

regular self-examination. Previously only about 5% of the women had regularly examined their own breasts. The costs per detected case of breast cancer were low (less than \$500) because only 1% of the women needed to see a doctor. Fear of breast cancer was not noticed among the women concerned.

### Discussion

The purpose of this study was twofold: to find out whether women could be persuaded to examine their own breasts regularly, and, if they could, to find out whether regular self-examination increased the rate of diagnosis of early breast cancer.

The results, though preliminary, show that the combination of mass health education and personal instruction seemed to convince about 70% of the women approached of the value of regular self-examination. There was no exaggerated fear of cancer, and the demands made on doctors' time were few. A

method of this kind is suitable for a whole population, whether or not the medical services are highly organised. Perhaps its most important aspect is that it can be used in areas where there are no screening facilities and probably never will be. In Finland the National Board of Health is already arranging special courses to train nurses in community health centres and in workplaces to be key people in the programme of individual instruction (see figure). The nurses give the information to women attending contraception and school clinics and for cervical screening. The specially designed calendars are used and will be returned after one year's use. The instructing nurses will then renew their message and give out new calendars.

### References

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- <sup>2</sup> Shapiro, S, and Strax, P, *Journal of the American Medical Association*, 1966, **195**, 111.

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## Medical Audit

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### Surgical audit: one year's experience in a teaching hospital

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#### Summary

**For 12 months the surgical staff at Hope Hospital have operated a form of audit. The monitored information included work load, methods of treatment, complications, misdiagnoses, and deaths. The method described is suitable for any district general or teaching hospital provided adequate secretarial help is available. In addition to helping to maintain standards, an audit of this type has a positive educational role.**

#### Introduction

In recent months there have been calls in both the medical and lay press for the results of medical treatment to be audited. It is not always clear, however, exactly what is meant by the term "audit." In the United States where such systems are practised widely, an audit may review cost-effectiveness, diagnostic effectiveness, an individual's work load and his efficiency, as well as maintenance of standards. Snee described medical audit "as the systematic evaluation of the quality of patient care as seen in medical records, including efficiency analysis and prescription for corrective action."<sup>1</sup> Similarly, audit for the clinician is defined by Dudley as "that process of self-assessment in qualitative and quantitative terms which enables him to say 'I have handled this patient or group of patients in an appropriate way'."<sup>2</sup>

Some members of the lay press, however, appear primarily interested in the continuous monitoring of standards of care—and the investigation of maternal and perinatal mortality has often been quoted as a model of how this is already practised. But apparently the public does not generally appreciate that many surgical units throughout the country already have regular death and complications reviews and often have done so for many years. It is, however, unusual for all the surgeons in any hospital to meet regularly to review each other's work. The complex methods of peer review and professional standards review that already exist in the United States are not a feature of medical practice in Britain.

#### Setting up the audit

When Hope Hospital, a busy district general hospital, was developed into a teaching hospital by the newly expanded University of Manchester Medical School, we decided to take the opportunity to establish a form of regular surgical audit. Initially, the audit has been limited to the general surgical units (six consultant surgeons working in two hospitals and servicing beds in the Salford Area). Each week the registrars of these units are asked to fill in a form giving details of the total number of admissions; the total number of operations carried out and their nature; the number of complications; the number of misdiagnoses; and the number of deaths.

The completed forms are passed to a secretary in the University department, who assembles the information and then duplicates copies for each member of the general surgical staff. One consultant surgeon surveys the audit a day in advance to decide which cases should be discussed and tells the junior staff on the units concerned. Each week a different consultant chairs the audit.

#### Management of the audit

The audit takes place one evening each week and lasts for exactly one hour. By and large, attendance has been good, and five of the six consultant surgeons are usually present. Although one surgeon leads the audit and the discussion of particular cases, questions may be

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asked about any case, both for information and to establish why an unusual procedure has been carried out. Most cases are not discussed in detail as they are uncomplicated and not of particular clinical interest. Important complications and misdiagnoses are, however, discussed in considerable depth when the case warrants it. Radiological investigations are also reviewed. A free and open discussion then takes place to discover if and when errors of judgement took place. Deaths are treated in a similar fashion, and particular attention is paid to those cases where the underlying condition was not fatal. Two examples that were freely discussed in this way during the last year were acute appendicitis in a young patient who later developed fatal septic shock and a patient who died from a duodenal fistula. This developed in a chronically malnourished man after simple closure of a large perforated duodenal ulcer.

## Results

In the first year of the review the general surgeons in the Salford Area reported the admission of 5774 patients, including patients admitted as day cases. There were 4440 operations carried out with a reported complication rate of 5.8%. The 215 patients who died during the year included those admitted to the wards for terminal care.

On reviewing the misdiagnoses, we found that very few had serious implications. Thus the confusion of acute gynaecological disorders with acute appendicitis, a commonly recognised diagnostic problem, was reported on 15 occasions. Only rarely were serious misdiagnoses reported.

Initially the audit was somewhat subdued because all surgeons, especially the junior ones, felt that open discussion was critical of both themselves and their colleagues. This inspired a rather defensive reaction to begin with, but as the weeks passed and members of surgical teams realised that the discussion was essentially fair and non-aggressive, the atmosphere changed. Junior surgeons commented that it was useful to hear the more experienced surgeons indicating their own approach to problems such as haematemesis, the management of abdominal injuries, and whether certain investigations were valuable in some crises.

## Discussion

"No clinician should be averse to some form of feedback of performance that permits an external critique."<sup>2</sup> The complex auditing procedures carried out in the United States are not at present applicable in this country, for they demand expensive and extensive administrative machinery and their value has yet to be proved. Nevertheless, the type of examination of surgical practice we have described is possible in both district general

and teaching hospitals. It can be carried out only by doctors who understand the problems being discussed, and for this reason it should be open only to the staffs of the units concerned. Occasionally, however, visiting surgeons may be invited to join in the audit and discuss the cases. The attendance of anyone else would undoubtedly inhibit the frank discussions that take place. It is important that those in charge of the auditing procedure must not be aggressive, especially to the junior staff, who may have had to make difficult decisions in less than ideal circumstances. An audit such as we have described undoubtedly has a positive educational role as the experience of the more senior surgeons is pooled during discussion of difficult problems. The main difficulty would appear to be that of boredom and repetition, yet there is usually sufficient variety of material each week to provide a lively clinical discussion on the week's work.

One further advantage is that an audit such as this gives the opportunity for differences in surgical practice to be aired without fear or favour. For example, some surgeons routinely carry out sigmoidoscopy under general anaesthesia—is this necessary? Another example is the treatment of pilonidal sinus—is wide surgical excision, leaving the wound to granulate, justifiable now that minor procedures, such as Lord's operation, are available? Finally, difficult ethical decisions, such as the wisdom and efficacy of operating on very old patients with ruptured aortic aneurysms, may also be freely discussed.

To undertake an audit less frequently than once a week would mean that many cases would be left undiscussed simply because of the volume of work that passes through the units. Regular monitoring of the clinical work load should not, however, detract from or replace normal postgraduate activities such as clinicopathological conferences to discuss in detail the more interesting cases. With the establishment in a hospital of such a group a way is open for the health authorities to refer statistics derived from the Hospital Activity Analysis for discussion.

We acknowledge the co-operation of our surgical colleagues Mr J R N Curt, Mr A W Hargreaves, Mr G Ingram, and Mr R W Marcuson, and their junior staff, without whose help this venture could not have been started.

## References

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# Statistics at Square One

## XIX—Correlation (continued)

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### Calculation of correlation coefficient

When making the scatter diagram (Part XVIII, fig 18.2) to show the heights and pulmonary anatomical dead spaces in the

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15 children he was studying, Dr Green set out the figures as in cols (1), (2), and (3) of table 19.1. It is helpful to arrange the observations, as he has done, in serial order of the independent variable when one of the two variables is clearly identifiable as independent. The corresponding figures for the dependent variable can then be examined in relation to the increasing series for the independent variable. In this way we get the same picture, but in numerical form, as appears in the scatter diagram.

The calculation of the correlation coefficient is as follows, with  $x$  representing the values of the independent variable (in this case height) and  $y$  representing the values of the dependent variable