

CURRENT TOPIC

Paediatric medical audit

R Primavesi, R MacFaul

According to the Royal College of Physicians report 'Medical audit is primarily a mechanism for assessing and improving the quality of patient care; enhancing medical education by promoting discussion between colleagues about practice; identifying ways of improving the efficiency of clinical care'.¹ Other definitions exist: 'Medical audit is a systematic approach to peer review of medical care in order to identify opportunities for improvement and provide a mechanism for realising them. Medical audit and clinical audit are often used interchangeably, but clinic audit might be considered to cover all aspects of clinical care—eg nursing and the role of paramedical staff—whereas medical audit relate to practices initiated directly by doctors. It complements and may partly overlap financial audit, utilisation review and management of resources, but is primarily clinical, not managerial. The focus is the process and results of medical care rather than the use of resources and it is the responsibility of doctors rather than managers'.²

Purpose of medical audit

Medical audit is primarily an educational exercise for doctors intended for the benefit of the patient. Some monitoring of the use of resources including medical time will result, as well as an assessment of the disturbance to the child and to his or her family resulting from illness and medical intervention. A secondary gain may be more efficient use of limited health care resources.

Uncertainties in paediatric medical audit

Clinicians see medical audit as primarily a medical responsibility, although this view is not universally shared. The Royal College of Physicians Working Party saw medical audit as a professional activity preserving clinical freedom within a healthy atmosphere of challenge between clinicians, leading to improvement and development of clinical practice but with benefits to the patient, family, and to the population as a whole by more efficient use of resource.¹ Medical audit activities may also provide justification for the development of new techniques or expenditure to improve care. These principles are generally acceptable to clinicians but the implications of the white paper *Working for Patients*³ prove more worrying: where clinical freedom may be perceived to be challenged

and clinicians exposed to medicolegal retribution or painful criticism, especially from non-professional groups who may not understand the circumstances in which practice occurs. The white paper recommends that managers request regular audit of clinical practice. Clinicians are concerned that as this expands into process and outcome areas comparisons will be made by managers between and within districts and regions.

It is important to compare like with like and the data will require careful evaluation by clinicians and epidemiologists to exclude errors of input or variations due to local populations or circumstances before attributing differences to personal performance. As it appears likely that in the future directors of public health will advise district health authorities on where to place contracts on the basis of such audit information it behoves clinicians to take an interest in data collection from an early stage.

Confidentiality

The clinical information gathered during medical audit sessions should be confidential and kept separately from the clinical records. Management should facilitate audit by clinicians who in turn should, within the limits of confidentiality, facilitate managerial review especially when relating to structure and resource.

Methods of paediatric medical audit

Medical audit lies within the framework of 'Structure', 'Process', and 'Outcome'.

(A) STRUCTURE

Structure involves the quantity and type of resources available and is usually easy to measure, set standards for, and change. It is not usually a good indicator of the quality of care but its review may provide explanations for poor quality of delivery of care. Standards need to be set against which provision of resources may be judged.

Examples include: (1) Guidelines for medical staffing at senior and junior level for districts (The British Paediatric Association (BPA)) and provision of nursing and medical staff for neonatal care.⁴ (2) Nurse staffing related to ward size and dependency⁵ and A Woodhouse, Recommended staffing levels for a 20 bedded/cot

Department of
Paediatrics,
Southmead General
Hospital, Bristol
R Primavesi

Department of
Paediatrics, Pinderfields
Hospital, Wakefield,
West Yorkshire
WF1 4DG
R MacFaul

Correspondence to:
Dr MacFaul.

children's ward in a district general hospital. Newsletter of the Society of Paediatric Nursing, Royal College of Nursing, 1989. (3) Bed numbers for children with occupancy rates low enough to prevent children being admitted to adult wards (no adequate data available but a health building note advised 75% occupancy with approximately 1 bed/1000 child population).⁶ (4) The facilities and staffing which should be available for children receiving care in the health service available from the BPA and summarised in the *Quality Review* published in 1989 by the National Association for the Welfare of Children in Hospital.⁷

Future developments could include guidelines for the number of outpatient clinics per week that a consultant might be expected to undertake. In assessing the number of children per clinic note will have to be taken of the type(s) of disorder encountered and the experience and number of supporting junior staff, with recognition that too high a number may be associated with a lesser quality of care, and that for certain conditions very small clinics are appropriate.

(B) PROCESS

Process audit can include the assessment of access to paediatric services, such as the waiting time to be seen in a new patient clinic for a common condition. In acute conditions delay in referral or lack of referral may be monitored and problems may relate to the resource provision (for example number of beds, staff, or clinics) or to clinical judgment. The British Association of Perinatal Medicine has data on the difficulty in achieving access to regional neonatal intensive care units for newborn babies and this could be used as a basis for audit of services. These access evaluations inevitably overlap structure audit.

Process audit, however, mainly relates to the way in which a patient was managed and the speciality of paediatrics needs to establish management guidelines for a number of common conditions which can be used for *between* hospital comparisons. For the less common conditions paediatric subspecialists could collaborate with paediatricians from district hospitals to provide a commonsense consensus of approach. Furthermore, guidelines must be recognised as just that and clinicians should be able to diverge from them when judged necessary. Such safeguards in the implementation of guidelines will protect individual clinical freedom and safeguard the principle that clinicians will have differing styles of practice. Audit meetings will not only look to see how actual practice matches up these agreed guidelines but also whether the process itself is providing effective care.

Part of process audit is the system of case note review which involves such a monitoring exercise and contributes to the quality of care, communication, and record keeping. It is such case note reviews that the Royal College of Physicians has proposed that visiting teams evaluating training posts should examine. Examples given in the Royal College of Physicians report (appendix 1 and 2)¹ have been

modified for paediatrics at Pinderfields Hospital and are available from RM. The BPA Paediatric Audit Working Party will produce more suitable forms for general use by autumn 1990. The quality of clinical assessment of children, communication with parents, family doctors, community child health services, etc, and the use of laboratory resources as well as the management of common or rare conditions can be examined during such case note reviews.

Problems raised in the provision of services could be discussed at intervals with local managers who may wish to compare local performance with regional and national figures. If this is the case it is important to appreciate that special local conditions may often preclude meaningful comparison.

A potential disadvantage of process audit is increased standardisation of practice, although the accompanying decrease in the extremes of style of practice may be generally welcomed.

(C) OUTCOME

Medical audit is focused heavily on structure and process while useful information about outcomes is still awaited. The BPA Outcome Measures Working Party has produced a helpful initial report.⁸

Clinical information systems

All audit systems will require data recording and retrieval for the purpose of providing useful information. Resource management initiative sites will be the first to benefit from computerised systems, which ideally should extend across hospital and community child health services.

(A) DATA COLLECTION

Data collection systems and diagnostic codes used in district hospitals in the United Kingdom and the rest of Europe should be similar so that in future meaningful comparisons can be made about care provision in different areas. These systems need to be compatible with existing ones dealing with obstetric, neonatal, and community child health data in order to avoid collecting the same information more than once and to promote sharing of information between departments. It should be possible to record information onto the systems easily with terminals available in work areas throughout the hospital. For example at Southmead Hospital, details of inpatient management information already recorded on the patient administration system are transferred to the medical diagnostic index producing a minimum data set comprising patient's name, age, address, name and address of the general practitioner, date of admission and discharge, coded reason for admission and diagnostic code (both using the specialty specific codes compatible with the International Classification of Diseases, 9th revision (ICD9), and the Office of Population Censuses and Surveys classification (OPCS4) derived for use in this hospital), drugs on discharge, details of follow up, and the name of the senior house officer producing the summary. This is linked to eight

lines of free text producing an initial discharge summary providing nursing advice to health visitors and a pharmacy card for drugs to take home.

Direct input is possible from wards, outpatient departments, and casualty with terminals in the secretary's and other offices. Its use in other areas of patient care such as outpatients and casualty allows the identification of a child with a high risk of child abuse by highlighting certain diagnostic codes when a child is seen. In the future a patient activity database will allow cross referencing of information between hospital systems such as the medical data index, patient administration system, pharmacy, wards, biochemistry, chemical pathology, radiology, and subsequently between the hospital and community. Each summary takes approximately five minutes to generate and the data, its accuracy, and the completeness of data, are checked at weekly meetings. The Family Practitioner Committee was consulted before the setting up of this system and continue to give feedback about its usefulness. Confidentiality can be protected by entry codes appropriate to different levels of staff allowing users differing levels of accessibility to sensitive patient information.

(B) DIAGNOSTIC CODES

There are a number of diagnostic coding systems available such as ICD9 and OPCS4 and the Read classification⁹ all of which are cross referenced. The Read coding system is likely to prove particularly helpful for paediatric inpatient and outpatient practice, although some considerable development of the system for specialty use is still needed. The BPA has produced three useful booklets containing paediatric and perinatal appropriate codes compatible with the ICD9 (1977) and similar attention to paediatric codes will be necessary after the imminent introduction of ICD10.¹⁰ The diagnostic codes used in our minimum data set at Southmead are derived from these.

(C) DIAGNOSTIC RELATED GROUPS

The purpose of diagnostic related groups (DRGs) is to try to distinguish conditions with differing mean lengths of stay and resource expectations. DRGs were produced from a US

national sample which specifically excluded children's hospitals so not surprisingly were of little use in paediatric practice. The problem for paediatrics is that mean lengths of stay are very similar for most diagnoses (table 1). More recently paediatric modified DRGs (PM-DRGs) have been developed which are more specific (in neonatology 46 PM-DRGs are proposed rather than seven). They make possible calculation of resource expectations in this specialty from different diagnostic groups.¹¹ As treatments and costs change with the introduction of new technologies the resource expectations will need continual revision.

(D) SEVERITY CODING

In addition to the minimum data set a system of codings of severity is required before the comparison needed for criterion based audit (see mechanisms of audit) can be undertaken. There are a number available including the Read classification based on three dimensions; disease, disability, and pain.

Mechanisms of audit

Although computerised data collection systems such as the one described are at the heart of setting up audit they are not essential to the practice of medical audit in any department. Groups may meet once a week for an hour either at the beginning, middle, or end of the day or audit meetings may take the place of some postgraduate meetings.

If there are fewer than three consultant paediatricians in a department, then it will probably be necessary to arrange joint meetings with neighbouring health districts. Once barriers (if they exist) have been broken down, most departments would find review by outsiders valuable. Junior medical staff should be required to attend and for some topics other professionals such as nursing staff or therapists may be included. Joint meetings with general practitioners or other specialists and departments are likely to be fruitful.

The aim of the audit is to compare clinical care by seeing how clinical practice matches up to agreed practice. In a relatively subjective way this is already done in perinatal mortality meetings. 'Criterion based audit' offers a more objective process. Explicit and measurable criteria for good practice at unit level are agreed upon against which practice can be compared. The advantage of criterion based audit is that much of the initial screening could be done by non-medical staff, and the differences between hospitals can easily be identified as can improvements in performance measured over time within a particular unit.

Personal experience of paediatric medical audit

Recently both at Pinderfields and Southmead Hospitals formal minuted audit meetings lasting approximately one hour have been set up to which all members of the medical staff attend. At Pinderfields Hospital in the absence of a

Table 1 Top 15 diagnoses (Southmead Hospital)

Diagnosis (ICD9 code)	% Of total admissions	Mean (SD) length of stay (days)	Mean age (years)
Asthma (493)	11	1.50 (0.54)	4.2
Non-specific viral infection (079)	10	1.21 (1.52)	3.7
Ill defined intestinal infections (009)	9	1.38 (0.46)	3.3
Acute upper respiratory tract infection (465)	7	0.94 (0.54)	1.8
Non-specific abdominal pain (789.09)	6	0.86 (0.20)	11.1
Febrile convulsion (780.30)	4	0.98 (0.50)	2.1
Accidental ingestion (E858)	4	0.93 (0.61)	3.2
Healthy infant (V30)	4	0.93 (0.60)	0.4
Concussion (850)	4	0.79 (0.32)	7.5
Bronchiolitis (466.1)	3	2.10 (1.58)	0.6
Acute laryngotracheobronchitis (464.2)	2	1.20 (2.31)	1.9
Urinary tract infection (599)	2	1.80 (1.46)	3.4
Enteritis due to specified virus (008.6)	1	1.30 (1.30)	3.5
Acute tonsillitis (463)	1	1.40 (1.23)	5.3
Pneumonia, organism unspecified (486)	1	2.08 (1.69)	5.1

clinical information system these are largely based on case note reviews and, every three months or so the district information service produces data on length of stay for conditions such as head injury, febrile convulsion, or asthma to allow the effects of changes in policy to be reviewed. Written guidelines have been available in the unit for 10 years and are updated regularly.

At Southmead Hospital the first meeting of the month is taken up with analysis of data collection for the previous month, difficulties are discussed with a representative of the computer department who always attends this meeting. It is hoped that as teething problems are removed from the data collection system this meeting will be changed to every three months. A further meeting looks in detail at aspects of inpatient management. Specific cases identified by the consultants before the meeting from the week's discharge summaries are first discussed and then criterion based audit is used to look at randomly selected case notes of common admission diagnoses where guidelines have been agreed such as gastroenteritis, convulsions, and asthma (table 1). The third week involves a similar exercise looking at common outpatient clinical problems such as management of bed wetting or 'funny turns'. The fourth is generally used to look at interface areas with paediatrics and joint meetings are held with other medical staff to discuss specific topics—for example, with surgeons (pyloric stenosis), neurosurgeons (treatment of posthaemorrhagic hydrocephalus), radiologists (use of chest and skull radiographs), the casualty department (recognition of non-accidental injury), pathology laboratories (jejunal biopsy), and community services (immunisation and developmental screening).

It is an important principle that the meetings are seen to be audit of the work of the paediatric unit as a whole rather than one group (the consultants) assessing the performance of another (the senior house officers). To this end topics for discussion are chosen by the group and individuals are assigned to analyse and prepare data for presentation in turn. In any case many of the problems identified are due to administrative error rather than poor clinical judgment. An audit secretary records the minutes which are circulated to medical staff with a record of actions taken.

Simple analysis of the data is made every three months (total number of admissions, discharges, and completed discharge summaries) and a more detailed assessment yearly as part of the annual report. Any associations between the variables in the minimum data set can be analysed, table 2 shows the top 15 reasons for admission expressed as a percentage

Table 2 Top 15 reasons for admission (Southmead Hospital)

Diagnosis	% Of total admissions
Wheeze	15
Acute abdominal pain	11
Infection	9
Vomiting	9
Convulsion	7
Ingestion of toxic substance	7
Fever	6
Cough:acute	6
Accident at home	6
Diarrhoea and vomiting	6
Routine for investigation	3
Stridor:acute	3
Headache	3
Diarrhoea	2
Crying	2

of total admissions and table 1 the top 15 diagnoses with average age and length of stay.

Audit of audit

Apart from its educational value it is hoped that medical audit will lead to a change in practice—for the better. It remains to be seen whether the time and effort spent in such activity truly improves patient care. Review of the time spent and review of measures of change for the better must be an integral part of the audit process.

- 1 Royal College of Physicians. *Medical audit—a first report*. London: Royal College of Physicians, March 1989.
- 2 Shaw CD, Costain DW. Guidelines for medical audit: seven principles. *Br Med J* 1989;299:498-9.
- 3 Secretaries of State for Health, Wales, Northern Ireland and Scotland. *Working for patients. Medical audit. Working paper 6*. London: HMSO, 1989. (Cmnd 555.)
- 4 Royal College of Physicians. *Medical care of the newborn in England and Wales*. London: Royal College of Physicians, 1988.
- 5 Donnelly P. Staffing a children's unit. *Nursing Times* 1986: 35-6.
- 6 Department of Health and Social Security. *Health building note*. London: Department of Health and Social Security, 1984.
- 7 National Association for the Welfare of Children in Hospital. *Quality review*. London: NAWCH, 1989.
- 8 British Paediatric Association. *Outcome measures for child health*. Report of BPA working party. London: BPA, 1990.
- 9 Read J, Benson T. Comprehensive coding. *British Journal of Health Care Computing* 1986;3:22-5.
- 10 British Paediatric Association. *Classification of diseases*. Vols 1, 2, 3 (perinatal) paediatric supplements. London: British Paediatric Association, 1987.
- 11 Lichtig L, Knauf R, Bartoletti A. Revising diagnosis—related groups for neonates. *Pediatrics* 1989;84:49-61.

Useful booklets

South West Regional Hospital Medical Advisory Committee. *The regional approach of medical audit*. Bristol: South West Regional Health Authority, June 1989.

Shaw C. *Medical audit: a hospital handbook*. London: Kings Fund Centre, February 1989.

Useful addresses

Association for the Study of Medical Education, Level 10, Ninewells Hospital and Medical School, Dundee DD1 9SY.

Kings Fund Centre, 126 Albert Street, London NW1 7NF.

CBO National Organisation for Quality Assurance in Hospitals (Churchillaan 11), PO Box 20064 3502 LB, Utrecht, The Netherlands.