

## **Perceptions of training in gonioscopy.**

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Conflict of interest:

The authors declare no conflict of interest.

## **Abstract**

*Purpose:* To evaluate ophthalmology trainees' perception of their gonioscopy learning experience in the Ophthalmology Specialty Training programme.

*Materials and methods:* A cross-sectional electronic survey was conducted amongst ophthalmology trainees across London Deaneries. The 10 questions survey collected parameters including training grade, previous level of gonioscopy training, confidence in performing the procedure, level of satisfaction with the training formats received, potential barriers and improvements to the training programme. The respondents were also invited to express any additional comments.

*Results:* Fifty-seven complete responses were analysed. Respondents included 25 junior trainees (ST1-3) and 32 senior trainees (ST4-7 and fellow). One fifth of the respondents (11/57) were unconfident in performing gonioscopy, majority being junior trainees (9/11). Over a quarter of the respondents were dissatisfied with the quantity of the gonioscopy training received. Teaching formats such as consultant teaching (mean 8.0), self-directed learning (mean 8.0) and small-group tutorials (mean 7.6) were all well received. Overall, lack of clinical time was considered as the major barrier to gonioscopy training; however lack of training was considered as the major barrier in the low confidence group.

*Conclusion:* This study highlighted ophthalmology trainees' dissatisfaction in the current gonioscopy training curriculum and a lack of confidence in performing the procedure. Appropriate modifications to the Ophthalmology Specialty Training programme could enhance trainees' gonioscopy learning experience.

## **Keywords**

Gonioscopy, Ophthalmology training

## **Introduction**

Glaucoma is one of the leading causes of irreversible blindness worldwide.<sup>1</sup> Studies have shown that diagnosis made based on symptoms alone often fails to correctly detect a common form of glaucoma - primary angle closure glaucoma (PACG).<sup>2,3</sup> It is therefore vital for ophthalmologists to be experienced in the gold standard diagnosis tool, gonioscopy, as it is the only slit-lamp based method to allow direct examination of the anterior chamber angle, along with important information such as morphology, pigmentation and any other abnormality.<sup>4,5</sup> NICE guidelines recommend all patients with suspicious anterior chamber angle or previous inconclusive examinations to undergo gonioscopy at presentation,<sup>6</sup> however recent research have indicated that its use in clinical practice has decreased.<sup>7-9</sup> Reasons postulated include the advancements in other modalities of angle assessments and patient refusal.<sup>7,8</sup> In this study, we aim to explore another dimension to this issue, namely the challenges faced by ophthalmology trainees in learning gonioscopy.

Recent ophthalmology training in the UK has undergone significant reformation since the introduction of Modernising Medical Careers (MMC), Ophthalmology Specialty Training (OST) Programme and European Working Time Directives (EWTD).<sup>10</sup> Many believe these new agendas have significantly compromised the practical aspects of ophthalmology training.<sup>10-12</sup> The reduction of training hours is believed to have resulted in a fall of confidence amongst trainees in performing practical procedures including gonioscopy, a skill that require regular practice and repeat reinforcement to master.<sup>13,14</sup> Ophthalmologists are under enormous pressure to meet service provision targets,<sup>15</sup> which further reduces valuable learning opportunities and could potentially leads to anxiety in inexperienced trainees.<sup>13-14</sup>

Therefore, this study was designed to evaluate ophthalmology specialist trainees' perception of gonioscopy learning experience, including their performance and interpretation skills, with a view to identifying areas for potential improvement in the training programme.

## **Materials and methods**

### *Questionnaire*

An electronic questionnaire (Supplementary document 1) was distributed online via the survey tool Qualtrics in May 2015 to ophthalmology trainees across London Deaneries using its internal mailing list. The completion of the questionnaire was anonymous, voluntary and non-incentivised.

Parameters collected include training grade, previous level of gonioscopy training and the level of satisfaction with the training received. Trainees self-evaluated their confidence levels in performing gonioscopy and were subsequently asked for potential barriers and improvements in these areas. The response options for each question were on a Likert scale

between 0 to 10. The final section invited the respondent to express any additional opinions and comments regarding gonioscopy training.

### *Statistical analysis*

Questionnaire results were collated using Qualtrics and extracted for further statistical analysis using Stata software version 14.0 ([www.stata.com](http://www.stata.com)). Respondents were divided according to their training grade into juniors (ST1-3) or seniors (ST4-7 and fellows). Basic analysis was performed for demographical data. Confidence and satisfaction was graded as 'poor' if rated 0 to 4, and reasonable if rated 5 to 10. Chi-square tests were used for categorical data and unpaired t-test analysis were used for interval data. A p-value of less than 0.05 was considered as statistically significant. The free text section was analysed thematically.

## **Results**

One hundred questionnaires were distributed electronically to ophthalmology trainees in the North London and South London deaneries and 69 replies were received (69 %). Twelve participants commenced the questionnaire but only responded to the first question hence were excluded in the analysis. One reply was largely completed except the last two questions hence was included in the study. In total 57 responses were included in the analysis (82.6%). For the purposes of analysis, the respondents were divided into junior (ST1-3) trainees (n=25) and senior (ST4-7 and fellows) trainees (n=32).

Overall, 16 (28.1%) and 17 (29.8%) trainees were poorly satisfied (scores less than 5) with the quantity of performance and interpretation training, respectively. Only 8 (14.0%) and 11 (19.3%) trainees were dissatisfied with the quality of performance and interpretation training. Satisfaction with gonioscopy training was variable amongst junior and senior trainees, as demonstrated by Figure 1. Overall, junior trainees have significantly lower satisfaction than seniors in the quantity ( $p < 0.01$ ) and quality ( $p = 0.01$ ) of performance training. For interpretation of gonioscopy, junior trainees also have lower satisfaction in the quantity and quality of teaching; however, this lower satisfaction is only statistically significant in the quantity ( $p = 0.04$ ) and not in the quality of training ( $p = 0.07$ ).

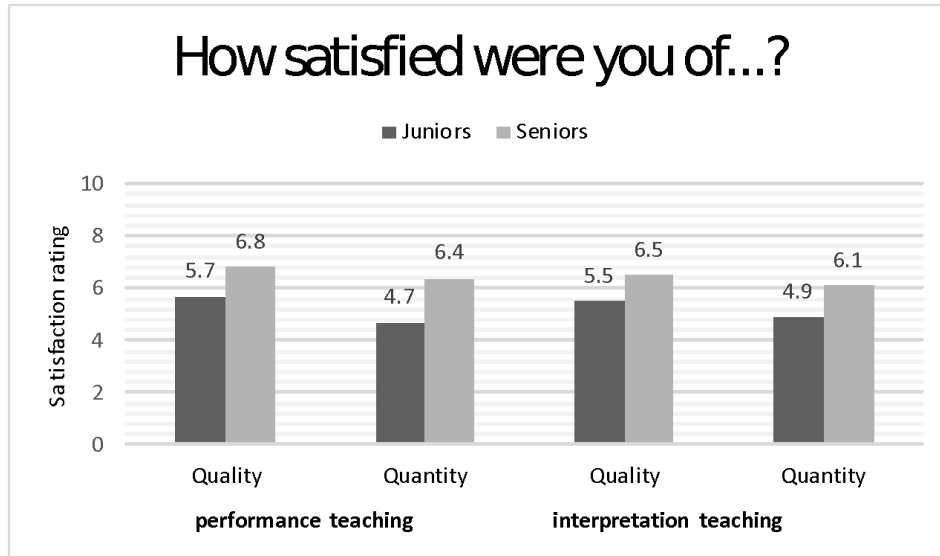


Figure 2 shows the distribution of respondents’ training grades and their confidence in performing gonioscopy. Amongst junior trainees, 2 ST1s, 5 ST2 and 2 ST3 reported poor confidence (scores less than 5) in performing gonioscopy (36%). Only 2 trainees (1 ST4 and 1 ST6) reported poor confidence (scores 5 or more) in the senior trainees group (6%). All responses were divided into trainees with poor confidence in the technique and those with reasonable confidence. Those least confident were, unsurprisingly, significantly less satisfied in all aspects of their gonioscopy training, when compared to their counterparts (Figure 3). In trainees with poor confidence, there was no statistical difference in their opinions between quantity and quality of performance and interpretation training ( $p=0.55$ ).



All trainees report receiving comparable amount of teaching in different formats, as demonstrated by Table 1. The only significant difference between senior and junior trainees was in small group tutorial teaching, where senior trainees (28%) are more likely to receive this format of training than their junior (1%) counterpart ( $p=0.02$ ). Trainees were subsequently asked to grade their satisfaction regarding the effectiveness of different teaching methods that they have received, on a scale 0 to 10 (Table 2). Comparing the mean satisfaction score of each options, trainees rated highly on consultant teaching (8.0), self-

directed learning (8.0) and small group tutorials (7.6), compare with lectures, books and conferences, all with means of 6.6.

Teaching format	Junior (%) n=25	Senior (%) n=32	Chi <sup>2</sup> p value
Consultant teaching	18 (72%)	28 (88%)	0.14
Self-directed learning	22 (88%)	30 (94%)	0.45
Small group tutorial	1 (4%)	9 (28%)	<b>0.02</b>
Lectures	17 (68%)	24 (75%)	0.56
Books	20 (80%)	28 (88%)	0.44
Conferences	3 (12%)	8 (25%)	0.22

Methods	Total Mean Satisfaction	Junior Trainees Mean Satisfaction	Senior Trainees Mean Satisfaction
Consultant teaching	8.0	7.7	8.4
Self-directed learning	8.0	7.4	8.4
Small group tutorials	7.6	5.0	7.9
Lectures	6.6	6.0	7.0
Books	6.6	6.7	6.6
Conferences	6.6	7.0	6.5

Respondents were asked to rate the extent to which each of the three barriers hindered their competence in performing gonioscopy. Lack of clinical time was the most highly rated barrier (mean 5.3, SD 3.3) followed difficulty of the task (mean 4.7, SD 2.8) and lack of training hours (mean 4.4, SD 2.9). Those with poor confidence recorded higher scores for each barrier - p=0.09 for lack of clinical time, p= 0.04 for lack of training hours and p=0.12 for difficulty of the task.

Trainees were invited to rate the desired method to improve gonioscopy learning experience. All 4 suggested methods were all rated favourably- The most popular was the 'use of patient images in camera during clinic with direct feedback' (mean 8.7, SD 2.3). 'online materials' was the next most popular choice (mean 7.4, SD 2.3) and 'small group tutorials' and 'surgical simulation' had an equal mean rating of 6.6 (SD 2.5 and 2.2 respectively).

*Trainee's comment on their experience of gonioscopy training*

Thematic analysis of comments at the end of the questionnaire showed two main themes:

1. Junior trainees dissatisfaction of learning gonioscopy

*'As a ST2 I have found this a very difficult skill to become good at during busy glaucoma clinics, where I have been unable to get feedback on my findings.'*

2. Suggestions of training methods to improve gonioscopy learning.

*'Online videos were extremely useful, especially if the videos have arrows on them so you actually know what the voice over is referring to.'*

*'Arrange a grand rounds session where gonioscopy can be performed on 8-10 people with a range of angle grades and features, with a feedback session with images to follow.'*

## **Discussion**

This is the first study looking at ophthalmology trainees' perception and satisfaction of their gonioscopy learning experience in the UK. The results have highlighted significant shortcomings of gonioscopy training in the current OST curriculum. One fifth of the respondents (11/57 trainees) were unconfident in performing gonioscopy, especially with junior trainees (9/11 trainees). This is an unsurprising finding as senior trainees are expected to have greater cumulative exposure and practice at performing gonioscopy than their junior counterparts, thus likely to be more confident. Importantly, over a quarter of the respondents were dissatisfied with the quantity of gonioscopy interpretation and performance teaching. Trainees with low confidence in performing gonioscopy are unsatisfied with both the limited training time and training quality in learning how to perform and interpret gonioscopy. A numerical target for performing gonioscopy might address the training time issue highlighted, which is a simple interim measure to implement.<sup>20</sup> Incorporating this into the OST curriculum would be worth considering, as it would be particularly beneficial for those with limited experiences and exposure to gonioscopy. More emphasis on gonioscopy training in the OST curriculum by the Royal College of Ophthalmology would ensure more financial and human resources are introduced in teaching gonioscopy, which may consequently influence quality of the gonioscopy learning experience for trainees, thus addressing training quality concerns raised by trainees with low confidence.

Teaching formats such as consultant teaching, self-directed learning and small group tutorials were all well received amongst trainees as effective methods of learning gonioscopy. Small group tutorials were not rated quite as highly, however a much smaller number of mainly senior trainees had received this form of teaching. No-one in this study had yet received surgical simulation training for gonioscopy. When asked what method they felt would be beneficial, the trainees expressed a preference predominantly for consultant teaching including live video images. This was also reviewed positively in the thematic analysis. Teaching equipment such as video camera, teaching scopes should



ideally be available in teaching hospitals to allow effective delivery of training to young ophthalmologists.

Surgical simulation, online materials and small group tutorials were next in popularity. We would therefore recommend these teaching formats to be integrated into the OST curriculum for gonioscopy. More detail about online gonioscopy resource such as the [www.gonioscopy.org](http://www.gonioscopy.org) should be provided by the curriculum to help trainees to access these valuable materials early in the training. Surgical simulation is a rapidly evolving field in ophthalmology training and is gradually being adopted into the current curriculum, especially in phacoemulsification training.<sup>16,17</sup> Some have questioned its ability to replicated real clinical experience,<sup>18</sup> however it could assist novices in developing a baseline level of skill.<sup>16,17</sup> This can then be transferred to clinical settings under supervision and could play a vital role in bridging the need for teaching with the limited resources.<sup>16,19</sup>

Most of the respondents rated the lack of clinical time as a major barrier to gonioscopy training. We suggest dedicated training clinics to provide sufficient time for trainees to acquire the skill of gonioscopy. We would hope that a re-survey would show that they feel less time pressure in glaucoma clinics, allowing trainees to practice gonioscopy under senior supervision in clinics as a result.

Method of assessment was not addressed in this study but the use of a video slit-lamp or direct observational assessment may be the most appropriate method. This would formalise gonioscopy teaching and provide appropriate feedback, thus potentially improving satisfaction and confidence of the procedure in all trainees.

There are several limitations to this study. Firstly, due to the nature of the electronic survey, the reliance on self-reported data is subject to bias. Furthermore, this survey was only conducted in training deaneries within London hence limited in generalisation. Distributing this survey to trainees across the UK would allow the exploration of inter-regional training discrepancies. In addition, the respondents of this survey were still in their ophthalmology training. Our evidence suggests opinions concerning satisfaction and self-reported confidence in learning gonioscopy changes at different stages of training. Around a quarter of the questionnaires were not responded and 10% of replies were excluded due to incomplete data. This may limit the ability of our study to reflect a comprehensive picture of the situation. However, we believe using electronic questionnaires allow trainees to express their views anonymously and enhance our understanding of their true perceptions. Nevertheless, we feel the results of this study have provided insight from trainees' perspective toward gonioscopy training under the current ophthalmology curriculum.

## **Conclusion**

In conclusion, this study has investigated specialist trainees' experience and views of training in gonioscopy. Junior trainees were less confident and more dissatisfied than senior trainees. We have identified areas of dissatisfaction within the current training and the

preferred methods for acquiring the specific skillset needed for gonioscopy. Suggestions were made to both the OST curriculum and the clinical trainers to improve the current situation.

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### **Titles and legends on figures and tables**

Figure 1 - Training grades of the respondents

Table 1 - Methods of teaching received by trainees

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None

### **Conflicts of Interest**

The authors declare no conflict of interest.