reports do mention hyperventilation with a low P_{CO_2} . Hyperventilation was the outstanding feature in this patient and could not be attributed to any mechanical abnormality or hypoxaemia. The whole functional picture resembles that attributed to disease of the small pulmonary arteries by Nadel and his colleagues,⁸ but I think Dr. Evans has conclusively excluded the possibility in the present case.

DR. FLETCHER: About the honeycomb pattern—I would have thought this was a very uncommon result of chronic bronchitis.

DR. J. SILVER (8): Are steroids of use in these patients?

DR. PETERS: Steroids have been given to most patients. I think it is only reasonable to try them in a patient with rapidly progressive nephritis but the evidence that they are of benefit is inconclusive.

I regret that this is all we have time for and I think we should now close the discussion.

This conference was recorded and edited by Dr. G. F. Joplin.

APPOINTMENTS OF SPEAKERS

- (1) Dr. D. K. Peters, Lecturer in Medicine, Royal Postgraduate Medical School.

- (2) Dr. T. Sherwood, Lecturer in Radiology, Royal Postgraduate Medical School.
 (3) Dr. N. B. Pride, Lecturer in Medicine, Royal Postgraduate Medical School.
 (4) Dr. D. J. Evans, Senior Lecturer in Pathology, Royal Postgraduate Medical School.
 (5) Dr. G. Simon, Hon. Senior Lecturer in Radiology, Royal Postgraduate Medical School.
 (6) Dr. C. M. Fletcher, Reader in Clinical Epidemiology, Royal Postgraduate Medical School.
 (7) Professor R. E. Steiner, Professor of Radiology, Royal Postgraduate Medical School.
 (8) Dr. J. Silver, M.R.C. Research Assistant in Gastroenterology, Royal Postgraduate Medical School.

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Outside Europe

Medical Audit in North America

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Medical audit has been defined by a leading authority¹ as "the evaluation of the quality of medical care as reflected in medical records." In his review of quality evaluation Donabedian² has described three ways of assessing the quality of care: firstly, the study of the structure, setting, and organization of medical care; secondly, the study of the process of care; and, thirdly, the study of the outcome of care. Audit is used chiefly as a means of assessing process and outcome.

An audit may be either internal or external. Internal audit is performed by members of the institution itself and is usually a continuing process. External audit is conducted by independent assessors and is usually episodic.

Current Audit Practices in North American Hospitals

The legal requirements for hospital staff organization vary between the United States and Canada and among the different provinces of Canada. In Ontario, hospitals are required by law to have four committees: credentials, records, admission and discharge, and therapeutic abortion. To obtain accreditation from the American Joint Commission on Hospital Accreditation,

hospitals are required to have an audit procedure, though the way this should be organized is not laid down. A hospital may decide to have a single audit committee or several committees organized by department or by task.

However they are organized, audit committees function in a similar manner. The committee first decides on an area of concentration. Obviously it cannot monitor every aspect of care simultaneously and must therefore choose a few areas to scrutinize at a time. Next it established its criteria for assessment—for example, when looking at tonsillectomies it must decide what indications for surgery are acceptable. Thirdly, it must arrange with the medical records librarian for the abstraction of appropriate records. The medical records department therefore has a key role in a successful medical audit. If the audit committee has critical comments to make on the care provided it does not itself take action, but reports its findings to the appropriate head of department.

Since no committee structure is recommended by the Joint Commission on Hospital Accreditation, a wide variety of different committee structures has grown up. In many hospitals there has been a piecemeal approach, with several audit committees, each covering narrow areas of concern. One common example of this approach is the tissue committee, whose function it is to review all tissue removed by surgeons. This piecemeal approach is now tending to be abandoned in favour of a more comprehensive approach to medical audit. Slee³ now recommends small departmental audit committees, rather than a single large committee or numerous small committees with

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narrow frames of reference. If the subject under review cuts across departmental lines, a joint working party can be formed.

Medicare and Medical Audit

In the United States the Medicare Act requires all hospitals to have a utilization review plan. Though utilization review is concerned with efficiency rather than quality, it obviously has a great deal in common with medical audit. Like audit, it also depends on information abstracted from patients' records. The utilization review is concerned with three questions: (1) Was the patient's admission necessary?; (2) Was the treatment expeditious?; (3) Was the patient discharged as soon as possible?

Traditionally utilization review has been the function of the admission and discharge committee. The Medicare Act has now extended the responsibilities of this committee to include a retrospective review of utilization as well as the customary current reviews. Since this function is now so similar to the medical audit, Snee recommends that both audit and utilization should be made the responsibility of the audit committees.

History of Medical Audit in North America

Interest in medical audit was first awakened by the appalling conditions in many American and Canadian medical schools revealed by the Flexner report in 1910. First to act was the new American College of Surgeons, which in 1916 received a grant from the Carnegie Corporation to conduct a survey of hospitals in the United States and Canada. The college was heavily influenced by Codman—a pioneer of medical audit—who founded his own hospital on the principle of outcome evaluation. In Codman's hospital an abstract of every case was published and every patient discharged from the hospital was reviewed at intervals until his condition had become stable.³

The system evolved by the College of Surgeons, however, did not use the concept of medical audit. The College instead concentrated on the organization of hospitals and their medical staffs. Under their hospital standardization programme, which extended from 1918 to 1952, the College attended to matters such as the qualifications for staff membership, the organization of medical staff, policies governing the work done in the hospital, the arrangements for audit, and the diagnostic and therapeutic facilities. These aspects of hospital care were studied by accreditation teams, which made periodic visits. No hospital was obliged to seek accreditation, but the prestige of the College was such that no major hospital could afford to ignore it.

In 1952 the Joint Commission on Accreditation of Hospitals succeeded the American College of Surgeons as the accrediting body. The work of the College and the Joint Commission has undoubtedly been a potent influence in raising hospital standards. In the last two decades, however, it has gradually been appreciated that evaluation of the organization of hospitals is not enough. The hospital may comply with all the standards required for accreditation and yet may fall short in the quality of care it provides. Hence the renewed interest in medical audit.

Recent Progress in Medical Audit

The supply of information from medical records is obviously a crucial factor in medical audit. Since the scrutiny of large numbers of records is very time-consuming, some form of abstracting process becomes necessary. Much progress has been made in this field in the last two decades.

In the early 1950's the S.W. Michigan Hospital Council began making uniform abstracts of records for transfer to punch cards and statistical analysis. The results were then made available to the individual hospital's audit committees. The Professional Activities Study (P.A.S.), as it was called, was

continued when in 1955 the S.W. Michigan group became the Commission on Professional and Hospital Activities Inc. (C.P.H.A.) The C.P.H.A. was established as a non-profit corporation by the American College of Physicians, the American College of Surgeons, the American Hospital Association, and the S.W. Michigan Hospital Council. By 1971, 1,379 hospitals in the United States and Canada were subscribers to P.A.S. From these hospitals, P.A.S. receives each year about 11 million abstracts of patients' records. P.A.S. feeds back information to the hospitals in monthly, semiannual, and annual reports. C.P.H.A. also offers a Medical Audit Program (M.A.P.) which provides more detailed information for each clinical department of the hospital at quarterly intervals. The information supplied by P.A.S. and M.A.P. enables hospital audit committees to focus their attention on individual diseases, operations, investigative or therapeutic procedures, or individual departments or physicians. P.A.S. also provides another very important type of information: it compares the individual hospital's statistics with the averages of all the participating hospitals.

Quality Assessment in General Practice

Two well-known studies of the quality of general practice have been done in the United States and Canada.^{4 5} Though the medical records of the practices were examined, no effort was made to abstract data for quality assessment. The chief method used was the direct observation of the physician at work. Each physician was scored on certain aspects of his history-taking, physical examination, and patient management. Though both studies have been criticized, they were important pioneering studies on the methods used for quality assessment.

As with hospital accreditation, periodic visits to practices by outside assessors will not provide the continuing review which is needed for the maintenance of high quality care. In the future we will almost certainly see the development of systems for abstraction and processing of data from general practices. Before this can take place general-practice record keeping will have to improve greatly, for the evidence suggests that in many practices the records are inadequate for any kind of audit.

One of the growing points of American medicine is the reform of record keeping stimulated by Weed's proposals for the problem-orientated record.⁶ One of the purposes of the problem-orientated record is to provide a document suitable for medical audit, and Bjorn and Cross⁷ have shown that this type of record is applicable to general practice and have described how it can be used both for internal and external audit.

The introduction of universal medicare in Canada has enabled data from medical practice to be collected and processed centrally through the billing system. Though these opportunities have not been fully realized, it would be possible to provide practices with information about their work load, consultation patterns, and morbidity patterns. Unfortunately, the natural concern of governments about over-servicing has tended to focus attention on the use of the system for controlling utilization. This has reduced its potential value for quality assessment and the self-education of doctors. For medical audit to be acceptable to doctors it should be independent from the administration of health services.

Problems of Medical Audit

Though the conceptual problems of medical audit lie outside the scope of this article, it would be wrong not to review them briefly. The practice of medical audit rests on two propositions: that medical records are an accurate reflection of the process of patient care; and that the quality of care can be assessed by studying the process as reflected in records. Both these propositions have been questioned. It has been said that good care can be provided without keeping good records, and, conversely, that good records may give a misleading picture of the care

provided. For example, the fact that pathological reports are in the records is no guarantee that they are accurate. To check on their accuracy requires that the specimens themselves be examined.

Even though good records may not be essential for good care, it may be argued that we can no longer tolerate a situation in which the quality of care is hidden from view. To paraphrase a famous legal dictum, it may be necessary to say that "good care must not only be given, but must be seen to be given." If this principle of accountability were accepted, then it would become as unthinkable for a physician not to keep good records as it would be for a banker not to keep good accounts. The problem of validating the records can be dealt with by expert review of the original material. Even when this is impossible, however, it is still possible to assess a physician's performance, given the information which was available to him.

Another difficult problem is the establishment of valid criteria of quality. These criteria are of two types: the empirical, derived from statistical averages obtained from many similar settings; and the normative, derived from traditional sources of orthodox medical standards—teaching centres and textbooks. It may be objected that averages do not necessarily represent the best care, and that standards developed for teaching centres may be irrelevant to other settings. Another problem is the relation of the process of care to the outcome. We know too little about the significance of many of the criteria which we use for assessing the quality of care. All these difficulties, however, are not so much arguments against medical audit as arguments in favour of much more research on the subject.

Medical Audit in Britain

Until recently there has been little interest in medical audit in Britain. Since the inception of the National Health Service the chief guarantee of quality in hospitals has been the rigorous selection of hospital staff. The hierarchical organization of the medical staff in a British hospital allows greater supervision of work than the horizontal organization of North American hospitals.

The recent revival of interest in audit may be due to the realization that—as the Joint Commission on Hospital Accreditation found—the quality of care may fall short even when certain broad standards are attained. For example, the quality of care depends not only on the ability of an individual consultant but on his supporting staff, the nursing staff, the diagnostic and therapeutic services, and the state of communications among them. Moreover, the ability of a consultant is no guarantee that he will make optimum use of scarce resources—a factor which is related to both the quality and the efficiency of care.

Another reason may be given for introducing medical audit to Britain. If present trends continue, general practitioners are likely to play a much larger part in hospital care. This is already true in obstetrics and may soon be the case in other hospital departments. When this occurs the organization of hospital staff will lose its tight hierarchical structure and take on more of the characteristics of North American staff organization. This change will make some audit procedure much more necessary. It is important to emphasize, however—as Slee has done—that audit is not a system by which specialists scrutinize the work of general practitioners. It is a process in which the work of *all* the medical staff comes under review. It is to be hoped that British physicians, both specialists and general practitioners, will appreciate the need for internal audit of this kind.

Though internal audit has been little used, external audit has been used in Britain, notably in the valuable Confidential Enquiry into Maternal Mortality. As in North America, no system of audit has developed in general practice. Nevertheless, the Royal College of General Practitioners has, in its continuing morbidity survey, a system for collecting and processing data from a large number of practices.

The Future of Medical Audit

Dollery⁸ has recently proposed the setting up of a continuing external audit of the N.H.S. He visualizes this as an independent body, beginning as a committee on health care, then becoming a statutory authority with an identity separate from the Department of Health and Social Security. The committee on health care, he suggests, should set up audit teams to visit and assess hospitals and general practices. In the course of these visits they would study organisation, accommodation, and equipment, as well as scrutinizing data from medical records. The committee would also set up study groups to conduct inquiries into single problems, such as maternal mortality and anaesthetic deaths.

Dollery's proposal deserves careful study. It would be difficult to argue against a continuing external review of the quality of care in the N.H.S.: indeed, it is surprising that the need for it has not been seen before. In establishing the organization, we have much to learn from North American experience in this field. Three points have particular relevance to Dollery's proposals.

(1) The audit teams proposed by Dollery would be analogous to the accreditation teams which visit North American hospitals. These teams can make good observations about staff organization and physical facilities, but they would not be able to make any detailed assessments of the quality of patient care.

(2) An audit of patient care requires a sophisticated system for the abstraction and processing of data from a large number of clinical records. The N.H.S. provides the opportunity for a comprehensive information system covering all aspects of health care, but this opportunity has not yet been realized. Before a medical audit can become fully effective, the quality and quantity of information from all levels of the N.H.S. will have to be improved.

(3) External audit in itself is not enough. A visit every three years from an accreditation team is no substitute for the continuing review of care by the staff of the institution itself. For audit to be fully effective, our hospitals, health centres, and practices will need to set up the machinery for internal audit.

All these proposals are eminently practicable. Of course they would take time. It may be several years before our records and information systems are of the required standard. However, the benefits would be immense, not least those to medical education. A doctor learns chiefly from his own experience. The more information he has about his own working methods and the outcome of his actions, the greater his self knowledge will be. The more he knows about how his own methods and results differ from those of his colleagues, the more opportunities he will have for identifying and remedying his own shortcomings. As an educational experience, a good system of medical audit is worth any number of postgraduate courses.

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