tbody>
<tr>
<td>Demographic</td>
<td>Patient's name, Patient's address (inc. postcode), Patient's date of birth, Patient's sex, Patient's status (NHS, private)</td>
</tr>
<tr>
<td>Medical care</td>
<td>General practitioner's name, General practitioner's address (inc. postcode), Consultant surgeon, Operating surgeon, Patient's hospital number</td>
</tr>
<tr>
<td>Administration</td>
<td>Date of booking/waiting list addition, Admission data, source and priority, Discharge date, method, location, Follow-up prompt dates</td>
</tr>
<tr>
<td>Clinical</td>
<td>Diagnoses (maximum of 6), Operative procedures (maximum of 10), Prophylactic antibiotics, DVT prophylaxis, Complications</td>
</tr>
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</table>

To facilitate the fourth objective, that of establishing a global database, it was desirable that clinicians all used the same surgical audit software. This would ease the task of developing the global audit software. While it would be possible for several different local systems to supply data for global audit, the cost of designing the software and running the system would be higher. A global audit office was established in a Health Services Research Unit in the university rather than within the NHS. This has helped to ensure the confidentiality of the data and to distance the database from the direct control of managers.

The final objective of involving clinicians in health services research has been approached by establishing a regional audit group composed of all clinicians using the microcomputer system. This group meets quarterly and can review comparative data from across the region and establish both retrospective and prospective studies. The global audit database remains confidential to them and the project staff. Currently one full-time research assistant is employed to run the system.

PROGRESS (JUNE 1990)

Developing the strategy, piloting the first systems and getting the project funded by the region took almost two years (June 1986–May 1988) [8]. Since then the project staff have been installing systems and training clinicians and their secretaries in its use. By June 1990 over one hundred and twenty surgeons working in 18 NHS hospitals throughout the region had access to a system (Fig. 2). This represents about 50% of the surgical work load of the region. Currently the system covers the main surgical specialties (Table 3), with software for ophthalmology becoming available soon.
Over the past year, the global audit software has been designed and written. Piloting of the software is almost complete and the system will then 'go live'. Participating clinicians will send data on floppy disks to the global audit office three or four times a year.

USES OF GLOBAL AUDIT

The idea of pooling clinical data from several hospitals to enable region-wide audit to be carried out is not new. Just such a programme has been running in the Lothian area in and around Edinburgh for many years [9]. The N.W. Thames project took

FIGURE 2. Hospitals in NW Thames Region participating in the project.
that as its starting point and aimed to build a larger, more comprehensive project in which the surgeon's systems also provided essential data for hospital management. In these respects it was influenced by a similar project in N.W. Thames which covers obstetric and midwifery practice in the maternity hospitals [10,11].

From the outset, several purposes have been envisaged for global audit (Table 4). The most immediate is that of auditing the quality of the data being collected by the clinicians.

On receiving a data file from a clinician, the global audit system checks its completeness and to some extent its validity. Obviously without access to the patients it is impossible for some items, such as secondary diagnoses, to be validated. Where data are found to be missing or inaccurate a report will be produced for the clinicians so that they can avoid similar errors in the future.

The most basic use of the global database is in describing variations in the process of care. This could focus on the length of hospital stay, different surgical procedures for the same condition, the use of prophylactic antibiotics or the grade of the surgeon carrying out the operation. By examining and discussing such variations with the participating surgeons, topics worth exploring further can be identified. In addition, competing hypotheses to explain such differences are likely to be generated. These can form the basis of prospective ad hoc studies using the global database as a foundation. Additional data items can rapidly and cheaply be collected on a prospective group of patients. Given the large number of participating surgeons, a large sample of patients can be collected in a relatively short space of time. Unlike traditional research studies, a hypothesis could be developed, data collected, and results obtained all within a few months rather than several years. In addition, involving those clinicians whose practice-style is the subject of interest, may increase the likelihood of them being influenced by the study results.

One particular role for global audit is in testing the impact of innovations in practice on the outcome of care. For example, rather than just adopting a new

| General surgery | 38 |
| Urology | 10 |
| Orthopaedics | 31 |
| Otolaryngology | 20 |
| Gynaecology | 22 |
| Plastic surgery | 6 |
| Oral surgery | 1 |
| **Total** | **128** |
prophylactic antibiotic in the belief that it reduces the risk of post-operative infections, the supposed benefits can be assessed systematically.

Finally, by linking global audit data to other databases it is possible to audit aspects of care that rarely get much attention such as geographical and social equity. Two particular applications are currently being investigated—linking to the census data via the patients' postcode (place of residence) to provide a measure of their social conditions, and linking to the newly computerised primary care registers to audit the referral practices of general practitioners. Using mapping packages it will be possible to audit the movement of patients.

FUTURE DEVELOPMENTS

While several of the uses of global audit outlined above are not yet operational, they are all functions that it is envisaged will be in use during the coming year. Looking further ahead, several other developments are being considered.

At present the microcomputer systems only collect routine information up until the time of a patient's discharge from hospital. This is clearly an inadequate basis for assessing outcome. It is hoped that medium and long term outcomes will be able to be assessed in future using postal questionnaires sent to patients. A study to develop such instruments is currently underway using prostatectomy as an example [12]. If successful, then software for producing validated questionnaires will be installed on the clinician's microcomputers so that using a mailing facility the state of health of a group of patients who had a particular operation in the past can be surveyed. The returned questionnaires could either be analysed locally using standard analysis software provided for the surgeon or analysed centrally in the global audit office.

Just as the assessment of outcome on the current system is inadequate, so is the collection of data on the indications for treatment. With increasing interest in identifying the appropriate indications for many interventions, it is envisaged that additional screens may be introduced into the microcomputer systems which would require surgeons to record their reasons for intervening. The appropriateness of procedures could then be audited.

One other possible development is to extend the database beyond NHS hospitals in N.W. Thames region. This could occur in a number of ways, but there are two that would probably be the most productive. One is to include private or independent hospitals as an increasing proportion of elective operations in the UK are being performed outside the NHS. The other is to include clinicians working in other countries, particularly elsewhere in Europe. Obviously this would present considerable practical problems but the potential benefits might be such as to make the effort worthwhile.

Acknowledgements—This work has been the work of several key people: Julie Wilkinson, Maria Barnes and Alisa Jaffa (implementation officers); Kim Clarke (global audit research assistant); and Palmer Iriowen (global audit programmer). The project has been generously funded by North West Thames Regional Health Authority and the constituent District Health Authorities. In addition, global audit has received financial support from the Department of Health. Throughout its history the project has benefited from the support of several regional managers—Drs Frank Seymour, Sheila Adam, Maureen
Dalziel and Jackie Spiby in the Public Health Directorate; Colin Reeves and his staff in the Directorate of Finance, Computing and Information—and many clinicians throughout the region.

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