

Medical audit: a review

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Introduction

Medical audit is the systematic, critical analysis of the quality of medical care, including the procedures used for diagnosis and treatment, the use of resources, and the resulting outcome and quality of life for the patient¹. In recent years pressure from the profession to implement audit has been increasing. This has been recognized and encouraged in the National Health Service Review¹. Audit has not been implemented widely. This is in part due to institutional barriers including an unsatisfactory information environment and inadequate support by management and also due to uncertainty among clinicians about the best way to implement audit. Audit is a continuous cycle, involving observing practice, setting standards, comparing practice with standards, implementing change, and observing the new practice. To be meaningful audit procedures must complete this cycle.

Factors influencing the development of audit

Increasing interest in clinical audit has arisen both from within and outside the medical profession. The Royal Colleges have led the development of audit within the profession. External pressure to develop audit has come from politicians and some sectors of the public. Political pressures are a feature of the government's desire to see value for money in all public services. The need to evaluate effectiveness has become more apparent because of the relative resource constraints resulting from demographic change and technological development. The introduction of general management has established a structure which has the potential to make decisions based on evaluations of effectiveness.

During the preparatory work for the NHS review, ministers have noted the relative lack of progress of audit in the NHS compared with the United States and the private sector in Britain². Prior to the review the government had demonstrated its commitment to audit by providing £200 000 for a national confidential enquiry into perioperative deaths³.

Audit has been supported by back bench MPs⁴, in a series of official reports⁵⁻⁷, and by being incorporated into legislation where appropriate. The 1988 Ionising Radiation Regulations indicate that those directing medical exposure to ionising radiation should be familiar with the clinical value of the procedures in relation to other techniques⁸. This may require the production of guidelines.

At the international level the United Kingdom has agreed to implement effective mechanisms to ensure quality of patient care by 1990 as part of its commitment to 'Health for all by the year 2000'⁹. Pressure also has arisen from some sectors of

the public. This is partly due to the growth of consumerism in all areas of life, from which the health service is not immune. The role of the consumer in determining the appropriateness of health services is incorporated within the Griffiths Report¹⁰ and is assisted by increased availability of information¹¹, including the publication of performance indicators and, in Wales, mortality rates for certain diagnostic groups in individual hospitals¹².

Some of the most compelling pressure has come from the profession itself. Part of this may be due to the view that self-regulation is preferable to an imposed external system, but many of those who have introduced audit have done so because of the positive benefits that it provides¹³. Many leading members of the profession have advocated clinical audit, including the former president of the Royal College of Physicians¹⁴ and a former Chief Medical Officer¹⁵. The Royal College of Physicians is developing audit methodologies in general medicine¹⁶. The Royal College of Surgeons has endorsed the need for surgeons to have a corporate responsibility in evaluating services¹⁷.

Why do medical audit?

Treatment

The principal aim of audit is to improve patient care, for example by reducing unnecessary treatment and investigations, preventing iatrogenic disease, and by identifying patients with continuing problems who have not been followed-up¹³. This can be achieved through agreement on methods of treatment of common conditions, adoption of standard policies and regular reviews of the work of departments. The reviews can evaluate whether diagnoses and treatments are appropriate and should identify complications which could have been avoided. Ideally each unit's performance should be compared with agreed standards which take into account relevant factors including the social composition of the population, case-mix, provision of unrecognized regional services and constraints on the service.

Communications

Many complaints by the public refer to poor communications. Inadequate notes and insufficient discussion with patients are recognized problems¹⁸ and are a major factor in complaints which reach the courts¹⁹.

Audits have demonstrated how communication with patients can be assisted by the production of written guidelines for junior hospital staff, by printed information leaflets²⁰ and by the practice of monitoring the recording of information given to patients¹⁸.

Communication with general practitioners is facilitated by production of prompt discharge summaries. Some audit systems produce regular summaries as a by-product of data-entry²⁰, and others monitor the delay in sending letters¹⁸. Audit has also identified the value of criteria for patient referral for general practitioners, thus reducing work at outpatients. Monitoring the quality of notes will facilitate the transfer of information to those nurses and doctors who see patients when on call.

Education

Audit can be a form of education, and formal sessions are increasingly being recognized as an essential component of training in clinical skills. Consultants have a key role in postgraduate medical education. Training schemes based on learning by apprenticeship are often inadequate and pressure is increasing for regular appraisal of both trainer and trainee. Audit can make an important contribution to this procedure and is likely to become a requirement for the recognition of training posts.

Financial

In a climate of resource constraints the ability of audit to improve cost-effectiveness is attractive. Ineffective care is, by definition, expensive, and precludes the provision of other services. Audit will identify those areas which can generate cost savings without affecting patient care. Examples might include guidelines for the use of investigations, for the early diagnosis of illness, for standardized policies on drugs and consumables, and the reduction of length of stay by reducing complications.

Methods of audit

Although a number of systems are available for auditing non-clinical systems this paper is only concerned with the clinical aspects. Many of the possible measures for evaluating clinical practice were examined during early work in the United States. A series of indices, or 'reports of professional activities' were used to compare hospitals. These included indices such as death rates occurring after admission to hospital. Different types of case-mix meant that the indices were found to be virtually meaningless even when medical and surgical conditions were considered separately^{21,22}. These attempts to derive global methods of quality have given way to efforts to evaluate specific aspects of care.

Information is the key to audit. The level of available information will influence the approach to be adopted. When implementing audit four general approaches have been found to be useful.

(1) Case note review

Most clinicians who are planning to introduce audit will not have access to sophisticated hospital information systems or microcomputer networks. In addition, aggregate data may be inappropriate in some conditions which are chronic and have ill-defined outcomes. In many situations, review of case notes with feedback of results is effective, and is one of the methods favoured by the Royal College of Physicians. This requires an improvement in the quality of notes, which may be a by-product of audit¹⁸. Rosenfield²³ has shown that in several specialties two clinicians independently reviewing a series of cases can achieve a high level of consistency.

This method can be used with unselected cases¹³ or those selected by diagnosis or by outcome. Eisele²⁴ demonstrated that a subjective review was able to reduce by half the number of appendicectomies and tonsillectomies in one hospital. There are many examples of case note reviews which have examined specific outcomes such as deaths²⁵, postoperative infections²⁶ and other complications²⁷. Ultimately it may be possible to develop agreed objective criteria of a successful outcome. This usually involves the use of techniques for achieving agreement such as consensus conferences. Consensus conferences have been held on a wide variety of topics in the United Kingdom and elsewhere but their conclusions cannot easily be transferred across frontiers. This is illustrated by a study which found considerable differences in the indications for investigating and operating on patients with coronary artery disease in Britain and America²⁸.

(2) Analysis of routinely collected health service data

Implementation of the Korner recommendations will increase the amount of health service information considerably and will eliminate many of the problems arising because of inappropriate definition of what is being measured. In those districts with a high standard of data collection and retrieval it will be possible to use the data for audit. The accuracy, timeliness and completeness of the data should be examined at an early stage. A study of diagnostic coding in this district revealed that many records failed to reach the coding department but those which did were accurately coded (unpublished data). Although data will often be incomplete or incorrect it will only be improved if it is used.

Analysis of routinely recorded health service data derived from the Korner data sets might include monitoring of length of stay for various diseases and similar measures of activity. It can also be used for determining some measures of outcome such as case-fatality rates although interpretation must allow for variations in the severity of cases. Most patient administration systems produce lists of numerous discrete diagnostic categories, many of which contain only a few cases, and which could be meaningfully grouped together. The failure to incorporate measures of case mix in most districts in the United Kingdom represents a significant barrier to the use of Korner data for audit. There is an urgent need to consider the use of diagnosis related groups²⁹ or alternatives to the current classification of diseases, such as SNOMED³⁰.

Unfortunately many districts collect only the Korner minimum data set. This is rarely of value for medical audit. In some cases it may be possible to supplement it with appropriate data items, but many units have developed micro-computer systems which collect more appropriate data, are flexible, and can provide information when required. This has been especially successful in surgery and obstetrics/neonatal medicine³¹.

(3) Population-based epidemiological studies

An audit programme should not be confined to patients seen in hospitals. A policy of stringent selection in which only the most ill patients are accepted for surgery is a possible explanation for an unusually high operative mortality rate. Audit of uncommon conditions carried out in major centres

may miss many patients. Earlam has examined management of oesophageal cancer in the North East Thames Region³². He suggested that many acute hospital beds were being inappropriately used for terminal care, and questioned whether too many patients were being treated in small hospitals and being denied adequate palliation for dysphagia.

Population-based data can be used to examine deaths from conditions amenable to medical treatment³³. Unusually high mortality rates from specific conditions may indicate areas of concern. Confidential enquiries may be held into deaths from some of these conditions where numbers are small. These might include deaths from asthma and diabetes in young people, cervical cancer and tuberculosis.

(4) *Analysis of the appropriate use of investigations and therapies*

This topic has received widespread attention in the literature. Some examples may be implemented as a by-product of computer systems in radiology, pharmacology or laboratory medicine, in the absence of a comprehensive patient administration system. Analysis of the appropriate use of investigations and therapies has been widely used in the fields of laboratory medicine and radiology, although there are a few studies in other areas.

Evaluation of preoperative chest X-rays has been carried out following the publication of a report in 1978 from the Royal College of Radiologists Working Party on the Effective Use of Diagnostic Radiology³⁴. The working party found that the frequency of preoperative chest X-rays varied widely, and that X-rays did not influence either the decision to operate or the choice of anaesthetic. They introduced a series of guidelines which were expected to result in a preoperative chest X-ray rate for non-acute non-cardio-pulmonary surgery of no greater than 12%. Fowkes *et al.* have examined a variety of strategies for ensuring that these guidelines are implemented³⁵. In a multicentre study in which five different strategies were used, the largest reduction in tests was in a hospital in which a utilization review committee was formed. A similar study examining ways of reducing the number of laboratory tests showed that publication of guidelines for the use of tests in 10 common medical emergencies in association with a weekly review meeting resulted in an immediate fall of 64% in haematology and biochemistry tests³⁶. Other examples of studies of appropriateness include evaluation of the role of cervical lymph node biopsy³⁷, the use of plain X-rays in acute abdominal disease³⁸, and the value of operative cholangiography³⁹.

Guidelines have been produced for many investigations including the use of radiological investigation of patients in accident and emergency departments⁴⁰, preoperative laboratory tests⁴¹, and electrocardiographs⁴². The Royal College of Radiologists have produced a comprehensive package of guidelines which will be published in late 1989 (W P Ennis, personal communication). There is also a considerable volume of work on audit of specific treatments. Antibiotic review committees are now widespread and many hospitals operate a system in which justification is required to depart from the agreed pharmacopoeia.

Why is audit not implemented?

Although audit can produce many advantages it is not implemented widely in the United Kingdom.

There are many reasons for this. The term 'audit' is sometimes regarded as threatening but the alternative of 'quality assurance' evokes the spectre of commercial consumerism and is often confused with 'quality control'. 'Peer review' may be more acceptable. Semantic arguments have had a considerable influence in this area.

Some clinicians will argue that audit is implicit to normal practice and is already being carried out. This presupposes that current practice is correct although many routine procedures have never been evaluated. This is illustrated by the variety of approaches to many clinical situations by individual doctors. In addition, audit requires that criteria and standards should be explicit.

The time required to perform audit has also been advanced as a reason for not doing it. In the United Kingdom the number of consultants in relation to the population served is considerably lower than in other countries which perform audit more extensively¹⁷. However there are many examples of successful audit systems despite this constraint. It is possible to redesign discharge summaries so that audit data is produced as a by-product⁴³, and many of the microcomputer based systems will result not only in a considerable reduction in clerical work but will ensure that notes are available at clinics when needed so releasing a considerable amount of consultant's time⁴⁴.

There have been a number of other criticisms - that audit substitutes talking for action, that it masquerades as research, and that staff could make more productive use of their time. The improvements in medical care as a result of audit are being recognized increasingly. The numerous examples which can now be found in the journals indicate that audit is accepted as a valid form of research.

The quality of information is a major barrier to widespread implementation of audit. When a unit does not know what it is doing it can not be expected to know if it is doing it well. Although sophisticated information systems are not necessary for some methods of audit such as note reviews, they are a basic requirement for many other methods.

Information requirements can be considered in terms of the use and limitations of existing sources of data and the possible development of new systems or adoption of those which are available elsewhere.

Much of the available data in the health service relates to activity rather than outcome. This is inevitable as the existing systems were established to collect management information. An example is the development of performance indicators. Nevertheless there are many possible sources of information for audit including data from patient administration systems, pharmacy information systems, laboratory medicine and radiology information systems.

There are problems with all of these systems. Data about hospital activity is notoriously inaccurate⁴⁵ and introduction of patient administration systems has not always improved accuracy. In some districts the information is relatively inaccessible, particularly where computerized pharmacy, radiology and laboratory medicine systems have not been installed. Many of the problems relating to existing information systems occur at source and result from the structure of the system. Information will not be entered accurately unless those entering it have a clear understanding of why it is being collected and if users have routine access to it for their own purposes.

Any attempt to provide clinical information from a system which does not incorporate these features will be futile. The quality of the information contained in the original records will also influence the accuracy with which information is recorded on computer. This may be facilitated by the introduction of structured discharge letters⁴³. The failure of some existing patient administration systems to produce meaningful information has stimulated the development of microcomputer systems⁴⁶. In many districts their introduction has been an integral part of a programme of audit and it is arguable that they are essential for the development of a comprehensive audit programme in the absence of a functioning hospital information system.

Medical audit must be professionally led. Clinicians have considerable scope to modify their practice and have demonstrated their willingness to do so. But it is likely that audit will identify areas which are not under the control of clinicians. These may include the design of facilities and provision of administrative or secretarial services. Dialogue between clinicians and management is essential to eliminate misunderstanding about the function of audit. Clinicians may view audit as a mechanism for redirecting resources to their benefit whilst managers may look on it as a way of bringing about reduction or redistribution of expenditure. The truth is somewhere between these two views. Much of the activity involved in clinical audit will be of no direct interest to managers, and their presence at regular meetings would be time-consuming for them as well as being unnecessary. Their commitment and involvement is important and the proposed district medical audit advisory committees will provide a much needed focus.

It is also important to recognize that audit will require time. Junior medical staff are often the most suitable people to collect data but they will need encouragement from consultants and recognition of the work involved. In some health authorities it may be possible to negotiate the employment of a part time nurse to assist with audit. How this time is identified will depend upon individual circumstances, but one health authority has accepted that surgeons will require one session per month which will not then be available for clinics or operating sessions⁴⁷.

Conclusion

There are a range of methods which can be used in the performance of audit. Although an effective information system is not essential for all forms of audit, and some, such as case-note review can be carried out without one, it will be necessary for most other methods. Much more could be done by making full use of existing systems, but this may involve improving access to data. Some current systems will not be capable of producing information which is timely, accurate and appropriate. In these cases it may be necessary to provide clinicians with personal computers (PCs). Information systems must start to examine measures of outcome as well as activity.

The increasing availability of PCs has made it possible for many more people to analyse data. There is an urgent need for sources of data to be produced in a format in which they can be downloaded to PCs. In the cases of hospital data this could be achieved through direct communications systems. Other data could be made available on compact discs. If audit is to succeed it must have the full support of

management. This will mean that clinicians and management must agree that the prime objective of audit is to improve patient care, and not to reduce costs regardless of quality of service. There must also be a recognition that audit takes time which will not be available for other activities, and it will require adequate clerical support.

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Forthcoming events

British Sleep Society: Inaugural Meeting

4-5 September 1989, Edinburgh

Further details from: Dr N J Douglas, Department of Respiratory Medicine, City Hospital, Greenbank Drive, Edinburgh EH10 5SB

First World Congress in Paediatric Pathology

18-22 September 1989, Rotterdam, The Netherlands

Further details from: ICOF Congressbureau, attn Mrs Joyce Flieten, PO Box 841, 3000 AN Rotterdam, The Netherlands

Pediatric Flexible Bronchoscopy: First Postgraduate Course with Animal Laboratory Teaching in Europe

19-22 September 1989, Davos, Switzerland

This course is being held by Professor R E Wood from the University of North Carolina, USA, sponsored by the University of Berne, Pediatric Department

Further details from: M H Schoni MD, Alpine Children's Hospital 'Pro Juventute, CH 7270 Davos Platz, Switzerland

Tenth Anniversary Paediatric, Obstetric and Psychiatric (POP) Conference

27 September 1989, The London Hospital Medical College, London

Further details from: The Postgraduate Teaching Centre, The London Hospital Medical College, 47 Turner Street, London E1 2AD

Colloquium on Neurological and Genetic Aspects of Albinism

27-30 September 1989, Keble College, Oxford

Further details from: Dr W O G Taylor, 16 Ronaldshaw Park, Ayr KA7 2TJ

Fifth International Symposium of Digestive Surgery and Endoscopy

Twelfth European Postgraduate Course of Gastro-intestinal Endoscopy

11-14 October 1989, Rome, Italy

Further details from: Organizing Secretariat, SC Studio Congressi, Via F Ferrara, 40-00191 Roma, Italy

The Skin from A to Z

14-15 October 1989, San Francisco, California

A postgraduate course designed for the non-dermatologist.

Further details from: Extended Programs in Medical Education, University of California, Room U-569, San Francisco, CA 94143-0742, USA

San Francisco Otology Update: 1989

2-4 November 1989, San Francisco, California

Further details from: Extended Programs in Medical Education, University of California, Room U-569, San Francisco, CA 94143-0742, USA

1990 International Association for the Study of Pain Congress

1-6 April 1990, Adelaide, South Australia

Further details from: Loisa E Jones, BS, Executive Officer, ISAP, 909 NE 43rd St., Suite 306, Seattle, WA 98105-6020, USA

35th General Assembly of the International Union against Venereal Diseases and the Treponematoses: Sexually Transmitted Diseases in the Age of AIDS

9-11 May 1990, Royal Society of Medicine, London

Further details from: Barbara Kominiewska BA, The Royal Society of Medicine, 1 Wimpole Street, London W1M 8AE

Second Greek/Australian International Medical & Legal Conference

25 May to 1 June 1990, Rhodes, Greece

Further details from: Secretariat, ICMS, PO Box 29, Parkville, Victoria, Australia 3052

East-Coast Conference on Biomechanics

26-28 August 1990

Call for papers: please send one page abstract by 1 February 1990

Further details from: Professor H S Ranu, Department of Biomechanics, Nycom, New York Institute of Technology, Old Westbury, New York 11568, USA