Learning assessment at shoulder surgical skills course

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ABSTRACT

INTRODUCTION Surgical skills courses are an important part of learning during surgical training. The assessments at these courses tend to be subjective and anecdotal. Objective assessment using multiple choice questions (MCQs) quantifies the learning experience for both the organisers and the participants.

MATERIALS AND METHODS Participants of the open shoulder surgical skills course conducted at The Royal College of Surgeons of England in 2005 and 2006 underwent assessment using MCQs prior to and after the course.

RESULTS The participants were grouped as non-consultants (14) and consultant orthopaedic surgeons (8). All participants improved after attending the course. The average improvement was 17% (range, 4–43%). We compared the two groups while adjusting for the association between pre-course score and score gain. We found a strong correlation between pre-course score and score gain ($r = 0.734$; $P = 0.001$). Adjusted for pre-course score, we found that the score gain (learning) for the non-consultants was slightly larger than for the consultants, but this did not reach statistical significance ($P = 0.247$).

CONCLUSIONS All participants had a positive learning experience which did not have a significant correlation to the grade of surgeon.

KEYWORDS

Assessment – Surgical skills course

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Surgical skills courses are an important part of learning during surgical training. The assessments at these courses tend to be subjective and anecdotal. Objective assessments are important both to the trainee and the organisers. To the organisers, it serves to improve the course for subsequent participants and for the trainees it helps them assess improvements after focused learning on an individual subject. These courses it is hoped would form an integral part in achieving surgical competencies in a more efficient manner with the modernising of medical careers.

The assessment of learning should not be time consuming so that a majority of the time could be spent in learning and also that the participants would be willing to undertake the assessment. Ideally, assessments should test all the individual components of learning.

The process of learning comprises of comprehension, application, analysis, synthesis, and evaluation.¹ Modern educators have simplified and collapsed it into three general levels.² The three levels include: (i) knowledge (recall or recognition of specific information); (ii) combined comprehension and

application (understanding or being able to explain in one's own words previously learned information and using new information, rules, methods, concepts, principles, laws, and theories); and (iii) problem solving (transferring existing knowledge and skills to new situations).

The application of core knowledge in surgical situations, error detection, problem solving and technical skills to achieve the desired result is the aim of all surgical training. The assessment of techniques can be achieved using Objective Structured Assessment of Technical Skills (OSATS), which are assessments of individual techniques or components of techniques in a simulated environment. Although technical learning is very important, especially in endoscopic surgery where the learning curve is very steep and technical skill vital, it can occasionally divert the attention of organisers from the importance of knowledge-based learning, especially cognitive learning. The importance of error detection and problem solving in surgical practice cannot be overemphasised and there is evidence to suggest that teaching cognitive skills improve learning.⁵

Figure 1 Score gain after the course.

The multiple-choice question (MCQ) is the most common type of written test item used in undergraduate, graduate, and postgraduate medical education.⁴ Appropriately constructed MCQs result in objective testing that can measure knowledge, comprehension, application, and analysis.⁵ Advantages of MCQs are that they can be used to assess a broad range of learner knowledge in a short period of time, while disadvantages are that they test recognition (choosing an answer) rather than recall (constructing an answer) and they allow for guessing. In order to achieve the aims of the course assessment, a direct relationship between instructional objectives and test items must exist. Thus, test items

should come directly from the objectives.⁵ The assessment of core knowledge can be done using context-free MCQs while the application of knowledge or cognitive function can be tested using context-based MCQs.

Materials and Methods

A pool of MCQs were prepared keeping in mind the instructional objectives of the open shoulder surgery course by the moderator (CPK). The questions included both context-free questions to evaluate the core knowledge and context-based questions to evaluate the application of knowledge. All participants of the open shoulder surgical skills course conducted at The Royal College of Surgeons of England in 2005 and 2006 underwent assessment using the prepared pool of MCQs. All participants had a pre-course assessment and a post-course assessment. All assessments were marked by the organiser and a percentage of the total score calculated for the individual participant. An improvement in the score implied a positive learning experience. The score gains following the assessment were analysed using regression analysis and analysis of co-variance.

Results

A total of 26 surgeons participated in the course. Two responses were excluded from the final analysis as they were incomplete. Two participants refused to take both the pre-course and post-course assessments. In the final analysis, 22 responses which included both the pre-course and post-course assessment were used.

Figure 2 Correlation between pre-course score and score gain.

The participants included specialist registrars (7), clinical fellows (2), staff grade surgeons (5), all grouped as non-consultants (14) and consultant orthopaedic surgeons (8).

The pre-course scores ranged from 43–92% (average, 68.8%), while the post-course scores ranged from 67–100% (average, 85.5%). The improvement ranged from 4–43% (average, 17%). All participants improved after attending the course (Fig. 1). The improvement was largest in the group who had low pre-assessment scores.

For analysis of association between grades of the surgeon, we grouped the participants as consultants and non-consultants. We compared the two groups while adjusting for the association between pre-course score and score gain. We found a strong correlation between pre-course score and score gain ($r = 0.734$; $P = 0.001$; Fig. 2). Adjusted for pre-course score, we found that the score gain (learning) for the non-consultants was slightly larger than for the consultants, but not significantly so (average difference, 4.2; $P = 0.247$; Fig. 2).

Discussion

The MCQ assessment was easy to administer and was not time consuming either for the organiser or the participants. It is well established that use of MCQs is a good and reliable method of testing that correlates well with overall competence and performance.⁶

All participants improved after attending the course. The pre-course assessment gave the participants a good understanding of course objectives and helped concentrate their minds on possible deficiencies in their knowledge base. It re-iterated the objective of the course organisers that the course should not be restricted to individual grade of surgeons and that, irrespective of prior experience, all participants stood to gain substantially from the course.

We analysed the trends in learning. Logically it would be expected that participants with less knowledge would gain more. This was found to be true with a positive correlation between the pre-course score and score gain in both groups. We also found that the score gain did not have a significant relationship with the grade of surgeon. This again emphasised that the potential participants may be surgeons with an interest in shoulder surgery irrespective of previous experience or position, although it should be said that all participants had some experience in orthopaedic surgery with an interest in shoulder surgery.

The limitation of this study in analysing the patterns of learning and the correlation between grade of surgeon and learning was the number of participants. We did a power analysis to calculate the minimum number of participants required to reach statistically significant conclusions on relationship between grade of surgeon and learning, which is 49 per group. Although this formed a part of our analysis, the investigation into patterns of learning was not the primary objective.

OSATS may be useful in assessing the technical skills of individual participants and may, at a later point in time, become relevant when assessment of surgical competencies becomes a course objective. At the present, it may not be appropriate in the context of the open shoulder surgical skills course as the course does not teach a single technique. Moreover, didactic assessment methods could possibly increase drop-out rates amongst participants, as four participants did not complete the assessment during this course.

Conclusions

Objective assessment helped quantify the learning experience for individual participants and was a useful addition to subjective evaluation in the form of comments from the participants. The course provided all participants with a positive learning experience which did not have a significant correlation to the grade of surgeon.

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