

Development of robust methods of assessment of clinical competency in ophthalmic
dispensing – results of a pilot trial

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Abstract

Purpose: We evaluated whether the use of Objective Structured Clinical Examinations (OSCEs) combined with established standard setting procedures, could be used to define standards for the achievement of clinical competencies in ophthalmic dispensing.

Methods: Ten OSCE stations were created to assess a range of professional competencies for dispensing opticians. For each station, examiners made a global judgment about student performance using a rating scale, (bad fail, fail, borderline, pass, good pass). Examiners were instructed not to base their rating on the checklist marks. We also introduced performance based standard setting using a linear regression method. The rating of the student was plotted against marks obtained for the station and a line of best fit was derived from the data. The pass mark for each station was set at the mark for the borderline rating.

Results: The average pass mark across stations was 57%. Students with higher marks also tended to be rated more highly by examiners; however, this was not universal. The slopes of the regression lines were significantly greater than zero across stations suggesting that the checklists were appropriate. Feedback from students and examiners was positive.

Conclusions: Our study has demonstrated that the OSCE format and use of standard setting procedures is a viable approach to assess clinical competencies in ophthalmic dispensing. More data are required to confirm the reliability of the stations over repeated use.

Introduction

The General Optical Council (GOC) is one of a number of health and social care regulators in the UK established to ensure the safety of the public. As part of this remit the GOC is charged with setting the professional standards for the education of optometrists and dispensing opticians in the UK and monitoring their training. The GOC also approves qualifications that lead to registration (as an optometrist or dispensing optician), maintains a register of qualified individuals and makes investigations where fitness to practice is brought into question. A dispensing optician is a registered professional with expertise in ophthalmic dispensing, who fits and dispense spectacles according to a prescription written by an optometrist or medical practitioner with account of the visual, vocational and lifestyle needs of the patient. The dispensing of spectacles to the visually impaired or to children may only be performed by dispensing opticians or optometrists registered with the GOC or under their supervision (GOCa 2012).

The registration as a dispensing optician by the GOC requires satisfactory completion of an approved course of study (typically 3 years of further or higher education), including a period of supervised pre-registration practice and the satisfactory completion of professional certifying examinations. All relevant UK training institutions are required to submit annual reports that summarise student performance and highlight issues that may impact on student performance and are also subject to periodic reviews by the GOC. The GOC also specifies the clinical competencies in ophthalmic dispensing that define the skills and attributes of an entry level dispensing optician ready for professional practice (GOCb 2012). As such, these competencies are important to promote the achievement of a high level of skill in the student dispensing optician and for instilling confidence in the public that appropriate standards are being met. However, although the GOC describes the required competencies in detail, it does not specify the standard required to meet them or the method of assessment and leaves this to the respective training institutions and professional organisations responsible for assessment and certification. Therefore, as the assessment of clinical competence and the setting of professional standards is a high stakes activity that carries with it significant

consequences for the student, it is essential the methods used to conduct the assessment and arrive at the passing score are both justifiable and defensible (Wilkinson, Newble et al. 2001) Although methods to assess clinical competency have existed in medicine for many years (Harden, Stevenson et al. 1975), little published research exists for the optical professions in the UK either in optometry or ophthalmic dispensing. Therefore, the aim of this project was to conduct a pilot study to determine whether the use of the objective structured examination (OSCE) (Newble 2004) *combined with* an established standard setting procedure (Wilkinson, Newble et al. 2001; Boursicot, Roberts et al. 2007) could be a viable method to assess clinical competency for entry level dispensing opticians. Our specific interest was to develop an assessment process that is robust to scrutiny (from students, examiners and regulators), that is practical to implement and is acceptable to both staff and students.

Methods

Ten new 10-minute OSCE stations (Smee 2003) were created and divided into two groups of 5 stations representing winter and summer assessment periods. All of the OSCE stations were designed to evaluate the required GOC competencies for dispensing opticians that assessed a candidate's so called 'ability to do' tasks (GOCb 2012). Each station assessed one or more specific competencies and comprised a checklist of items that covered the competencies, the marks associated with each item and a global rating scale (Fig. 1). For each station, students were required to perform one or more tasks and where appropriate answer a series of defined questions posed by the examiner. In 8 of the 10 stations students were directly observed performing the task required whilst in the remaining 2 stations they performed the required task and completed an answer sheet but were not directly observed. Instructions for examiners and examiner information sheets were also included for each station (students did not have sight of these). We have successfully used a similar format in our department for a number of years to assess clinical competencies in undergraduate optometry (Siderov, Patel et al. 2008; Siderov, Norgett et al. 2009).

Insert Fig 1 about here

A series of meetings of examiners was held prior to any testing. The aims of the meetings were to discuss the OSCE stations, to review the checklists and information sheets associated with the stations, to agree on the appropriateness of the items on the checklist, the marking scale and the weighting of the marks for each item. The examiners included GOC registered dispensing opticians and optometrists and included both male and female registrants with many years of cumulative experience in academic teaching and assessment, in clinical examining for certification, in research and scholarship and in patient care in optometry or ophthalmic dispensing. Two of the examiners were recent graduates of our own undergraduate course in ophthalmic dispensing. The OSCE stations were also reviewed by our external examiner in ophthalmic dispensing.

The OSCE format lends itself to the use of performance based standard setting procedures, particularly where the OSCE is used to define competency (Newble 2004). As our intention was to apply the new OSCE assessments for credentialing purposes it was important that we employed an absolute standard in our standard setting procedure (Kramer, Muijtjens et al. 2003; Norcini 2003; Newble 2004; Boursicot 2006). We used the global rating scale and borderline-regression (BR) method as our standard setting procedure (Wilkinson, Newble et al. 2001; Kramer, Muijtjens et al. 2003; Boursicot 2006; Boursicot, Roberts et al. 2007). In the BR method examiners mark the student using the checklist then make a global judgment or rating (bad fail, fail, borderline, pass, good pass) about the student's performance. In this way, the examiner's clinical expertise and their expected standards for the task formed part of the assessment process. Examiners were instructed not to base their global judgment on the checklist marks. The marks obtained for each station were plotted against the examiner rating of the student and a line of best fit was derived from the data for each station. The

pass mark for the station was set at the mark for the borderline rating and obtained directly from the regression line (Fig 2), rounded up to the nearest integer.

In order to gain efficiency, each ring of 5 stations was duplicated once so that a single OSCE session (winter or summer) comprised 2 of each station. Although more staff and equipment were required to deliver this format, this was balanced against more students that could be assessed in a single sitting. For the purposes of this pilot study, a total of ten students participated and each student rotated through both OSCE sessions (winter and summer). The students were selected from all levels of our current cohort of undergraduate students in ophthalmic dispensing and also included candidates that had recently graduated from our course. Students were given a briefing which described the OSCE format and the stations but were not given the station checklists. Examiners were also briefed on the OSCE format but formal training was not given as, for the purposes of this pilot, most of the examiners were experienced in assessing in OSCEs and the use of performance based standard setting. Thus we obtained pilot data from 10 students per OSCE station using 2 different examiners per station.

Insert Fig 2 about here

Results

Representative results plotted for one OSCE station are shown in Fig. 2. The straight line represents a linear regression fit to the data. The pass mark for the station was set at the borderline rating. All of the data for each OSCE station were analysed in the same way and a summary of the results, showing the derived pass marks, is presented in Table 1. The slopes of the regression lines for each station were all greater than zero. The average pass mark across all OSCE stations (both winter and summer sessions) was 57%. Students with higher marks also tended to be rated more highly by examiners; however, this was not universal and occasionally some students scored relatively highly on a station but were rated as a fail by the examiner. For the purposes of certification, students would be required to

pass each station. Although the number of candidates was small, anecdotal feedback from both students and examiners regarding the OSCE format was positive.

Insert table 1 here

Discussion

The purpose of this project was to evaluate whether the use of the OSCE and borderline-regression performance based standard procedure is an acceptable method for assessing clinical competency in ophthalmic dispensing. The approach that we took was based on established methods used in medicine and other health disciplines (Kilminster and Roberts 2004; Boursicot 2006; Boursicot, Roberts et al. 2007) and one that we have also piloted in other courses in our department (Siderov, Patel et al. 2008). The OSCE format was well received by the students and examiners and all students completed the stations in the allotted time.

Given that the study was based on relatively few students, the data obtained from the OSCE stations should be interpreted with caution. Nevertheless, we are able to make some general observations. The regression lines for each of the stations had a slope greater than 0, which suggests a positive correlation of the checklist items with the examiners' global rating of student performance. This finding may not be unexpected if the examiners were using the checklist scores to help them arrive at their rating score. However, we do not think that this was the case. Firstly, we instructed all examiners to base their global rating in relation to what they considered adequate performance of a competent practitioner. Secondly, there is evidence that in some instances, examiners rated students as fail, borderline or pass for approximately the same checklist mark (e.g. Fig. 2). This suggests that examiners were not basing their rating on the checklist mark rather that they also relied on their own judgement of clinical competency. We therefore tentatively suggest that the checklists were appropriate and correlated with the examiners' opinion on what was important for the relevant

competencies in each station. However, more data would be required to confirm this supposition.

Two of the 10 OSCE stations did not require direct observation of the student. However, whilst the examiner did not directly observe the student they were nevertheless required to provide a rating of performance. The two stations in question required students to make a series of ophthalmic measurements on lenses or spectacle frames and examiners were asked to use their judgement to determine whether the student's answers were appropriate for the competency assessed. We did not provide any other instruction. In this case whilst examiners would have had to base their rating on the checklist they were also required to make a judgement of competency based on the results. We did not instruct examiners on which specific elements of the checklist to use to determine competency, hence we feel that our approach was appropriate in that examiners were using their judgement of clinical competency to arrive at an appropriate rating. Of course in these stations we assume that the checklists are broad enough to cover the requirements of the competency assessed.

We purposefully used examiners with a range of experiences and a mix of attributes as has previously been suggested (Norcini 2003). We felt that such a selection would offer the best balance and input into both the design of the stations and the determination of competency in ophthalmic dispensing. A recent review of the use of OSCEs in medical education concluded that there is no specific examiner trait that has been identified as important in the administration of OSCEs (Casey, Goepfert et al 2009). Other studies have even concluded that student examiners can be as good as qualified practitioners or educators (Chenot, Simmenroth-Nayda et al 2007; Moineau, Power et al 2011). We therefore feel that our use of examiners with a range of experiences did not adversely affect our results.

The pass marks for the OSCE stations were between 49% and 70% depending on the station. While such differences could reflect station related factors (e.g. differences in difficulty between stations, poor checklist construction) or student/teaching related factors

(e.g. poor learning of task or poor teaching), we cannot draw any conclusions from the mark range due to the small number and varied nature of the student candidates. Future analysis, based on more OSCE data is needed before any such conclusions can be drawn. In addition, comparisons with other assessments in the course to assess the validity of the OSCE would be helpful. One of the possible limitations of the BR method of standard setting is that the pass mark is not known until after the all of the results are collected and analysed at the end of the assessment. However, with repeated testing over many cohorts a consistent pass mark for each station should be possible (Wilkinson, Newble et al. 2001).

It is well known that delivering an OSCE is resource intensive (Carraccio and Englander 2000; Newble 2004; Turner and Dankoski 2008) a finding we agree with. On the day of the assessment, we required 10 different examiners and 2 technical staff, timetabling of 10 individual examination cubicles and 2 additional rooms to be used for refreshments and a student waiting area and all of the necessary equipment. Pre-assessment preparation time and post-assessment analysis was also required. Nevertheless and despite the additional resources needed, the importance of the OSCE for the professional certification of students cannot be underestimated. Students and examiners all felt that the way in which the OSCE was conducted promoted professional practice and emphasised the importance of the assessment.

The use of the objective structured clinical examination has found its place in the assessment of clinical competency in medicine (Harden, Stevenson et al. 1975; Kaufman, Mann et al. 2000; Boulet, De Champlain et al. 2003; Boursicot 2006; Harden and Gleeson 2009) and other health profession (Schoonheim-Klein, Muijtjens et al. 2009); however, this is the first report of the successful use of the OSCE and performance based standard setting in the assessment of clinical competency for undergraduate dispensing opticians. Further research is required to confirm our initial impressions from this pilot study, that the OSCE and BR method of performance based standard setting is a practical and acceptable option for the certification of professional competency for dispensing opticians.

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Table 1. The 10 OSCE stations grouped per session are shown with their respective pass marks derived using the borderline regression (BR) method as described in the text.

OSCE Summer	Pass Mark	OSCE Winter	Pass Mark
Station 1 (Occupational lens recommendation)	61%	Station 1 (Ocular abnormality)	70%
Station 2 (Frame and lens identification)	49%	Station 2 (Spectacle dispense)	56%
Station 3 (Focimetry)	54%	Station 3 (Paediatric prescription discussion)	49%
Station 4 (Problem solving)	50%	Station 4 (Paediatric case records)	65%
Station 5 (Case records)	59%	Station 5 (Low vision)	59%

Figure 1

OSCE Station 1
Occupational lens recommendation

Candidate Identifier**Examiner**

The candidate has 10 minutes to gather information from the patient/examiner and provide appropriate responses. The candidate is provided with a prescription to make a lens recommendation

Questions patient and sufficient information gathered	6
Provides recommendation of suitable lens and reason for use	6
Provides examiner with list of measurements that would need to be taken for given lens recommendation	2
Respect to patient and professional conduct	1
Total	/15
Task not attempted	0

Examiner please tick if student has met competencies below:

1.1.1. Obtains relevant history and information relating to general health, medication, family history, work, lifestyle and personal requirements

2.1.3. Shows respect for all patients

4.1.2. Dispenses and advises on a wide range of lenses and frames, taking into account the patient's needs and requirements (part)

Overall impression

Bad Fail

Fail

Borderline

Pass

Good pass

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Feedback:

Occupational lens recommendation **Candidate Identifier**

Figure 2

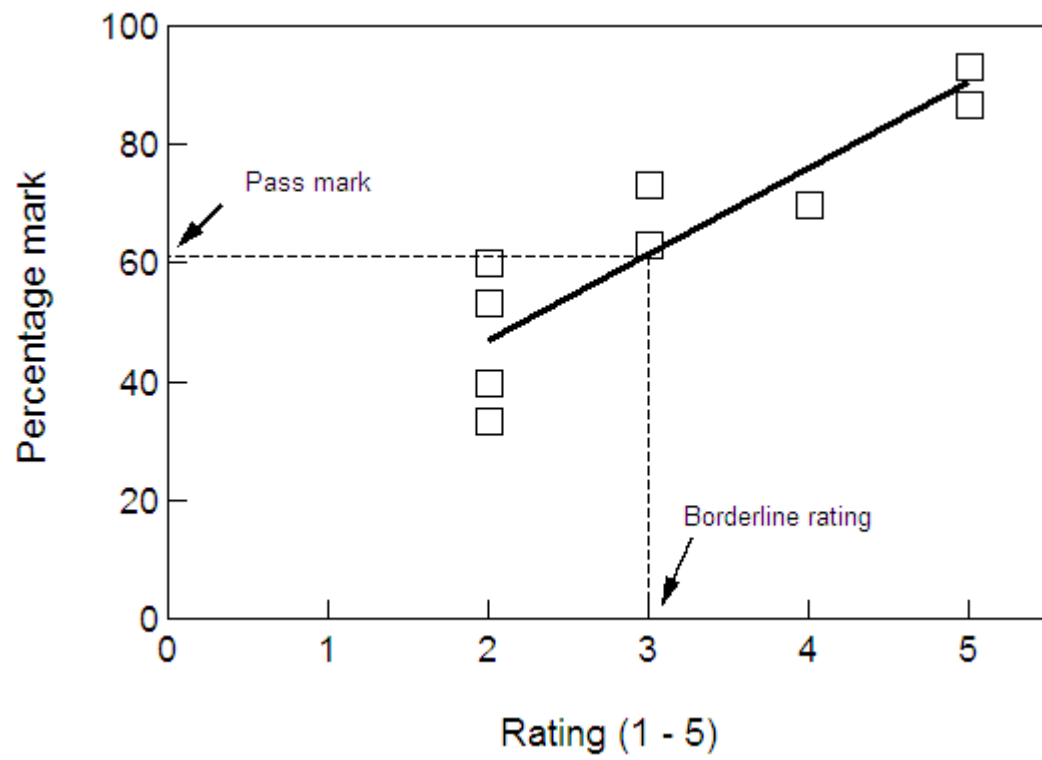


Figure Captions:

Figure 1. OSCE station 1, titled Occupational Lens Recommendation (summer session), showing the checklist and rating scale. Also shown are the relevant clinical competencies that are assessed. A feedback section was included to allow examiners to provide comments to students for improvement. All of the stations used this format.

Figure 2. The percentage mark (y-axis) is plotted as a function of the global rating (x-axis) (open squares) for the OSCE station depicted in Fig. 1 (Occupational Lens Recommendation). The solid straight line represents the best fitting linear regression. On the x-axis, 1 represents a bad fail, 2 a fail, 3 borderline, 4 a pass and 5 a good pass. The vertical and horizontal dashed lines indicate the borderline rating and pass mark respectively.