The state of ophthalmic education in medical schools: a UK perspective

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Abstract

There is a growing body of literature suggesting a decline in undergraduate ophthalmic education. Anecdotally and in the literature, ophthalmology is a specialty that many students and doctors feel lacking in knowledge and skills, which may put patient-care at risk.

The aim of this review was to investigate (with an emphasis on systematic review of literature, complimented by snapshot-survey of student representatives from U.K. medical schools) the current status of ophthalmology education provided at U.K. medical schools as well as students’ perception of their preparedness for future practice, to guide the future of ophthalmic education. A comprehensive literature search was carried out using Embase, Health Management Information Consortium and Ovid MEDLINE. Simultaneously, a survey was sent out to all U.K. medical schools to ascertain the current status of undergraduate ophthalmology education and students’ perception on preparedness for future practice.

Results showed that though more schools are now providing an ophthalmic education, the length of teaching has eroded. Almost 10% of medical schools reported no formal ophthalmic education. Almost half of the total surveyed felt ‘unprepared’ or ‘very unprepared’ for future practice. We recommend the General Medical Council and Medical Schools Council to work together with the Royal College of Ophthalmologists to improve the current situation.

Keywords: Ophthalmology; Undergraduate; Survey

Introduction

It is of little question that ophthalmology deserves a place in the undergraduate medical curriculum. Not only is there a large prevalence of ocular disease across the spectrum of specialties in medicine and all age groups, early recognition of critical eye signs can lead to saving sight and even preventing life-threatening consequences
Apart from ophthalmology itself, several other fields require a working knowledge of ophthalmic anatomy, physiology and pathology. In the U.K. in 2016, around 7400 doctors successfully completed their foundation training, of which around 600 took a career break rather than applying directly for specialisation (FPAS 2016). Over 40% of trainees went on to specialise in general practice, just under 20% in acute medicine and around 5% in emergency medicine (HEE 2017). Of those going into core surgical and core medical training pathways, a number will go on to specialise in neurology and neurosurgery, rheumatology, otorhinolaryngology, plastic surgery and endocrinology - just to name a few of the specialities apart from ophthalmology itself where a working knowledge of ophthalmic anatomy, physiology and pathology is well required. During a graduate’s foundation training, many of acute signs of sight- or life-threatening disease may well be commonly reviewed initially by junior doctors; and 6% of casualty complaints are ophthalmic (Gout 2015; RCOphth 2018).

Yet, historically doctors feel inadequately prepared in their knowledge and apprehensive in their application of practical ophthalmology skills after graduating - noted not just anecdotally but also widely in the literature (Sheldrick, Vernon & Wilson, 1992; Shuttleworth & Marsh 1997; Schulz, Moore, Hassan, Tamsett & Smith, 2015; Murray, Benjamin & Oyede, 2016).

The Council of British Ophthalmologists denoted in 1919 the earliest reference (Byers 1992) to an undergraduate ophthalmology curriculum. Based on this, the General Medical Council recommended at least ten weeks of training in ophthalmology for undergraduates. In contrast, today, the International Council on Ophthalmology (ICO 2006) recommends between 40 to 60 hours (5-8 days) of training. Yet, the current recommendation from the General Medical Council’s (GMC 2009) document ‘Tomorrow’s Doctors’ does not include ophthalmology at all in its recommendations of undergraduate training; i.e. a clinical placement is no longer a requirement. Nonetheless, examination of the visual system would be needed to complete a ‘full physical examination’, a required competency (Foundation Programme 2018) for all graduating medical students.

It is crucial that – as with other medical and surgical systems, aims and expectations for undergraduate ophthalmology education are equally as defined.

Studies around the world including the U.K. (Gout 2016; Jacobs 1998; Welch and Eckstein 2010; Succar, Grigg, Beaver & Lee, 2016) have shown that undergraduate education time in ophthalmology is being eroded as a consequence of various factors, including resources and time.

This raises two points:

1) Whether there is enough time given in the course to be able to deliver an adequate ophthalmic education,

2) Regardless of the above, whether the students feel confident at the end of the course.

This appears to be a global issue, but in this review, the focus is the current state of affairs of ophthalmic undergraduate education in the U.K.: whether medical schools are delivering quality ophthalmic education and importantly – whether undergraduates feel that this prepares them satisfactorily for encountering ophthalmic presentations in their career.

There is some literature on the state of the U.K. undergraduate ophthalmic curriculum including a study (Hill, Dennick & Amoaku, 2017) comparing medical schools’ curricula to the ICO recommendations. However there has been no literature assessing U.K. medical students’ perception of the undergraduate ophthalmic education and the
level of confidence instilled by the education.

**Aims:**

This paper aims to review the current status of ophthalmology education in the U.K. described in the literature. Furthermore, we compliment this with a current snapshot into medical school practices and explore medical students' perceptions of preparedness for future practice.

It is hoped that the knowledge of where we stand currently with undergraduate ophthalmology education will help to shape outcomes for medical graduates in the future, leading to future doctors being more confident on ophthalmic presentations or indeed ophthalmic sequelae of systemic conditions.

**Methods**

1. **Literature Review:**

A comprehensive literature search was carried out using Embase, Health Management Information Consortium and Ovid MEDLINE, limiting the search to the U.K. Data was collected using the terms "ophthalmic", "education", "ophthalmology", "undergraduate", "medical school", "evaluation", "review", "survey", "medical education" from 2000-2017 in English. This yielded 116 articles abstracts that were read and assessed for relevance. If needed for clarification, the full text was read. Articles describing recommendations of teaching methods or descriptions of post-graduate teaching were removed from the systematic review, leaving 7 articles. After reading the full texts, 4 of these were deemed to be relevant for inclusion in the systematic review (figure 1).
Figure 1: Study selection

2. Survey:

A survey was sent out to all U.K. medical schools’ British Medical Association medical student representatives to ascertain the current status of undergraduate ophthalmic education.

Whilst the literature search revealed articles describing medical schools’ practices in teaching for ophthalmology, there was no report into the confidence levels of medical students regarding preparedness for encountering
ophthalmic presentations in future practice. The survey thus included a question on students’ confidence levels of adequacy of their ophthalmic education to prepare them for future practice.

The questionnaire was administered by email. Questions for each medical school included: whether ophthalmology education was offered, whether this was a clinical placement, which year of medical school this takes place in, the length of placement, the average number of clinic, theatre and eye casualty sessions, the average number of lectures and how well the respondent felt the programme prepared them for future practice. Following the initial email, steps were taken to maximise the response rate; non-respondents were contacted and re-sent the questionnaire. The data was compiled by a single researcher.

Results

From the literature review, four studies met the inclusion, exclusion, quality and relevance criteria. The response rate achieved for these four studies varied from 56% to 93%. Of the four, three described the national picture of ophthalmology education (Welch 2010; Baylis, Murray & Dayan, 2011; Hill, Dennick & Amoaku, 2017) whilst the fourth (Jawaheer et al. 2011) described a regional survey of foundation year doctors in hospitals in the North-West of England.

At the time of our survey, there were 34 medical schools in the UK. The survey was sent to all 34 medical schools. The response rate was 31 out of 34 medical schools (91.17%).

Do medical schools offer ophthalmology education?

Literature review:

In a study reported in 2017, 97% of responding schools described offering an ophthalmology education placement, higher than the 79% reported in 2011 (Baylis, Murray & Dayan, 2011, Hill, Dennick & Amoaku, 2017). Welch reported 100% in 2011 however the response rate here was only 56%.

Our survey:

Our survey showed 90.3% of schools offer formal ophthalmology education, slightly less than the 2017 study perhaps due to difference in the cohort of medical schools responding. 3 out of 31 (9.7%) medical schools of those surveyed reported no formal undergraduate ophthalmology education. 100% of those offering no education report feeling ‘very unprepared’ or ‘unprepared’ for future practice.

Our survey also showed, of the 28 (90.3%) medical schools that do offer education, the confidence levels vary between ‘very unprepared’ and ‘adequately prepared’. No school reported feeling ‘very well prepared’ with their ophthalmic education.

When is the teaching?

The literature did not offer detail on what stage of medical school the teaching is offered. Our survey highlighted, of the schools that do offer ophthalmology teaching (n=28), 87.5% of medical schools offer ophthalmology teaching as a clinical placement. 50% of schools schedule this in fourth year and 25% in third year.

What is the length of education?
Literature review:

The average length of placement reported in the literature review varied between 2 to 12 days (Welch 2010; Baylis, Murray & Dayan, 2011; Jawaheer et al. 2011; Hill, Dennick & Amoaku, 2017).

Our survey:

In our survey, of the schools scheduling ophthalmology teaching as a clinical placement, length of placement varied between 3 and 10 days. Two schools offer 3 days, one offers 4 days, the majority (75%, n=18) offer 5 days and three schools (13%) offer 10 days. Of the schools that offer 10 days, 66.7% feel 'satisfactorily prepared'.

What are the methods of education?

Literature review:

Education methods were variable across the board in the literature review; from 76% lecture-based education reported in 2011 to 96% reported in the 2017 study (Baylis, Murray & Dayan, 2011; Hill, Dennick & Amoaku, 2017). Various other education methods were described briefly, including self-learning, small-group teaching, electronic-learning, simulation and workshops. The literature does not describe the distribution of lectures, clinic sessions, theatres and eye casualty sessions offered.

Though a higher percentage of UK medical schools taught each ICO recommended topic in 2017 than previously reported, clinical skills teaching still did not meet the recommendations (Hill, Dennick & Amoaku, 2017).

Formal assessment in ophthalmology was reported as 39%-46% needing a written pass in Ophthalmology to complete the year in 2011 to 55.1% in 2017 (Welch 2010; Baylis, Murray & Dayan, 2011).

Our survey:

From our survey, of schools offering a clinical placement (n=24), the majority of schools (79%, n=19) offer 1 to 3 clinic sessions on average. Four offer 4 to 6 and one offers 8 clinic sessions.

Most schools (87.5%) offer 1 to 3 theatres sessions, with 3 schools offering none (two of these 3 feel ‘very unprepared’).

14 schools (58.3%) offer 1 to 3 eye casualty sessions with one offering 4 to 6.

9 schools do not offer any eye casualty sessions; of these 7 (77.8%) feel ‘very unprepared’ or ‘unprepared’.

All schools surveyed that offer ophthalmology undergraduate education offer lecture-based sessions. Fifteen schools (62.5%) offer 1 to 3 lecture sessions on average (with equal numbers feeling ‘unprepared’ and ‘satisfactorily prepared’). Ten schools (42%) offer 4 to 6 lecture sessions (with 40% feeling ‘unprepared’ and 60% feeling ‘satisfactorily prepared’). Four schools offer more than 6 (with 25% feeling ‘prepared, and 75% feeling ‘adequately prepared’).

Of the 7 schools that do not offer ophthalmology education as a clinical placement, only two offer formal classroom-based education (lectures and clinical skills teaching); both of which felt ‘satisfactorily prepared’. One of the 7 reported ophthalmology teaching mixed in with neurology and psychiatry with odd clinics and theatre lists during the placement, whom felt ‘satisfactorily prepared’. Of the remaining four schools, two receive case-based learning
sessions to work through themselves (both feel ‘unprepared’) and the other two receive no teaching whatsoever, 100% of these feeling ‘very unprepared’.

**Discussion**

The importance of medical graduates being confident in key ophthalmic knowledge and examination of the eyes and visual system to pick up common, sight- or life-threatening signs in any specialty cannot be understated (Sheldrick, Vernon & Wilson, 1992).

This review shows that ophthalmic undergraduate education remains extremely varied throughout medical schools, something that has not changed over the years (Dias 1987; Bellan 1998; Fan, Sherwin & McGhee, 2008). Some students may graduate with no formal ophthalmology education, and may miss crucial ophthalmic sight- or life-threatening signs. The most recent survey in 2017 (Hill, Dennick & Amoaku, 2017) shows a higher proportion of medical schools teaching each ICO-recommended topic than previously reported which is positive, however our survey shows a worrying proportion, almost half (48.4%) of medical students, feeling their ophthalmic education leaves them only ‘very unprepared’ or ‘unprepared’ for future practice. No respondent reported feeling ‘very well prepared’.

**Delivery of education**

Despite recommendations from papers and the ICO defining core ophthalmic knowledge, some U.K. medical schools offer no formal undergraduate ophthalmology education whatsoever. This may be as a result of a clinical placement in ophthalmology no longer being a requirement in the GMC’s ‘Tomorrow’s Doctors’ (GMC 2009). However, we would propose that even classroom-based teaching in ophthalmology is better than no education at all; two medical schools offer only classroom-based (lecture and clinical skill based) teaching; both of whose medical students felt ‘satisfactorily prepared’. It is important to note however, the methods and quality of education is important – schools that only offer case-based or self-directed teaching as their non-clinical teaching feel as unprepared as schools offering no teaching.

Overall however, the proportion of medical schools offering an ophthalmology placement is higher than reported in 2011 (Baylis, Murray & Dayan, 2011) which is pleasing.

**Length of education**

In 1998, ophthalmologists, general practitioners and other specialists judged the ideal length of ophthalmic attachment to be over three weeks (Vernon 1998). In 1996, ophthalmology was taught in each medical school with an average length of attachment of just under 2 weeks (Shuttleworth and March 1997). Most schools in our survey offer 5 days (which meets the ICO recommendation of 5-8 days) however it has been suggested (Fan 2008) that in practice, it is difficult to achieve required outcomes in less than two weeks. Three schools offer 10 days. Of the schools that offer 10 days, 66.7% do feel ‘satisfactorily prepared’, vastly more than the national average of 48.4% of students feeling unprepared.

The drop in time dedicated to ophthalmic education has been echoed in other countries also (Quillen, Harper & Haik, 2005; Mottow-Lippa 2009)

**Confidence levels of students**
In our systematic review, the only publication alluding to recent graduates' perception of preparedness for foundation year training regarding ophthalmic presentations was a regional survey (Jawaheer et al. 2011) limited to the North-West of England in 2011. This showed that only 28.1% of foundation year doctors felt their medical school training in ophthalmology prepared them adequately for practice – worryingly not a huge increase from the 22% reported in a 1997 study (Shuttleworth and Marsh 1997) surveying general practitioners on how confident they felt in ophthalmic presentations. Our survey showed a pleasing increase to 51.6%, however this still leaves a worryingly large proportion (48.4%) of students feeling inadequately prepared.

Factors correlating to increased confidence include increased length of placement (80% of those feeling 'adequately prepared' had a placement length of at least 5 days). In addition, free-text comments highlighted positives such as a full lecture series augmented with clinical skills sessions covering normal and abnormal anatomy, physiology, pathophysiology and enthusiastic and engaged dedicated teaching-fellow coordinators.

One medical school reported that "the structure of final year is changing to include more of these niche professions in the coming years, as it was fed back students wanted more" which is encouraging.

Free text comments from those who feel 'unprepared' and 'very unprepared' highlight that there is a need for ophthalmological problems to be introduced earlier on in the curriculum (for instance, ophthalmology emergencies along with cardiac emergencies and respiratory emergencies) and that it is less helpful to have a purely self-directed or case-based learning approach in a subject that students do not feel confident with. It was also felt that specialised clinics were less helpful in the early stages than, for instance, eye casualty sessions. All those who felt 'very unprepared' had no eye casualty sessions offered. 60% of those feeling 'unprepared' or 'very unprepared' had curricula offering at least 1 to 3 clinic sessions and 1 to 3 theatre sessions; this shows that perhaps it is not enough to simply schedule students into clinic and theatre sessions, but that dedicated teaching time is required for students to feel at ease with important ophthalmic presentations. In general, students with a greater number of tutorial-style lecture sessions felt more confident.

It should be noted that most schools do offer extra ways of signing up to clinics and theatre if students are interested, such as student-selected components. However, of course, the uptake of these would be highly dependent on students' perception of their initial ophthalmology placement (Hill, Dennick & Amoaku, 2017).

**Recommendations:**

Our literature search highlighted several articles describing innovative ways of delivering resource-efficient, good quality education. We would recommend the GMC and Medical Schools Council to work together with the Royal College of Ophthalmologists, and propose a minimum attachment length with good quality teaching of core competencies with outcome-based curricula including an element of assessment, which has been shown (Stern 1995; Davis and Ponnamparuma 2007) is required to achieve curriculum aims.

Emphasis should be on teaching ophthalmology as a stand-alone subject, with importance placed on topics for treatable sight- and life-threatening conditions as well as primary-care level common eye disorders (Vernon 1998; RCOphth 2018). Anatomy learning should be prosection-led if possible (Schulz 2017). Peer-learning schemes are effective, as are technological inclusions such as teaching videos, 'virtual' ophthalmology clinics (Succar et al. 2013), technology-driven simulators (Michael et al. 2014) and teaching-opthalmoscopes (Schulz, Moore, Hassan, Tamsett & Smith, 2015).

**Strengths and limitations:**
This is the first systematic review of U.K. medical school’s undergraduate ophthalmic education alongside a national survey to assess student confidence levels, providing an up-to-date picture of the current scenario. However, as with any cross-sectional survey, only a snapshot of the state of affairs can be produced. Having said this, the high response rate (91.17%) is pleasing and the data collected is highly likely to be representative. The survey was sent to all U.K. medical schools’ British Medical Association medical student representatives. Different representatives may have canvassed medical students at their school in varying ways. As with any survey, misinterpretation of the questions by respondents is possible, however we included free-text boxes to allow the respondents to further clarify their responses.

In conclusion, the most remarkable finding from our survey is despite previous literature on this subject, some schools still do not offer a formal undergraduate ophthalmic education and almost half of the survey respondents reported feeling unprepared for future practice. No respondent reported feeling ‘very well prepared’ with their ophthalmic education. It is important that medical graduates are and feel confident in their assessment of ophthalmic presentations in any specialty.

Knowledge from this project can contribute significantly impact on outcomes for all medical graduates and, importantly, in turn, patient care.

**Take Home Messages**

It has been widely noted that there is a general decline in undergraduate ophthalmic education. However so far, there has not been a systematic review of U.K. undergraduate ophthalmic education, or a national report on medical students’ perception of how well they feel their medical schools prepare them for encountering ophthalmic presentations in their future practice. This study was to investigate (with an emphasis on systematic review of literature, complimented by snapshot-survey of student representatives from U.K. medical schools) the current status of ophthalmology education provided at U.K. medical schools as well as students’ perception of their preparedness for future practice, in order to guide the future of undergraduate education in this specialty. This systematic review and national survey shows that though more schools are now including an ophthalmic curriculum, the length of teaching has been eroded. Strikingly, almost 10% of medical schools reported no formal ophthalmic education. Furthermore, almost half of the total surveyed felt ‘unprepared’ or ‘very unprepared’ for future practice.

**Notes On Contributors**

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Appendices

Declarations

The author has declared that there are no conflicts of interest.

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