

Closing the audit circle: effect of continuing audit on arthroscopic practice

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A prospective study in a single orthopaedic unit for one calendar year was carried out to examine the effect of continuing audit on arthroscopic practice.

A standard proforma was introduced to record information and results were analysed using a system of audit codes.

Two audit periods were examined, the first 3 months and the subsequent 9 months. Results after audit of the first period were compared with the second period; diagnostic accuracy and clarity had improved as had the accuracy of audit coding.

The subset of patients with a preoperative diagnosis of a meniscal tear was analysed and the diagnostic accuracy for this group improved over the year.

We found that the Audit Circle had been closed in the areas of diagnostic clarity, diagnostic accuracy of meniscal tears and the accuracy of audit coding.

General audit usually consists of 'deaths and discharges' information. Specialist audit examines procedures of various kinds, be they operative or non-operative, in a prospective manner and as a result attempts to close the 'Audit Circle' for that activity.

Any operation or procedure may become overused if it is freely available and shown to be diagnostically accurate and surgically effective in the hands of experts (1). If there is a possibility that the procedure replaces good clinical skills as a diagnostic tool it must be examined by critical methods to determine whether it is fulfilling its primary function. This situation applies to arthroscopy at present.

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In addition, magnetic resonance imaging is increasingly being used as the only preoperative investigation of internal derangements of the knee (2) and may also be replacing clinical acumen. The cost implications of this can be formidable.

We present the result of a prospective audit that examines the change in arthroscopic practice in our hospital in a single calendar year after interim audit.

Patients and methods

All patients undergoing arthroscopy at the Lister Hospital from 1 January to 31 December 1991 were included in the study. The majority (81%) were day cases. Table I shows the patients' demographic data.

A standard proforma was introduced to record patient details, clinical history, results of preoperative investigations, the intention of surgery (ie diagnostic or therapeutic arthroscopy), surgeon and anaesthetist, findings at operation and the result of surgery according to a set of audit codes (Table II).

Table I. Demographic details of patients in the two audit periods (percentages in brackets)

	Number	Right	Left	Mean age (years)	Range (years)
1 January-31 March					
Men	46 (56.8)	22 (45.8)	26 (54.2)	36.1	17-71
Women	32 (43.2)	16 (44.4)	20 (55.6)	38.1	14-76
1 April-31 December					
Men	123 (62.8)	73 (51.4)	69 (48.6)	37.5	11-74
Women	78 (37.2)	48 (53.3)	42 (46.7)	40.8	11-80

Table II. Audit codes used to assess preoperative diagnostic accuracy compared with the arthroscopic findings and treatment

Code	Contribution to diagnosis	Treatment
1	Diagnosis confirmed	Yes
2	New diagnosis	Yes
2	No contribution to diagnosis	No
4	Diagnosis confirmed	No
5	New diagnosis	No
6	Pathology excluded	No

At the beginning of the year, all the surgeons in the department were introduced to the proforma and had the audit codes explained to them.

A half-day audit meeting in April 1991 was allocated to allow us to examine the results for the first 3 months and correct any recording difficulties that may have arisen. The results from the next 9 months were then compared with these to assess the effect of the audit. Specifically, we looked at the variation in coding outcome for patients thought to have a meniscal tear by analysing the clinical presentation, the intention of surgery and the arthroscopic findings. The information was analysed using the ALITE^(c) spreadsheet (3) program on an IBM compatible PC.

Results

The clinical diagnosis rate was very similar for both audit periods (Fig. 1), but the number of diagnoses offered for each knee fell from an average of 1.4 in the first 3 months to 1.3 in the second 9 month period (more than one diagnosis per knee was allowed).

The arthroscopies were designated diagnostic or therapeutic depending upon the preoperative diagnosis, which then determined the intention of surgery. For the first period there were 42 of each (50.0%). For the second

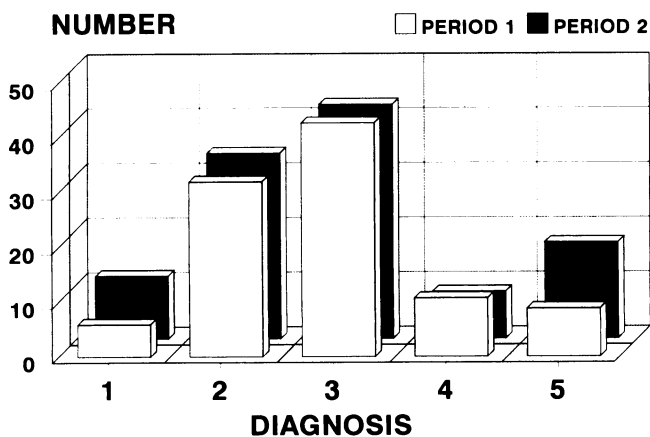


Figure 1. Number of clinical diagnoses in periods 1 and 2 is shown. The diagnostic groups are: 1, Cruciate ligament lesions; 2, Meniscal tears; 3, Degenerative lesions; 4, 'Chondromalacia patellae'; 5, Other lesions. The rates of clinical diagnosis are similar during both periods.

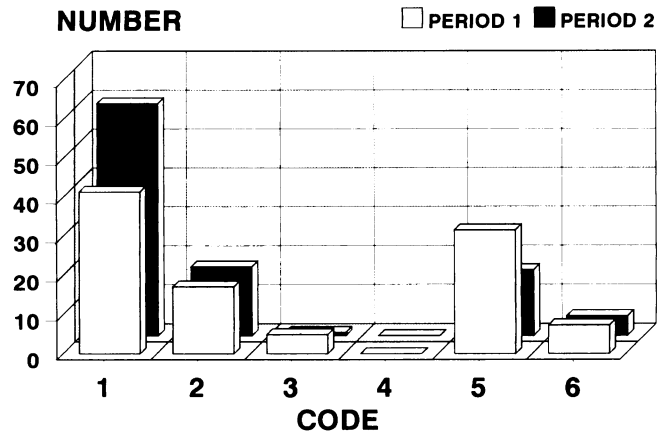


Figure 2. Results of audit coding for therapeutic arthroscopies show that over the audit period Code 1 results improved by 44% and non-Code 1 results improved by 32%.

period 102 (47.4%) were diagnostic and 113 (52.6%) were therapeutic.

Figures 2 and 3 show the results of audit coding for both groups. For therapeutic arthroscopies, codes 1 and 2 are 'appropriate', ie the result of surgery is therapeutic whether the diagnosis was correct or not. Similarly, codes 4-6 are appropriate for diagnostic arthroscopies since no treatment was required. Code 3 indicates a technical failure. There was an increase in the number of 'appropriate' results from the first to the second period for both therapeutic (58.6% to 77.2%) and diagnostic (61.8% to 78.7%) operations. In both, this was a result of improved preoperative diagnostic accuracy; for therapeutic arthroscopies the number of Code 1 results increased while the Code 5 results decreased, and for the diagnostic arthroscopies the reverse was true with Code 4 numbers increasing and Code 2 numbers falling.

For the first 3 months, 21% of audit codes had been wrongly assigned by the operating surgeon at the time of surgery. This fell to 6% in the next 9 months.

For the meniscal tear subset we looked at the clinical history and examination findings to allocate patients to a 'typical' or 'atypical' group. If patients had a good history for a tear, ie a twisting injury, swelling, locking, etc., and

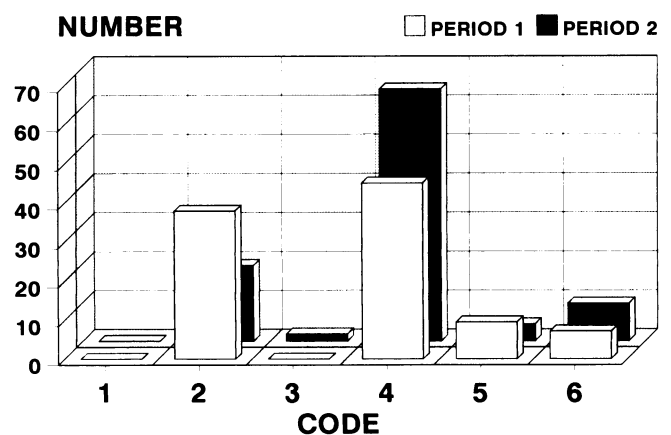


Figure 3. Audit coding results for diagnostic arthroscopies which show that Code 4 results improved by 43% and non-Code 4 results by 34% during the year.

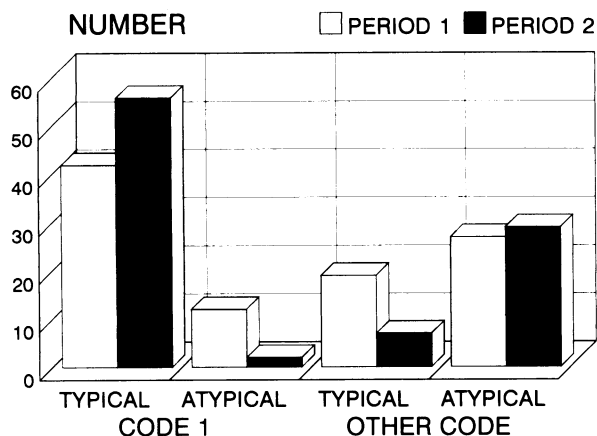


Figure 4. Coding results when a clinical diagnosis of a meniscal tear has been made. The change in diagnostic accuracy is the sum of all of the differences between the groups.

examination features that supported this, eg joint-line tenderness, effusion, locked knee, positive McMurray's test, etc., they were deemed to have 'typical' features of a meniscal tear. Those with a vague or no history of injury, few symptoms and one or less examination features of a tear were classed 'atypical'.

Figure 4 shows that the overall diagnostic accuracy improved by 17.2% between the two periods. The correlation between a clinical diagnosis of a meniscal tear, whatever the presentation, and finding a tear at operation rose from 54.5% in period 1 to 63.1% in period 2.

Coding results for 'typical' presentations improved between the two periods by 19%; from 70% accuracy (Code 1) in period 1, to 89% in period 2. For 'atypical' presentations there was an improvement only for Code 1 cases, but not for other codes.

All of the records of patients with meniscal tears found at operation (excluding degenerate menisci in arthritic knees) were reviewed to examine those that were 'missed' (ie not identified by preoperative diagnosis, thus false-negative results). The ratio of Code 1 tears to 'missed' tears fell from 28.0% in the first period to 21.6% in the second. Of the seven 'missed' tears in the first 3 months, three were thought to be lesions of the other meniscus preoperatively and four knees were thought to have degenerative lesions only. In the next 9 months, 16 tears were 'missed'; five had been thought to be tears of the other meniscus; six, degeneration only; two, anterior cruciate ligament tears and three knees were thought to have loose bodies preoperatively. Of the 'missed' tears, three (43%) had typical features for a tear in the first 3 months and five (31.2%) in the next 9 months.

Discussion

Audit requires time, money and commitment from those involved. It is increasingly important as purchasing authorities may require audit results before deciding to place contracts with provider units (4,5).

Prospective and retrospective audit provides information about the level of activity in a unit. By comparing activity levels with similar departments in other hospitals, local differences may be placed in their true context (6). The 'Audit Circle' can be closed by both of these forms of audit, but prospective audit has the benefit of being easier to carry out once set up. By the elimination of retrospective bias, prospective audit can be used to answer specific questions about an activity and so provide information for future planning.

The present study has defined the level of arthroscopic surgery in the department and this information will be useful for planning purposes. We have also shown that there was an overall improvement in diagnostic accuracy, which, since it corresponded with the audit, may be taken to be as a result of audit. For all meniscal tears the improvement has been modest, although for 'typical' presentations it was almost 20%. In addition, the number of 'missed' tears fell over the year.

As arthroscopy has become freely available, the tendency to become less diagnostically rigorous, clinically, has increased. Older orthopaedic surgeons have questioned the widespread use of the technique. This study has demonstrated that not only is the level of arthroscopic surgery in our department appropriate (as shown by the results of audit coding), but also that by using audit, we have increased our efficiency.

With the increasing availability of magnetic resonance imaging (MRI) there is pressure to use this non-invasive, non-radiological technique to help make a diagnosis in cases of internal derangement of the knee before embarking upon arthroscopy (7). The cost implications are considerable and would have to be built into contracts for arthroscopy. Our data suggest that clinical assessment alone should identify the majority of meniscal tears (63.1% overall and 89% for 'typical' presentations in the second period), which is comparable to other published data (2,7,8). Although highly desirable, it may not be possible to improve the diagnostic accuracy much more, since more than 30% of presentations are not typical. The indications for MRI need to be clearly defined, especially since it is known to have quite a high false-positive rate (9,10). From our figures we could at least suggest one indication, which is to scan all knees which are thought to have a meniscal tear but do not have a 'typical' presentation.

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