CLINICAL RESEARCH ON REFRACTION IN THE SIGHT TEST

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Executive summary

Refraction is the component of the sight test when the clinician determines the optical prescription, using both objective testing (typically, a technique involving reflected light called retinoscopy) and subjective testing (which uses the patient's feedback about the clarity of successive lenses). The GOC commissioned this research to provide advice on refraction for the purposes of the sight test. The research comprised three studies.

Study 1: Content of contemporary sight tests

Study 1 assessed the content of contemporary sight tests. A survey was sent to 15 participants from across the UK representing a variety of optical settings, including large corporate bodies, domiciliary, and independent sectors.

Typical sight tests include history and symptoms, presenting vision, refraction (objective and subjective), eye muscle and alignment tests (pupillary function, ocular motility, cover test), ocular health assessments (external and internal examinations, *intraocular pressures, visual fields, retinal photos/scans*), and closing explanation and discussion with the patient. Eleven of the 15 participants used support staff (typically, optical assistants) for pre- and post-screening tests (*italicised* above).

A variety of training methods are used for optical assistants. The key benefits of using optical assistants are to use clinical resources efficiently to save time and increase profitability. The main potential disadvantages are the cost of training, inadequate performance resulting in additional time pressures on the optometrist, poor communication, and potentially missing signs or information gathered during the examination. The most reported adverse event and clinical risk from using optical assistants were, respectively, not performing the correct test and missed pathology or missed symptoms that might have indicated pathology.

The average sight test duration quoted was 30 (range 20-60) minutes. Most respondents worked in conjunction with dispensing opticians; two with an orthoptist (one dual qualified as an optometrist); four described good links with ophthalmologists; and two noted support from pharmacists. When asked if the organisation was exploring any departures from normal practice, two participants listed remote testing.

Study 2: Possible impacts of separating sight test components

The second study administered two rounds of detailed questionnaires to 20 eye care practitioners and three patients, selected for expertise and to represent different stakeholders, regions, and ages.

Round 1 highlighted the distinction between core and non-core sight test components, with the latter typically undertaken by optical assistants. Mirroring the first study, the main advantages reported for using optical assistants to undertake non-core tests were saving optometrist time and increasing cost-effectiveness. The main disadvantages/risks are clinical errors, inaccuracies/omissions; reduced quality; repetition; missing non-verbal signs; loss of continuity; and inefficiency.

Most respondents considered the risks would be increased if sight test components were carried out at a different time or in a different place (explored further in Round 2). Concerns were also raised about practitioner insurance and care for patients who need special support, such as people with learning disabilities or young children. Participants described both good and poor clinical outcomes from tests being undertaken by personnel other than the optometrist. Concerning recruitment, participants anticipated that in the future it will be more difficult to recruit dispensing opticians than optometrists.

Round 2 narrowed the issues, building on responses to Round 1. Orthoptist participants want to undertake refractions and issue optical prescriptions solely in their work in the hospital eye service, not in community optical practices. Other eye care practitioners were generally agreeable to this but expressed reservations about “mission creep” and commercial pressures that might be exerted on orthoptists who refract to leave the hospital eye service.

There was no consensus amongst dispensing optician participants about the role they seek in refracting and other participants expressed reservations about dispensing opticians refracting, mirroring comments from Round 1. There was universal concern for the concept of a “refraction only sight test”. It was noted that in the hospital eye service, multidisciplinary teams are subjected to extensive training, quality control, and governance procedures. In contrast, community optical practices generally lack these safety features.

In view of the GOC mission statement, centred on protecting the public, Round 2 further investigated concerns raised in Round 1 using a risk matrix. For all the risks identified by participants, Round 2 revealed mean risk scores for likelihood in the “common” range and for severity mostly in the “major” (sight loss) category. Replicating Round 1, participants indicated that risks (likelihood and severity) would be increased if sight test components were undertaken at a different time and especially if in a different place.

Two participants gave the example of an eye condition called keratoconus, in which the cornea becomes conical causing blurred vision. In this condition, there may be subtle clues to the condition that occur during different components of the sight test. Each of these clues individually may not reach the threshold for the condition to be detected, but if each of these sight test components is undertaken by the same practitioner it is likely that the combined observations will meet the threshold for detection. Keratoconus

typically occurs in young adults and can be treated to prevent progression, if it is detected before the condition becomes too advanced.

Concerning the contemporary use of optical assistants, Round 2 found reasonable awareness of GOC Standard 9 of the Standards of Practice for Optometrists and Dispensing Opticians, relating to supervision of optical assistants. Participants noted that time constraints and commercial pressures increase the risk of non-compliance. In view of imperfect compliance with Standard 9 at present, concerns were raised if changes to the Opticians Act 1989 increase the number of delegated functions in the sight test.

Study 3: Orthoptists

Study 3 used Focus groups to investigate the role of orthoptists in refraction and sight testing, including current scope of practice and ambitions. This revealed that some orthoptists are already undertaking refraction as part of their work in the hospital eye service, typically of young children using objective techniques (retinoscopy). A finding of Study 2 was confirmed: orthoptists are not seeking to undertake refractions in community optical practices. Orthoptists wish to be allowed to refract and issue optical prescriptions in the hospital eye service. They recommend this should be conditional on the right to prescribe being limited to the hospital environment, the orthoptist having suitable post-graduate training and competence, and the patient being under a hospital eye service consultant and receiving regular ocular health assessments. This recommendation was reached after a careful consideration of advantages and disadvantages.

Conclusions

1. Optical assistants are widely used in the delivery of non-core components of the sight test, under supervision and largely in concordance with GOC Standard 9.

2. Concerning core component eye health checks (excluding scans and photographs), the consensus is that these should be carried out by the person delivering the sight test.

3. The risk matrix in Study 2 raises concerns (Table 3 and Table 4) about potential risks if the *status quo* changed to permit refractions to be carried out by clinicians other than the optometrist undertaking the sight test (e.g., refraction undertaken by a dispensing optician). The main potential benefit is increased profitability for corporate bodies/practice owners, but it seems unlikely that this benefit outweighs the risks. The most severe risk scores were associated with inadequate training or the person doing the tests lacking competence, missing key information, impaired ability to recognise a diagnostic pattern from combining results of different tests, poor care for patients with special needs, impaired decision-making, health issues missed due to lack of continuity, important details missed if symptoms and history not undertaken by the optometrist; pathology missed in the domiciliary setting, and increasing health inequalities.

4. The greatest reservations and risks were attributed to the idea of a “refraction only sight test”. In addition to all the risks identified above as severe, additional risks that were ranked as severe for the “refraction only sight test” included reduced

quality of care, missing ocular pathology, missing systemic pathology, and patients assuming that a "refraction only sight test" replaces the need for periodic full eye examinations.

5. In the authors' view, it would seem inappropriate to relax the rules on who undertakes sight test components in community practices unless research evidence is produced showing that proposed changes are safe. Such research should address the risks identified in this report.

6. Participants considered that risks would be increased if sight test components were carried out at a different time or in a different place. The authors conclude that such changes should not be considered without research to evaluate real-world safety (e.g., a pilot study of a population that is both representative of the general population and of adequate size).

7. At present, a minority of orthoptists undertake refractions in the hospital eye service as part of their orthoptic work, typically of young children using retinoscopy. These orthoptists find it frustrating that they must find an optometrist or ophthalmologist to sign the optical prescription.

8. Very few orthoptists work in community optical practices and those who do undertake orthoptic work. This research revealed no appetite amongst orthoptists to carry out sight tests in community optical practices.

Introduction

Background

The General Optical Council (GOC) is the regulatory body for the optical professions in the UK, and regulates 33,000 optometrists, dispensing opticians, student optometrists, student dispensing opticians, and optical businesses. In the UK, the current model of sight testing includes both refraction and eye health checks. Section 24 of the Opticians Act 1989 ("the Act") provides that a sight test can be conducted only by an optometrist or a registered medical practitioner (with special provision for students under supervision). Section 27(7) of the Act and article 3(2)(a) of the Sale of Optical Appliances Order 1984 provide that a spectacles prescription can be issued only by an optometrist or registered medical practitioner.

In 2013 the GOC stated that no part of the sight test can be delegated, even under the supervision of an optometrist or registered medical practitioner.[1] However, refraction for purposes other than the testing of sight, for example to verify a prescription issued by an optometrist or registered medical practitioner, is not restricted. Also, optical assistants can complete triage checks prior to sight testing by an optometrist or registered medical practitioner.

The GOC is considering whether, particularly in light of current technological and professional developments, the GOC's position should be revised to allow refraction to be delegated provided that an optometrist or registered medical practitioner is in control of

the process. To inform this consideration, the GOC commissioned research on four relevant topics. The present report relates to one of the four topics, entitled clinical advice on refraction for the purposes of the sight test.

Refraction

An eye examination consists of a series of tests to measure how well a patient can see and to look for any problems that might be affecting the overall health of the eyes. Refraction is performed as part of the sight test where the eye care practitioner determines what, if any, optical prescription (or change to the current optical prescription) is required. There are two methods of performing refraction:

- Objective refraction: This is done using tests which do not require responses from the patient. The objective assessment can be done using an autorefractor (automated and often operated by optical assistants) or using retinoscopy (performed by the eye care practitioner using a handheld instrument called a retinoscope). There are three different ways eye care practitioners perform retinoscopy:
    - Static retinoscopy (also called dry retinoscopy): used most frequently to objectively determine a patient's refractive error.
    - Cycloplegic retinoscopy: determines the patient's complete refractive error by temporarily paralysing eye muscles that act to focus the eye. Cycloplegic eye drops are used for this technique. This method is particularly useful in younger children and those with significant learning difficulties.
    - Dynamic retinoscopy: a technique that is used to investigate focussing problems by assessing the eyes' ability to change focus from one point to another (ocular accommodation). This technique is particularly useful in younger children.

The objective assessment is usually done first, to give the optometrist an estimate of the refractive error. The results from this test are usually fine-tuned using a subjective refraction. This part of the examination requires responses from the patient to questions asked by the optometrist (e.g., "Do the black rings appear darker and bolder on the red or green background?", "Which is clearer, lens one or lens two?", etc).

Retinoscopy is a vital and valuable skill in eye care though it takes a significant amount of training and practice to master the technique. Retinoscopy provides an objective measure of refractive error making it extremely useful in paediatric patients, those with learning difficulties or difficulties with communication (e.g., stroke, cognitive impairment). Additionally, retinoscopy gives clues about the patient's ability to focus (accommodation), presence/absence of ocular pathology such as keratoconus (a cone-shaped cornea that causes blurred vision, corneal diseases, and lens opacities (cataract). These subtle clues would not always be detected or individually may not reach the threshold for the condition to be detected during other elements of the sight test, or with an autorefractor which is sometimes used in place of retinoscopy.

During a typical optometry degree programme, retinoscopy is introduced during the first year (approximately ten hours of supervised practice) and students are assessed on this towards the end of the academic year. During the second year of the degree, students spend approximately 30 hours practising retinoscopy as part of a full refraction. Students

often report this is one of the most difficult assessments of the first and second years. During the third year students are required to complete a minimum of 18 refractions as part of primary care clinics with some additional experience in retinoscopy gained through contact lens clinics. Finally, pre-registration optometrists are required to complete a minimum of 275 refractions. Competency based assessments, including retinoscopy, take place during the second, third and pre-registration year.

Aims and overview of research

Based on the GOC Invitation to Tender (ITT), the aims of the research are to explore the following:

1. How the sight test is delivered by providers of optical services across the four nations of the UK.
2. The possible impacts that might occur if the refraction, binocular vision, and eye health checks were not carried out by the same person, both with and without the oversight/supervision of an optometrist or registered medical practitioner. The ITT notes that dispensing opticians and orthoptists may have experience in refraction and the GOC wishes to understand whether there would be any risks to patient safety if a suitably trained and qualified person who is not an optometrist or registered medical practitioner carried out the refraction separately to the binocular vision and eye health checks.
3. The possible impacts that might occur if the refraction, binocular vision, and eye health checks were not carried out at the same time or in the same place, both with and without the oversight/supervision of an optometrist or registered medical practitioner.
4. More about the role of orthoptists in refraction and sight testing.

In (3) and (4), the possible impacts relate to patient care, including the detection of eye diseases and systemic problems (e.g., high blood pressure, heart disease, diabetes, and intracranial pathology such as brain tumours). The ITT provides background information, noting that "if dispensing opticians were able to carry out part of the sight test, it could free up the time of optometrists to support a wider range of clinical activities".

The aims are addressed in three studies, a Survey study, a Focus group study and a larger Delphi study. The three studies took place concurrently, with each being led by a different member of the research team. Ethical approval for all three studies was granted by the Institute of Optometry Ethical Committee on 12 November 2022.

Background to the methodologies

Surveys (Study 1)

Surveys involve questioning individuals on a topic or topics and then describing their responses. This methodology is well-suited to describing current practices. An advantage is that participants respond individually and therefore are unlikely to be influenced by the opinions of others. Although well-suited to asking what participants do, a disadvantage is the limited opportunity for exploring in depth why they do what they do.

Delphi studies (Study 2)

The Delphi method was developed in the 1960s[2] and is a widely used and accepted method for gathering data from respondents within their domain of expertise.[3] The Delphi method is typically used for goal setting, policy investigation, or predicting the occurrence of future events.[3] A goal is to encourage a true debate, independent of personalities, with anonymity ensured in that no one knows who else is participating. Further, to avoid opinions being dominated by the most eloquent or authoritative participant, the reasons given for extreme opinions are synthesised by the researchers to give them all equal "weight" before feeding them back to the whole group for further analysis. These aspects, anonymity and feedback, represent the two irreducible elements of the Delphi method.[2] The number of participants required for a Delphi study is typically ten to 50.

The Delphi technique begins with the development of a set of open-ended questions on a specific issue. These questions are then distributed to various 'experts'. The responses to these questions are summarised and a second set of questions that seek to clarify areas of agreement and disagreement is formulated and distributed to the same group of 'experts'. Sometimes, a third round of questions is also used.

Focus groups (Study 3)

Focus groups are a form of group discussion that capitalises on communication between research participants to generate data. Group interaction is explicitly used as part of the method.[4] The number of participants in a Focus group study ranges from three to 21, with a median of ten participants.[5] The ideal Focus group size is six to 12 participants with the group discussion lasting one to two hours.[6]

Study 1: Survey of sight test delivery

Methods

The methods for Study 1 are detailed in Appendix 6. In summary, participants were representatives from the professional services teams of major optical companies, medium sized optical groups, and practice owners/directors from independent optical practices. All participants completed a survey using Microsoft Forms. The questions are given in Appendix 6 and summarised in the Results and Discussion sections below.

Results and discussion

Twenty-two people were invited to participate and, after reminders, 19 returned consent forms. Consenting participants who had not completed the survey were sent two reminders a week apart. Fifteen participants completed the survey.

Three participants work in independent practices, four were from small group practices (two participants from professional services and two employees) and eight participants represented most of the large (multiple) group practices in the UK. Seven of these eight

participants reported their large optical groups have practices across the UK and one participant works for a domiciliary company that provides domiciliary services across the UK. Altogether, these seven companies have over 2,000 branches across the UK. Six of the eight participants were from professional services (typically, large optical groups have a professional services department at head office which oversees the registered staff) and two participants were employees working in a branch. Further details of the invitees and participants are provided in Appendix 6, Table 7.

All 15 participants who completed the survey were optometrists, of whom four were qualified for more than 30 years, ten for 10-30 years and one participant qualified for less than 10 years. Six of the 15 participants hold a specialist qualification for independent prescribing of therapeutic drugs. Two of these six prescribing optometrists are also qualified dispensing opticians.

Participants were asked to briefly describe the different steps of the sight test from a patient's perspective and the duration of a typical sight test. All 15 participants responded to this question. Broadly speaking, the steps of the sight test include history and symptoms, vision check (with and without spectacles as appropriate), pupil reactions, ocular motility, cover test (with and without spectacles as appropriate), objective and subjective refraction, external and internal examinations, pre/post screening (intraocular pressures, visual fields, retinal photos or scans), summary of eye health and spectacle recommendations. The different patient journeys used by optical practices are summarised in Figure 1 (full responses are in Appendix 6, Table 8). Participants working in independent practices and small group optical practices largely reported that the pre/post screening (intraocular pressures, visual fields, retinal photos, scans) were carried out by the optometrist as part of the sight test. Participants working in large group optical practices reported patients having pre-screening (focimetry, intraocular pressures, visual fields, retinal photos, scans) rather than post screening (after the examination with the optometrist) with a review of the results by the optometrist as part of the examination and a handover for dispensing of new spectacles if applicable. On average, the duration was 30 minutes (range 20-60 minutes).

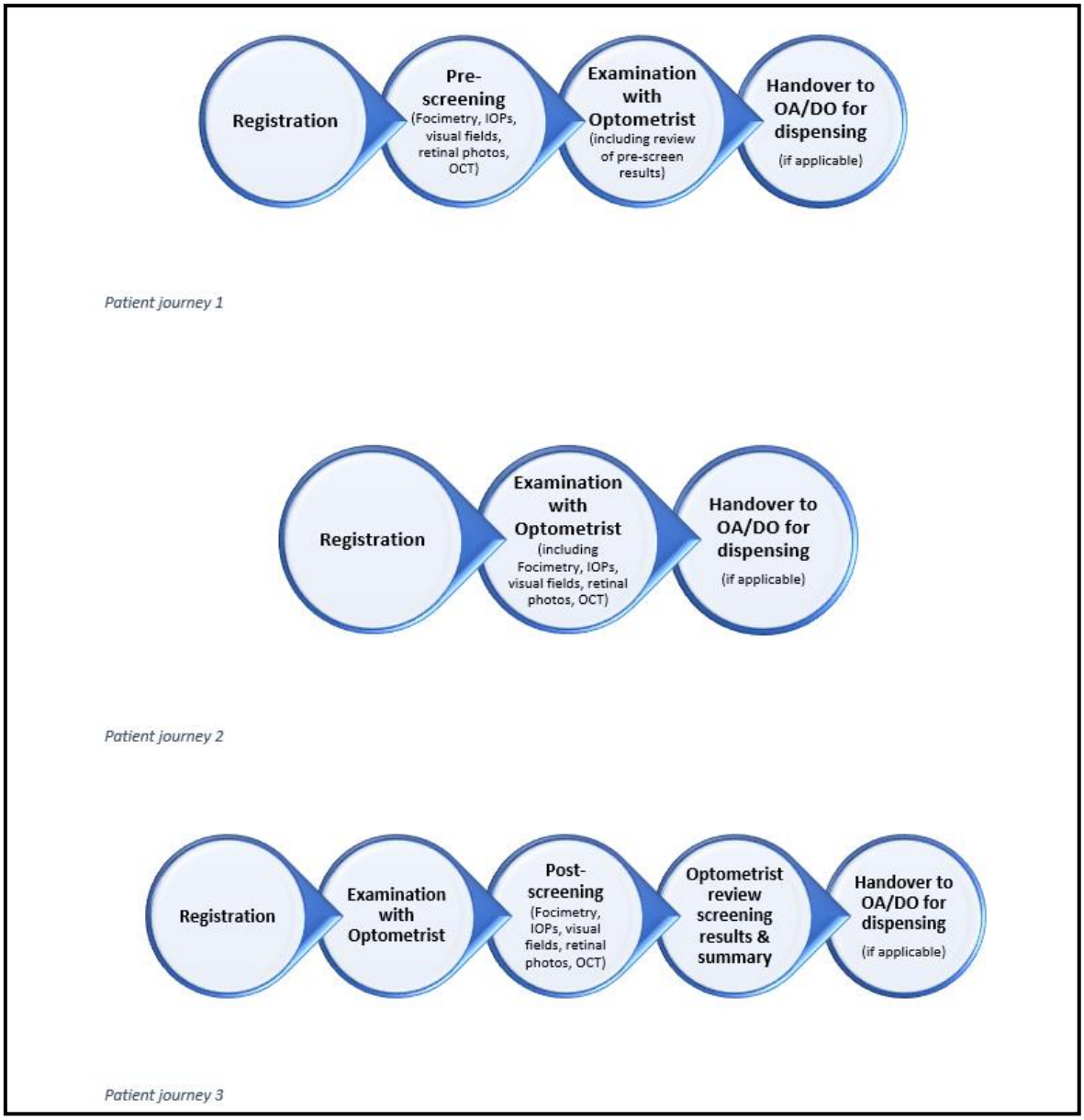


Figure 1. **The different patient journeys used by optical practices in the UK.**

Eleven of the 15 participants reported that their company or practice uses optical assistants or other personnel to assist with elements of the sight test. Participants 3-6 all responded "none" to this question. Participant 1 reported that receptionists would welcome and check the patients in, and dispensing opticians repair and adjust spectacles, though when asked further questions relating to arrangements for training and supervision for the optical assistants and other personnel, they responded that this question was not applicable. Participant 7 reported limited involvement with staff trained in performing pre-screening procedures and would only step in to help if the optometrist is running late. Verbatim responses to this question are provided in Table 9 (Appendix 6).

Participants who responded to the previous question relating to use of optical assistants and other personnel, were asked to specify details of the training provided and the arrangements for supervision when undertaking elements of the sight test. All ten participants who responded to these two questions described different methods of training, with in-person observations in some cases to ensure competence is achieved prior to colleagues performing elements of the sight test unsupervised. Eight of the ten participants reported that the optical assistant and/or other personnel is supervised by

an optometrist, with three participants specifically stating that the optometrist would need to be in the practice and in a position to intervene for all pre-screening tests (verbatim responses in Appendix 6, Table 10).

Fourteen of the 15 responded to the question asking for the advantages of using optical assistants and/or other personnel carrying out elements of the sight test and all fifteen optometrists responded when asked for the disadvantages of the same. The most commonly reported advantage (11/14 participants) was this would be an efficient use of clinical resources, ultimately saving time. Three participants stated it was advantageous for the optical assistants to upskill for their personal development. The most frequently reported disadvantages of using optical assistants in carrying out elements of the sight test were the cost of training (three participants), not performing the correct test or not performing the test correctly resulting in additional time pressures on the optometrist (three participants), poor communication (three participants) and missing signs or information gathered during the examination process (two participants). The results indicate that unsurprisingly there is a tendency for participants who use optical assistants to report more advantages, and those who do not to report more disadvantages (verbatim responses in Appendix 6, Table 11).

All 15 participants responded to the question asking if optometrists are assisted, supported by, or work in conjunction with other healthcare professionals (e.g., dispensing opticians, orthoptists, pharmacists, ophthalmic medical practitioners, ophthalmologists). Participants were asked to explain the other healthcare professionals' roles. Most participants (13) work in conjunction with a dispensing optician, two participants noted working with an orthoptist (one in a visual stress clinic and the other for private orthoptic assessments), four reported having good links with ophthalmologists to discuss cases and two reported being able to obtain support from pharmacists (Appendix 6, Table 12).

Participants were asked to describe any adverse events, clinical risks, or other risks that have occurred relating to the use of optical assistants or other personnel to assist with elements of the sight test (Appendix 6, Table 13). Five participants (two working in independent practices, two working in small multiples and one working for a large optical group) answered "not applicable" though one of the participants who works for a large group optical practice reported that all the pre-screening information captured by the optical assistant is normally checked and signed off by the clinician conducting the test. The most reported adverse event was not performing the correct test and the most frequently reported clinical risk was missed pathology or missed symptoms revealing pathology. The importance of appropriate communication channels to mitigate risks of using optical assistants to assist with elements of the sight test were highlighted by two participants.

Participants were asked to discuss additional ways in which they would like to expand the use of optical assistants or similar personnel and, if so, what is preventing them from doing this now. Fourteen of the 15 participants responded to this question. Participant 5 responded by saying "no" and Participant 14 does not believe there is anything holding them back and does not believe the optical assistants' role should be expanded. Participants 3 and 10 noted that their business model does not suit this expansion. Verbatim responses to this question are presented in Table 14.

When asked if the participants' personal view differs from those noted in the survey questions, one participant (Participant 11) agreed that this was the case. They reported

that the organisation they work for does not allow clinic time to be allocated for training on a regular basis, as the sight test numbers and dispensing rate are classed as having a higher priority. One participant (14) reported that their personal view does not differ to that reported in the questions answered earlier in the survey. Thirteen participants stated this question was not applicable to them.

When asked if there were any departures from normal practice being explored by the organisation the participants work for, most participants reported there were no departures from normal practice. Responses from the seven participants who described departures that were being considered are summarised below:

- Participant 2 noted their practice uses injected local anaesthetic for removal of chalazion though not insured due to Medicines Act.
- Participant 8 reported that the practice they work in is trialling remote refractions and remote slit lamp assessments, both in infancy stages.
- Participant 9 reported that OCT (optical coherence tomography scans of the retina) was the newest technology deployed in all their practices and they were unaware of any other changes or departures.
- Participant 11 expressed an interest in remote testing. They were unaware of any other changes or departures.
- Participant 12 stated that the definition of 'Normal' is undoubtedly going to evolve to embrace new and different ways of working (many of these arising from experiences during the pandemic), changing working practices (e.g., desire for remote working), increasingly scarce clinician resource which in turn has more demands on its time (e.g., clinically commissioned services over and above the traditional sight test, sometimes called enhanced optometric services), changing customer expectations, and new and emerging technology. For example, this large optical group of practices are currently engaging optometrists (GOC registered) who work remotely from the store location (where the patient is attending) and, it was argued, can deliver a full eye examination through technology and support from an onsite clinical technician.
- Participant 13 noted that remote contact lens consultations were used during the COVID pandemic with reduced clinics in place.
- Participant 14 reported the practice they work for makes use of telemedicine, tele-ophthalmology and monitoring technologies that can enhance patient care and allow delivery more efficiently.

Study 2: Delphi study of possible impacts of separating the components of the sight test

Background

This study explores possible impacts of separating components of the sight test, whereby aspects such as refraction, binocular vision, and eye health are not carried out by the

same person, not in the same place, or not at the same time. It also explores the influence on these considerations of whether the separated functions are supervised by an optometrist or registered medical practitioner. The GOC Invitation to Tender notes that dispensing opticians and orthoptists may have experience in refraction and the GOC wishes to understand whether there would be any risks to patient safety if a suitably trained and qualified person who is not an optometrist or registered medical practitioner carried out the refraction separately to the binocular vision and eye health checks.

Methods

Study 2 used purposive sampling to engage a diverse group of participants, including patients, ophthalmologist, optometrists, dispensing opticians, orthoptists, clinicians working with patients with learning disabilities, and clinicians from the charitable sector.

Consenting participants were sent two questionnaires in two rounds of this Delphi study (this methodology is described in the Introduction, p.7). The first round of the Delphi study addressed broad questions, which were narrowed in the second round according to first round responses. The questionnaire format was Excel spreadsheets, with alternative formats available in case required by any participants.

Results and discussion: Questionnaire 1

Throughout this section, participants are differentiated by their participant number preceded by P (e.g., P3 is participant 3).

Questionnaire 1 Section 1: Demographics

Forty-three people were invited to participate and, after reminders, 23 agreed, consented, and returned questionnaires. The invitees and participants are detailed in Appendix 7, Table 15. Two invitees were qualified in more than one eye care profession: optometry and ophthalmology; and orthoptics, dispensing optics, and optometry. Regrettably, despite reminders neither person participated.

The demographic details of participants who returned Questionnaire 1 is summarised in Appendix 7, Table 15. In summary, there were three patient participants, a consultant ophthalmologist, two community optometrists qualified for less than five years, four community optometrists qualified for more than five years, three hospital optometrists qualified for more than five years, three dispensing opticians from corporate chains, two orthoptists working with adults and children, three participants with clinical roles in charities for people with disabilities, and two participants with a leadership role in low vision clinics/charities.

Of the three patient participants, two had ocular pathology and low vision and one had good ocular health and good visual acuities. This latter patient was a retired GP but was asked to complete the questionnaire from a patient perspective. All three patients had been under the care of optical practices for more than 30 years and the two patients with low vision had wide experience of different sectors: both of multiple optical groups, hospital eye service, and university clinics and one also with experience of independent optometric practice.

For the 20 eye care practitioners, the most common ethnicity was White (75%), and of the non-white eye care practitioners the most common description given was Asian/Asian British (15%). The regions in which the eye care practitioners practised revealed inter- and intra-individual diversity. On the latter point, half the eye care practitioners had experience of working in more than one region and two participants worked in five regions (Appendix 7, Table 16).

The working environments of the eye care practitioners were diverse. Only two of the 20 eye care practitioner respondents had experience of only one setting. All three dispensing opticians had worked in more than one setting. One orthoptist had worked only in hospital practice and the other had worked in a hospital, university, and independent practice. Full details of work settings are given in Appendix 7, Table 17.

Questionnaire 1 Section 2: Main table of sight test components and opinions on who should undertake the components

The main table in the questionnaire lists the sight test components and opinions concerning whether they are suitable to be carried out by the optometrist only or by other professionals, and if so which professionals. The results reveal a diversity of opinions and highlight that the setting in which people work has implications for how they respond.

This is exemplified in the section of the questionnaire that asks, for each component of the sight test, whether respondents thought this component should only be carried out by the optometrist undertaking the sight test. The responses are plotted in Figure 2 (full details in Appendix 7, Table 18).

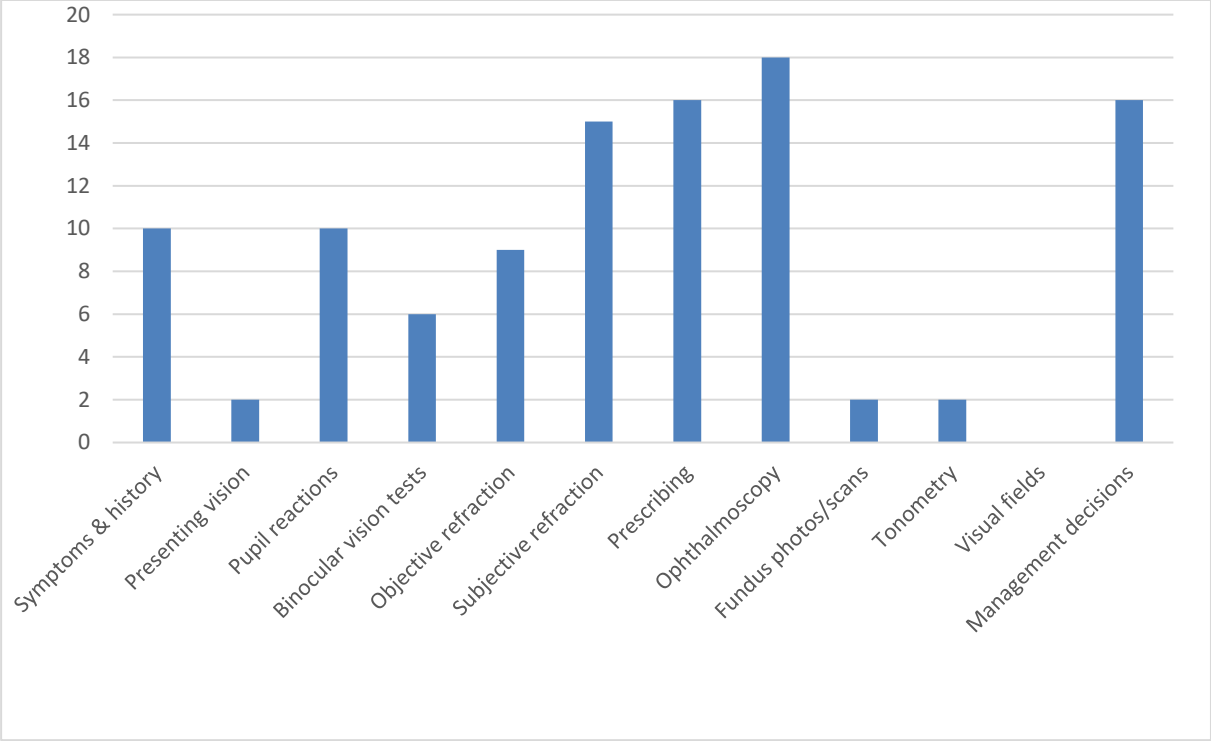


Figure 2. The number of participants who consider that each sight test component should only be carried out by the optometrist undertaking the sight test. Lower values (i.e., values for presenting vision, fundus photos/scans, tonometry, visual fields) indicate consensus that these components were suitable to be conducted by personnel

other than the optometrist. Note: some participants opted out of giving their opinion, most likely when they were unsure.

Figure 2 clearly shows that eye care practitioners have a ready acceptance of the notion of tests being carried out by non-optometrists, with nearly all participants agreeing that presenting vision, fundus photographs/scans, tonometry, and visual fields can be carried out by personnel other than the optometrist. In contrast, most participants considered that ophthalmoscopy (examination of the inside of the eye), subjective refraction, prescribing, and management decisions and patient explanation should be confined to the optometrist. All the optometrists were of this opinion. For the other sight test components, the findings were less clearcut.

Some of the responses highlight the different perspectives of participants. The questionnaire asked about community optical practice and participants who are familiar with this setting discussed personnel who typically work in community practices. Some participants who work in the hospital eye service describe personnel who are found in that setting, but not typically in community optical practices (e.g., nurses, technicians, etc). In view of the different perspectives and experience of community v. hospital participants identified in Round 1, it was decided in Round 2 to separately direct some questions to each group of participants.

The consultant ophthalmologist's responses were identical to those of the optometrists, with the ophthalmologist specifying that objective and subjective refraction, prescribing, and ophthalmoscopy should only be carried out by an optometrist.

The concept of core and non-core sight test components

This main finding indicates that not all sight test components are considered equal. What is special about ophthalmoscopy, subjective refraction/optical prescribing, and management decisions/patient explanation? One likely explanation is the risk to the patient: the risk from missing pathology in ophthalmoscopy; the risk of non-tolerance (this describes the situation when patients have difficulty tolerating a new spectacle prescription) and accidents from errors in subjective refraction/optical prescribing; and the risks from inadequate management decisions/patient explanation. A second potential explanation relates to decision-making. For example, visual field testing is a component that all participants agreed could be carried out by somebody other than the optometrist. In this test, the optometrist typically requests a type of field test (nearly always, there will be a default type of visual field test most commonly in that practice) and the optical assistant then runs that test, which is fully automated on the instrument. During the test, there is no decision-making required and after the test the optometrist interprets the results.

In contrast, nearly all (18/20) of the eye care practitioners considered that ophthalmoscopy must be carried out by the optometrist. In this sight test component, the clinician makes clinical decisions not only about how to perform the test, but also during the procedure itself (e.g., whether to dilate the pupils, magnification setting, etc). The same is true of subjective refraction. During the procedure, clinicians make important clinical decisions about the technique (e.g., there are various methods available for testing visual acuity and determining the refractive error, especially a component of the refractive error called astigmatism) that will influence the results obtained.

In summary, ophthalmoscopy, refraction/optical prescribing, and management or explanation are core sight test components that differ from non-core components in that they are most important for patient safety and require clinical decision-making during the test procedure. This is likely to explain the reluctance of most eye care practitioners to have these tests carried out by somebody other than the optometrist. Round 1 raised the question of who takes overall responsibility for the sight test if important clinical decisions are taken by different healthcare professionals, and this was explored further in Round 2.

The dispensing opticians and orthoptists disagreed with the view that core sight test components should be undertaken by the optometrist. One dispensing optician said that refraction (objective and subjective; see Introduction) should only be carried out by the optometrist undertaking the sight test. The two other dispensing opticians stated that refraction (objective and subjective) and prescribing could be carried out by optometrists, dispensing opticians, and orthoptists (one specifying dispensing opticians in retail settings and orthoptists in a hospital setting).

One orthoptist stated that refraction and prescribing could be undertaken by optometrists or orthoptists and the other said by optometrists, orthoptists, ophthalmologists, or ophthalmic nurses (with training). The latter two vocations are not typically found in optical practices and one of the orthoptists stated that refraction by orthoptists was only appropriate in the hospital eye service. This raises the possibility that orthoptist responses may have been referring to the situation in the hospital eye service rather than in community optical practices. Evidence from our Study 3 (see below) indicates that orthoptists are not interested in carrying out refractions in community optical practices, but rather in the hospital eye service. Round 2 sought clarification on refractions and prescribing by orthoptists in the separate settings of the hospital eye service and community optical practices.

Concerning ophthalmoscopy, all eye care practitioner participants other than the orthoptists considered that this should only be undertaken by optometrists. Both orthoptists considered this test should also be available to orthoptists. Round 2 sought clarification on whether this opinion relates to the hospital eye service, community optical practices, or both.

The reason for the divergent responses concerning objective refraction was explained by one respondent who highlighted that autorefractor results could be obtained by a non-optometrist but retinoscopy (see Introduction) could only be obtained by an optometrist. As explained on p.6, retinoscopy requires considerable skill and practice to acquire that skill.

One respondent, a dispensing optician who considered that all sight test components except for ophthalmoscopy could be undertaken by non-optometrists, stressed that “remote tests should not be permitted”. This person commented that prescribing should be approved by the optometrist who should also take responsibility for management decision-making and patient explanation, despite stating this component could be undertaken by dispensing opticians or orthoptists.

This, and later comments from the first questionnaire, raises the question of who takes responsibility for tests that are not conducted by an optometrist in community optical practices. At present, it is widely accepted and understood that the sight test is the overall responsibility of the optometrist and when tests are delegated to optical assistants (e.g.,

visual fields, tonometry, fundus photographs or scans) the optometrist is responsible for ensuring the tests are adequately conducted and for interpreting the results. This is explicit in GOC Standard 9 of the Standards of Practice for Optometrists and Dispensing Opticians. If components of the sight test were undertaken by different registered healthcare professionals (e.g., a dispensing optician undertaking the refraction and optometrist the health checks), there could be less clarity about who takes responsibility for outcomes of the sight test (e.g., decision to refer, optical prescription). This is explored further in Round 2.

The questionnaire results from the two low vision patients are clearly influenced by their personal experience. For example, one participant with a history of orthoptic problems emphasised the tests that an orthoptist could do. The third patient expert, a retired GP, had a viewpoint more akin to the perspective of most eye care practitioners. This participant indicated that symptoms and history, objective refraction, subjective refraction, prescribing, ophthalmoscopy, and management decisions and patient explanation were all only suitable to be undertaken by the optometrist. For the other components of the sight test, the participant argued these could be undertaken by any suitably trained ophthalmic professional if under supervision of the optometrist and in the same premises.

Conditionality when non-optometrists undertake sight test components

The main table in the questionnaire contains three additional columns with questions that represent caveats regarding conditions that the respondent considers need to be met if a person other than the optometrist is undertaking the test. The first asks about supervision/oversight. In accordance with the principle of keeping questions in the first round of a Delphi as open as possible,[3] these terms were not defined but rather the respondents were invited to "explain how the supervision or oversight should work". The second additional question in the main table asks, when tests are undertaken by somebody other than the optometrist, whether this should be at the same premises.

The third additional question asks if any other factors are relevant. In most cases, respondents entered the same comment for each of the sight test components that they believed could be carried out by somebody other than the optometrist. In other words, responses were dependent on the respondent rather than on the component. For example, respondent 1 who was a patient with low vision emphasised for several components that the test results must be conveyed to the optometrist and explained to the patient. Respondent 3, an optometrist, stressed for all components that could be carried by somebody other than the optometrist, that the optometrist should be present to interpret the results. Interestingly, this participant was content for two of these components to be carried out at different premises to the optometrist, but only if the optometrist was "around to interpret the results".

The most common conditions, each cited by nine or more participants, were appropriate training, same premises as the optometrist, and under supervision. Five participants noted that their responses would depend on the patient's age and ability (e.g., mobility, special needs). Further details of the responses are in Table 19 (Appendix 7).

One respondent, who stressed that when components are carried out by non-optometrists this must be under supervision, differentiated between "under supervision initially (when in training)", for presenting vision and objective refraction, and "always

under supervision", for tonometry and visual fields. Most participants who used the terms supervision or oversight did not define these even when the respondent used both terms.

Many participants considered that tests that were suitable to be undertaken by non-optometrists should be carried out in the same premises, but some participants indicated the opposite. Round 2 further explores these opinions.

Orthoptists' responses

The responses by the two orthoptists were interesting. Although the introductory email and Participant Information Sheet both highlighted that the research relates to refraction for the purposes of sight testing and the GOC, the questionnaires from both respondents relate largely to the hospital eye service environment. For example, the responses refer to staff typically only found in the hospital eye service (ophthalmologist, ophthalmic nurse, ophthalmic technician) and to multi-disciplinary teams and explicitly to the hospital eye service. This is not surprising since orthoptists typically work in the hospital eye service. These responses highlight issues to be addressed elsewhere in this research. First, Round 2 of the Delphi study should differentiate between orthoptists refracting as part of their work in the hospital eye service and in community optical practices. Second, Study 3 explores the goals of orthoptists who are seeking to refract (e.g., whether this is only in the hospital eye service).

Conclusions on Section 2 of the Round 1 Questionnaire and implications for Round 2

In view of the Round 1 findings, Round 2 differentiated between core and non-core sight test components. It explores why all optometrists in the survey opine that core components should be undertaken by the optometrist by exploring opinions on clinical risk/patient safety and clinical decision-making during the testing.

Round 2 also determines whether orthoptist participants are seeking to refract in the hospital eye service and/or in the community optical practice setting. More generally, Round 2 differentiates between these two settings when considering the role of orthoptists in refracting and prescribing, as does Study 3.

Questionnaire 1 Section 3: Advantages of components of the sight test being carried out by non-optometrists

The most frequently cited advantage, listed by 15 participants, was efficiency in terms of saving the optometrist time. The second most frequently cited advantage, cited by 3 respondents is cost savings (it was noted that non-optometrists are "cheaper"), which might be considered as linked to first advantage. Other advantages were listed only by one or two participants (Appendix 7, Table 20).

When listing advantages of components of the sight test being carried out by non-optometrists, participants were asked to state if it would make a difference if the non-optometrist was working under supervision or oversight and if so, what supervision/oversight would be required. Many respondents stressed the importance of supervision or oversight (although few respondents defined these terms) and several respondents noted that closer supervision was required when first undertaking a role (Appendix 7, Table 21).

When listing advantages of components of the sight test being undertaken by non-optometrists, participants were asked to state if it would make a difference if the sight test component was carried out in different premises. Several participants commented that any advantages of having a component of the sight test carried out by a non-optometrist would be negated if in different premises because queries could not be checked immediately, previous records may not be accessible, and/or oversight or supervision was not possible. It was also noted that pathology could develop between the offsite session and the appointment with the optometrist and that using separate premises for some tests this would specifically disadvantage patients with complex needs, such as people with dementia (Appendix 7, Table 21).

When listing advantages of components of the sight test being carried out by non-optometrists, participants were asked to state if their answers depended on other factors (e.g., age of patient, clinical setting, training, insurance). Two participants stressed the importance of training or that the non-optometrist must be skilled. There were five other responses, each made by only one participant (Appendix 7, Table 23).

Questionnaire 1 Section 4: Disadvantages of components of the sight test being carried out by non-optometrists

The most commonly cited disadvantages of components of the sight test being carried out by non-optometrists were categorised as the risk of missing key information, mis-diagnosis, erroneous prescription, errors, and inaccuracies. This was cited by 13 participants for various sight test components (Appendix 7, Table 24). Other disadvantages that were each cited by four to six participants were quality (less well trained/experienced staff), repetition for the patient, missing non-verbal or subtle signs, lack of integration/continuity, and inefficient use of time.

When listing disadvantages of components of the sight test being carried out by non-optometrists, participants were asked to state if it would make a difference if the non-optometrist was working under supervision or oversight and if so, what supervision/oversight would be required. Responses were diverse, with some participants indicating that oversight or supervision would be helpful and others taking the opposite view (Appendix 7, Table 25).

When listing disadvantages of components of the sight test being carried out by non-optometrists, participants were asked to state if it would make a difference if the sight test component was carried out in different premises. Responses were again varied, but common themes emerge of concerns about access to records, and patient inconvenience including delays (Appendix 7, Table 26).

When listing disadvantages of components of the sight test being carried out by non-optometrists, participants were asked to state if their answers depended on other factors (e.g., age of patient, clinical setting, training, insurance). Responses noted the importance of insurance, competence, registration, and consideration of patients with special needs.

Questionnaire 1 Section 5: Clinical outcomes

Section 5 of the questionnaire asked participants about clinical outcomes, using a series of open questions with a large space for replies. The first question on clinical outcomes asked “Do you have any experience of good clinical outcomes resulting from tests being

undertaken by non-eye care professionals (clinical outcomes that are better than would have been likely if the optometrist had undertaken all the tests themselves)? If so, please explain, with examples if you think they would help to illustrate."

Responses were varied, ranging from "None I can think of in the last 22 years" to "Patient rapport with ophthalmic technicians is often better than with optometrists/orthoptists" (Appendix 7, Table 28). The only general themes to emerge are the potential to free up the optometrist's time.

The second question asked "Do you have any experience of good clinical outcomes resulting from tests being undertaken by only one healthcare professional (e.g., the optometrist)? If so, please explain, with examples if you think they would help to illustrate." Most participants responded to this question and many described cases that they implied were frequent (one said, "every day") where a diagnosis was facilitated or only occurred because the patient assessment was undertaken by only one healthcare professional. Interestingly, these comments were not confined to the optometrists but included a comment from an orthoptist. Other themes to emerge were the advantages of this approach for patients with special needs, greater convenience for the patient, clearer decision making, increased patient trust, and less disjointed (Appendix 7, Table 29). Two participants specifically gave the example of an eye condition called keratoconus. In this condition, there may be subtle clues to the condition that occur during symptoms and history, retinoscopy (objective refraction), subjective refraction, and the ocular examination. Each of these clues individually may not reach the threshold for the condition to be detected, but if each of these sight test components is undertaken by the same practitioner it is likely that the combined observations in each of these tests will meet the threshold for detection.

The third question asked "Do you have any experience of adverse clinical events or other adverse impacts that have occurred because some tests were undertaken by a person other than the optometrist? If so, please give details of the person's background (e.g., dispensing optician, orthoptist, optical assistant, etc.)"? These responses also cited the example of keratoconus. An orthoptist, whose responses to the questionnaire indicated that she was describing the situation in the hospital eye service, replied that there were no adverse events because "safety check and competencies in place". In contrast, optometrists cited several adverse events including delegated staff missing symptoms, missed keratoconus, missing visual field defects (mentioned by three participants), missed stroke, missed prismatic correction in spectacles, inadequate quality of scans or tests (Appendix 7, Table 30).

The final question in this section asked "Do you have any experience of cases where you foresee that adverse clinical events or other adverse impacts are likely to occur if the components of a sight test are carried out by different people? If so, please explain, with examples if you think they would help to illustrate."

As in earlier tables, it is clear from the responses that optometrists and dispensing opticians are referring to the situation in community optical practices (Appendix 7, Table 31). In contrast, orthoptists' responses are referring to the situation in the hospital eye service. Several participants raised concerns about communication between different people involved in delivering the sight test and the specific case of patients with special needs was again raised. One optometrist had indirect experience and was critical of a

situation in North America of an eye examination where the optometrist was online in another state.

The final question in this section asked "Do you have any experience of cases where you foresee that adverse clinical events or other adverse impacts are likely to occur if the components of a sight test are carried out by different people? If so, please explain, with examples if you think they would help to illustrate."

One participant expressed concern that if a patient could choose to have a "refraction alone" sight test, implying without health checks, serious problems could be missed. This raises an important point, as there are potentially two different changes to the current sight test format, where the optometrist carries out both the refraction and the health checks. First, a similar "sight test event", but with a different registered health care practitioner undertaking a core component test (refraction or ophthalmoscopy). Second, a "refraction only sight test", which does not include ophthalmoscopy. Round 2 explores this distinction.

Conclusions concerning Sections 3-5 and implications for Round 2

Sections 3-5 of the Round 1 Questionnaire attracted more detailed responses than might have been anticipated. Round 2 attempts to narrow the issues and concentrates on the core tests (p.18), specifically on refraction/prescribing and ophthalmoscopy.

Protecting the public is core to the GOC mission,[7] "to protect the public by upholding high standards in the optical professions". Therefore, the findings in Sections 3-5 have been filtered to extract comments relating to public safety. After removing duplicates, these are reproduced in Table 1. The increased focus in Round 2 on patient safety means that there was a greater emphasis on risk, or negative impacts of components of the sight test not being carried out by the same person, at the same time, or in the same place. The intention is not to ignore potential positive impacts, which have been clearly identified in Round 1 and are considered further later in this report.

In addition to the risks identified by participants, in discussions the research team introduced one additional item into Table 1: the risk of increasing health inequalities. In view of the UK Government policy of "levelling-up", it was thought that this topic should be included in Round 2.

In Round 2, participants were asked to rank each item in Table 1 for risk, using a conventional risk matrix (likelihood vs severity of consequences).[8] Participants were invited, for each risk, to state if the risk matrix factors are changed (a) depending on whether the tests are carried out at a different time; (b) in a different place; and (c) if the sight test was carried out without health checks. As noted above, for each question in Round 2 it was made clear whether it is referring to a community optical practice setting or to the hospital eye service.

Table 1. Summary of findings from Section 3 and 4 that relate to patient safety or patient harm.

Description of risk
Inadequate training/person doing tests is not competent for the task
Missing key information, mis-diagnosis, erroneous prescription, errors, inaccuracies
Reduced quality of care
Missing non-verbal signs
Impaired ability to recognise diagnostic pattern from combining results of different tests
Poor communication between professionals carrying out components of the sight test
Poor care delivered to patients with learning disability, cognitive impairment, sensory impairment, or young children
Missing ocular pathology if retinoscopy is not carried out by the optometrist
Impaired decision-making process
Missing early keratoconus
Discontinuity from multiple team members producing problems for people with autism
Increased non-tolerances (e.g., wrong dispenses from too segmented a process)
Health issues missed due to loss of continuity
Important details missed if symptoms and history not undertaken by the optometrist
Pathology being missed in a domiciliary setting
Increasing health inequalities

The plan outlined in the last paragraph, based on Table 1, does not include the non-core sight test components that in contemporary practice are frequently delegated to optical assistants (e.g., visual fields and tonometry). Several responses in Round 1 highlight adverse events that have occurred when these sight test components are delegated to lay staff. These components are peripheral to an important theme of the present research, which relates to the new situation where, to quote the GOC Invitation to Tender, "a suitably trained and qualified person who is not an optometrist or registered medical practitioner carried out the refraction separately to the binocular vision and eye health checks". However, some of the responses in Round 1 highlight adverse events that have occurred when non-professional staff undertake non-core (e.g., automated) tests and these issues cannot be ignored.

GOC Standard 9 of the Standards of Practice for Optometrists and Dispensing Opticians explicitly covers the supervision required for these delegated functions by non-professional staff and makes it clear that the optometrist retains clinical responsibility for the patient. In the GOC Standards for Optical Businesses, there is an equivalent section requiring optical businesses to ensure that staff are adequately supervised, and that

supervision follows GOC Standard 9. Round 2 checks that respondents are familiar with Standard 9 and that this is being followed.

Questionnaire 1 Section 6: Recruitment

The GOC Invitation to Tender noted that dispensing opticians and orthoptists may have experience in refraction and asks whether there would be any risk to patient safety if suitably trained and qualified persons other than optometrists or medical practitioners carried out refraction. Since these professionals are already fulfilling important roles, it is relevant to consider whether there is likely to be capacity within these professions, now and in the near future, for personnel to be reallocated to a sight test role without risking patient safety by leaving a shortage of practitioners for their current role.

Participants were asked four questions, as show in Figure 3. For each question, there were four Likert-type options, and "I don't know".

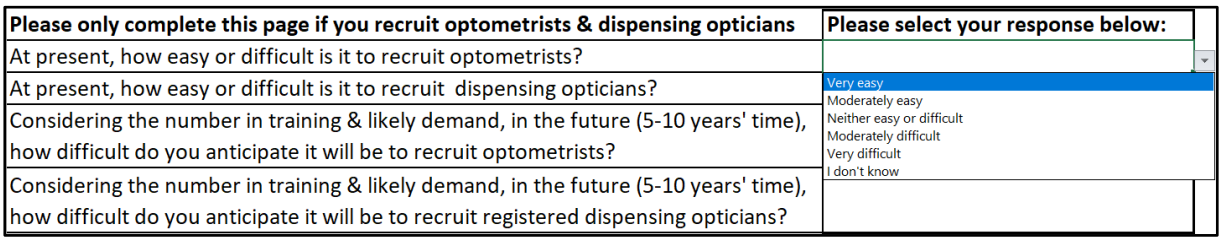


Figure 3. Questions on recruitment.

The results were analysed quantitatively for those who provided answers other than "I don't know". Responses were scored as follows:

"Very easy" were scored as	4
"Moderately easy" as	3
"Neither easy or difficult" as	2
"Moderately difficult" as	1
"Very difficult" as	0

The results are summarised in Figure 4 for the 13 participants who responded to these questions. Although the sample size is modest, the results are perhaps not surprising. The number of undergraduate training courses offering optometry degrees and the number of undergraduate optometrists in training have grown considerably in recent years.[9] Figure 4 indicates that respondents consider that it is equally difficult to recruit optometrists and dispensing opticians at present, but that it will be easier to recruit optometrists than dispensing opticians in five to ten years' time.

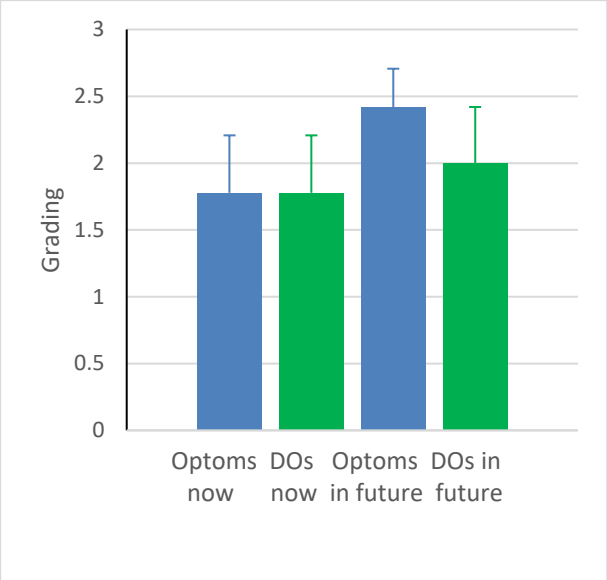


Figure 4. Participant gradings of the ease and anticipated ease of recruiting optometrists, now and in five to ten years' time. The results show the mean and the standard error of the mean.

This concern, that in future it will be more difficult to recruit dispensing opticians than optometrists, is likely to be exacerbated by a finding of the 2022 GOC Registrant Survey. The survey indicates that the proportion of dispensing opticians (19%) who are planning to leave the profession is higher than the proportion of optometrists (15%). A chi-squared test indicates that for the survey sample size (2,262 optometrists and 982 dispensing opticians) this difference is strongly statistically significant (p=0.0045). Although clearly relevant, it is not considered that there are any further issues relating to recruitment and retention that need to be explored in Round 2.

Questionnaire 1 Section 7: Additional comments

In the final section of the questionnaire, participants were invited, in a free text box, to make any "additional comments on the points raised in this questionnaire". As in earlier questions, the responses of optometrists and dispensing opticians related to community optical practices and in contrast, responses of orthoptists relate to the hospital eye service setting. One of the patient participants noted that orthoptists are now delivering injections (for macular degeneration) and expressed concern that orthoptists refracting and seeking to be able to issue optical prescriptions may indicate that they wish to work in community optometric practice. This is explored further in Study 2 Round 2 and in Study 3.

An optometrist participant used the analogy of diabetic fundus photograph screening and children's vision screening, noting that many of the public think these replace the need for regular sight tests. Indeed, the participant cites research indicating that 85% of patients surveyed believe that school vision screening will detect all eye problems, which clearly it won't. This is a concern if there was a move towards a "two-tier sight test", with some sight tests comprising refraction without health checks.

A dispensing optician participant differentiates between the current requirement for supervision when a non-professional undertakes a sight test component, with the optometrist taking responsibility and able to intervene. The participant suggests that if a sight test component was undertaken by a different eye care professional, the optometrist should still take overall responsibility but with oversight rather than

supervision. The participant defines oversight as the optometrist not always being in a position to intervene, but available if the dispensing optician or orthoptist needs to seek advice or clarification.

Most of the significant risks raised in response to this question (Appendix 7, Table 32) have been identified in earlier sections and are included in Table 1. An exception is the point noted above that a patient who has received a test that is less than a full sight test (e.g., diabetic retinal photo screening, school vision screening) will assume this is equivalent to a full eye examination and not attend for optometric eye care. This is particularly relevant to the notion of a "refraction only" sight test, raised by some participants in Round 1, and is added to the table of risks in Round 2.

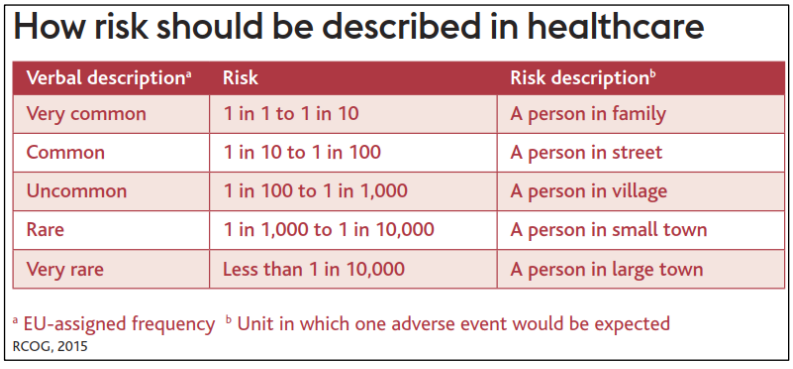
Questionnaire 1: Conclusions and implications for Round 2

1. In accordance with usual practice in Delphi studies, the questions in Round 1 were broad and the phrasing was wherever possible open.[10] When designing Q1 it was unknown how many participants would respond, what proportion of questions they would answer, and the depth of their answers. The response rate turned out to be high and participants addressed nearly all questions, often in considerable depth. It seems likely that this reflects the emotive nature of the topic.

2. Round 2 aims to be more focussed. As noted above, a commonly used approach in Delphi Round 2 questionnaires is to provide feedback on the pooled answers from Round 1 and to base the second questionnaire on statements drawn from Round 1, inviting participants to revise their responses considering the summary of responses. Sometimes, participants are asked to rank or rate statements.

3. A useful approach to provide greater focus for Round 2 is to consider the core statement in the GOC's mission, to protect the public.[7] Therefore, Round 2 concentrates on risks to patient health and patient safety. Round 1 identified key risks to patient safety (Table 1) and these are addressed in Round 2. A useful approach is considered to be the widely used risk matrix.[8] This considers risk along two axes, likelihood of risk and severity of risk.

    a. For likelihood of the risk, the scale developed by the Royal College of Obstetricians and Gynaecologists and disseminated to optometrists by The College of Optometrists[11] is used (Figure 5).



How risk should be described in healthcare

Verbal description[a]	Risk	Risk description[b]
Very common	1 in 1 to 1 in 10	A person in family
Common	1 in 10 to 1 in 100	A person in street
Uncommon	1 in 100 to 1 in 1,000	A person in village
Rare	1 in 1,000 to 1 in 10,000	A person in small town
Very rare	Less than 1 in 10,000	A person in large town

[a] EU-assigned frequency [b] Unit in which one adverse event would be expected

RCOG, 2015

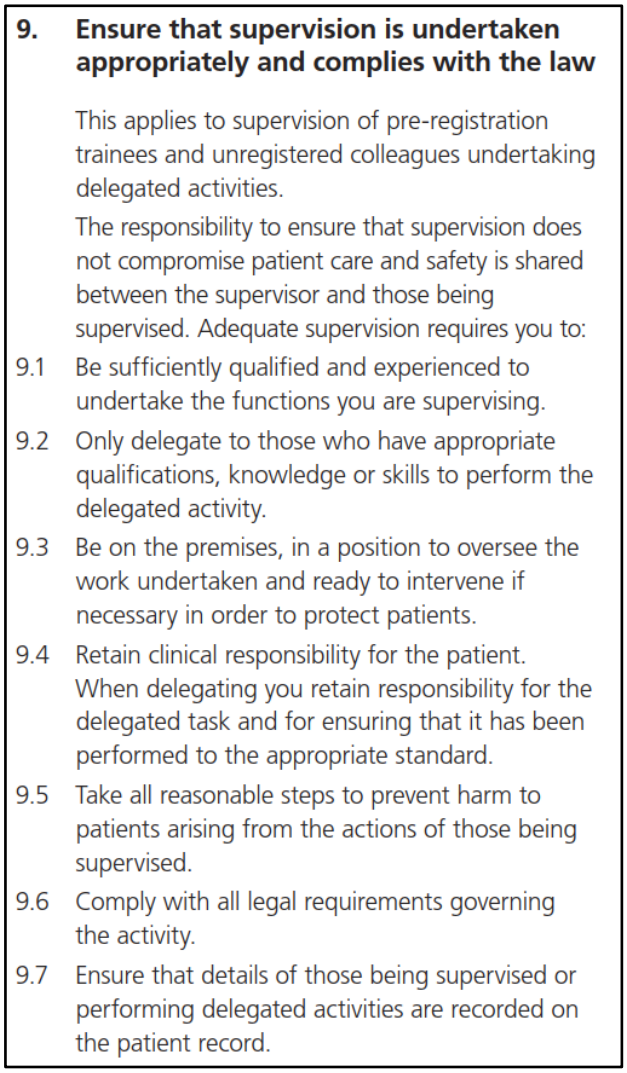
Figure 5. Expressing risk in healthcare, from Acuity, a magazine published by The College of Optometrists.

    b. For severity of risk, a modification of the approach advocated by Ristic is used.[8] Participants are asked to grade severity of risk as catastrophic (death), major

(sight loss in one or both eyes), moderate (reduced vision), or minor (symptoms but no vision loss).

4. Round 1 asked about all components of the sight test, which is relevant for context. Also, the key aim stated in the GOC Invitation to Tender referred to "The possible impacts that might occur if the refraction, binocular vision, and eye health checks were not carried out by the same person", and all components of the sight test can be considered to fall under these three headings. Round 2 concentrates on the core components of the sight test (p.18) since these are most important for patient safety and attracted divergent opinions in Round 1 (optometrist and ophthalmologist v dispensing optician and orthoptist). Specifically, refraction/optical prescribing and ophthalmoscopy are the two most important sight test components that need to be addressed in Round 2.

5. Although Round 2 concentrates on core sight test components, the non-core components are briefly touched on to check one finding from Round 1. Round 1 (and Study 1) confirmed that non-core components that are essentially automated (e.g., tonometry, visual fields) are already often undertaken by optical assistants. Whilst participants broadly consider this appropriate (Figure 2), other data from Round 1 provide caveats and raise concerns about the contemporary widespread delegation of these components. Round 2 will check that GOC Standard 9 (Figure 6) is complied with. If Round 2 identifies that GOC Standard 9 is widely breached or disregarded, this has two implications. First, although incidental to the aims of this research the GOC clearly need to know if a standard is not being followed because GOC Standards are obligatory. Second, if the current clear-cut requirements of Standard 9 are widely breached, this must raise doubts about whether any changes to allow core components of the sight to be undertaken by different healthcare professionals could work in practice.



9. Ensure that supervision is undertaken appropriately and complies with the law

This applies to supervision of pre-registration trainees and unregistered colleagues undertaking delegated activities.

The responsibility to ensure that supervision does not compromise patient care and safety is shared between the supervisor and those being supervised. Adequate supervision requires you to:

9.1 Be sufficiently qualified and experienced to undertake the functions you are supervising.

9.2 Only delegate to those who have appropriate qualifications, knowledge or skills to perform the delegated activity.

9.3 Be on the premises, in a position to oversee the work undertaken and ready to intervene if necessary in order to protect patients.

9.4 Retain clinical responsibility for the patient. When delegating you retain responsibility for the delegated task and for ensuring that it has been performed to the appropriate standard.

9.5 Take all reasonable steps to prevent harm to patients arising from the actions of those being supervised.

9.6 Comply with all legal requirements governing the activity.

9.7 Ensure that details of those being supervised or performing delegated activities are recorded on the patient record.

Figure 6. Standard 9 from GOC Standards of Practice.[12]

6. Round 2 also explores opinions concerning orthoptists refracting and prescribing as part of their work in the hospital eye service vs in optical practices.

7. Round 2 attempts to achieve consensus on sight test components that can be carried out by non-optometrists. Specifically,

a. For the orthoptists, do they consider that they should be refracting in the hospital eye service as part of their assessment of the patient, or are they seeking a change in legislation to allow them to do this work in community optical practices? If the latter, would this be as part of a team with optometrists or in their own capacity? The preliminary results from Study 3 indicate that orthoptists are not interested in working in community optical practices, but Round 2 checks this view with the Study 2 participants.

b. For the dispensing opticians, how do they see a role for dispensing opticians refracting in optical practices? For example, do they foresee dispensing opticians:

    i. Undertaking sight tests in the same capacity as optometrists do at present;

    ii. Undertaking refraction and issuing prescriptions that the dispensing optician signs off, in a "sight test without health checks", possibly, with the optometrist still periodically undertaking health checks;

    iii. dispensing opticians carrying out refraction as part of an optometrist's sight test, with the optometrist still signing the prescription;

    iv. Not as part of a sight test, but when required in rechecks (a recheck is an appointment when a patient has complained they cannot tolerate a new prescription). If so, are they asking to be legally allowed to change the prescription?

    v. In some other way.

8. The more focussed nature of Round 2, with an increased emphasis on clinical matters, means that it is not amenable to completion by patient participants. As noted above, for some topics Round 2 addresses different questions to members of different professions.

Clinical responsibility, legal responsibility, and insurance

One of the themes to emerge from Round 1 relates to who takes responsibility for a test, both in clinical and legal contexts, and the related issue of insurance. In the *status quo*, clinical responsibility for the sight test unambiguously rests with the optometrist. If the optometrist is the practice owner whose business structure is sole trader, legal responsibility also fully rests with this individual and they are solely responsible for insurance to cover claims resulting from their sight test. If the optometrist is an employee of a corporate body, then it is likely that in the case of litigation, the business would be the subject of the litigation and the business must have appropriate insurance.

In the hospital eye service, where healthcare professionals already work together in teams, there will be a named consultant who nominally takes overall responsibility for the patient. Classically, this consultant was an ophthalmologist but nowadays there are also clinics led by optometrist consultants. There are likely to be several registered healthcare practitioners who see the patient, and each will take responsibility for their role and associated clinical decisions. In some cases, the consultant who nominally takes responsibility may not even see the patient or the clinical record. In the case of litigation, it will be the Trust that will be sued, and they will be covered by the Clinical Negligence Scheme for Trusts (for the purposes of this report, analogous to insurance).

In optical practices, there is no direct equivalent to a Trust and in any event, not all sight tests are carried out under the NHS. Some sight tests are funded partly by the NHS and partly privately (e.g., there may be a charge for retinal scans). As noted above, the legally responsible entity varies between practice and sometimes there may be more than one entity. If, for example, a dispensing optician undertakes the refraction component of a sight test, with an optometrist taking overall responsibility for the sight test, whose insurance should be expected to cover an accident, error, or non-tolerance result from an inappropriate prescription? Is it the practice, the optometrist, or the dispensing optician and what are the implications for professional indemnity insurance? Similar questions arise if ophthalmoscopy is performed by somebody other than the optometrist undertaking the sight test.

If the current situation in community practice is to be changed, so that more than one healthcare professional takes responsibility for some clinical decisions within the sight test, considerable thought should be given to the clinico-legal implications. Although this has been highlighted by the present research, it is beyond the scope of the research to progress further in investigating these implications. The study participants are not legal experts and should not be asked to speculate beyond their expertise. Therefore, this is not considered further in the present work.

This consideration impacts the increased risk to patients that may result from fragmentation of the sight test. For example, if refraction is undertaken by a dispensing optician and ophthalmoscopy by an optometrist, who would be responsible for missing early keratoconus? There may have been subtle clues present during refraction, and further clues during ophthalmoscopy. If one person had conducted both sight test components, it is reasonable to expect them to combine these subtle cues so that the threshold for referral was reached. If the sight test components were carried out by different eye care practitioners, for each eye care practitioner the threshold for detecting keratoconus may not have been reached and this further complicates the question of which eye care practitioner would be responsible for an error.

Professional disciplinary matters also need to be considered. At present, if a patient complains to the GOC about a sight test, it is clear which registrant the complaint relates to. If core components of the sight test are carried out by different registrants, there would need to be clarification of the roles and responsibilities within the multi-disciplinary team.

Results and Discussion: Questionnaire 2

Response rate and participants

As explained above, all 20 eye care practitioner participants in Round 1 were invited to participate in Round 2 and were sent the Round 2 questionnaire. Despite a reminder, two participants did not reply (P22 and P18). Therefore, the response rate was 90%, although not all participants responded to every section, as revealed in the tables below.

Questionnaire 2 Section 1: Role of orthoptists

The first few questions in Section 1 asked orthoptist respondents how they would like to see the scope of their practice expanding. The responses from the two orthoptist

respondents indicate that neither were routinely undertaking refractions at present, but felt this would be useful for their work in the hospital eye service. Both confirmed that they are not at present able to sign hospital eye service optical prescriptions and one of the two considered this would be useful. Both confirmed that there is no desire within the orthoptic profession to undertake sight tests in community optical practices (Appendix 7, Table 33).

Two further questions in Section 1 were addressed to eye care practitioners other than orthoptists, to refine opinions from Round 1. The first question asked "If, in Round 1 of this study, you expressed concerns about people other than an optometrist carrying out refractions or ophthalmoscopy, do these concerns apply solely to community optometric practice?" The responses were evenly split, with seven respondents replying yes and eight answering no. There was no discernible correlation between responses and the setting in which the participant worked.

The second question asked participants to explain if they have any concerns about orthoptists undertaking refractions and issuing hospital eye service prescriptions as part of their work in the hospital eye service. Eight of the 14 non-orthoptist respondents said they had no concerns but most added caveats (Appendix 7, Table 34). An interesting objection, which the respondent characterised as "mission creep", is that some companies may entice orthoptists out of hospital into the community. Since patients typically wait several months for hospital eye service appointments and sights tests in the community are generally available within a few days, it would seem regressive if a change led to orthoptists leaving the hospital eye service. This point was addressed in more detail by Study 3 participants.

Other participants raised concerns about whether orthoptists would have the skills necessary to prescribe and mentioned the risk of non-tolerance. Another objection was in essence a concern that refraction should be part of a full eye examination and takes considerable skill. One participant who works in the hospital eye service argued that orthoptists are only trained in retinoscopy for children, not adult refractions. Study 3 (below) explored opinions in a larger sample of orthoptists and reveals little interest amongst orthoptists for adult refractions.

The Round 1 questionnaire raised the question of non-tolerances (when patients have difficulty tolerating a change in optical prescription), but Study 3 indicates that orthoptists are predominantly interested in refracting and issuing HES1 prescriptions for children. Since non-tolerance is exceptionally unlikely in children,[13] it would seem that changes to allow orthoptists to refract and prescribe would be widely accepted and with minimal risk, as long as this is confined to young children and orthoptists' work in the hospital eye service.

Questionnaire 2 Section 2: Role of dispensing opticians

The first few questions in Section 2 asked dispensing optician respondents how they would like to see the scope of practice of dispensing opticians expanding. Opinions from the three dispensing opticians were divergent. Various models for allowing dispensing opticians to refract were explored, with each dispensing optician favouring at least one model and disfavouring other models, with no agreement on what is an acceptable model. It is interesting that one dispensing optician argued against dispensing opticians refracting in a sight test unless there is an undersupply of optometrists in the future. This

links to the Round 1 finding that in the future it is considered more likely there would be an undersupply of dispensing opticians than of optometrists.

All three dispensing opticians disagreed with the concept of a dispensing optician sight test attempting to replace or complement the current optometrist sight test. Two of the three also disagreed with the suggestion of "refraction only" sight tests with a dispensing optician, which one dispensing optician commented "would not be beneficial for the public" (Appendix 7, Table 35). As explained on p.25, it was appropriate for Round 2 to concentrate on potential risks, but these should be considered in the context of the potential advantages of sight test components being undertaken by non-optometrists that were identified in Round 1.

Further questions in Section 2 were addressed to eye care practitioners other than dispensing opticians, to refine opinions from Round 1. Only the optometrists and ophthalmologist responded, eight of whom had experience of working in the hospital eye service, with four participants who only had experience of community practice. Participants' opinions were sought on five options which are summarised in Figure 7.

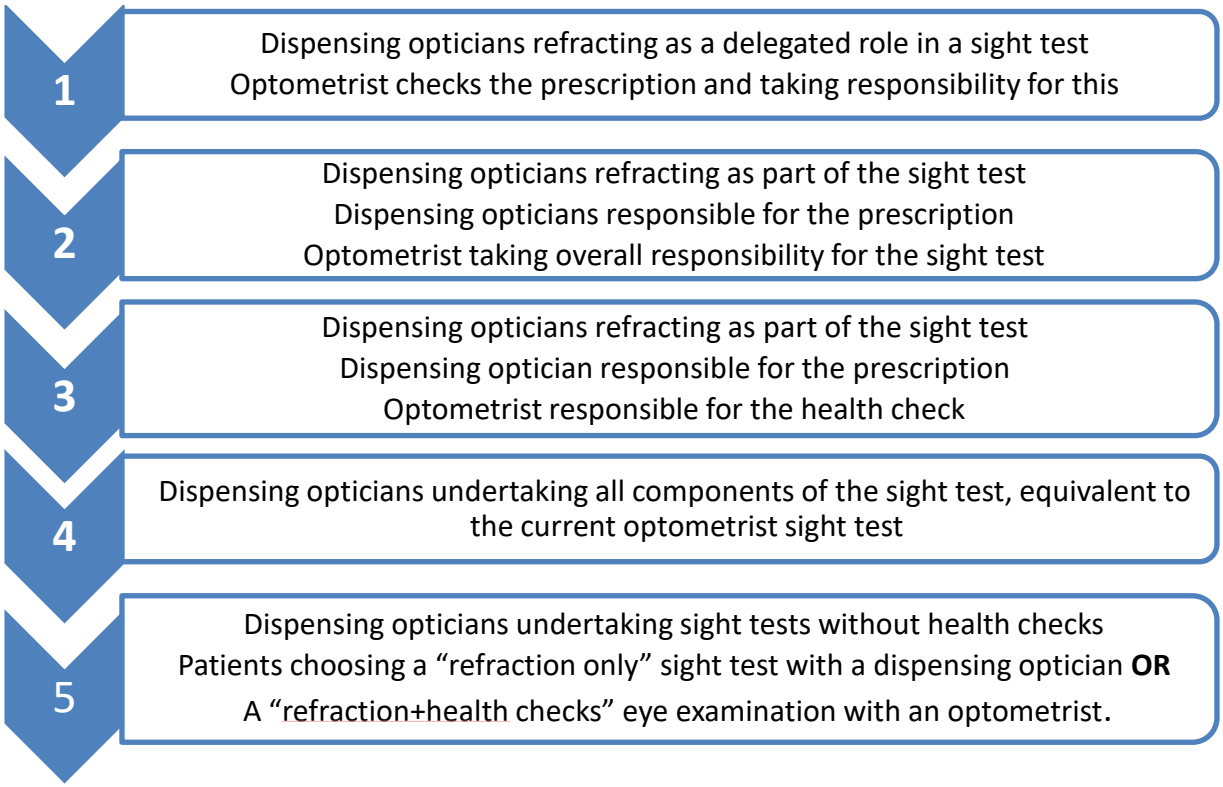


Figure 7. The options for involving dispensing opticians in refractions in the sight test that were presented to participants.

The responses to the various scenarios are summarised below, starting with the most radical options (the last of the options listed above). Responses show a universal concern for the concept of "refraction only" sight tests, which several respondents linked to significant risks to patient health, summarised by one respondent as "an extremely worrying scenario". The option of dispensing opticians attempting to carry out a sight test equivalent to the current optometric sight test also attracted widespread objections, noting that for this to be safe, the dispensing optician would need to be trained to the level of an optometrist which would negate any advantages. The scenario where dispensing opticians refract as part of a sight test in which the dispensing optician is

responsible for the refraction and the optometrist for the health checks raised concerns from most (8/12) respondents, including worries about patient safety.

The two least radical options (Figure 7) are dispensing opticians refracting as a delegated role in a sight test with the optometrist checking the prescription and taking responsibility; and dispensing opticians refracting as part of the sight test, with the dispensing optician responsible for the prescription and the optometrist taking overall responsibility for the sight test. Both options raised concerns about patient health/safety, or practical objections from most respondents.

Since clinicians who have worked in the hospital eye service are likely to be familiar with working in teams, where different people are accountable for different sight test components, it is relevant to consider whether these participants are less likely to raise concerns about separating sight test components. However, such an effect was not apparent. Concerns were raised by eight of the nine participants who had worked in the hospital eye service and all three participants who had not worked in the hospital eye service. The one respondent who did not raise concerns introduced conditions ("as long as competent/quality control/governance in place") which may explain why participants seem content with division of sight test components in the hospital eye service but not in the community (Appendix 7, Table 36).

Several responses in Round 1 and Round 2 noted the extensive training, quality control, and governance procedures in the hospital eye service which facilitate safe team working. Similar points were made by orthoptists in Study 3. There are concerns that such measures, which are considered necessary for safe practice when sight test components are undertaken by different personnel, may not be applied in community practices. A comment from an optometrist participant with wide-ranging experience (hospital eye service, community optometric practice in corporate and independent sectors, and university eye clinics) is apposite:

> "I do not believe optometrists will be provided opportunity/sufficient time to check the prescription obtained by the dispensing optician - much as many practices do not/are not able to provide sufficient time for supervisors to supervise pre-registration optometrists due to significant pressures already faced in many areas (waiting lists, business/finance pressure etc)."

This mirrors comments in Section 5 of the questionnaire (discussed below) about problems (at present) with compliance to GOC Standard 9 owing to "busy practices", "time constraints", "financial and time pressures", and "not given time and resources". Since clinicians are clearly concerned about safe practice with the limited team-working in community practices at present, it is understandable that they are concerned about any move towards fragmentation of the sight test.

Questionnaire 2 Section 3: Risks of refraction in a sight test by an eye care practitioner other than the optometrist

In Section 3 of the Round 2 questionnaire, the risks that participants identified in Round 1 relating to refractive error were listed and respondents were asked to grade each of these risks in terms of the likelihood of risk and severity of risk, using the schema in the first two columns of Table 2.

Table 2. Format of questions asking participants to assess (in separate columns) the likelihood of risk and severity of risk. For each column, participants had to select one option from a drop down list. The scores for coding column are explained below.

Likelihood of risk	Severity of risk	Scores for coding (and colour codes)
Very common: 1 in 1 to 1 in 10	Catastrophic: death	4
Common: 1 in 10 to 1 in 100	Major: sight loss in one or both eyes	3
Rare: 1 in 1,000 to 1 in 10,000	Moderate: reduced vision	2
Very rare: less than 1 in 10,000	Minor: symptoms but no vision loss	1

Most questions were answered by all 18 of the Round 2 participants. An exception was the question about the risk of increasing health inequalities, which was answered by 14 participants. Comments on some of the questionnaires indicated that a few participants did not understand this question.

For each participant, the options from the first two columns of Table 2 were converted to numerical scores using the values in the last column of Table 2. The mean score from all respondents was calculated and is given in Table 3. To give an overall score for risk, the likelihood value was multiplied by the severity value to give a combined score that ranged from 1 (least severe risk and lowest likelihood) to 16 (most severe risk at highest likelihood). The summative statistics are given in Table 3 and are colour coded following typical conventions in risk assessment,[8] as summarised in the fourth column of Table 2. For the combined risk score, <2.3 was scored as low risk (green), 2.3-6.2 as medium risk (yellow), 6.3-12.2 as severe risk (orange), and >12.2 as extreme risk (red).

Table 3. Summative statistics for risks of separating refraction from the rest of the sight test, calculated from participants who responded to each question. See text for explanation. The combined risk was calculated by multiplying likelihood x severity (this calculation used more decimal places than those shown). The risks are presented in order of decreasing combined risk. The last two columns are explained below.

Risk	Likelihood of risk	Severity of risk	Combined risk	Time	Place
Pathology being missed in a domiciliary setting	3.3	3.1	10.0	100%	82%
Health issues missed due to loss of continuity	2.8	2.9	8.1	86%	92%
Impaired ability to recognise diagnostic pattern from combining results of different tests	3.0	2.6	7.9	79%	86%
Important details missed if symptoms and history not undertaken by the optometrist	2.8	2.8	7.7	85%	92%
Poor care delivered to patients with learning disability, cognitive impairment, sensory impairment, or young children	3.2	2.4	7.5	71%	93%
Increasing health inequalities	2.9	2.5	7.4	100%	100%

Risk	Likelihood of risk	Severity of risk	Combined risk	Time	Place
Impaired decision-making process	3.0	2.3	6.9	77%	83%
Missing key information, mis-diagnosis, erroneous prescription, errors, inaccuracies	2.9	2.3	6.8	80%	93%
Inadequate training / person doing tests is not competent for the task	2.9	2.3	6.5	79%	87%
Missing ocular pathology if retinoscopy is not carried out by the optometrist	2.5	2.5	6.2	77%	92%
Missing early keratoconus	2.7	2.3	6.2	69%	92%
Poor communication between professionals carrying out components of the sight test	2.6	2.3	6.0	93%	100%
Discontinuity from multiple team members producing problems for people with autism	3.0	2.0	6.0	86%	100%
Missing non-verbal signs	2.5	2.3	5.8	77%	92%
Reduced quality of care	2.8	1.9	5.4	79%	87%
Increased non-tolerances (e.g., wrong dispenses from segmentation of process)	2.8	1.8	5.1	75%	92%

The risk analysis described above needs to be considered in the context of the seven potential advantages of sight test components being carried out by non-optometrists that were identified in Round 1. For the relevant risks identified by participants in the first round, the second round revealed a mean risk score for likelihood in the "common" range (1 in 10 to 1 in 100). The mean gradings for severity of risk were mostly "moderate" (reduced vision), with six of the risks showing a mean score in the "major" (sight loss) category. For the combined risk, nine of the risks were classified as "severe risk" and the remaining seven as "medium risk".

The last two questions in this section asked participants to state if the likelihood and severity of risk would change if the sight test components were carried out at (a) different times and (b) in different places. Participants' responses were graded as -1 if they considered the risk would decrease and +1 for increased risk. There was only one risk (Poor care delivered to patients with learning disability, sensory impairment, or young children) for which one participant indicated that either of the options could decrease the risk. This was when considering the effect of sight test components being carried out at different times and the participant added the following comment:

> "may be more helpful in some cases where patients have short attention span, but when multiple different personnel are used then the patient may find this confusing and it becomes less efficient due to the time taken for introductions and trust to be built up with each patient episode"

This comment raises both a potential advantage and disadvantage and therefore can be characterised as overall neutral. In every other case, respondents' comments indicated

that there would be an increased risk if sight test components were carried out at different times and in different places. The proportion of participants who indicated that the risk would increase is given in the last two columns of Table 3.

In summary, the vast majority of responses considered that if sight test components were carried out at different times or places this would increase each of the risks identified, especially if in a different place. It is notable that 100% of respondents considered that if sight test components were carried out at different times this would increase the risks of missing pathology in the domiciliary setting (these risk scores were already amongst the highest, even for all tests being carried out at the same time). All who responded to this question considered that carrying out sight test components at different times or in different places would increase the risk of health inequalities.

Questionnaire 2 Section 4: Risk matrix for "refraction only" sight test

In Round 1, participants raised concerns about refraction only sight tests, which are provided in some continental European countries. Section 4 of the questionnaire, the risks that participants had identified in Round 1 are used to assess a refraction only sight test, without ophthalmoscopy. As in the preceding section, respondents were asked to grade each of these risks in terms of the likelihood of risk and severity of risk, using the scales in Table 2.

Most questions were answered by all 18 of the Round 2 participants. An exception was the question about the risk of increasing health inequalities, which was answered by 12 participants (see last section). For data analysis, the same procedure was used as detailed above for the data on Refraction. The results are summarised in Table 4.

This risk analysis needs to be considered in the context of the seven potential advantages of sight test components being carried out by non-optometrists that were identified in Round 1. For all the risks identified by participants in the first round, the second round (Table 2 and Table 4) revealed a mean risk score for likelihood in the "common" range (1 in 10 to 1 in 100). The mean gradings for severity of risk were mostly in the "major" (sight loss) category. The two risks that were not in this category both related to spectacle prescribing. Similarly, the mean scores for all combined risks except these two were in the "severe" category.

Table 4. Summative statistics for risks of "refraction only" sight test (no ophthalmoscopy). See text for explanation. The combined risk was calculated by multiplying likelihood x severity (this calculation used more decimal places than those shown). The risks are presented in order of decreasing combined risk.

Risk	Likelihood of risk	Severity of risk	Combined risk	Time	Place
Patients assuming that a "refraction only" sight test replaces the need for periodic full eye examinations	3.5	3.2	11.1	70%	89%
Pathology being missed in a domiciliary setting	3.3	3.3	11.0	67%	78%
Missing ocular pathology	3.2	3.2	10.2	78%	78%
Missing systemic pathology	2.9	3.4	10.0	78%	89%

Risk	Likelihood of risk	Severity of risk	Combined risk	Time	Place
Impaired ability to recognise diagnostic pattern from combining results of different tests	3.2	2.9	9.5	70%	80%
Missing key information, mis-diagnosis, erroneous prescription, errors, inaccuracies	3.0	3.1	9.4	80%	91%
Reduced quality of care	3.4	2.8	9.3	64%	82%
Poor care delivered to patients with learning disability, cognitive impairment, sensory impairment, or young children	3.3	2.8	9.3	70%	90%
Important details missed if symptoms and history not undertaken by the optometrist	2.9	2.9	8.6	70%	80%
Increasing health inequalities	3.1	2.5	7.7	75%	89%
Impaired decision-making process for spectacle prescribing	2.8	1.9	5.5	60%	80%
Increased non-tolerances	2.8	1.7	4.8	60%	90%

The last two questions in this section asked participants to state if the likelihood and severity of risk would change if the sight test components were carried out at (a) different times and (b) in different places. Participants' responses were graded as -1 if they considered the risk would decrease and +1 for increased risk. In every case where participants provided comments, these indicated that there would be an increased risk if sight test components were carried out at different times or in different places. The proportion of participants who indicated that the risk would increase is given in the last two columns of Table 4.

Questionnaire 2 Section 5: Non-core components

Section 5 of Questionnaire 2 asked about participants' familiarity with Section 9 of the GOC Standards of Practice for Optometrists and Dispensing Opticians (Figure 6). Understandably, the participants who are not registered with the GOC were either not familiar (both orthoptists) or only slightly familiar (the ophthalmologist), and these participants were excluded from the rest of this section. Of the remaining 14 respondents to this question, two selected the "slightly familiar" option, seven "moderately familiar", and five "very familiar".

When asked generally to what extent community optometrists are familiar with Standard 9, most (11/14) respondents selected "very familiar", and the rest (3/14) said "moderately familiar". When the same question was asked about the familiarity of optometric/optical assistants, one participant said not familiar, six slightly familiar, four moderately familiar, and three very familiar. When asked to what extent Standard 9 is complied with in everyday optometric practice, most respondents (9/12) selected "always", and the rest (3/12) selected "often".

It is reassuring that all GOC registered participants reported some familiarity with GOC Standard 9 and likewise for the optometric colleagues. The lower degree of familiarity

expressed for optical assistants may be acceptable because they would be working under supervision of an optometrist.

The other responses in this section are free text entry in response to three questions (Appendix 7, Table 37). The first question asked respondents who had indicated that Standard 9 is not always complied with, why this was the case. Common themes were financial and time pressures. The next question asked participants if they thought the GOC should do anything further to ensure Standard 9 is followed and, if so, what should be done. Themes that emerged from responses are training and education. The final question asked whether participants' experience of compliance with Standard 9 has any implications for changes to the *status quo*. Some responses were reassuring (e.g., "In general, the vast majority of registrants follow this standard fully"), but others raised concerns (e.g., "If the current small amount of delegation is not managed properly, as more is delegated, standards of supervision will worsen with time").

Questionnaire 2 Section 2: Additional comments

The final section of the Round 2 questionnaire attracted additional comments on topics ranging from a concern about orthoptists moving out the hospital eye service to summaries of concerns that respondents had raised in earlier sections (Appendix 7, Table 38). One comment cautioned that "delegating refraction" will lead to poor outcomes and "only businesses benefit". A similar point was made by other participants elsewhere in this research and highlights an anxiety amongst some eye care practitioners that the motivation for considering changes to the Opticians Act may be to increase corporate profitability. This may indicate a need for the GOC to expend further efforts in communicating the motivation(s) for considering changes as well as the extensive efforts taken by the GOC to research potential impacts of any changes.

Study 3: Focus groups exploring the role of orthoptists in refraction and sight testing

Methods

Study 3 used purposive sampling to identify student orthoptists, qualified orthoptists, optometrists working alongside orthoptists and dual qualified professionals (qualified as orthoptist and as optometrist). Data were gathered from two Focus groups and, after transcription, were analysed as detailed in Appendix 8.

Results and discussion

In this purely qualitative study, direct comments from participants have been anonymised and are reproduced Appendix 8.

Demographics

Six participants attended Focus group one and nine attended Focus group two. The demographic details of the participants in the two groups are given in Table 5 and Table 6.

Table 5. Demographic description of Focus group participants in Group 1.

Participant number	Clinical setting	Professional qualifications	Years qualified	Region	Refracting experience
One	Hospital	Orthoptist	10-30	London	Over Retinoscopy
Two	Hospital	Student Orthoptist	N/A	Glasgow placements UK wide	University based teaching and some on placement
Three	Hospital	Student Orthoptist	N/A	Sheffield placements UK wide	Nil
Four	Hospital and private	Orthoptist and Prescribing optometrist	10-30	South-West	Some as orthoptist Core as optometrist
Five	Hospital	Student Orthoptist	N/A	Glasgow placements UK wide	University based teaching and some on placement
Six	Hospital	Optometrist	<10	London	Nil

Table 6. Demographic description of Focus group participants in Group 2.

Participant number	Clinical setting	Professional qualifications	Years qualified	Region	Refracting experience
One	Hospital	Orthoptist	10-30	London	Nil
Two	Hospital and community	Orthoptist	10-30	Scotland	Nil
Three	Hospital	Orthoptist	>30 years	South-East	Retinoscopy (dilated, undilated, over refraction, Mohindra, Bruckner, dynamic)
Four	Hospital	Orthoptist	10-30	South-East	Paediatric cycloplegic refractions
Five	University and private practice	Prescribing optometrist	10-30	North-West	All types; core technique
Six	Private practice	Orthoptist Prescribing optometrist	10-30	London	Core technique in practice
Seven	Independent optical practice	Orthoptist Pre-registration optometrist	10-30	London	As orthoptist: in research As optometrist: core technique
Eight	Hospital	Orthoptist	10-30	London	Nil
Nine	Hospital	Student Orthoptist	N/A	Liverpool	Learnt as part of degree

Use of the term refraction

Throughout both Focus groups, the participants frequently use the generic term refraction (which encompasses several different types of refraction; p.6) and only occasionally specified the type of refraction such as subjective refraction, auto-refraction

or cycloplegic retinoscopy. In the NHS, most paediatric patients are under eight years old. Children over the age of eight are unlikely to require treatment in hospital eye clinics and are therefore usually discharged to community optometrists unless they need to remain under the hospital eye service due to their clinical needs. Because of this, the hospital eye service paediatric refraction clinics are predominantly made up of cycloplegic retinoscopy slots with only the occasional subjective refraction. It is therefore likely that when participants generically refer to refraction, they are talking about cycloplegic retinoscopy. For example, when the facilitator asked one participant to specify the type of refraction they meant she concluded "I think it's retinoscopy that we're referring to, perhaps more."

1. To what extent are orthoptists currently refracting?

The first question that was asked to both Focus groups was: What happens now, to what extent are orthoptists refracting? In total there were 15 comments from the 15 participants (Appendix 8, Table 39). Seven responses indicated that they were either an orthoptist who was already carrying out refractions and/or that they knew of orthoptists carrying out refraction. Nine responses indicated that participants felt that refraction was mainly carried out by other clinicians such as optometrists or ophthalmologists and that it was more unusual to have orthoptists carrying this out.

The dichotomy of views probably arises from the fact that in certain parts of the country it is harder to find an optometrist or ophthalmologist who is available and willing to carry out paediatric refraction clinics (four comments indicated this). This comment was mentioned repeatedly throughout both Focus groups. It is also more likely that orthoptists who refract, are more likely to know each other as they have attended the same training courses.

2.1. If they had experience of orthoptists refracting how do they prescribe and how are they supervised?

There were three responses indicating that the orthoptists would carry out retinoscopy with the agreement of a patient's consultant who would then sign their prescription. One of the clinicians commented that "if you've got an optom you'd probably just let them do the fundus check and refraction because they're you know pretty good at it".

An additional four responses stated that the final decision about optical prescribing is already a multi-disciplinary decision and that team members need to talk to each other to decide what is best for the patients (Appendix 8, Table 40).

2.2. When orthoptists undertake refractions, in what setting does this occur?

In total there were 13 comments about the clinical environment where orthoptic refractions are presently being carried out or should be carried out in the future. There was complete agreement between the participants that orthoptic refractions are presently carried out in an NHS hospital environment. The participants also felt that there was no desire from orthoptists to work in optical practices in the community and that orthoptic refractions should always be limited to the hospital environment (Appendix 8, Table 41).

2.3. Training for orthoptists in undertaking refraction

There were 15 responses outlining the training orthoptists had received over the course of their undergraduate degree and/or career (Appendix 8, Table 42). All orthoptists who answered the question acknowledged that they had received some form of training during their undergraduate orthoptic degree. One student commented that although they were taught how to refract, they still would not feel prepared to refract real patients.

The clinicians who had been qualified the longest acknowledged from listening to the discussion that it was likely that orthoptic students now receive more training on refraction, compared to when they were a student. A postgraduate course designed for qualified orthoptists based on retinoscopy skills was also acknowledged throughout the discussion along with some in house training to enable orthoptists to be allowed to carry out refractions on paediatric patients with the consultant's consent.

Some participants felt that it was difficult for orthoptists to become confident with refraction as they don't have the opportunity to practise once they have left the university. The student participants also explained that it was harder to acquire the practical skills in recent years, due to COVID restrictions. There was significant discussion (10 comments; Appendix 8, Table 42) indicating that refraction is not a skill that a newly qualified orthoptist would be confident in applying. Rather, they would need a significant amount of practical experience in this area to be allowed to carry it out as part of an extended role.

There were two comments that orthoptists receive comparable training to ophthalmologists in refraction, but only the ophthalmologists are legally allowed to prescribe. There were also two observations that if the law were to change that orthoptic training should be better than ophthalmologists currently receive. There was some disagreement about how the level of training in refraction currently varies between orthoptists and optometry students at undergraduate level. There was however agreement that upon completion of the degree, optometry graduates have significantly more (Appendix 8, Table 42).

2.4. When orthoptists undertake refractions, what are the results used for?

Four responses indicate that orthoptists use the results of their refractions to aid clinical decision-making to improve the management of their patients and make appointments more efficient in terms of time and costings within the hospital (Appendix 8, Table 43). Two responses indicate the results of the refraction are being used to prescribe spectacles. Finally, three different comments on this topic explained why it would be important for orthoptists to prescribe spectacles to their patients in the future.

3. Potential disadvantages and mitigations to orthoptists undertaking refractions

The first three responses from the groups relate to the overall safeguarding of the patients and the fact that not every qualified orthoptist should be able to refract. Other comments indicate that orthoptist refractions should be limited to certain circumstances to ensure patient safety (Appendix 8, Table 44).

This section of the discussion was further broken down into the following four subsections, relating to the safeguards that should be put into place.

3.1 The need for patients to be under a consultant ophthalmologist

The was a consensus that if orthoptists are to play a great role in refractions and to issue optical prescriptions, this would need to be carried out very carefully to safeguard patients. Five participants either quoted examples of where orthoptic led refraction clinics were already successfully running within a hospital environment or where clinicians felt they would be happy to allow it if they met the following requirements: the patient was under a consultant, in an NHS environment with satisfactory health checks in place. Finally, there was also an observation that orthoptists should not be refracting new patients (Appendix 8, Table 44).

3.2 The need for orthoptists to have sufficient training

There was general acknowledgment that there would need to be sufficient training to ensure patient safety. The participants felt very strongly and in total there were 12 responses about this (examples in Appendix 8, Table 44). Student orthoptists felt that they would not have had sufficient training to refract when they qualified as they had not had sufficient regular practice with refraction as part of their undergraduate degree.

Qualified clinicians also acknowledged that orthoptists would need to use these skills on a regular basis to become proficient in the technique. One clinician commented that they should carry out hundreds of retinoscopy episodes per year, a different clinician felt that they would need to carry out at least 1,000 retinoscopy episodes to become good at the method (Appendix 8, Table 44).

3.3 Patients would all need a regular ocular health assessment

Three responses from the Focus groups stated that it was very important for the patients to have a regular ocular health check, in addition to the refraction, particularly in a hospital environment where there is more pathology. There was some concern from one clinician that orthoptists might not be able to look for pathology. The orthoptists commented that in more recent years there was significantly more training in ophthalmology as part of their undergraduate degree and that many more orthoptists were carrying out extended roles within eye disease including injections for macular degeneration, glaucoma screening or glaucoma management. Additionally, there were some comments suggesting that models of eye care in other parts of the world had already split the refraction and fundus examination into separate parts.

Of relevance are points made in Study 2, that although some orthoptists have been trained to use ophthalmoscopes to look for changes related to specific conditions (e.g., glaucoma), they are not likely to have the holistic training in ophthalmoscopy that optometrists would have (Appendix 8, Table 43).

3.4 Concerns about commercialisation if orthoptist could issue optical prescriptions

The final worry that clinicians had in relation to orthoptists playing a wider role in refractions is that orthoptists should not be allowed to carry out refraction in community optical practices (“on the high street”). Participants were concerned that this would exacerbate staff recruitment problems in the NHS and reduce the quality of patient care due to less safety checks within community optical practices. Another concern raised was that if orthoptists could issue optical prescriptions, this would be abused by the corporate sector to make money (Appendix 8, Table 43).

4. Potential advantages to orthoptists undertaking refractions

Section 4 was further broken down into the following seven subsections.

4.1 Aid clinical decision-making

There were six responses about how orthoptists carrying out refraction could improve clinical care (Appendix 8, Table 44). There were some specific examples of binocular vision cases where a knowledge of the patient's current refractive error is required to manipulate their prescription and manage the patient appropriately. In addition, there were several generic comments that a knowledge of the refractive error is essential to ensure that the patient's binocular vision management is based on all relevant information, which includes an understanding of their current refractive error.

4.2 Reduce commercial pressure and improve clinical care

There were four responses from participants who had no problems with orthoptists refracting, but raised concerns that because of commercial pressure, the quality of eye care in community optical practices can be compromised. One participant was concerned about dispensing opticians being allowed to refract due again to commercial pressures (Appendix 8, Table 43). This comment probably explains why in Section 3 there were several participants who wanted to restrict orthoptic refractions to a hospital environment.

4.3 Cultural changes in eye care

Six general points were made which can be considered under the heading of cultural changes in eye care (Appendix 8, Table 43). First, two comments asserted that patients with special educational needs or autism struggle to find an interested optometrist or receive the correct treatment. There were two comments relating to the fact the ophthalmologists no longer want or should be asked to refract. It seemed to be felt that their opinions should be reserved for more complex cases and surgery.

There was also a common theme (seven responses) running through both focus group discussions that in certain areas of the UK, managers struggle to find optometrists willing to carry out paediatric refraction clinics. There was also a feeling that some optometrists preferred clinics that dealt with pathology such as retinal conditions and glaucoma.

One clinician felt that optometrists sometimes find it difficult to prescribe to patients who have binocular vision anomalies and that orthoptists would have a better knowledge in this area.

Another popular theme running through the Focus groups was the fact that optometrists and even ophthalmologists might be becoming deskilled in carrying out retinoscopy. There were ten comments to this effect, some suggesting that auto-refractors and pre-screening (by optical assistants) might be partly to blame for this skill becoming redundant.

Four comments stated that younger children below the age of five who cannot read are sometimes refused eye care in community optical practices. One explanation proposed for this refusal was that eye care in this population is not cost-effective because cycloplegic refraction is required.

4.4 Dynamic retinoscopy

Dynamic retinoscopy is a technique that is used to investigate problems with patients focusing their eyes. As an objective technique it is particularly useful in younger children.

The first set of responses in this section relate to the ability to perform dynamic retinoscopy (Appendix 8, Table 43). The way that most paediatric clinics run in the NHS is that the orthoptist initially sees all patients within an orthoptic clinic. Unless the orthoptist carries out regular refraction via retinoscopy, they often don't have the skillset necessary to accurately carry out dynamic retinoscopy. This means that accommodative anomalies may go undiagnosed within their clinics, particularly as the patients are often too young for subjective techniques. Following their initial orthoptic assessment, most patients are then booked into a paediatric refraction clinic where they arrive fully cyclopleged. This means that the optometrist is also unable to assess their accommodative function. The only exception to this might be children with Down's syndrome where clinicians are more likely to be aware that this group of patients may have accommodative insufficiency. There were five comments about these difficulties.

The second group of comments in this section related to understanding the technique of dynamic retinoscopy and quality of the technique. Optometrists and orthoptists often have a poor understanding of dynamic retinoscopy as both professions rarely perform this technique (five comments). Universities do teach this technique to undergraduates, but if an orthoptist does not regularly carry out retinoscopy for refraction, they often stop using dynamic retinoscopy altogether due to lack of practice. Allowing orthoptists to refract for the purpose of prescribing as an extended role would be likely to ensure that there are a few orthoptists in every department who can carry out this technique. They also might be able to support the other orthoptists who are less confident in this area.

4.5. More cost-effective

There were four comments that if orthoptists could issue optical prescriptions this would be cost-effective to the NHS by allowing orthoptists to carry out refractions instead of ophthalmologists when optometrists are not available (Appendix 8, Table 43). It would also be more cost-effective as experienced orthoptists would not need to have their findings checked by another clinician.

4.6 Patients would prefer one appointment

The final potential advantage, made by one participant (Appendix 8, Table 43), was that patients might prefer to have fewer visits to the clinic. This might be particularly true in paediatric clinics as the parent and child need to take time away from work and school respectively. It is also relevant in amblyopia management as this form of treatment requires multiple visits, typically over a one-year period.

Study 3 Conclusions

At present, there is a significant number of orthoptists undertaking refractions on behalf of ophthalmologists. One reason for this is difficulty recruiting optometrists to work in paediatric refraction clinics, since optometrists tend to prefer clinics where they manage pathology. A second reason is that clinically it is hard to justify paediatric ophthalmologists spending time undertaking refractions. Currently, orthoptists refract and prescribe on behalf of the ophthalmologist or with an optometrist checking. Clinicians commented that

the final prescription given to the patient was often one that was prescribed following discussion with a multidisciplinary team in a hospital setting.

There was consensus that the only setting in which orthoptists wish to refract is within NHS hospital eye clinics. Several reasons were given for this, most importantly to ensure patient safety.

Concerning training, it was agreed that although nowadays orthoptists receive more refraction training in their undergraduate degree than historically, it is still insufficient. Clinicians unanimously agreed that significantly more training would be required to allow orthoptists to carry out refractions. Several participants advocated an extended postgraduate role within orthoptics.

Orthoptists use their refraction results to aid clinical decision-making and to prescribe to patients, with assistance either from an ophthalmologist or optometrist. Participants indicated how they would like to use refraction results in the future to carry out retinoscopy in paediatric and adult patients diagnosed with learning disabilities. The results of their refraction would then be used to prescribe to their patients as part of an extended role, solely within an NHS environment. There was also some commentary to suggest that it would also be useful to be allowed to adapt an existing recent prescription, to manage a limited number of binocular vision anomalies.

Participants discussed potential disadvantages to a more widespread role for orthoptists in undertaking refractions, including issuing optical prescriptions. The clinicians discussed several mechanisms that they felt would need to be followed to ensure patient safety:

1. All patients should be under a consultant.
2. Orthoptists should have significant post graduate training before they are signed-off as competent in refraction.
3. All patients would require a regular ocular health assessment.
4. Orthoptists should be restricted to working in the hospital environment to avoid commercialisation and because of the need to maximise staffing levels in the hospital eye service.

There were many comments in relation to potential advantages from a more widespread role for orthoptists in undertaking refractions, including issuing optical prescriptions:

1. Improved clinical care by aiding clinical decision-making.
2. Improved clinical care by reducing commercial pressures.
3. Improved clinical care for young children and those with special educational needs.
4. Improved clinical care by enabling accommodative dysfunction to be assessed.
5. Making NHS appointments more cost-effective.
6. Improved clinical care by reducing waiting time for refraction appointments.
7. Patients would prefer one appointment in the hospital eye service rather than several.

In summary, it was felt that the disadvantages could be minimised or eliminated by restricting refractions to limited circumstances with appropriate training and

safeguarding procedures. There were many potential advantages foreseen in relation to permitting orthoptists to issue optical prescriptions as part of their work in the hospital eye service.

General discussion: Synthesis and contrasts

To address the first aim of the research, Study 1 describes the delivery of the sight test by optical providers across the UK. A marked difference in delivery exists between most practices (exemplified by the large corporate chains) who use optical assistants and some independent optical practices where all the tests are undertaken by the optometrist.

Concerning the contemporary use of optical assistants, it is interesting to contrast Study 1 with Study 2. The Study 1 participants are in leadership roles within their organisations - typically from the professional services departments of corporate chains or directors/practice owners of smaller organisations. In contrast, Study 2 participants are eye care practitioners who routinely practise in these settings. Study 1 details the training and clinical use of optical assistants from a "head office" perspective. In contrast, Study 2 Round 1 reveals real-world shortcomings in the contemporary use of optical assistants, although Round 2 suggests broad compliance with GOC Standard 9.

Two of the Study 1 participants indicated their organisations are considering remote testing. In contrast, the participants in Study 2 considered that remote testing increases clinical risks and could see few potential advantages. This is relevant to the third aim of the research, to investigate the possible impacts if sight test components were not carried out at the same time or in the same place.

Study 2 Round 1 identified potential benefits and, to a greater extent, risks from sight test components being undertaken by non-optometrists, which is relevant to the second aim of the research (which relates to the possible impacts if refraction, binocular vision, and eye health checks are not all carried out by the same person). Study 2 Round 2 asked participants to quantify these risks, which were found to be significant and likely to be exacerbated if components of the sight test were carried out at different times and in different places, addressing the third aim of this research. Research in this report is based on opinions, albeit from well-informed individuals including highly experienced eye care practitioners and patients. It must be acknowledged that there is no certainty that all the risks identified in this report would occur if the rules on sight testing are relaxed, although it would seem unwise to ignore these risks, many of which have significant implications for public safety (Table 3 and Table 4).

An area of concordance between the studies relates to the role of orthoptists in refracting and sight testing (the fourth aim of the research). Orthoptists in Study 2 and Study 3 concur that their desire to increase their role in refracting only relates to orthoptists in the hospital eye service. For the minority of orthoptists who are undertaking refractions at present, they undertake this role typically for young children who have conditions requiring orthoptic treatment in hospital eye service clinics. Understandably, these orthoptists are frustrated by having to find an optometrist or ophthalmologist to sign off their refractive findings as a hospital optical prescription (HES1). When Study 2 Round 2 presented this scenario to optometrists and dispensing opticians, there were few

objections to a change that would allow orthoptists to issue optical prescriptions as part of their work in the hospital eye service. The only significant concerns were that there may be commercial enticements from corporate bodies for orthoptists to leave the hospital eye service and work in community optical practices and that orthoptists' skills do not extend beyond children to the refraction of adults.

Reassurances in Study 3 that orthoptists have no intention of working in community optical practices are somewhat diminished by two Study 1 participants who described already working with orthoptists in community optical practices, albeit with the orthoptists undertaking private orthoptic work (and one dual-qualified as an optometrist). It would be unhelpful to the hospital eye service, and the many patients on hospital eye service waiting lists, if any change led to hospital eye service clinicians migrating to community optical practices. Any patient can obtain a sight test in their local shopping centre within days, if not hours, and yet would be likely to wait several months for a hospital eye service appointment; so, it would be unhelpful to encourage clinicians to leave the hospital eye service. In relation to orthoptists, these concerns mean that any change to enable orthoptists to issue optical prescriptions should be confined to their work in the hospital eye service.

Undertaking refractions of pre-school children is very different to older children and adults. With the former, objective techniques are required (retinoscopy) and the risk of spectacle non-tolerance is negligible.[13] In older children and adults, subjective testing is necessary and the risk of non-tolerance increases with age.[13] Study 2 participants highlighted concerns about orthoptists lacking the skills or experience necessary for subjective refraction of complex adult prescriptions. This is particularly concerning in view of the increased risk of consumer dissatisfaction when spectacle dispensing occurs in a different setting to the prescribing.[14] In conclusion, there are good reasons to facilitate orthoptists issuing optical prescriptions for young children in the hospital eye service, but only if conditions can be applied to ensure this facilitation only applies to this population and setting.

Another area where workforce availability needs to be considered is the notion of a sight-testing role for dispensing opticians. This is relevant to the second aim of the research ((which relates to the possible impacts if refraction, binocular vision, and eye health checks are not all carried out by the same person). Study 2 participants anticipate greater difficulty recruiting dispensing opticians than optometrists in the future. This situation relates to the current role of dispensing opticians and raises doubts over the wisdom of expanding the role of dispensing opticians to refraction in sight testing. If there are not going to be enough dispensing opticians to dispense spectacles, fit contact lenses, and care for patients needing low vision aids, is it sensible to consider changing the *status quo* to enable dispensing opticians to refract?

The authors of this report have been unable to find any research that takes an interdisciplinary approach to eye care practitioner workforce demand and supply. Anecdotally, the authors are aware of reports that in some parts of the country there is a surplus of applicants for optometrist vacancies in both community practices and in the hospital eye service, and in other regions there are difficulties in filling vacancies. Research indicates that within and outside the eye care professions, relatively few workers are willing to relocate.[15] If, as seems likely, there is synchrony within the different disciplines in the areas of over- and under-supply, then the notion that using dispensing opticians to undertake additional sight test components will increase capacity may be wrong. This

could simply lead to a bottleneck at a different stage of the patient journey; a case of "robbing Peter to pay Paul". The finding in the 2022 GOC Registrant Survey that dispensing opticians are more likely than optometrists to leave their profession will exacerbate this problem.

Appendices

Appendix 1: Abbreviations and acronyms

24-2	a type of visual field test (visual field tests assess peripheral vision)
Any	anyone
BCVA	best corrected visual acuity (how well someone can see while wearing their spectacles or contact lenses)
BE	Bruce Evans
BV	binocular vision (refers to how well the eyes work together as a team)
C40	a type of visual field test
CATS	cataracts (loss of transparency of the lens inside the eye)
Cha	charity clinic
CL	contact lenses
CLO	contact lens optician
CMO	cystoid macular oedema (a swelling at the macula)
CUES	community urgent eye care services
Cyclo	cycloplegic refraction; assessment of refractive error using drops to relax accommodation
Cyl	cylinder, the astigmatic component of a refractive error
Disp.	dispensing
DO	dispensing optician
DOB	date of birth
Dom.	Domiciliary practice
DV	distance vision
EC	Elizabeth (Liz) Chapman
ECP	eye care practitioner
EE	eye examination
EOS	enhanced optical services
EM	East Midlands
ERM	epi-retinal membrane (a membrane in front of the retina)
FTP	fitness to practise
GDH	General District Hospital
H&S	history and symptoms
HES	hospital eye service
I/Ind.	independent
IMO	in my opinion
IOP	intraocular pressure (pressure in the eye)
KC	keratoconus (a condition in which the cornea becomes conical causing blurred vision)
L	large optical group

LD	learning disability
Lon	London
M	medium-sized optical group
Ma	management decisions and explanations to the patient
MC	Miriam Conway
MDT	multi-disciplinary team
MECS	minor eye conditions scheme
MPSII	instrument that measures macular pigment (an indicator of age related macular degeneration risk)
Mul	multiple group
NHS	National Health Service
NEE	North-East England
NWE	North-West England
O	optometrist
Ob	objective refraction (a method of estimating the refractive error that does not rely on patient responses)
Ophth	ophthalmologist
Optom	optometrist
Ortho.	Orthoptist
OA	optical assistant
OCT	optical coherence tomography; retinal scans producing cross-sections
Oph	ophthalmologist
Optos/Optomap	wide-field scans of the retina
P1, P2, etc	in study 2, Participant 1, Participant 2, etc
Paeds	paediatric
Pat/I/Px	patient
Pu	pupil reactions
Ph	fundus photography/scans (fundus refers to the structures at the back of the eye)
PI	principal investigator
PVD	posterior vitreous detachment; a separation of the vitreous gel from the retina which is usually harmless but rarely causes retinal detachment
PVQ	patient verification questionnaire
Q1, Q2	questionnaire 1 and questionnaire in Study 2
RS	Rakhee Shah
Refn.	refraction
Ret	retinoscopy; an objective method of estimating the refractive error
Rx	prescription/prescribing
S	small optical group
Sco.	Scotland
S&H	symptoms and history
SEN	special educational needs
ST	sight test
Strab	strabismus (which occurs when the eyes are misaligned)
Su	subjective refraction
SEE	South-East England
SEN	special educational needs
ST	sight test
SWE	South-West England

Tecn	technician
To	tonometry (measurement of the pressure in the eye)
Uni	university clinic
VPD	visual perception difficulties
Wal.	Wales
WM	West Midlands
V	unaided/presenting vision
VA	visual acuity
VF	visual field
VI	visually impaired
Y	year
Yor.	Yorkshire/Humber

Appendix 2: Authorship of this report

The team member that led each study produced the first draft of the section relating to that study. BE wrote the first draft of the Executive Summary, Introduction, General Discussion: Synthesis and Contrasts. All team members provided feedback and input to all sections of the report.

Appendix 3: The study team

Team member	Prof Bruce Evans	Dr Rakhee Shah	Dr Miriam Conway	Liz Chapman
Profession	Optometrist	Optometrist	Orthoptist	DO
Qualifications	BSc PhD FCOptom FAAO FEAOO FBCLA DipCLP DipOrth	BSc (Hons) PhD MCOptom MA FHEA	BSc (Hons) Orthoptics, PhD, SFHEA	FBDO
Current position	Director of Research, Institute of Optometry Visiting Professor, City, University of London	Senior Research Fellow, Institute of Optometry Honorary Senior Research Fellow, City, University of London	Senior Lecturer Optometry City, University of London Orthoptist SeeAbility	Eye Health Information–n Assistant– - RNIB
Relevant skills and experience	Involved in over 80 research projects, over 260 publications, in 2021 listed in top 100 in the Global Optometrist Research Ranking	Involved in over 10 research projects, over 26 refereed publications.	20 refereed publications, 6 completed grants. 5 PhD students. Co-Chair CAG Vision Screening BIOS. Programme Director BSc Optometry 2018-2022. Member of the cross Whitehall children's vision advisory group.	Worked in optics for over 30 years in both multiple and independent practice. Practice manager of an independent practice from 2016-2021
Examples of relevant projects conducted	Director of studies in a purely qualitative PhD project and three mixed method (qualitative and	Project Manager for the PrOVIDe study using mixed methods (quantitative and Focus groups and	My PhD Student recently completed her PhD relating to paediatric eye care using both Delphi	None

	quantitative) PhD projects. PI in a Delphi study.[16]	discussions). PhD Supervisor for PhD Project using Delphi Study and Focus groups.	and Focus group approaches.	
Specific project roles	Principal Investigator (PI). Lead on Study 2. Contribute to all aspects.	Lead on Study 1. Contribute to all aspects.	Lead on Study 3. Contribute to all aspects.	Contribute to all aspects.

Appendix 4: Support from the GOC

The research team are committed to a multidisciplinary and collaborative ethos and are grateful for feedback from the GOC including the following: original study protocol including lists of questions to be addressed in each study; feedback on Study 2 Questionnaire 1 and Questionnaire 2; Study 2 Questionnaire 1 preliminary analyses and results, first full draft of this report.

Whilst the authors acknowledge valuable feedback, the authors take sole responsibility for the content of this report.

Appendix 5: Key risks and mitigations

The key risks and mitigations are summarised below.

Risk	Mitigation
Potential participants may be unwilling to participate	In accordance with the MRS Code of Conduct,[17] complete transparency was provided to potential participants. The informed consent of participants in the survey and the Delphi study gave assurance of the confidentiality of information collected. The informed consent of participants in the Focus group explained that others in the group would know their identity, but that the overriding principle is that "Chatham House rules apply" (neither the identity nor the affiliation of the participants may be revealed). Participants were paid (£40 for survey and Focus group participants and £60 for Delphi group participants) to encourage recruitment.
Participants' perspectives may be unduly influenced by their membership of one the professions considered in the research	In accordance with the MRS Code of Conduct,[17] information (verbal and written) to potential participants stressed the importance of maintaining an open mind. Nonetheless, it is accepted that some partisan views are inevitable. These were mitigated by involving participants from a broad range of professional backgrounds.
The research team's perspectives may be unduly influenced by their membership of one the professions considered in the research	The triangulation of views amongst the multidisciplinary research team mitigated this risk. In accordance with the MRS Code of Conduct,[17] the researchers strove to ensure that their professional background did not unfairly influence their views. The research team approached this work with an open mind, genuinely inquisitive to discover the results.

Appendix 6: Study 1 details

This study was led by RS, with contributions from other members of the research team.

Study 1: Details of methods

Using purposive sampling, participants were representatives from the professional services teams of major optical companies, medium sized optical groups, and independent optical practices. Recruitment involved informed consent, with the goal being to recruit 12-16 participants.

The goal was for the survey to address broad questions, as open-ended as possible, with care taken to avoid leading questions. Indicative examples of questions include the following:

1. To what extent, if at all, does your company/practice use optical assistants (OAs) or other personnel to assist with elements of the sight test? What activities do they undertake?
2. When OAs or other personnel undertake the tests listed above, what are the arrangements for training?
3. When OAs or other personnel undertake the tests listed above, what are the arrangements for supervision?
4. Are optometrists ever assisted by or work in conjunction with other healthcare professionals (e.g., DOs, orthoptists, pharmacists, ophthalmic medical practitioners, ophthalmologists)? If so, please explain their role.
5. What are the advantages of using OAs or other personnel in the ways we have discussed?
6. What are the disadvantages of using OAs or other personnel in the ways we have discussed?
7. Please describe any adverse events, clinical risks, or other risks or problems that have occurred relating to the use of OAs or other personnel to assist with elements of the sight test.
8. Are there any additional ways that you would like to expand the use of OAs or similar personnel and, if so, what is stopping you from doing this now?
9. If we have any further questions, would you be happy for us to contact you for (a) a further briefer online questionnaire and/or (b) a brief telephone interview?

Various online survey instruments and formats were explored. After finalising questions, it was concluded that Microsoft Forms would be straightforward and easily accessible for participants. A pdf version was prepared for participants who may not be able to access/complete the form online, but this was not required. Participants were also offered the option to complete the form during a telephone interview in which the questions would be read to the participants with the researcher (RS) completing the form, but this was not required.

The survey results were reviewed by RS for accuracy and completeness.

Study 1: Details of results

Details of Study 1 invitees and participants are in Table 7.

Table 7. Participant invitees and respondents by practice category with demographic details of the practice locations.

Category	Invited	Consented	Survey completed	Region	Participant reference numbers
Independent practice/sole practitioner	5	4	3	East of England, Scotland	1,2,3
Small group optical practices (<10 practices)	4	4	4	South-East, East Midlands, Scotland	4,5,6,7
Medium group optical practices (11-50 practices)	3	1	0	-	-
Large group optical practices (>50 practices)	10	10	8	UK Wide	8,9,10,11,12,13,14, 15
Totals	22	19	15		

Verbatim responses to the questions in Study 1 are provided in Table 8 to Table 14.

Table 8. The different steps of the sight test from a patient's perspective and the duration of a typical sight test. Note: in this, and subsequent tables that describe participants' responses, these are verbatim.

Participant number (practice category/ region)	Steps of the sight test from the patient's perspective	Duration of sight test
1 (I/East of England)	First, they will be asked how they are and their reason for attending. We will check patient details. When did they last have their eyes examined and are they happy with their current spectacle correction. They will then be asked more specifically about visual symptoms e.g. double vision, flashes/floaters and whether they suffer with headaches, ocular discomfort or redness of the eyes. They will then be asked about any previous ocular conditions/ procedures or eye related hospital visits. We will ask them about general health and any medications. We will ask them about family ocular and general health. They will then have a series of tests involving lights and reading letters and following targets. They will then be asked to sit relatively still whilst their eyes are examined. Then they will wear a trial frame and be asked to engage with some questions whilst we swap out lenses and make what they see better and worse and better again. They may have a test to measure the eye pressure and they may have visual fields test in which they have to sit with their head in a bowl and respond to little flashes of light by pressing a button. They will then be advised as to the outcome of the tests and any advice for improvement of sight or remediation of ocular conditions. If referral into secondary care is needed this will be explained to them with an idea of what we suspect, where they may be referred and roughly how long they may expect to wait. They will then be handed over to a DO for any adjustments needed or dispensing.	Adult sight test is 30-40 mins

Participant number (practice category/ region)	Steps of the sight test from the patient's perspective	Duration of sight test
2 (I/Scotland)	Steps are H&S, Objective and Subjective Tests, Additional examinations if required such as VF, OCT etc. Then a lengthy discussion of results and recommendations.	Primary Sight Test 40 mins and Supplementary Sight Test 20 mins
3 (I/Scotland)	Primary all elements of a sight test from objective to subjective. Supplementary only what is required e.g. Dilate and investigate for PVD	Primary Sight Test 40 mins and Supplementary Sight Test 20 mins
4 (S/South East)	Patients register their attendance at reception and have their personal details confirmed. The optometrist then takes the patient through and personally performs all the necessary clinical tests included in the sight test/eye examination. The optometrist performs a 3-way handover at the end of the consultation and leaves the patient with a member of the spectacle dispensing team.	NHS sight test is 30 min (20 min for children). Private eye examination offering (including Optos, OCT & any other necessary enhanced diagnostic tests) is 45 min.
5 (S/East Midlands)	History & Symptoms, Unaided and aided VA with current Rx (if applicable), refraction & BCVAs, binocular assessment, fundus assessment, tonometry, fields.	Duration approximately 35-45mins
6 (S/South East)	The sight test is carried out fully by the optometrist. We are responsible for carrying out all screening tests as well. Typically, the patient will have a history taken, vision checked and then some muscle checks. Refraction is carried out and finally a slit-lamp exam and indirect ophthalmoscopy is carried out. Screening can be done at any time during the test.	Range from 30 minutes to 60 minutes depending on what type of test the patient requests
7 (S/Scotland)	1. Patient arrives at practice, greeted by front of house staff member, directed to waiting area. 2. Optometrist welcomes patient through to test room. 3. History and symptoms. 4. Vision check (with and without spectacles as appropriate.) 5. Pupils, ocular motility, cover test (with and without spectacles as appropriate.) 6. Retinoscopy. 7. Subjective refraction. 8. Slit lamp examination (external then internal with Volk.) 9. IOP. 10. Visual fields if appropriate. 11. Retinal imaging (fundus photo, OCT, Optomap as required.) 12. Summary of eye health and spectacle recommendations followed by handover to front of house staff.	
8 (L/UK Wide)	1. History & Symptoms 2. Current VA in spectacles (Vision in glasses) 3. BV assessment/Pupils 4. Review of retinal images/OCT/IOP's/ Visual fields (Px will understand as pre-tests) 5. External eye and Volk examination (Health check) 6. Refraction (new glasses prescription) 7. Any further tests required e.g Amsler, dilation etc	25mins
9 (L/South East)	A typical sight test comprises of: 1. Pre-screen - IOP, autorefractor, retinal photo & oct if offered.2. The sight test: - H&S - Visions and visual acuity - muscle balance, pupils - refraction - objective and subjective - ocular health assessment - slit lamp & volk/ophthalmoscopy - management - summary of results/recommendations i.e.. New Rx, referral for further tests if indicated - post screen - if required repeat iop's / visual fields if indicated by the clinician 3. Handover to colleague for further help i.e. dispensing etc	Pre-screen (5-10 minutes) Sight Test (Average 25-30 minutes) Dispensing (20 minutes)

Participant number (practice category/ region)	Steps of the sight test from the patient's perspective	Duration of sight test
10 (L/UK Wide)	Point of service checks. Pre-screening - IOPs, focimeter. History and symptoms. Health check - ophthalmoscopy and photos Refraction. Summary. Handover/dispense. Paperwork Additional tests as required e.g. fields.	Typical patient journey c. 1 hour
11 (L/UK Wide)	Patient has a pre-screening usually delegated to a trained Optical Advisor. Then moves into a consultation room with the optometrist for questioning to understand their reasoning for coming, medical history etc, a check of the health of the eyes and then ascertaining their level of vision & if a spectacle prescription is needed & what that prescription is.	30mins
12 (L/UK Wide)	The elements that take place before the patient attends include: Booking (when a covid triage is completed); pre-visit consultation (short phone or video call to discuss their needs and improve service by being prepared); pre-visit questionnaire (contains a set of questions on history and reason for visit /symptoms); check-in on arrival (verify PVQ details, collect further info, prepare any necessary forms); diagnostics (will include equipment hygiene, focimetry, autorefraction, fundus photography, tonometry, OCT, fields - all as appropriate); consultation with optometrist (I'm assuming you don't wish me to list the individual steps here, but in line with the College guidance on 'routine eye examination'); any additional tests indicated by the exam (e.g repeat fields and of referral); advice leading to handover to dispenser as appropriate; dispensing advice; frame selection; lens selection; book for further consultations (e.g contact lenses); purchase; collection; adjustments.	Typical journey from the point of arrival in practice through to end of optometrist consultation is on average 35 minutes - with some variation across the country and increasing with patient age.
13 (L/UK Wide)	The patient is invited into the pre-screen room for the initial examinations, typically this is carried out by a trained OA. The pre-screen includes general questioning and reason for visit, previous spectacles are measured, non-contact tonometry, autorefractor, fundus photography and visual fields are carried out, as required. The patient is then invited into the testing room. After the initial welcome, a full detailed history and symptoms is carried out. We discuss reason for visit, how they are getting on with their current spectacles and if they have noticed any changes since their last visit. A discussion on ocular and medical health follows. The next part of the test is the refraction. The trial frames are used and the new prescription measured. The next part of the sight test is the ocular examination using slit lamp/volk/ophthalmoscopy. The findings are then discussed, and dispensing recommendations are given. The patient is then invited to ask any questions. The patient is then brought out into the dispensing area and a hand over to the OA with the recommendations discussed.	The duration of the pre-screening is approximately 5-10 minutes. The eye examination takes approximately 20-30 minutes depending on complexity.
14 (L/UK Wide)	Booking in / pre-screen with OA, "can I see part" (i.e. reading letter chart, putting on the trial frame and having lenses in front of eyes to see whether they make an improvement), health examination, some other test which patients generally don't know what they are and finally dispense. We are a medium - large size group of independents with head office central support so there is variability is eye exam length.	30 to 60 mins, average 50 mins (including any pre-screening tests whether done by an OA or optom)
15 (L/UK Wide)	1. Completion of Health and Lifestyle Questionnaire.2. Diagnostic Scans Completion by OA (interpretation by optometrist) 3. History and Symptoms 4. Uncorrected Visual Acuities, Refraction and Best Corrected Acuities. 5. Binocular Vision Assessments.6. Eye Health Assessments (Anterior and Posterior Segments). 7. Additional Supplementary Tests.8. Recommendations and Advice to Patient.	

Table 9. Activities undertaken by the optical assistants (OAs) and/or other personnel in different practice settings.

Participant number (practice category)	Elements of the sight test undertaken by OAs and/or other personnel
1 (I)	Receptionist to welcome and check patient details. Optometrist to perform all tests. DO to repair, adjust and dispense spectacles.
2 (I)	For every test, OAs perform VFs and measurement of macular pigment MPSII. They could also perform OCT except this is in my consulting room.
7 (S)	Limited involvement. Staff are trained to perform visual fields and take images and would help if optometrist running late or if patient was returning to repeat tests that didn't require an optometrist appointment.
8 (L)	Pre-screening 'including I'P's, autorefraction, keratometry readings and pachymetry. Fundal and OCT Imaging. Dispensing. Contact lens teaches.
9 (L)	OAs carry out all pre-screening: I'P's, Autorefractor, Visual Fields & OCT/Retinal photo. DOs help with administering mydriatic drops in patients under the supervision of an optometrist where possible beyond their normal dispensing role. Most OAs and DOs are also trained and signed off on contact lens teaches where possible once training is complete.
10 (L)	OAs used for aftercare queries, adjustments etc. Registrants complete most of the above patient journey.
11 (L)	Pre-screening: auto refractor, tonometry, visual fields, OCT & Fundus imager– OA complete the task & pass all information to the optometrist
12 (L)	Each store uses a large team of colleagues to support the optometrist in their work. This will include most of the elements in the list above, apart from the examination that occurs in the consultation room with the optometrist.
13 (L)	The OAs are trained to book the patients into the clinics and to perform the pre-screening examinations. The activities include arriving the patient into the clinic using the computer system, taking the patient through for pre-screening, discussing basic questions about reason for visit and lifestyle questions, focimetry of current spectacles, carrying out non-contact tonometry, fundus photography, visual field assessment dispensing - based on optometrist recommendations.
1– (L)	Varied - half our practices use OAs for pre-screening (IOPs, autorefraction, fields, OCT) half don't. Most use OAs for dispensing or OA/DO arrangement.
15 (L)	Administration. Completion of the capture of diagnostic tests. Ensure patient's complete the Health and Lifestyle Questionnaire. Handover to and from the optometrist.

Table 10. Arrangements for training and supervision of elements of the sight test undertaken by the OAs and/or other personnel in different practice settings.

Participant number (practice category)	Arrangements for training for OAs or other personnel who undertake elements of the sight test	Arrangements for supervision for OAs or other personnel who undertake elements of the sight test
2 (I)	Formal training includes a manual, supervised training, reflective learning and ongoing training.	One to one
7(S)	Company induction covers basic training in visual fields and retinal imaging. Optometrists in practice will then deliver	Optometrist must check image quality and visual field result before patient leaves practice.

Participant number (practice category)	Arrangements for training for OAs or other personnel who undertake elements of the sight test	Arrangements for supervision for OAs or other personnel who undertake elements of the sight test
	more targeted training on specifics of the equipment in the practice.	
8 (L)	Company led training and then delegated sign off by optometrist/ DO through clinical policies	Optometrists in the practice and in a position to intervene for all pre-screening tests and contact lens teaches. Dispensing except for restricted groups can be dispensed without supervision although this is generally an exception as registrants are on the premises.
9 (L)	E learning modules must be completed by colleagues. There is a requirement to have colleagues signed off on these delegated health checks and they are reviewed at regular intervals by the resident clinicians. Administering of drops is dependent on the optometrist testing on the day and the confidence of the DO to carry out the task. DOs as part of their course are taught about the drops used in practice and their potential side effects.	These tests cannot be carried out without a clinician i.e. optometrist on site. All OAs need to be signed off as competent by an optometrist/contact lens optician (CLO) or DOs depending on the task. This may take the form of verbal questions assessing knowledge and observing the tasks being undertaken by the colleague.
10 (L)	Onboarding training. In person observations to ensure competent and following procedure. Support available.	Onboarding training. In person observations to ensure competent and following procedure. Support available.
11 (L)	Can only complete tasks unsupervised if been trained & validated by a registrant on that piece of equipment.	A GOC registrant is on the premises at the time.
12 (L)	A range of training support is delivered through the organisation's substantial training resources - and specifically this includes BTEC level 3 and 4 certificates for OAs, contact lens assistants and Clinical Technician. Several colleagues in every practice will have achieved or be working towards these qualifications. Refresher training is provided in role.	Non-registered colleagues will work under the supervision (as prescribed by GOC standards) or GOC registrant colleagues (O, DO or CLO - depending on the activity being supervised).
13 (L)	The OAs are trained in full before any responsibility is given to pre-screening and dispensing. This is usually done by an optometrist where the tests are fully explained, and the use of the machines are demonstrated. The assistant is then supervised completing the tasks on other members of staff. Once the technique is satisfactory, they are then supervised carrying out the tests on patients. Once competent, they go ahead and complete the tests unsupervised. Ongoing monitoring is carried out intermittently after this time. The same occurs with dispensing staff and ongoing education is given related to lenses, frame choices and measurements. The staff are always made to feel that they can ask questions at any time to further their training.	The initial supervision is carried out by optometrists for the introduction to the tests. The importance behind each of the tests and the information required to enable them to discuss the relevant information with the patient. Training time is restricted due to clinic commitments, but time is taken out where possible. The ongoing training is then supervised by more senior assistants or the store manager.
14 (L)	We have a company OA training program although we don't mandate that all OA's	All pre-screening tasks are supervised by optometrists and the optometrist is on the premises, aware of the task and in a position

Participant number (practice category)	Arrangements for training for OAs or other personnel who undertake elements of the sight test	Arrangements for supervision for OAs or other personnel who undertake elements of the sight test
	follow it. Where it's not used, practices deliver training locally.	to intervene. All dispensing to under 16, those registered VI or partial VI are supervised by an O or DO. There is currently variability in how supervision is implemented at practice level which we are streamlining. Supply of CLs under general direction rules is delegated to OAs
15 (L)	Trained in clinic, overseen by the resident optometrist.	Supervised by the in-clinic optometrist. Centre Clinical Services support available during working hours for second line support.

Table 11. Advantages and disadvantages of using OAs and/or other personnel in helping with elements of the sight test.

Participant number (practice category)	OAs used/not used	Advantages of using OAs or other personnel	Disadvantages of using OAs or other personnel
1 (I)	OAs not used	Would save some time for the optometrist if some tests are performed correctly by an OA.	If not trained sufficiently or not able to understand the test process it may be done incorrectly, we may have to repeat the test. They are not aware of the bigger picture and may miss important signs/ information collected during the test process as they do not understand the implications.
2 (I)	OAs used for visual fields & macular pigment measurement	To upskill staff for personal development.	You deskill yourself at performing the task but not interpreting it.
3 (I)	OAs not used	To free up time	Audit and Training
4 (S)	OAs not used	My perception is that the use of OAs allows optometrists to perform more refractions in a given time. Ultimately increasing number of spectacle sales.	In my experience the test results obtained by technicians can be of very high quality however to reach that is dependent on a high level the training, experience and personnel interest in their role. High turn-over of staff is detrimental to this and the use of inexperienced technicians can result in a substandard diagnostic test results. I find that patients value the uninterrupted, additional time spent with the optometrist and feel this contributes, in part to our, unique selling point. Our patients often mention that they choose us, in part, because they dislike feeling of being passed along 'a factory line'. For new patients and children our optometrists use retinoscopy (rather than an autorefractor via a technician) and I feel there are added clinical benefits to this approach. Subtle clinical

Participant number (practice category)	OAs used/not used	Advantages of using OAs or other personnel	Disadvantages of using OAs or other personnel
			clues (E.g. signs of posterior cataract, keratoconus or active accommodation) can be gleaned by the optometrist during retinoscopy which would not necessary be identified during autorefraction with a technician. We also favour contact tonometry (which cannot be delegated) or iCare which would not save the optometrist any time by delegating. Visual field screening and repeat threshold is performed when clinically necessary by the optometrists during the consultation. Having discussed this with our team the optometrists; they report that the 2 minutes it takes to perform an FDT screening tests during the consultation is useful to complete the patients notes and print their prescription or print necessary patient information leaflets.
5 (S)	OAs not used	N/A	As an optometrist, I prefer to undertake my own assessments so I can interpret findings and explain procedures and outcomes as a go along
6 (S)	OAs not used	I always felt in my former job that an OA or DO carrying out these roles did two things: it showed the patient that the staff aren't just sales people, and it got the staff more involved in the eye examination, making them more aware of what was going on with the patient.	Communication of what's happening in a health condition - they may not be able to explain something which can add to patient anxiety. Also, if a basic screening test were to show up a problem, they can't decide what to do next and that can add time pressure to both them and the optometrist.
7(S)	Limited involvement of OAs	Allows better flow and prevents optometrist running late.	Patients may have questions that the OA is unable to answer. Leaves more work for the optometrist after the fact.
8 (L)	OAs used for pre-screening	Free up capacity for registrants to complete eye examinations and Contact lens fittings and aftercare	The training and sign off can be long and onerous
9 (L)	OAs used for pre-screening	It allows more time with the patient to concentrate on their symptoms and complaints. Otherwise, more time would be needed to conduct each eye test and you would probably be looking at approx. 45-50 minutes per test if an optometrist were to conduct all the tests themselves.	Sometimes the tests have to be repeated where the results may not be correct or poor image capture which could have been avoided if the patient had been set up correctly and the tests explained properly. This adds extra time and can push the clinic back as to having to repeat the tests.
10 (L)	OAs used for aftercare queries and adjustments	Frees up more costly registrant time. Better patient flow in some instances.	Relevant smaller details may be missed e.g. visual symptoms. May not have skill or experience of qualified staff.

Participant number (practice category)	OAs used/not used	Advantages of using OAs or other personnel	Disadvantages of using OAs or other personnel
11 (L)	OAs used for pre-screening	Allows the optometrist to focus their time on the techniques/tests/examinations that can't be delegated, analysis of the results, compiling all the information & the management of the patient	If not completed well by an OA then may need repeating
12 (L)	OAs used for pre-screening	An improved customer journey (i.e. patients are guided through all processes with time for consistent explanation of what is happening at each stage); by being more involved, colleagues have a greater understanding of what is being delivered creates many more 'experts' in the store); potential career progression for support team colleagues; skilled support available to assist the optometrist in their duties; more efficient use of clinical resource; repetition of time consuming tasks (largely data gathering) by team colleagues enables them to focus on consistent delivery (e.g. visual fields, OCT); reduces risk of e.g. 'short cuts' that might occur when all activity falls on the shoulders of one individual (i.e. the optometrist) e.g. ensures GDPR process and hygiene processes are consistently followed as there are multiple opportunities for checking and observing each step of the process.	Main disadvantage is likely to arise around the use of locum colleagues who may not be familiar with the way the team works in that particular store and hence there is a risk of them making assumptions about what or how and colleague has completed a particular task. In a busy large store environment, there is also potential risk of the patient feeling they are interacting with a lot of different people - although this does not generally appear to be an issue as reflected in CSI scores and other post-test patient perception research.
13 (L)	OAs used for pre-screening	It takes the pressure off the optometrist in a busy clinic to help the clinic run more smoothly	There is more of a disjointed feel for the patient as they are seeing different members of staff throughout rather than one consistently. There is also trust that must be placed on the staff to ensure they are completing the tests correctly
14 (L)	Half the practices used OAs for pre-screening, half don't. Most use OAs for dispensing - OA/DO arrangement	Cost efficiency - OA's cost significantly less than an optom or DO and there are tasks which can be delegated to non-registrant staff	Continuity - You have to be super focused on the patient / customer journey and making sure that there is handover and contact at all the down points. Patient's hate being left and not knowing what's happening next or how long they should expect to wait. You need OA's to be mindful of keeping the customer informed of breaks or delays in the journey and why. It's quite tricky getting the right OA to understand and be able to do this.
15 (L)	OAs used to complete diagnostic tasks	Supply and Demand Availability Time efficiencies in the interests of patients.	No disadvantages. Reliant on an optometrist being onsite / available.

Table 12. Examples of allied healthcare professionals working in conjunction with and/or assisting optometrists in their role.

Participant number (practice category)	Healthcare professionals working in conjunction with and/or assisting optometrists in their role
1 (I)	This is not really assisting with the sight test, but of the journey through the practice for the patient. DOs dispense spectacles in our practice. They understand lenses and how to fit them correctly. They mend and adjust spectacles and are first line to deal with a non-tolerance of spectacles. They look out for skin conditions as they adjust and fit glasses and flag up any concerns. They also reiterate good compliance of spectacle and contact lens wear.
2 (I)	We work with a DO and orthoptist for dispensing and visual stress clinics respectively.
3 (I)	We have a peer group who use WhatsApp to communicate daily any queries such as IP prescribing for conditions. Ophthalmologists are also using this to discuss cases.
4 (S)	We employ a dual-qualified optometrist/orthoptist to whom we internally refer patients that require (a private) orthoptist assessment. Our non-IP optometrists also refer internally to our IP optometrists where necessary. Our spectacle dispensing team consists of qualified DOs and trainee DOs.
5 (S)	We work alongside DOs in low vision assessments. We carry out triage & referral refinement procedures as part of enhanced services
6 (S)	Yes - we work with DOs in all our practices. We also have good links to local ophthalmologists for opinions on conditions that may or may not need onward referral. We have an audiologist who can answer questions which we feel may be related to a patient symptom as well.
7 (S)	DOs. Shared care scheme for private cataract referrals - post op follow up done by optometrist in practice and results shared via secure website with ophthalmologist.
8 (L)	DOs is generally the norm. We do have access to pharmacists as required and some of our stores work in collaboration with ophthalmologists
9 (L)	Working for a multiple: on a daily basis we are assisted by DOs. They help with dispensing complex, regulated groups and problem solving before patients are referred back to the optometrist. They can also help in the administration of mydriatic drugs when patients attend a dilation appointment. We also have some form of relationship with the local pharmacist where we may cross refer patients for the provision of specific drops/treatments. Our local eye unit have 3 optometrists who work with them. They have been trained up to help with general red eye clinics and in the administration of treatment for wet AMD. As optometrists we do not have a lot of contact with the local orthoptists. They normally work within the hospital setting so we do not have any direct work with them.
10 (L)	DOs may provide training to optometrists in areas of their own expertise e.g., lens design, recommendations etc. In store CPD provided by other health care professionals in some instances.
11 (L)	Not in performing an eye examination but they work with wider healthcare professionals through referral - ophthalmologists, orthoptists or additional services e.g., low vision with DO's or MEC/IP services with a pharmacist or in restricted dispenses working with a DO to ensure correct appliance chosen, fitted etc
12 (L)	The established DO/ optometrist roles exist in all our stores. In addition to overall responsibility for delivery of an ophthalmic dispensing service, many DOs will also be engaged with supporting the delivery of the steps outlined at Q2 above. We also work closely with ophthalmologists - sometimes with them working on site or delivering remote consultation services.
13 (L)	Optometrists in the group of practices are often supported in clinics by DOs, however we do not have a DO in our practice. The purpose of the DO is to ensure the findings of the sight test are best translated into the best spectacles required by the patient, giving the best optical result. In cases of dry eye and basic ocular infections, there is a partnership with the pharmacy to prescribe ocular lubricants and antibiotics on the 'Common Ailments Scheme'. In more complicated cases, as optometrists we have direct contact with the ophthalmology A&E department for medical advice. If the concern is more routine, we can refer the patient onwards for ophthalmologist review at the local ophthalmology hospital department (private or NHS).

Participant number (practice category)	Healthcare professionals working in conjunction with and/or assisting optometrists in their role
14 (L)	Regularly work with DOs, generally have 1 in each practice. Also have contact with ophthalmologists in their community, but not always. Optometrists generally know the names of ophthalmologists locally, what they do & where they provide private services.
15 (L)	DOs - Dispensing Duties. Ophthalmologists - Clinical Case Management. Pharmacists - on call support service Clinical Services - always active support service delivered by experienced optometrists.

Table 13. Examples of adverse events and clinical risks that have occurred relating to using OAs to assist with elements of the sight test.

Participant number (practice category)	Adverse events, clinical risks, or other risks that have occurred relating to the use of OAs or other personnel to assist with elements of the sight test.
2 (I)	Not performing the correct test such as C40 VF rather than 24-2 VFs
5 (S)	If there is an unusual change or outcome that is caused by pathology, there is a risk that this could be missed if part of sight test conducted by OA/DO
7 (S)	Risk of missed pathology
8 (L)	Visual fields with incorrect data inputted e.g., incorrect DOB therefore affecting the outputs. Risk of any pre-screening tests not done accurately can affect clinical judgement.
10 (L)	Missed symptoms revealing pathology. Misuse of equipment giving erroneous results. Communication breakdown with all information not being effectively relayed. Incorrect point of service checks.
11 (L)	As OAs are only performing tests using equipment they have been trained on & all analysis, management & explanation/communication is left with the optometrist I don't believe in the current set up describe above there is. Risk would only be if not sufficiently trained or supervised.
12 (L)	Not aware of anything relating to the sight test as such - theoretical risks are likely to exist in the areas of communications (e.g., support colleague provides a verbal response to a patient question that might be misinterpreted - this is mitigated through use of written / digital materials, training and of course support from the supervising clinicians. There is a need to keep on top of supervision process to ensure that governance of this is robust.
13 (L)	The main risks are when the tests have not been completed correctly or repeat measurements have been requested and the staff have forgotten to do them. This usually requires notes to be made on the patient file for them to be booked back in to complete the tests needed.
14 (L)	Communication - patients often find OAs warm, friendly and more approachable than the optom. They will often tell them personal health info (I'm getting headaches, my vision has been funny etc) but and expect this to be captured and relayed to the optom. It's essential that OAs are trained to understand the important of this information and to capture it. Follow up tests - for example repeat IOPs/fields, dilation/cycloplegic. It's the optoms responsibility to ensure that any follow up tests are completed, and action is taken where necessary. Optoms should ensure that there is a process in practice for ensuring this happens.
15 (L)	Risks limited. Risk of patient electing to leave practice upon completion of diagnostic tests before engaging with an optometrist. Patients contacted by an optometrist in this circumstance.

Table 14. Additional ways in which OAs or similar personnel can be used.

Participant number (practice category)	Additional ways in which OAs or similar personnel can be used., if so, what is preventing you from doing this now?
1 (I)	I would like to have someone who can deal with all the contact lens teach appointments. It would save time if someone appropriately skilled and trained could do imaging and visual field testing
2 (I)	Use of a DO to perform applanation tonometry as not insured to do so as no MECS in Scotland.
4 (S)	We are shortly going to be involved in a hydroxychloroquine retinopathy screening service. Depending on demand the image capture part of this service may be delivered by a suitably trained technician. I would have no hesitation using technicians in service delivery particularly performing 'community enhanced services' such as the hydroxychloroquine retinopathy screening service or diabetic retinal screening. For us, the use of technicians during the sight test would not save sufficient time to make employment of another member of staff worthwhile.
6 (S)	OAs are capable of doing a lot of things in practice but require good supervision and excellent training. I've been in positions where an OA has been the best member of staff in the practice and also the weakest link which could have led to a serious problem for the optometrist. The question that should be asked as well is: if they're good enough to perform other roles, why are they not being trained in further or higher qualifications like ophthalmic dispensing? This question seems like it comes from the multiple side of the profession.
7 (S)	Pre-COVID, handovers for clinical tests were the norm. Due to staff shortages, appointment times were increased, and optometrists now do most of the screening. In order to return to this, we would require more front of house staff.
8 (L)	Enhance their ability to insert drops for further investigations. Understand how to lift and invert lids if we moved to remote examination. Legal restrictions and confidence of clinicians to delegate
9 (L)	It would be good to have DOs being able to subjectively refract more from a problem-solving perspective as opposed to prescribing of the prescription. The only concern I have with prescribing fully is the full test carried out by an optometrist takes into account the health of the eye as well as the visual outcome and refraction result. If this was de-regulated as to separate the refraction from the health check to a certain degree, certain health complaints may go unnoticed, and pathology missed. The full assessment also helps to reassure the patient and counsel better.
11 (L)	Needing GOC registrant to be on premise to repeat tests - in line with standards of practice
12 (L)	The use of clinical technicians to support the optometrist using the emerging refraction and imaging kit is likely to be an area of expansion. We're not conscious of anything preventing this directly, but equally conscious that in what is a relatively conservative sector, change will have to be evolutionary. The current regulations appear to be sufficiently permissive in this regard, while maintaining the definition of the sight test, which is an important patient protection.
13 (L)	Specialised training for different members of staff would be useful. The limitations we have are low staff numbers, busy clinics with high workload, and limited allocated training time given to optometrists to complete the regular training time required
15 (L)	Exploration / expansion of what a CLO can do to benefit patient availability is worth consideration. Effect of technology developments need to be monitored. More what technology can do needs to be considered.

Appendix 7: Study 2 details

Study 2: Details of methods

Study 2 was run in parallel with Studies 1 and 3. The study was led by BE, with detailed input from other members of the research team. The plan was to use purposive sampling to engage a diverse group of participants. Participants were sought from the following stakeholders, with the goal of obtaining at least 2 participants from each category:

1. Spectacle wearing patient with no history of ocular pathology.
2. Spectacle wearing patient with history of ocular pathology.
3. Consultant ophthalmologist.
4. Community optometrist, at least one of whom has been qualified for <5 years and another qualified for >20 years.
5. Hospital optometrist with at least 5 years' experience.
6. DO – working in a corporate chain and who is a contact lens optician (CLO), and currently refracting in this capacity.
7. DO – working in an independent practice.
8. Orthoptist – working with adults and children, at least one of whom already refracts.
9. Person with a clinical role in a charity for people with learning disabilities (e.g., SeeAbility).
10. Person with leadership role in low vision organisation/charitable sector.

In addition to the list above, one member of the Institute of Optometry Research and Ethics Committee recommended including an ophthalmic medical practitioner (OMP), if one could be found (the member commented that very few practices, if any, use OMPs nowadays). Extensive enquiries led to two practices that were believed to use OMPs, only one of whom does. The OMP working at this practice was contacted but did not respond.

All potential participants received a Participant Information Sheet and Consent Form. Only individuals who returned a signed consent form were included.

The plan was for the first round of the Delphi study to address broad questions, which would be narrowed in subsequent rounds according to first round responses. The following were used as indicative examples of questions in the first round (explanations of terminology were provided for patient respondents).

1. Please list any components of the sight test which you think are suitable to be carried out by a different person to the optometrist. For each of these, please indicate whether you consider the person carrying out the test should be under/not under/temporarily under the supervision of an optometrist or registered medical practitioner and whether it should be in the same premises as the optometrist. [A table was provided with columns to facilitate answers]
2. Please list any advantages you think may result from separating components of the sight test, whereby aspects such as refraction, binocular vision, and eye health are not carried out by the same person.

3. Please list any disadvantages you think may result from separating components of the sight test, whereby aspects such as refraction, binocular vision, and eye health are not carried out by the same person.
4. Considering your answers above, please indicate any difference it would make if the separated components were undertaken in different places?
5. Considering your answers above, please indicate any difference it would make if the separated components were undertaken under the supervision of an optometrist or registered medical practitioner?
6. Do you have any experience of good clinical outcomes resulting from tests being delegated to non-eye care professionals (clinical outcomes that are better than would have been likely if the optometrist had undertaken all the tests themselves)? If so, please explain.
7. Do you have any experience of good clinical outcomes resulting from tests being undertaken by one healthcare professional (e.g., the optometrist)?
8. Do you have any experience of adverse clinical events or other adverse impacts resulting from tests being delegated to non-eye care professionals? If so, please explain.
9. Do you have any experience of cases where adverse clinical events or other adverse impacts are likely to have occurred if the components of a sight test had been carried out by different people? If so, please explain.

Various online survey instruments and formats were explored. After attempting to design a suitable questionnaire in leading formats, it was concluded that an Excel spreadsheet was the most versatile approach. The Study 2 questionnaire (Q1) spreadsheet was created using Microsoft 365 Excel Version 2210 (Build 15726.20202) in an .xlsx format. Some participants required a .xls version, which was created without significant loss of formatting. A version was created for low vision patient participants who use screen readers, but when given the choice both low vision patients opted for the dictation option (see below). A pdf version was also prepared for any participants without access to Excel or who preferred paper versions, but this was not required. The final option, offered to all participants, was for the researcher (BE) to complete the form during a telephone interview in which the questions would be read to the participant. This option was chosen by both patient participants with low vision, but not by any other participants.

The invitation email included the participant information sheet and consent form. Potential participants who did not reply were reminded once. Those who consented and did not return a questionnaire were reminded once.

For Questionnaire 2 Section 3, the mean was chosen as a representative value because for every variable, the standard deviation was <1.1 and the mean was the same as the median (to the nearest integer) for 63 of the 64 variables (for “Impaired decision-making process”, the mean response was 2.3 and the median was 3).

Study 2: Details of results

Throughout this section, participants are differentiated by their participant number preceded by P (e.g., P3 is participant 3). Abbreviations that are used in tables are listed at the beginning of this report. The results are described and discussed in the main body of

the report and further details are provided in Table 15 to Table 38. When describing responses from one participant, the language used is that of the participant.

Round 1

Table 15. Participant invitees and respondents.

Category	Invited	Consented	Q1 returned	Participant reference numbers
Spectacle-wearing patients without pathology	3	1	1	13
Spectacle-wearing patients with pathology	2	2	2	1, 4
Consultant ophthalmologists	4	1	1	12
Ophthalmic medical practitioner	1	0	0	
Community optometrists qualified <5 years (England, Wales, Scotland)	4	2	2	3, 22
Community optometrists qualified >5 years (England, Scotland, domiciliary)	5	4	4	2, 6, 20, 23
Hospital optometrist with >5 years' experience (England, Wales, Scotland, Northern Ireland)	5	4	3	8, 14, 17
DO in corporate chain (England, Scotland, domiciliary)	5	3	3	11, 15, 19
DO in independent practice (England, Scotland, Wales)	4	1	0	
Orthoptist working with adults and children (England, Scotland)	3	2	2	5, 7
Person with clinical role in charity for people with disabilities (England, Wales)	4	3	3	9, 10, 18
Person with leadership role in low vision clinic/charity	4	2	2	16, 21
Totals	**44**	**25**	**23**	

Table 16. Demographic details of Q1 ECP respondents. There were 20 ECPs and half worked in more than one region.

Region	Number of ECPs who have worked in the region
Scotland	8
Northern Ireland	1
NW England	4
NE England	1
Wales	4
Yorkshire/Humber	1
W Midlands	4
E Midlands	2
SW England	3
SE England	7
London	6
E England	1

Table 17. Settings in which Q1 ECP respondents had worked. Nearly all ECPs listed more than one setting.

Setting	Number of ECPs who had worked in setting
Multiple (group) optical practice	8
Independent optical practice	15
Domiciliary	5
Hospital	12
University clinic	12
Charity	4

In email correspondence and verbal discussions, all three patient participants expressed concerns about their knowledge of components of the sight test and of the clinical significance of these being carried out by individuals other than the optometrist. Some of their responses are outliers that indicate an understandable lack of knowledge of the roles and training of ECPs (e.g., one patient participant was the sole respondent to opine that DOs can do ophthalmoscopy; but paradoxically argued against fundus photographs and scans being undertaken by non-optometrists). Therefore, the results of patient participants from Sections 2-4 are not included in the main summary tables below which report the combined results from the 20 ECPs from all the eye care professions. However, comments from the patient participants are included in the main body of this report. The patient participant responses from Section 5, concerning Clinical Outcomes, are included so that the patient perspective on clinical outcomes can be appreciated.

Table 18. Summary of ECP opinions on sight test components that can be carried out by persons other than the optometrist. The personnel identified in the top row were all recommended by one or more participants.

Component	Optom only	DO	Orth	OA	Nurse	Ophth	Techn	Any	Don't know
Symptoms and history	10	8	8	3	2	1	1	1	0
Presenting vision (e.g., unaided or with glasses)	2	13	10	7	2	0	1	1	0
Pupil reactions	10	7	8	2	2	1	0	0	0
Binocular vision tests (e.g., cover test)	6	7	8	2	1	1	0	0	0
Objective refraction	9	8	9	5	0	0	0	0	0
Subjective refraction	15	2	4	1	0	1	0	0	I0
Prescribing	16	2	4	0	1	1	0	0	0
Ophthalmoscopy	18	0	1	0	1	1	0	0	0
Fundus photography/OCT scans	2	9	8	10	1	1	2	2	1
Tonometry	2	12	10	11	2	1	2	1	0
Visual fields	0	14	12	11	2	1	2	1	0
Management decisions and patient explanation	16	4	4	0	1	1	1	0	0

Table 19. Conditions applied by ECP respondents when sight test components are undertaken by non-optometrists. It should be noted that respondents answered in their own words, but synonymous responses are

included together. When respondents specify technical requirements concerning the knowledge of the person undertaking the sight test component, these are classified in the table as "with appropriate training". Conditions are listed in the order of the frequency with which they were cited.

Condition	Participants	Details
Appropriate training	3, 6, 7, 8, 9, 10, 12, 14, 15, 20, 21, 22, 23	
Same premises as the optometrist	3, 6, 9, 11, 14, 15, 16, 17, 20, 22	P3 stated tonometry & VF must be in same premises as the optometrist, but V & objective refraction can be in different premises.
Under supervision	3, 10, 11, 16, 18, 19, 20, 21, 22	P16 "training provided & results audited for accuracy" P21 "regular review & training from optometrist with every patient signed off at decision-making process by optometrist" P22 "optometrist should be in the same building & results should be given to the optometrist"
Depends on age	8, 11, 14, 16, 21	
Depends on mobility or ability or patient needs	8, 11, 16, 20, 21	
Oversight	6, 11, 14, 20	P6 defined oversight as "the interpretation is done by the optometrist" P14 defines as "optometrist/ophthalmologist to review/repeat & expand if necessary"
Under supervision initially (when in training)	3, 12, 17	
If optometrist interprets the results	3, 11, 15	
Should be possible to defer to optometrist if results unclear	9, 11	Referring to presenting vision
Depends on instrumentation	6	Depends on tonometer type
Access to previous records	10	When measuring V so knows what to expect
Optometrist on site and able to intervene if required	2	
Depends on clinical information/presentation	11	
Optometrist should be contactable	18	
Requires communication between DO and optometrist	20	Referring to presenting vision

Table 20. Advantages of components of the sight test being carried out by non-optometrists. The abbreviations are explained in Appendix 1 and additional comments are given below the table.

Advantage	Participants who cite advantage and components it relates to
Efficiency/saves time/more time with optometrist for decision-making	P2 all; P3 V Ph To VF; P4 all; P6 S&H V Ob Su Ph To VF Ma; P7 S&H V; P8 V Pu BV Ob Ph To VF; P9 V Ph VF; P10 S&H Ob Ph To VF; P14 S&H V Pu BV Ob Ph To VF Ma; P17 V To; P18 S&H V Ph VF; P20 S&H V Pu BV To VF; P21 V Ob Su Ph To VF; P22 Ob Ph To VF; 23 Ph To VF

Advantage	Participants who cite advantage and components it relates to
Cost savings – non-optometrists are cheaper	P2 (all); P20 S&H V Pu BV To VF; P22 To VF
Quality of care - delegated staff may take more care with their delegated element than an optometrist	P2 (all), P3 (Ob, To)
Verification – if a test is carried out earlier it can be repeated by the optometrist	P2 (all), P3 (S&H)
Access – e.g., if components can be done remotely	P2 (all)
Patient is calmer (can avoid white coat syndrome)	P3 (To)
Orthoptist may be better trained in binocular vision tests than some optometrists	P10 BV

P16 considered there were no advantages to any sight test components being carried out by somebody other than the optometrist. Two participants noted that a questionnaire could be useful for symptoms and history, particularly for patients with complex needs. P15 emphasised that management decisions must be made by the optometrist, but the explanation to the patient could be provided by a suitably trained DO or orthoptist.

P19, a DO, stated that there were no advantages for most components being carried out by a non-optometrist, except for presenting vision and refraction (under supervision). The participant went on to state that these components should be allowable for DOs but only for occupational forms and retests, not for full sight tests. This is explored in Round 2.

Table 21. When listing advantages of components of the sight test being carried out by non-optometrists, participants were asked to state if it would make a difference if the non-optometrist was working under supervision or oversight and if so, what supervision/oversight would be required. Responses are detailed below and abbreviations are explained in Appendix 1.

P2 and P17 stated that non-optometrists required supervision or more supervision when first undertaking the role.
P2 noted that if the optometrist was present and able to intervene, any measurements that were difficult to obtain could be repeated by the optometrist and the episode used to train the tester.
P7 specified that the non-optometrist should have received "training to meet competencies and referral on".
P8 considered that (for V Pu BV Ob Ph To VF), oversight was not required after training had been completed.
P10 commented that all components that could be delegated would need supervision (not defined) except for binocular vision testing if performed by an orthoptist. P18 also commented that orthoptists are most expert to undertake binocular vision tests.
P11 stated that some components required supervision (S&H, V, Pu, Ph, To) and some oversight (VF, Ma), but did not define or clarify the difference.

P12, an ophthalmologist, noted that supervision was not required as the person undertaking the tests must be competent.
P14 considered oversight was required (S&H, V, Pu, Ob, Ph, To, VF), but this was not defined.
P15 commented that sight test components (S&H, V, Pu, BV, Ob, Su, Rx) that could be carried out by a DO or orthoptist would not require supervision but that explanations to patients would require "some form of oversight from optometrist".
P17 considered that most components should be carried out by the optometrist, but that presenting vision and tonometry could be carried out by a non-optometrist as long as the "optom could check was being done correctly" and that training is paramount.
P19, who advocated the DOs should be allowed to refract for retests, stated this should be supervised but did not define this.
P20 stated that the advantages of having some sight test components (S&H V Pu BV To VF) carried out by non-optometrists would be nullified if supervision was required.
P21 reiterated an earlier comment that supervision meant "regular review & training from optometrist with every patient signed off at decision-making process by optometrist" (V Ob Su Ph To VF).
P22 commented, concerning components that could be undertaken by a non-optometrist, that objective refraction would only save time if carried out by oversight not supervision, fundus photography requires supervision of an optometrist who could be asked questions, but that tonometry and visual fields could be under supervision or oversight (the participant did not define these terms).
P23 only commented that supervision was required for one component, fundus photography/OCT scans, specifying "Training and random checks plus optometrist repeat if not clear enough".

Table 22. Concerning advantages of components of the sight test being carried out by non-optometrists, details of responses about the difference it would make if these components were undertaken in different premises. Responses are detailed below and abbreviations are explained in Appendix 1.

Several participants commented that any advantages of having a component of the sight test carried out by a non-optometrist would be negated if in different premises because queries could not be checked immediately (P2, P6), previous records may not be accessible (P19) and/or oversight/supervision was not possible (P14). P18 made a similar point for symptoms and history, presenting vision, visual fields, and management decisions and patient explanations and P20 for S&H V Pu BV To VF.
P15 stated "I am firmly of the belief that all tests and explanations should be carried out in the SAME premises".
P3 noted that if the photo/scan was carried out offsite then it is possible that a condition could have developed in the interval between the imaging and the appointment with the optometrist. P10 made a similar comment about presenting vision and pupil reactions and subjective refraction and added that if visual field testing was carried out

in different premises the person conducting the test would need expertise to know if the result was not as expected.
P3 also noted that if tonometry was carried out offsite, the time at which the reading was taken must be noted.
P7, an orthoptist, referred to hubs and virtual clinics and noted that some roles (e.g., refraction, prescribing) needed to be part of a multi-disciplinary team.
P8 stated that, for all sight test components that could be delegated, the advantages might be negated if the tests were performed in different premises.
P10 expressed concern that if components were carried out offsite this would be problematic for patients with, for example, dementia (S&H, V, Ph) and that management decisions and patient explanation should not take place offsite and that test results must be discussed with the optometrist before relaying to the patient.
P21, an optometrist with experience in a domiciliary setting, commented that for some patients with poor mobility, remote data gathering could be useful prior to home visits. It was also noted that if more specialist instrumentation (e.g., tonometry, visual fields, scans) were located at a remote site, data could be gathered there and transferred to the clinician for interpretation.

Table 23. Concerning advantages of components of the sight test being carried out by non-optometrists, participants responses when asked to state if their answers depended on other factors (e.g., age of patient, clinical setting, training, insurance). Responses are detailed below and abbreviations are explained in Appendix 1.

Two participants stressed the importance of training or that the non-optometrist must be skilled (P3, S&H, Ph; P4, all).
P3 (concerning objective refraction) commented that the age of the patient is relevant.
P8 (for all delegated components) noted that the clinical facilities were relevant, such as whether there was room space.
P10 noted (for V, Pu, BV) there would only be an advantage for using non-optometrists if working in a hospital setting.
P20 stated that the sight test components that could be carried out by non-optometrists (P20 S&H V Pu BV To VF) would not be suitable for non-optometrists to perform in a domiciliary setting.
P22 considered that objective refraction had to be undertaken on the same premises, but photographs/scans, tonometry, and visual fields could be in different premises. P23 also considered these last three components could be at different premises.

Table 24. Disadvantages of components of the sight test being carried out by non-optometrists. Responses are detailed below and abbreviations are explained in Appendix 1. Additional comments are included below the table.

Disadvantage	**Participants who cite disadvantage and components it relates to**
Risk of missing key information/mis-diagnosis/erroneous prescription/errors/inaccuracies	P3 Pu Su Op Ph; P6 Su Op; P8 V Pu BV Ob Ph To VF; P9 Ob; P10 V Pu To VF; P12 all; P14 S&H V Pu Su Rx Op Ph To VF Ma; P16 all; P18

Disadvantage	Participants who cite disadvantage and components it relates to
	V Pu Rx To Ma; P20 S&H V Pu BV Ph; P21 S&H; P22 Ob VF; P23 S&H VF
Quality – less well trained/experienced/qualified staff	P2 all; P6 VF; P9 Ob Su; P10 BV Ma; P21 Su Rx Ph To VF; P23 Op
Repetition – patient feels like they are repeating themselves	P3 S&H; P5 S&H V Pu BV Ob Su Rx Op Ma; P15 S&H; P19 S&H
The optometrist and/or non-optometrist could miss non-verbal information/subtle signs	P6 S&H V Su; P9 V; P10 S&H BV Ob Su; P21 Su; P23 V Pu BV
Lacks integration/loss of continuity – impaired ability of optometrist to recognise diagnostic pattern from combined results	P2 S&H Ma; P3 BV; P9 Rx Ma; P18 S&H; P23 Ob Su Rx
Inefficient/waste of time	P14 Ob; P18 S&H V; P20 VF; P22 Ob
Perception – patients may perceive the test as being less thorough	P2 all
Insurance would be required	P3 Pu
Increased patient anxiety	P3 Ma
Sometimes leads to confusion as test carried out by one person and patient then has to wait for optometrist to view	P15 Ph

P6 noted that fundus photography/OCT scans could be undertaken by a non-optometrist, but the person must be skilled (P10) and understand normal/abnormal (P10) or images must be correctly labelled (P18) and examined by the optometrist.

P17 commented that, apart from presenting vision and tonometry (which do not require interpretation), they "can see no other aspect that can be separated as these other tests come as a package to help determine cause of patients presenting complaint. Interpretation and skill to carry out the other tests means using someone less qualified puts patients at risk".

Table 25. When listing disadvantages of components of the sight test being carried out by non-optometrists, participants were asked to state if it would make a difference if the non-optometrist was working under supervision or oversight and if so, what supervision/oversight would be required. Responses are detailed below and abbreviations are explained in Appendix 1.

P2 felt that the potential disadvantages could be overcome with supervision (not defined).
P3 felt that, for most components, supervision would make no difference to the disadvantages and that if subjective refraction was to be carried out by a non-optometrist, training and practice would be required.
P5 considered that the requirement for supervision/oversight was a disadvantage for all components because it required the time of two members of the team.

P8 listed disadvantages for several sight test components and for each commented that it would not make a difference if the testing was under supervision. P18 made similar observations (Pu, BV, Ob, Su, Rx, Op, Ph, To, VF, Ma).
P10 stressed that the non-optometrist carrying out the sight test components should be someone in a trusted team under supervision.
P11 stressed the importance of oversight and training for non-optometrists taking fundus photographs, tonometry, and visual field testing.
P14 and P21 intimated that oversight would be helpful, but did not define oversight.
P16 stated that oversight/supervision (not defined) would reduce the risks slightly but not enough to eliminate the risks.
P20 noted that, oversight/supervision would cause increased costs.
P21 commented that supervision would reduce the risk of mistakes, but oversight could lead to more errors. These terms were not defined.

Table 26. Concerning disadvantages of components of the sight test being carried out by non-optometrists, details of responses about the difference it would make if these components were undertaken in different premises. Responses are detailed below and abbreviations are explained in Appendix 1.

P2 noted that if components were carried out offsite, it would be particularly difficult to avoid the patient developing the perception that the sight test was of a lower quality than if the optometrist had carried out all the testing.
P3 commented that binocular vision tests were unsuitable for being carried out in different premises because of the risk of tiredness causing dissociation.
P5 stressed that, for all components, undertaking sight test components in different premises would be a disadvantage because it would add time for patient travel.
P8 considered that where sight test components were carried out offsite this may affect access to the results.
P10 considered that if sight test components were carried out offsite this would be a disadvantage because the information would only be in written format and the optometrist would have reduced ability to interrogate the information.
P12 and P20 considered that if sight test components were carried out offsite this would cause patient delay and inconvenience.
P14 stressed that the optometrist must be on site to provide oversight, applying this to all components that were suitable to be undertaken by non-optometrists. Similarly, P21 noted that oversight would be more difficult offsite.
P15 stressed that “I do not believe that any tests should be carried out in different premises”.
P16 stated that for all sight test components there would be a higher risk if carried out in different premises, citing potential delays.
P19 considered that if sight test components were carried out offsite it would cause difficulties as there would be no access to previous records.
P23 noted that if fundus photographs/OCT scans and visual field testing were carried out at different premises a disadvantage would be that the testing could not be repeated if issues were detected.

Table 27. Concerning disadvantages of components of the sight test being carried out by non-optometrists, participants responses when asked to state if their answers depended on other factors (e.g., age of patient, clinical setting, training, insurance). Responses (using the language of the participant) are detailed below and abbreviations are explained in Appendix 1.

P3 considered that insurance was required (Pu, Ob, Su, Rx, Op, Ph if scans analysed, Ma); as did P14 (S&H, Ph, To, VF); and P15 stated that it was assumed that all persons carrying out additional tests had insurance in place.
P4 commented that the person doing the testing must be competent.
P7, an orthoptist, noted that practitioners undertaking refraction, prescribing, and ophthalmoscopy should be registered. It was not stated with what body but, since this participant had specified earlier in the questionnaire that refraction could be carried out by optometrists, orthoptists, and ophthalmologists it is reasonable to assume that the comment about registration was not limited to the GOC.
P20, concerning symptoms and history, noted that patients are often unwilling to discuss medical matters outside of the consulting room. Concerning binocular vison testing, and pupil reactions it was highlighted that "The separate parts of sight test are all parts of the puzzle and complement each other. Separating them risks poorer patient experience and increased missed pathology and delays to referral, especially if different premises."
P21 highlighted that challenging cases (e.g., learning disabled/cognitive impairment/sensory impaired/paediatric) require the optometrist's skillset, even for components that many participants said could be carried out by non-optometrists (e.g., fundus photos, visual fields, tonometry).

Table 28. Good clinical outcomes from tests being undertaken non-eye care professionals. Verbatim comments with abbreviations explained in Appendix 1.

Participant number	Participant experience	Response
2	Optom; 10-30y; Scot NWE; ind HES uni	At our practice all scans are performed by techs who perform them better than I do. I would tend to rush the scans but they always take the time to get them right. Patients do seem to perceive the eye exam better with the techs doing the scans than when I used to do them myself - I'm not sure why that is.
3	Optom; <10y; WM L EE; ind.	Tonometry results can be lower if carried out by a non-health care professional as the px can feel less anxious - less white coat syndrome! Px also feel less anxious when some tests need to be repeated as the non-optometrist is just following protocol rather than interpreting the results.
5	Orth; >30y; Scot NEW; HES	Visual fields and quality OCTs - experienced dedicated technician often will spend time with pt to ensure best result obtained and doing it every day builds up knowledge and expertise
6	Optom; 10-30y; SEE; mul ind HES cha	In one of the independent practices, I work in, only Optos imaging and repeat fields may be delegated. Good outcomes were that in complicated patients, this gave me more time to explain the management and discuss decisions with the patient. Rather than just deciding to refer and not giving px so many options- as this would be quicker. However, I would only say the only advantage of being able to delegate to adequately trained staff is

Participant number	Participant experience	Response
		it saves time and reduces stress on the optometrist as you are not running behind so much in complicated cases or you have to do a referral.
7	Orth; >30y; Lon; HES ind uni	The numbers involved we have hubs with ophthalmic techs doing Glaucoma MR patients. VA, VF, IOP dilation, oct Optos imaging. These are then reviewed for quality and disease. Normals written to and abnormalities have face to face with ophthalmologist
8	Optom; 10-30y; Lon; ind HES uni	In a hospital setting, Visions, IOPs (NCT), VF OCTs and fundus photographs are carried out by trained ophthalmic technicians. This helps with the time management of the clinics, frees up more time for the clinician to see the patient and manage the condition e.g., glaucoma
9	Optom; 10-30; SEE; ind dom HES uni cha	Use of questionnaires in advance of appointment allows more thorough history and time for observations including of functional vision, particularly in very young Pxs or those with complex needs
10	Optom; >30y; SWE SEE; ind HES uni cha	In hospital settings some specialist practitioners become very good at performing a sub-set of tasks e.g orthoptists undertaking binocular vision assessments or biometry technicians undertaking ultrasound scans.
11	DO; 10-30y; Sco NEW Yor WM EM; ind dom	Again, this is all down to experienced staff, looking for best practice when it comes to experiencing patients expectations. Sometime on collection the VA's are better than recorded due to the patients capacity on the day of testing. The DO/OA may have more time to check prescription and environment to get best vision possible. Pre-testing may be more comfortable in the testing room rather than another room where the environment is different, less distractions etc....
12	Oph; 10-30; Sco NI; HES uni	Technicians often perform investigations to free up clinician time.
14	Optom; <10y; Wal SEE Lon; mul ind HES uni	Patient rapport with ophthalmic technicians is often better than with optometrists/orthoptists. I would suspect that this improves communication and to some extent, patient satisfaction. However, I'm not certain if it would be sustained if the same members of staff had increased clinical responsibility as the perception from patients would also change.
18	Optom; NEW; ind uni	Working in a clinic alongside orthoptists has suggested a more thorough BV assessment carried out by orthoptists, whilst the refraction is conducted by optometrists. Sharing the outcomes of the two assessments allows for a shared management plan.
19	DO; Sco; mul uni	Yes DO carrying out VF, as a patient waiting for optom to look at VF results can be time consuming. If carried out by DO in retail or orthoptist in HES px can receive results faster.
20	Optom; 10-30y; NEE; mul ind dom	None I can think of in last 22 years
21	Optom; >30y; Wal WM SWE SEE Lon; mul ind dom HES uni cha	Better rapport building for severe LD where initial approaches are from a familiar staff member at care centre. The ability for more patients to be seen in a busy clinic where trained auxiliary staff are involved in some tests for optometrist to interpret at the end. Auxiliary staff facilitate the use of further investigative tests (e.g., full threshold fields, specific OCT scan) at one single visit for the patient to premises.
22	Optom; <10y; Sco; mul ind	Yes. The practice I worked in previously was very large and always busy. It would have been impractical to have carried out all of the tests myself, given the time constraints.

Table 29. Good clinical outcomes from tests being undertaken by one healthcare professional. The table comprises verbatim comments with abbreviations explained in Appendix 1.

Participant number	Participant experience	Response
3	Optom; <10y; WM L EE; ind.	Missed points on visual field that may indicate a referral, but having the notes and history to see that they have either been seen at HES before or a longstanding defect that requires no action - saves px and HES time! Reduced vision when refracting but then the same person is doing the ocular health assessment and can see the OCT to see other macula issues that can explain the reduced VA and a more appropriate referral can be made. Or px may have a really large ERM with extensive puckering but with a VA of 6/6, no action/ referral is indicated as optometrist looking at all the findings together
4	Patient with low vision; SEE; mul , ind, HES, uni	When diagnosed with CMO it was found by a high street optometrist; might not have been easily spotted by somebody else.
5	Orth; >30y; Scot NEW; HES	yes - orthoptist assessing a stroke patient and being able to do all tests (inc refraction where applicable) and correlate results with presenting symptoms.
6	Optom; 10-30y; SEE; mul ind HES cha	This is my normal mode of practice in independent practice. You have the whole picture, making better decision e.g. on exactly which fields test you want to perform to detect which condition. It is also helps with rapport built up with the px, rather than them seeing several different people.
7	Orth; >30y; Lon; HES ind uni	Depends on what is being done, ophthalmic tech and ophthalmologist, daily optoms; orthoptist and ophthalmologists do this.
8	Optom; 10-30y; Lon; ind HES uni	In an optometrist practice, I have worked where the optom carries out all these tests. This is sometimes advantageous for the patient - who may feel they are getting a "good service". However, it is probably not the best use of the resources for the optom.
9	Optom; 10-30; SEE; ind dom HES uni cha	I have worked in different models for paediatric eye care 1.pathway with an orthoptist/nurse (for cyclo) /optometrist (who only sees Px dilated) / possibly ophthalmologist -again only seeing child once dilated and referral on to DO in another premises 2. optom and DO in community practice 3. optom and DO working as a team in special school The optom carrying out all the tests reduces anxiety of multiple personnel /rooms/ multiple appointments and it is much easier to build up a picture of a child's visual abilities when responses/results are limited. The classic HES pathway (1) particularly limits ability to build a true picture of a complex child's visual abilities and has historically led to accommodative problems going unidentified in a group with a high incidence of poor accommodation. Separating the dispensing from the prescribing reduces compliance with glasses wear.
10	Optom; >30y; SWE SEE; ind HES uni cha	Yes, e.g retinoscopy revealing keratoconus or posterior sub-capsular cataract; understanding why a patient's visual field plot is anomalous e.g due to poor understanding or poor posture
11	DO; 10-30y; Sco NEW Yor WM EM; ind dom	If we have patients that have complex Rx, or needs and we have their history already (which would be amazing if we had access to clinical records) it may take a lengthy time for the complete eye examination due to the patients specific requirements, that only the optom would understand; i.e., glaucoma present that needed urgent referral which was not noted previously.
12	Oph; 10-30; Sco NI; HES uni	Frequency of use = greater competence and more efficiency.

Participant number	Participant experience	Response
13	Pat; >30y; NWE SEE; ind	From the patient perspective it is more efficient to have all the tests performed by one person at one visit. Good continuity of care and the clinician has a 'total' picture.
14	Optom; <10y; Wal SEE Lon; mul ind HES uni	Patient's often reflect that they prefer to see one clinician consistently than be "passed along the conveyor belt", both at single and recurrent visits. Preference has also been noted for the 'holistic approach' where one practitioner considers all the results gathered by themselves.
15	DO/CLO; Sco; mul uni	Clear decision-making process for both patient and practitioner. Optometrist is clear about what tests are required , if they have been carried out and also can ensure tests carried out to a high standard.
16	Optom; >30y; SEE Lon; ind dom HES uni cha	Yes - young person with subtle increase in astigmatism, who was referred for suspect keratoconus based on refraction, retinoscopy, previous history and the resulting decision to do topography as an additional test. This resulted in the person being correctly identified as having early keratoconus at a stage where cross linking appropriate and prevented significant degree of astigmatism developing.
17	Optom; 10-30y; Sco; ind HES	Yes, numerous. A full patient history and one person doing all tests is the best possible scenario for patient safety
18	Optom; NEW; ind uni	Patient comfort can be influenced by the number of staff involved in the eye examination. E.g, autistic people can feel very anxious having to see multiple staff, and this can negatively influence the outcomes of the eye tests. Seeing the same member of staff throughout an eye examinations can help build a good rapport, better patient cooperation, better patient understanding and a more comfortable experience.
19	DO; Sco; mul uni	Yes one person carrying out all tests pretest, full ST, and VF helps to make better clinical decisions as they can see parts of the test and creates more patient familiarity and trust.
20	Optom; 10-30y; NEE; mul ind dom	Every day. More accurate tests as all the test results complement each other backing up diagnosis and referral. Faster referral. Px trust in optometrists increase if all tests done together.
21	Optom; >30y; Wal WM SWE SEE Lon; mul ind dom HES uni cha	Many - where there is cognitive impairment, some paediatric cases and most LD cases, continuity with the clinician is essential to build a rapport, to gain patient confidence and to ensure standardised approaches to management. This is usually reflected in better compliance with instructions and also better success at recall in terms of attendance and interactions.
22	Optom; <10y; Sco; mul ind	Yes, in my practice all tests are carried out by optometrist. I prefer this as I have a clear idea of everything about the patient and their ocular status. I find it less disjointed to do all tests by myself and patients often appreciate having the same person doing all the tests needed.
23	Optom; 10-30y; SWE EM WM Wal; ind	Yes, frequently as have experience in multiples, franchises and independent and since moving to doing all or nearly all tests ourselves, our practitioners have been able to pick up issues especially with binocular vision and quality of field test results. OCT scanning ourselves has meant that even in the case of difficult imaging the practitioner has had a view on the greyscale and on movement on the eyes and can tell more what is going on. Since doing our own pressures with iCare rather than the simpler NCTs typically used as pre-screening have had very little need to repeat or refer on artificially high IOPS. Frequently we find patients have ended up with wrong dispenses from other practices with too segmented a process especially health issues being underexplained or missed due to time pressures and loss of continuity so we end up solving problems or identifying clinical issues sooner.

Table 30. Adverse clinical events or impacts from tests being undertaken by a person other than the optometrist. The table comprises verbatim comments with abbreviations explained in Appendix 1.

Participant number	Participant experience	Response
2	Optom; 10-30y; Scotland and NWE; ind. HES uni	Got examples of near misses where H&S triaging by delegated staff missed important details that was then picked up by optom when double checked.
3	Optom; <10y; WM L EE; ind.	Keratoconus could be missed: high cyl could just be seen as normal without seeing if their cyl has increased or without looking at the ocular health if tests are carried out by different people. More unnecessary referrals to the hospital as ophthalmologist looks at all findings together to determine normal vs abnormal - abnormal findings could be explained without the need for a referral - ERM example as before. Ambylopia/squint being picked up too late when the px is outside the plastic period because the tests were not interpreted/done correctly - especially with children when their attention span may alone elicit abnormal results
4	Patient with low vision; SEE; mul , ind, HES, uni	In hospital once it was initially decided not to test one eye because was 1/60, but then decided to do the test and this found that the eye did have visual field.
5	Orth; >30y; Scot NEW; HES	Yes OA not correctly supervising pt responses on visual field testing /imaging leading to unnecessary referral /further testing for pts
7	Orth; >30y; Lon; HES ind uni	No because safety check and competencies in place
8	Optom; 10-30y; Lon; ind HES uni	VF errors e.g., lid artefact and wrong Rx entered by technician when they are not fully trained.
10	Optom; >30y; SWE SEE; ind HES uni cha	Missed stroke - Nurse checking visual acuity recorded <6/60 R&L because patient was unable to read letter chart but due to a left hemisphere stroke the patient was unable to name letters but could still match. Missed retinal detachment in diabetic patient with asteroid hyalosis, nurse practitioner thought reduced VA was due to the vitreous opacities and view of fundus was difficult but cause of visual loss was in fact RD.
11	DO; 10-30y; Sco NEW Yor WM EM; ind dom	Maybe prism has been missed on previous glasses, optom hasn't had any medical information passed on by the relative/carer which is eye related on the day of the clinic. Problems getting IOPs, environment that may be not suitable, however optom can make it better for ophthalmoscopy/ retinoscopy, where DO/OA maybe can't be control (home visits). This does not help when we are trying to dilate and the room is too bright.
12	Oph; 10-30; Sco NI; HES uni	Inadequate quality of scans or tests
13	Pat; >30y; NWE SEE; ind	I am aware of one instance of domiciliary eye test in a residential care home which totally missed a large visual field loss. Don't know who did the test though.
14	Optom; <10y; Wal SEE Lon; mul ind HES uni	Visual fields performed with clear visual field defects shown in results and not passed on to optometrist for contemporaneous review resulting in delay in treatment - ophthalmic technicians/advisors. VA both over and under-estimated leading to misinterpretation of condition severity and potential harm caused - nurses and doctors. Tonometry performed incorrectly resulting in inappropriate referral/treatment for glaucoma - doctors, OAs, DOs (all have done this). Children's glasses with significant astigmatism prescribed correctly but ordered incorrectly after test and glazed 90 degrees off axis resulting in delay in amblyopia treatment - DO. Refusal to issue replacement Rx for broken spectacles while waiting for

Participant number	Participant experience	Response
		hospital refraction or to provide interim refraction in primary care resulting in no spectacle correction for child(ren) and delay in amblyopia treatments.
15	DO/CLO; Sco; mul uni	A colleague did have issues when an OA noted down results for tests he did not carry out.
17	Optom; 10-30y; Sco; ind HES	Yes, sometimes when other tests carried out by health care support workers I have to repeat them as they dont make sense when i start to do my examination. Invariably I have to spend time asking how they were carried out and repeat them myself, wasting everyone's time
20	Optom; 10-30y; NEE; mul ind dom	When working in practice an OA did fields for child that showed bitemporal hemianopia. Of repeated testing by optom px presented a binasal hemianopia and then optom was able to confirm child was not performing test correctly and use other techniques to confirm px had full fields.
21	Optom; >30y; Wal WM SWE SEE Lon; mul ind dom HES uni cha	Many. OA/DO changing dispensing instructions for commercial rather than optical considerations. Support staff undertaking inadequate testing (fields strategy, poor quality imaging, poor quality OCT scanning). Orthoptist/ophthalmologist not considering refractive influences on binocular comfort, e.g prismatic effects post-op or influence of spectacle wear or lens design on phoria compensation. OAs failing to probe further issues arising in H&S, for example details of work environment, dry eye symptoms, concerns about family members, failing to understand significance of certain medications, noticing red flag responses for safeguarding or mental capacity awareness.
22	Optom; <10y; Sco; mul ind	Yes, in my previous practice there were rare occasions where other staff (OAs) had been asked to check a patient's post dilation pressure. These were missed as they were distracted by dispensing so this resulted in needing to ask the patient to come back to have their pressures checked.
23	Optom; 10-30y; SWE EM WM Wal; ind	Fields done on same eye rather than swopping eyes without realising, fields with head in wrong place, fundus images that don't give accurate enough information, these issues were frequent and happened with DOs and dispensing staff often due to understaffing and pressure on them to be out on the sales floor. Fields done have to be repeated by optom often as not the correct one, or unreliable, tonometry not done as 'too difficult'. History and symptoms provided by both DOs and dispensing staff often too limited or missed vital information, and if optometrist not redoing (which takes away point of other staff doing it) then issues were missed. Patients return from hospital visits which use separate staff for VA saying that the person doing the test moved chart or chair so VA incorrect (and this found frequently), the amount of people who have at best 6/9.5 or often worse VA or even miss half the letters on the chart who apparently have '6/6' at their hospital visit happens a lot. Don't feel can trust hospital results on VA as hear and see this many times.

Table 31. Cases where it is anticipated that adverse clinical events would be likely to occur if components of the sight test were carried out by different people. The table comprises verbatim comments with abbreviations explained in Appendix 1.

Participant number	Participant experience	Response
4	Patient with low vision; SEE; mul , ind, HES, uni	As I have low vision, if I was being tested by somebody other than the optometrist would be concerned that they might not think outside the box.
5	Orth; >30y; Scot NEW; HES	Patient complaining of headache and refraction reveals change in prescription therefore not further assessed/referred onwards but Binocular Vision assessment reveals extra ocular muscle anomaly which is responsible for symptoms and indicative of cranial nerve paresis/stroke

Participant number	Participant experience	Response
6	Optom; 10-30y; SEE; mul ind HES cha	Depends on how well the delegated person has been trained. If you are locum'ing you have no control or idea if that person is well trained or not.
7	Orth; >30y; Lon; HES ind uni	Should do is competency training is in place e.g., techs doing biometry
8	Optom; 10-30y; Lon; ind HES uni	I think having the tests carried out by an OA with the results reviewed online by an optometrist does not work well. My friend in the US has just had an eye test where the optom was online and in another State! He felt the service was poor with the OA unable to answer his questions on astigmatism at the end of the virtual eye test.
10	Optom; >30y; SWE SEE; ind HES uni cha	Communication and recording systems cause information to be lost. Quantitative data is easy to record but mention of non-verbal clues and subtle signs are absent from written records. Often poor performance or anomalous results or unusual answers in a number of different tests leads the clinician to explore reasons for this and can uncover information which would otherwise be lost. If the clinician simply interprets a series of data points without reference to the patient's performance and demeanour then clinical outcomes can be compromised.
11	DO; 10-30y; Sco NEW Yor WM EM; ind dom	Such conditions such as CATS, ARMD are missed or measured inaccurately. Rxs can be also be different if prism or different lens types are not noted from one person to another. When is it a good time to refer, one might say now or in 6 months' time when surgery may not be possible?
12	Oph; 10-30; Sco NI; HES uni	Lack of knowledge or awareness of implications of poor quality information/scans/tests
13	Pat; >30y; NWE SEE; ind	If elements of the eye check are fragmented in time, place, and person I can foresee missed opportunities for identifying problems early. If patients can just choose to have refraction alone (cost implications maybe) other serious problems could be missed.
14	Optom; <10y; Wal SEE Lon; mul ind HES uni	Where non-medical staff perform some tests and hand over patients to medical staff (i.e., optometrists/ophthalmologists) some clinical observations are not noted as these are not recognised as abnormalities and consequential to patient management. In other cases, no comments are made and notes are simply left with 'please review' slips paperclipped to the front page with no suggestion of urgency or reason. These notes could easily be filed away and no review taking place, pathology could be missed and result in serious risk of vision loss for parents.
15	DO/CLO; Sco; mul uni	Sometimes there can be some confusion as to what tests are required for individual patients. There is also no guarantee such tests will be done appropriately.
16	Optom; >30y; SEE Lon; ind dom HES uni cha	People who have communication impairments find the opticians very stressful, if you add into that situation pre-screeners, then a DO doing the refraction, followed by an optometrist carrying out ophthalmoscopy and determining the management, followed by an OA or DO doing the dispensing of spectacles - the outcome is likely to be very poor. There may be missed eye disease and certainly the patient will be distressed or even worse - avoid having an eye test again. We know that this happens already for many people. Having this conveyor belt approach means that subtle evidence of eye disease is bound to be missed in many cases and it benefits no-one except the business owners.
17	Optom; 10-30y; Sco; ind HES	If VAs not recorded adequately and patient advised able to drive but actually below standard and doesn't get refraction
19	DO; Sco; mul uni	Yes, patient over 60's usually have other factors which may contribute to change in vision, and having components of ST carried out by different people may prolong px diagnosis.

Participant number	Participant experience	Response
20	Optom; 10-30y; NEE; mul ind dom	Px symptoms change and if not carried out as a complete test more pathology will be missed and px experience will be less effective. Px with small pupils and cataract are often poor at subjective and dilated retinoscopy shows if subjective correct or not. Px often think their diabetic screening is a full ST and don't get ST done missing pathology. If parts of ST separated px may think they only need refraction and not health check which will result in later detection of ocular disease. E.g., glaucoma.
21	Optom; >30y; Wal WM SWE SEE Lon; mul ind dom HES uni cha	H&S where patient has cognitive or sensory impairment or LD, or paediatric cases where management is likely. Question sequencing is a specialised skill in each example and failure to adopt this technique results in poor assessment and management. Maximising objective refraction data (often after cyclo or dilation) is not achieved without skilled optom for many elderly, cognitive impaired or paediatric cases. Appreciation of the influence of some diseases on subjective refraction is an optometrist skill (hyperopic shifts or reduced photostress recovery in early macula oedema or maculopathy, identification of amblyopic nature and influence, refractive shifts due to lenticular change, distance and near refraction influences upon binocular status, nature of visual symptoms as a differentiator of vascular or retinal disease processes, speed of response as indicator to blue sensitivity and likely adaptation to final correction). Remote data gathering makes potential for data security concerns more likely.
23	Optom; 10-30y; SWE EM WM Wal; ind	See above plus the greatest risk is that the disconnect with the clinical examination means less information to the optometrist so more chance of missing issues, plus the patient doesn't understand the difference so would not then report problems or contact if issues as they have 'had an eye test' if they get new glasses. Other countries using this model have a different understanding and expectation of the clinical vs retail and often we do see people coming from those models who have had spectacle eye tests but rarely had health tests done fully.

Table 32. Additional comments from respondents to Questionnaire 1. The table comprises verbatim comments with abbreviations explained in Appendix 1.

Participant number	Participant experience	Response
1	Pat; >30y; Lon; mul HES uni	Prefers free-standing LogMAR chart because it can be moved closer or further from patient and at eye level so not looking up. Contrast is important in testing and the person doing the testing should know about the effect of contrast. The person doing the testing should check with the patient that the light levels in the clinic are OK for them.
2	Optom; 10-30y; Scotland and NWE; ind HES uni	On recruitment, it's moderately difficult because I'm very picky about who I employ, not because there is a shortage of people.
4	Pat with low vision; SEE; mul , ind, HES, uni	Orthoptists are now doing injections, is worried that if they are now going to be asked to do additional tests would this take them away from what they are really there for.
7	Orth; >30y; Lon; HES ind uni	This is all about being part of a MDT, competency training and referral to the appropriate expert. E.g ophthalmologists not doing keratoconic refraction.

Participant number	Participant experience	Response
8	Optom; 10-30y; Lon; ind HES uni	One of the problems with using non-professional staff is the turnover of people. We have had some excellent ophthalmic technicians working at our eye clinic. They are often graduates and will often leave for a better paid job e.g, in IT. The constant re-hiring and re-training of staff to carry out these tests takes up considerable time for a practice/NHS Trust.
9	Optom; 10-30y; SEE; ind dom HES uni cha	I want to mention here the significant anecdotal evidence among the diabetic population – particularly those with learning disabilities- of the misconception that a diabetic screening (with assessment of visual acuities) constitutes an eye test and so they do not seek a GOS test and hence miss out on refractive check/ tonometry and other eye health checks. Pxs report having had 'an eye test' when they have only undergone diabetic screening. From this we can hypothesis that if elements of a GOS sight test are available separately, patients will miss out. In Donaldson et all 2018 Eye care in young children: a parent survey exploring access and barriers 85% of the parents surveyed believe that school vision screening tests for all eye problems and we can assume children therefore more likely miss out on more detailed assessment if they are screened in school -e.g objective refraction, accommodation and orthoptic assessment/eye health checks. From this we can hypothesise that testing vision (especially only DV) in isolation will likely reduce uptake of other eye and vision assessments
10	Optom; >30y; SWE SEE; ind HES uni cha	Opportunities exist for elements of the sight test to be delegated to improve efficiencies, however if a clinician is not given opportunity to think about results and explore results then inappropriate conclusions may be drawn. Compressing clinical episodes will result in errors. Furthermore, whilst a large number of patients will be able to comply with numerous different staff conducting examinations a significant number will not. Often these patients are more vulnerable and more likely to have pathology which can be missed in any 'streamlined' process. It is important that these members of the public are protected.
11	DO; 10-30y; Sco NEE Yor WM EM; ind dom	We generally deal in the domiciliary sector which tends to get forgotten about at the early stages of optical training. This is important to try and facilitate people who are housebound and cannot on their own attend their High Street optician. There seems to be a stigma for optoms completing "DOMS", however this job is extremely rewarding when you can help someone preserve their sight for longer in the older population.
13	Pat; >30y; NWE SEE; ind	I am aware that in some corporate settings parts of the eye check are performed by trained staff other than the optometrist. I feel this is acceptable providing it is under the supervision and responsibility of the optometrist and the interpretation of the test results is the responsibility of the optometrist. Splitting the tests by date and location would not be acceptable to me.
14	Optom; <10y; Wal SEE Lon; mul ind HES uni	Simply put, splitting the sight test up to be delivered by various members of staff significantly increases the chance of error and harm coming to the patient from this. It is difficult enough to delegate and appropriately follow up IOP and visual field measurements. Increasing the chances of missed pathology makes harm more likely again.
15	DO/CLO; Sco; mul uni	I do believe there is some merit in having a different approach to supervision with the less onerous term of "oversight" . In my opinion this would involve the person taking overall responsibility not always having to be in a position to intervene. However, this is a new concept in Optometry and will require a significant amount of work prior to being put into place. Perhaps the DO/Orthoptist would only need to seek advice/clarification if not sure about a specific point.
16	Optom; >30y; SEE Lon; ind dom HES uni cha	We have no issues in recruiting optometrists in most areas – there are some areas such as the west country where I understand that this is difficult – but that would apply across the professions and OA roles not just optometrists. I feel that if the eye test is broken up it will result in greater risk and the only people that benefit are those that want to pay less for

Participant number	Participant experience	Response
		their professional staff and push more people through in each clinic. There are no clinical benefits.
20	Optom; 10-30y; NEE; mul ind dom	I believe separating parts of sight test can only be a detriment to patients, eyecare and the profession as a whole.
21	Optom; >30y; Wal WM SWE SEE Lon; mul ind dom HES uni cha	I would like to differentiate between remote data gathering for by secondary staff for clinician to maximize decision-making for more and more widespread patients (a good thing) and domiciliary or remote location assessment of patients at remote centres or in domiciliary settings (more specialised services where delegation is likely to be limited in success without extensive training and experience).
23	Optom; 10-30y; SWE EM WM Wal; ind	If this, as seems likely to happen, is going to be forced through by commercials interests, it would be better to make attendance with an optometrist compulsory as well even if retailers allow staff to do for example refraction in rechecks or to check before dispensing if the eye exam is in date.

Round 2

Table 33. Goals of orthoptist respondents. The table comprises verbatim comments with abbreviations explained in Appendix 1.

Questions	Response (P5)	Response (P7)
Are you currently undertaking retinoscopy as part of your work in the HES?	rarely	no
Are you currently undertaking subjective refraction as part of your work in the HES?	no	no
How important is it to your work in the HES to be able to provide refractions (retinoscopy and/or subjective)?	would be really useful	essential
Are there any barriers preventing you from undertaking refractions (retinoscopy and/or subjective) in the NHS?	maintaining skill and can't prescribe therefore hosp optom does and repeats refraction before prescribing	time and patient workload
Are you able at present to sign HES (P)/HES 2/HES 3 forms?	no	no
How important is it to your work in the HES to be able to sign these forms?	would be really useful	n/a
Are you currently working in a community optical practice ("High Street Opticians")?	no	no
Do you plan to work in community optical practices?	no	no
Do you think there is a desire in the orthoptic profession to carry out refractions in community optical practices?	no	no
Do you think there is a desire in the orthoptic profession to carry out ophthalmoscopy in community optical practices?	no	no
Do you think there is a desire in the orthoptic profession to carry out sight tests in community optical practices?	no	no
Do you think there is a desire in the orthoptic profession to carry out sight tests in private orthoptic practice (e.g., seeing patients in a private hospital referred by an ophthalmologist for an	no to pts for sight test but if it is a private *orthoptic* pt who requires Refn then yes.	no

Questions	Response (P5)	Response (P7)
orthoptic workup)? If so, what would this involve concerning issuing optical prescriptions?		

Table 34. Concerns about orthoptists undertaking refractions and issuing HES prescriptions as part of their work in the HES. The table comprises verbatim comments with abbreviations explained in Appendix 1.

Participant number	Participant experience	Explain if you have any concerns about orthoptists undertaking refractions and issuing HES prescriptions as part of their work in HES?
2	Optom; 10-30y; Scotland and NWE; ind HES uni	No concerns but there's always mission creep. I know there's no current desire from orthoptists but if employing an orthoptist is cheaper than an optometrist, some companies will encourage them out of hospital into community and it will eventually become a concern.
3	Optom; <10y; WM L EE; ind.	No concerns.
6	Optom; 10-30y; SEE; mul ind HES cha	Adequate training and experience on refraction. Optometrists see a higher volume of refractions in the community and also their own rechecks (if based at regular practice) - this all contributes to better skills via feedback).
8	Optom; 10-30y; Lon; ind HES uni	No as long as they get the same training as ophthalmologists in refraction
9	Optom; 10-30y; SEE; ind dom HES uni cha	No major concerns re issuing HES Rxs, some concerns that this may mean children in special schools don't get eye health check (but also allowing orthoptists to refract and Rx may mean more children get desperately needed refractive correction). Also concerns that orthoptists (but also optometrists) in HES do not check accommodation before cyclo refraction
10	Optom; >30y; SWE SEE; ind HES uni cha	No problem in a multi-disciplinary clinic setting but still some concerns that the drafting of any 'permission to prescribe' would need to ensure that all other examinations making up a 'sight test' have been completed. Often orthoptists work in isolation and see patients before they are seen by a medical practitioner or optometrist, I consider it would be inappropriate to prescribe at this point after a 'refraction', but if this were to be in the context of follow up and clinical management then it would improve efficiencies in the hospital out-patient system
11	DO; 10-30y; Sco NEW Yor WM EM; ind dom	No
12	Oph; 10-30; Sco NI; HES uni	Whoever does refraction needs to be competent and subject to same monitoring/quality control as others within HES
14	Optom; <10y; Wal SEE Lon; mul ind HES uni	No, they do not. Orthoptists already perform fundoscopy as part of glaucoma services in many hospitals. These individuals are trained to assess glaucomatous damage & changes but not other ocular pathology and there is a known risk of these individuals missing new/changes in co-morbidities for these individuals. In terms of refraction, orthoptists are also trained in this skill at university but only as a means of ascertaining if there is a significant Rx (change) in an objective refraction of a child. They are not trained in subjective refraction or for adult patients with co-morbidities that may influence prescribing decisions. In short, the risks are present in both primary & secondary care.
16	Optom; >30y; SEE Lon; ind dom HES uni cha	I feel that refraction should always be carried out in the context of a complete eye examination and by someone who has received extensive training in this field - of particular concern is that hospital prescriptions tend to be much more complex than average refraction in high street practice and therefore unless you have lots of experience in refracting this could result in some very poor outcomes.

Participant number	Participant experience	Explain if you have any concerns about orthoptists undertaking refractions and issuing HES prescriptions as part of their work in HES?
17	Optom; 10-30y; Sco; ind HES	Refractions within HES usually involve complex pathology and unusual/complex prescriptions. Mastering this takes years of refractive training and mentoring.
20	Optom; 10-30y; NEE; mul ind dom	Only if suitable communication between orthoptists and optometrists and ophthalmologists exists.
21	Optom; >30y; Wal WM SWE SEE Lon; mul ind dom HES uni cha	No, but I would hope this was as a delegated function under the supervision of a hospital optometrist OR after a further qualification in refractive management.
23	Optom; 10-30y; SWE EM WM Wal; ind	No if they are trained appropriately and as long as the health aspects of the eye have been checked already.

Table 35. Goals of DO respondents. The table comprises verbatim comments with abbreviations explained in Appendix 1.

Question	Response (P11)	Response (P15)	Response (P19)
Please describe in your own words how you would like to see the scope of practice of DOs expanding?	We currently do re-checks for VA's ONLY, then if there is a decline we request a full eye test		Refraction only
Are you currently undertaking refractions for any patients? If so, please give examples (e.g., non-tols, contact lenses, sight tests)	No	I carry out over-refraction for contact lens patients	None
Would you like to see a greater role for DOs in refracting non-tolerance cases?	No	Yes I believe that is one such case that DO's refracting could be beneficial to all parties	Yes
Would you like to see a greater role for DOs in undertaking refractions as part of a routine sight test?	It depends on the circumstances if the optician is with the DO, as this would be less time consuming for an optom to visit if requested, when it might only be a change of disp that is required.	I believe that the optometrists should still undertake the refraction as part of a routine EE	Yes
If you would like to see DOs undertaking refractions, how do you see this working? Specifically, do you envisage:	We are a domiciliary opticians, therefore this can be done on site by the DO, in the extreme cases if an optom wasn't available. We would also need floating equipment as all our teams may be out on site. Again, funds should be available i.e., equipment, car, time costs. etc	I see DO's refracting as either part of a non-tolerance or alternatively if the patient would like the refraction checked/fine-tuned during the 2 year interval for EE	
- DOs refracting as a delegated role in a sight test, with an optometrist checking the Rx and taking responsibility for this?	Yes	Unless the role of the optometrist changes dramatically and there is serious	No

Question	Response (P11)	Response (P15)	Response (P19)
		undersupply, I do not see a role for the do doing this	
- DOs refracting as part of a sight test, with the DO responsible for the Rx but the optometrist taking overall responsibility for the sight test?	Yes	It is possible if the above circumstances happen	No
- DOs refracting as part of a sight test, with the DO responsible for the Rx and the optometrist responsible for health checks?	No	Again, possible if above happens	Possibly
- DOs undertaking all components of the sight test, equivalent to the current optometric sight test?	No	This should not happen IMO	No
- DOs undertaking sight tests without health checks and patients choosing whether to have a "refraction only" sight test with a DO or a "refraction+health checks" eye exam with an optometrist?	No	This would lead to confusion and a 2 tier sight test which would not be beneficial for the public	Yes
- A different model to any of the options above (please explain)?			

Table 36. Concerns about DOs undertaking refractions. Respondents were asked to explain if any concerns they had raised in Round 1 about DOs refraction would apply to the following scenarios. Responses have been colour-coded as: blue – respondent has no concerns about this option; orange – respondent has concerns, related to logistics or feasibility, or not explained; re– - respondent has significant concerns relating to patient safety.

Participant number	DOs refracting as delegated role in a ST, with an optom checking Rx and taking responsibility for this	DOs refracting as part of ST, with DOs responsible for Rx, but Optom overall responsible for ST	DOs refracting as part of ST, with DO responsible for Rx and Optom responsible for health checks	DOs undertaking all components of the ST, equivalent to the current Optom ST	DOs undertaking STs without health checks and patients choosing "refraction only" ST with DO or "refraction + health checks" EE with Optom
2 Optom; 10-30y; Scotland and NWE; ind HES uni	No concerns	No concerns	Lack of integration between the elements is a concern	Concerned. No differentiation from an optometrist but lower level of qualification	Concerned. Decoupling eye exams from refraction will reduce eye exam uptake
3 Optom; <10y; WM L EE; ind.	Yes, If we are checking the Rx - may as well do ourselves	Yes, If we are checking the Rx - may as well do ourselves	No concerns	Yes, They have not has the training for ocular checks!	Yes, a lot of Pxs do not see the importance of ocular health checks and think a refraction is all Optoms do. Dividing it up will results in much less ocular health checks and things being missed – especially conditions like glaucoma that are asymptomatic!
6 Optom; 10-30y; SEE; mul ind HES cha	Time consuming for the optometrist to check the Rx again? How is this a benefit to the px? Or if you imply an optometrist signs off an Rx then it is unfair for them to take responsibility for it. Unlike in pre reg supervisor situation you are taking responsibility over the pre reg, but at least you should know their capability.	In this case may as well deregulate refraction and separate from a sight test.	As above [to left], may as well deregulate refraction (which I don't think is good idea!)	As above [to left], may as well deregulate refraction (which I don't think is good idea!)	I guess this model is what happens in Europe or Asia. They would only see ophthalmologist if they have an eye problem (as opposed to sight problem). The risk would be that some routine eye diseases may not be detected e.g. , early glaucoma. Less screening for eye disease and possible increase of risk of blindness and sight loss, especially in the less well-off patients.
8 Optom; 10-30y; Lon; ind HES uni	No concern	No concern	Concern might be linked to refraction and pathology - e.g. cataract causing myopic shift -	I would not be in favour of this	I would not be in favour of this

Participant number	DOs refracting as delegated role in a ST, with an optom checking Rx and taking responsibility for this	DOs refracting as part of ST, with DOs responsible for Rx, but Optom overall responsible for ST	DOs refracting as part of ST, with DO responsible for Rx and Optom responsible for health checks	DOs undertaking all components of the ST, equivalent to the current Optom ST	DOs undertaking STs without health checks and patients choosing "refraction only" ST with DO or "refraction + health checks" EE with Optom
			link may not be picked up? Other concern might be health checks not carried out on same and px may not come back for them		
9 Optom; 10-30y; SEE; ind dom HES uni cha	No concern	Some concerns - best prescribing often needs to consider reliability/repeatability of refractive findings and e.g retinoscopy reflex quality can influence decision to refer for KC or cataract	No concerns	Yes- insufficient training in pathology for DOS currently	Likely many- especially at risk groups would choose the 'basic' option and miss out on eye health screening. But also, loss of holistic impression- separating the refraction means can't consider eye health when prescribing. Will lead to greater inequalities for people with low income/complex needs
10 Optom; >30y; SWE SEE; ind HES uni cha	Concern regarding communication and recording of findings. In an exemplar service with open and easy access to colleagues this would not be an issue, however at the lowest level where a 'set of numbers' are passed on important diagnostic information could be missed.	as above [to left]	as above [to left]	In order to have the appropriate skills to perform and interpret all of the data the level of training would be equivalent to 'optometrist' and it is a matter of semantics whether this should be a 'higher level DO' qualification or 'optometrist'	This may be appropriate in a French style system where patients have to have had an eye health check within a set period before a DO can refract. In order to protect the public because most eye disease is 'silent' at onset and only becomes symptomatic in the later stages, unless systemic changes in health and eye screening are implemented allowing the public to choose a 'cheaper' refraction only test would reduce the opportunistic case finding that we currently enjoy.
12 Oph; 10-30; Sco NI; HES uni	No	No as long as competent/quality	No as long as competent/quality	No as long as competent/quality	Refraction is a component of the health check and separating runs risk of missing treatable disease

Participant number	DOs refracting as delegated role in a ST, with an optom checking Rx and taking responsibility for this	DOs refracting as part of ST, with DOs responsible for Rx, but Optom overall responsible for ST	DOs refracting as part of ST, with DO responsible for Rx and Optom responsible for health checks	DOs undertaking all components of the ST, equivalent to the current Optom ST	DOs undertaking STs without health checks and patients choosing "refraction only" ST with DO or "refraction + health checks" EE with Optom
		control/governance in place	control/governance in place	control/governance in place	
14 Optom; <10y; Wal SEE Lon; mul ind HES uni	I do have concerns with this as I do not believe optometrists will be provided opportunity/sufficient time to check the Rx obtained by the DO - much as many practices do not/are not able to provide sufficient time for supervisors to supervise pre-registration optometrists due to significant pressures already faced in many areas (waiting lists, business/finance pressure etc)	I do have concerns with this as this relies on taking responsibility for another's actions. I feel this would put optometrists at a significantly higher legal risk than DOs and may make many individuals very uncomfortable. If a clinician/health care worker is performing a test they should have legal and clinical responsibility for that test.	As long as there is clear documentation that the DO is legally and clinically responsible for this and the DO undergoes training in refraction, I think this is a much more acceptable alternative. If a clinician/health care worker is performing a test they should have legal and clinical responsibility for that test.	Significant concerns with this. DOs do not have enough training to undertake all of these elements - that's what's provided on an optometry degree course.	I think this would be very risky. Offering the option of abstaining from the health check from the time of booking could lead to many ocular (and systemic) conditions going undiagnosed and a negative change in the public perception of optometry and eye care as a whole. Many patients already believe that 'if I can read things then everything is fine' and don't understand that many sight threatening conditions do not affect Visual Acuity for some time and/or will not be relieved by refraction and subsequent spectacle wear. Patients are already able to decline aspects of the sight test at present (e.g., fear of 'the puffer test' leads to refusal to participate in IOP checks) and keeping it as standard practice minimises risks of pathology or relevant other factors being missed.
16					
Optom; >30y; SEE Lon; ind dom HES uni cha–Yes	Yes	Ye– - this is a very worrying scenario as it means that patients may well miss out on appropriate care and early diagnosis of some eye conditions.	Yes - they should train as an optom if this is what they would like to do. I can see no benefit at all to the patient.	Yes - also an extremely worrying scenario	

20 Optom; 10-30y; NEE; mul ind dom	This doubles px chair time if both professionals are checking Rx. Px already complain about not seeing same optom yearly, never mind different people for different parts of same test.	If splitting the refraction and ocular health, px care will be reduced as the refraction and health complement each other.	If splitting the refraction and ocular health px care will be reduced as the refraction and health complement each other. Risk of increased litigation and px care.	Only with suitable training such as an optometry degree.	Massive risk to px care and missed ocular pathology and increased litigation
21 Optom; >30y; Wal WM SWE SEE Lon; mul ind dom HES uni cha	No	With some provisos; under 16s, low vision etc. Those categorised as 'complex' might be better signed of' by an optometrist.	Not acceptable - the whole point of clinical refraction is based on the inter-association of health and refraction - otherwise, simply replace everyone with autorefractors.	Only if DOs have the equivalent optom qualification - so making the distinction of profession irrelevant.	Not acceptable - the whole point of clinical refraction is based on the inter-association of health and refraction - otherwise, simply replace everyone with autorefractors.
23 Optom; 10-30y; SWE EM WM –al; ind	Yes - this feels as if it is being pushed as a cost cutting exercise and will be likely to be financially driven not for benefit of eye health	Yes - this feels as if it is being pushed as a cost cutting exercise and will be likely to be financially driven not for benefit of eye health	Yes - this feels as if it is being pushed as a cost cutting exercise and will be likely to be financially driven not for benefit of eye health	Yes, this should only be done if trained to cover all aspects.	Yes - this feels as if it is being pushed as a cost cutting exercise and will be likely to be financially driven not for benefit of eye health

Table 37. Responses to free text entry questions about GOC Standard 9.

Participant number	Why is Standard 9 not always complied with?	Should GOC remedy and how?	Any implications for changes to Opticians Act?
2	Probably was initially but as skill & experience of supervised colleague increases without incident, the optom will become lazier about overseeing properly & may not be present etc	Require specific signing by optometrists that they will abide by this when delegating. Spot checks on those likely to not be adhering (perhaps encourage whistleblowing by anyone where people see this happening inappropriately in practices they work at)	If the current small amount of delegation is not managed properly, as more is delegated, standards of supervision will worsen with time
3		Share stories where the standard was not followed and the consequences for practitioner and px	no
6	In busy practices with high number of part time staff/ locums etc. Not sure if message is clear and maintained by all. Depends on the optometrist being firm on this.	Not sure what they could do.	no
8	Optom may not be in the day px comes in for e.g., repeat IOPs/VF		
9	Time constraints mean usually not in a position to 'intervene if necessary' or aware if poorly performed as not in same room\often not recorded who carried out the test.		
10	Due to lack of understanding of the need for appropriate supervision; financial and time pressures; disorganised and chaotic management and organisational failures	Yes: highlight the need for this in educational material but if a case is identified and if no harm has been caused but there is failure to follow appropriate procedures then education and training should be undertaken and follow up to ensure compliance. If harm has been caused and a complaint raised then the impact and cause of the failure should be considered using the FTP procedures in place.	Unsure, but this clause should not be removed
14	Insufficient training provided to support staff by employers. Support staff subsequently do not understand the implications of improperly performed tests and the importance of accuracy and correct supervision. (Lead) optometrist(s) legally responsible for actions of support staff but not given time and resources to provide adequate training and	Yes they should do more. Their inaction leaves patient's vulnerable to errors and optometrists vulnerable to legal actions against them due to the actions of others which they often have no means of influencing. Employers should have to evidence that they have provided adequate training to staff who perform delegated tasks and that the staff the tasks are delegated to	Potentially. Responsibility for tasks should be fully understood by all involved and adequate time and resources provided for all aspects of eye care in order to protect patient and practitioner wellbeing.

Participant number	Why is Standard 9 not always complied with?	Should GOC remedy and how?	Any implications for changes to Opticians Act?
	supervision by employers (whether salaried or locum). Lack of training often identified as due to time pressure or financial pressure by employers.	fully understand Standard 9 and all its implications themselves.	
20	Occasionally optometrists look at the level of risk and decide to take such a risk by not fully supervising the tests being carried out or	I believe that there is little risk as registrants take a calculated risk	In general, the vast majority of registrants follow this standard fully.
21	I suspect that in some busy practices supervision of these delegated tasks is cursory at best due to the desire to see more patients	There should be a training scheme to quality assure - I know of one practice that employed a 17 year old who had less than one day training before he was doing these delegated tasks - this is ok because there is no minimum training requirement	Yes - if any or all the suggested changes happen (which would be a serious concern) then at the very least these delegated roles need to be quality assured, audited and some form of CPD in place to ensure the safety of the patient
23	Mostly in retail environment, due to lack of training	Yes, all staff must be signed off or officially recorded that they have received adequate training to perform these ST components .	Yes

Table 38. Additional comments.

Participant number	Participant experience	Comment	Authors' note
8	Optom; 10-30y; Lon; ind HES uni	I don't want to be contentious - but wondered about the bias in some of the questions: E.g. increasing health inequalities - it may be the case that health inequality might reduce if more patients attended for a refraction "as it is cheaper" so therefore access to eyecare may increase?	The risks in Sections 3 and 4 were introduced in response to the risks raised by participants in Round 1. However, it is accepted that this question could have been phrased better.
12	Oph; 10-30; Sco NI; HES uni	Estimates of risk and frequency are unknown, purely opinion based without evidence. And the fundamental question here is if these roles will be performed by trained competent individuals and subject to appropriate governance/appraisal and quality control to ensure safety for patients and reproducibility of measurements and outcomes. Standards should not drop with different role allocation.	This respondent holds a senior position in the HES where, as revealed in Round 1 (e.g., responses of participant 7 in Tables 10, 11) support staff are trained and safety checked to ensure they meet competencies.
14	Optom; <10y; Wal SEE Lon; mul ind HES uni	If changes are to be made and others are to perform tests then those individuals should have sufficient training and provide written evidence that they are accepting their own clinical	

Participant number	Participant experience	Comment	Authors' note
		responsibility for the aspects of the test they were involved with.	
15	DO/CLO; Sco; mul uni	I do believe there could be some merit for changing the current supervision rules. There are some instances when supervision could be tighter and others when they could be relaxed with little or no risk to the public.	
16	Optom; >30y; SEE Lon; ind dom HES uni cha	Refraction is not a difficult thing to do - and getting the wrong prescription is not the end of the world, but the lack of continuity, the risk of missing more important things and particularly significant issues when managing more challenging cases means that I would not be in favour of splitting the sight test and delegating refraction. It is a poor decision which will result in poor outcomes, and only businesses benefit. I cannot see that there is a justification in terms of work force either particularly as orthoptists are in short supply - why would we tie them up with further tasks? This will further impact those patients waiting to see an orthoptist surely?	

Appendix 8: Study 3 details

Study 3: Details of methods

Study 3 ran in parallel with Studies 1 and 2. As in the other studies, participants were assured that their results would be treated confidentially, although it was made clear that views would be heard by other members of the Focus group. The study was led by MC, with contributions from other members of the research team, especially RS.

Participants' main residence was either England or Scotland, working in a range of clinical settings including the hospital eye service, university clinics, and community optical practices.

Twenty-two participants were invited to join the study, receiving a patient information sheet, consent form and demographic questionnaire. The 19 who consented were divided between two Focus groups. An experienced independent facilitator was invited to chair each Focus group. Before the Focus group began, participants were reminded of the purpose of the Focus group, that Chatham House rules applied, and that the meeting would be recorded for the purpose of transcription which would involve pseudonymisation.

Recordings were automatically transcribed via Zoom technology and transcripts were initially reviewed by MC for accuracy and completeness. A thematic analysis was then used to categorise themes and patterns in the data.[18] The transcripts were coded independently by two researchers (MC and RS) using Nvivo 12 Professional software technology. The themes were identified according to each research question. Disagreements in the allocation of comments to the themes were then deliberated, to reach consensus.

Study 3: Details of results

Study 3 is a purely qualitative study. Therefore, in this section participants responses are reproduced in tables (one participant response per line), using the exact words used by the participant. Where participants used a term or word that could lead to the identification of an individual, this is replaced with xxxxxx. Abbreviations and acronyms that are used in this section are explained in Appendix 1.

Table 39. Examples of responses to question: To what extent are orthoptists currently refracting?

Responses indicating some orthoptists refract
I know of orthoptists who refract on behalf of consultant ophthalmologists.
She was this trailblazing orthoptist that refracted.
There are a couple of orthoptists. They do. They do refraction clinics.
So, I refract. I've been refracting for quite a while now, and also another orthoptic colleague refracts.
Myself and my colleague, had an interest in refraction we have actually attended one of xxxxxx courses, in the past and 'we've been trained in-house it's all under the consultants.
There's a lot of orthoptists already refracting.
I know there are departments around England where orthoptists are doing retinoscopy.
Responses indicating that refractions are mainly carried out by optometrist or ophthalmologists
I think but most of our ophthalmologists refract in paediatric ophthalmology clinics. Where in previously I worked in GDHs (General District Hospitals) it was more optometrists that would do the refractions in those clinics
I've never seen an orthoptist do refraction, they've always been sent through to an ophthalmologist or an optom just.
I've only seen optoms doing it or occasionally the ophthalmologists.
There is no orthoptic refractions happening in Scotland and I think I think, because it's still not the norm, I think.
The referral usually comes from the orthoptist, wanting me to see the patient. So, I don't think they actually you know they do refraction themselves.
But I don't think it's a thing the orthoptists are generally doing.
But I think that goes to show you just how limited certainly, from my experiences of working with orthoptists that refraction is done by orthoptists.
Again, it's not the norm to have orthoptists refract

Responses indicating that it can be difficult to find an optometrist or ophthalmologist to work in refraction clinics
We do not have a lot of optoms on our team
When we've got big backlogs and that's how it came about.
And you can't get hospital optometrists
But we have trouble recruiting optometrists to refract children.

Table 40. Responses to question about how orthoptists' prescribe (optically) and how they are supervised.

Responses from orthoptists who undertake retinoscopy with consultant signing prescription
I know of orthoptists who refract on behalf of a consultant ophthalmologist and then the ophthalmologist will prescribe the glasses based on the findings of the orthoptic refraction
I do retinoscopy with the, you know, the agreement with the consultants. And so, you know, everything is all you know, signed off and agreed. But I'm the one who does the retinoscopy
I know that in some departments they work with the agreement and the signatures of the consultants for the prescription of glasses.
Response about multi-disciplinary team involved in optical prescribing in the HES
And then from that because it's a small department, we'll talk to each other
And so, we sort of discuss that amongst ourselves
That largely depends on what clinic, or if I'm working with somebody else, including, of course, that would be a joint decision
Yeah, it's joint decision-making.

Table 41. Responses about the setting in which orthoptists refract.

I just I really just wanted to clarify exactly which bit we were talking about and in in a hospital environment.
But having that orthoptic background and maybe doing some paeds (paediatric) refractions, especially when we've got such a backlog in the NHS.
They want to come into the hospital and do glaucoma clinics, retinal clinics work in the acute high service to get independent prescribing.

I mean I wouldn't know if any other setting than a hospital. I know I know what they. My experience is that orthoptists primarily work in NHS Trusts.
It is a hospital setting yes.
I don't think as a profession we would be keen to be working in a high street practice.
I don't think anybody wants to go out into the high street and start refracting the children.
Orthoptists are extremely well placed within the hospital setting for cycloplegic refractions.
I know very few orthoptists work independently on the high street.
I don't want orthoptists going out into the high street, saying. You know I can prescribe anybody glasses, and I'm going to set up my own shop, you know, and I don't think we would particularly want that. I think it. There is definitely a role in hospital practice.
There is a clear indication for all of orthoptists to refract within the hospital eye service.
And I think that's the advantage of having the hospital setting under consultant care.
Can I just say that going back to being to being restricting in the hospital setting and the community setting, I think, would be ideal. [participant was supporting the fact that orthoptists should only be allowed to refract within a hospital environment]

Table 42. Responses about training for orthoptists in undertaking refraction.

General responses
We have been trained at uni so like ret and stuff. But on placement. We'll follow the child through, and then they'll give us a go at doing it ourselves.
Optics in year one optics and year 2 and more practical refraction year, 3. So probably 3 modules based on optics or refraction. And the cumulative of that would be, we had to do a refraction on 2 adult patients in clinic. There was dry ret and a subjective refraction afterwards and that was probably what I learnt as a student.
I also did optics in year, one year, 2 and a refraction in year, 2 as well.
We are taught to refraction at university, which is great. But refracting in a university clinic room with your peers isn't the same in a hospital, and if someone told me. Once I had graduated to go and start refracting patients. I think I would scream because I wouldn't know what I was doing.
Responses about changes in orthoptist training in refraction over the years
Yeah, just about remember my orthoptics degree it was about 25 years ago. Now. So, bear that in mind. But yeah, we did. In our final year. We did have a brief module in refraction it was. We had an optom come over from those hospital in Manchester. I think I just did some sessions and afternoon sessions with us. So, it was piecemeal. It

was like a taster like we had a taste in how to use a slit lamp and a taste in various other kind of the sort of things that you might encounter in in eye testing.
So, maybe orthoptists are getting more retinoscopy practice I hardly had any when I was an orthoptist student. And then thinking back to my city university when doing optometry, there were lots of labs where we would practise refraction. So, I think after the degree, you do have a lot more retinoscopy experience as an optometrist.
The course that I run in, and the course was entitled Non Prescribing Retinoscopy Skills. It was to talk about non prescribing skills. It was about the mechanics of retinoscopy. It was particularly about dynamic retinoscopy and the Mohindra retinoscopy, and over refraction.
We have actually attended one of xxxxx courses in the past and we've been trained in-house it's all under the consultants.
Responses about opportunity to practise refraction
But mainly it's just some exposure in joint clinics when the patients are going through, like XXXXX said and they do know that we've been trained as well. So, occasionally we get the opportunity to participate.
My main thing is that the skills involved in refraction aren't just about prescribing glasses, and I think that orthoptists are taught retinoscopy and subjective refractions and the optics, and they get it in uni and they come out probably at a level equivalent to a newly qualified optometrist but they just don't, often they don't get to practise it so often. Those skills are lost.
So, we have an optics module in year 1 and year 2 kind of the theoretical side and we did refraction in year 2 in clinic and we ended up doing. I think I don't know if it's because of Covid, but we didn't end up seeing patients to do refraction on. We did have an exam, though that incorporated having to do Ret in year 2.
COVID sort of had an impact. So, it was like model eyes and they were very creative. But unfortunately, it wasn't patients from out in the street. So, we were just doing it on each other, and how we could.
I think we do get patients from like the BV Clinics and things like that as well as doing on each other. But I think not in first year. It's still model eyes in first year. But I think in second year you are supposed to get patients it's just we never got that opportunity.
Responses about the need for training and appropriate pathways
And I've heard of a refraction, and like possibly extended roles or something like that.
I think it's all about how much training an optom gets or an orthoptists gets, or you know that how much time is devoted to that to provide the training because it there is a lot of clinical experience that's needed.
I don't want to mention it, but you know you're not very good at things you don't do very often. So, if you're going to go down that road, you kind of need to make sure it was part of your of your workflow, I think just doing it very, very occasionally is not going to be great. My only caveat in the back of my mind is in my degree. I think you get a taster

of what refraction really is and I don't think many orthoptists who qualify, would feel super confident to do refractions straight out of the gates.
Worked it out about 650 a year, or something like that, so, I do quite a few of them and there are certain types of lens which have these really weird split reflexes, and you have to do a lot of them to be able to work out which bit of that reflex you're looking at. So, an auto-refractor is going to get caught up with that. Someone who does ret once the month is going to get caught out on that. A lot of optometrists, who, in fact, refract a lot of the time get caught out with that sort of thing because they're not doing a lot of them. So, it's that getting good at it here you got to do the numbers to get good.
Yeah, but I again, I suppose it's not to say that people shouldn't do a test because they're not going to get good at doing it, because then you'll never get good at doing it.
I don't think we are all competent to refract. Of course, there is going to be extra training, practice, and things come into place.
There are analogies where people work. They have a degree of qualification in prescribing drugs but there's still someone else that owns that decision, and they have been signed off as competent to make those sub decisions, if you like, as part of the care package.
I work there we weren't allowed to independently prescribe ourselves. The ophthalmologist had to sign off every prescription. That was just the rule in the hospital. So, you would write a prescription out for any patient, and they would look at it, and often I don't know they would change it, depending on what they thought. You know they would ask for a re-refraction. But you know they then decided that it was up to us as optometrists to do what we wanted, and then we were given those rights to make decisions ourselves and it is difficult. I remember the first few months; you know you didn't have that person. Oh, sitting on top of you signing everything off. So, you got independent pretty quickly, but it was because, you know, in the refraction clinic we do 40, 50 refractions a day. It was extremely busy and you just learned on the job doing things really quickly. So, I think you definitely, you know, if you are thinking of being good at refraction, you do need that experience it doesn't come.
Which is where the pre-reg (pre-registration) year in optometry is really useful, because you get that experience but orthoptists don't have that pre-reg (pre-registration) year, and if you're going to learn refraction fairly late on in your course there is not going to be the number of patients to see, to sign off to say, yeah, okay, you know you understand why you don't give this in that situation. Why, it's beneficial to get that in that situation. So, it's again. It's the just the numbers
So, I think, without the volume of knowing what is normal and the training, of the disease without all of those tendencies being in place. It. It's just going to take one thing to go wrong, and it just it becomes futile really. So, that would be it.
Comments that the training orthoptists receive in refraction is comparable to that of ophthalmologists
But compare our training to what ophthalmologists get when they do their part one training. I think it's probably comparable, so I don't think ophthalmologists have an awful lot more training. But they are allowed to prescribe glasses and I find that it will

be a junior ophthalmologist that's more likely to come to me and say, what do you think we should give here.
When the Royal College of Ophthalmologists have their DO (diploma in ophthalmology) exam, and they have a refraction exam which is quite basic. You don't have to be terribly good to pass it. To be honest, I mean I think we would aim for much higher standards than the College of Ophthalmologists.
I taught on some of those courses, and well, let's just say that one of them wants to prescribe ten base down on an asymptomatic patient, because the trial frame is a bit wonky. Look we get ophthalmic medical practitioners that might be GPs refracting on the high street and they you know again, there's a few good ones, but it's not. It's not the generally the best use of??
We would aim for much better than that.
Comments about variability in training between clinicians
I think that orthoptists are taught retinoscopy and subjective refractions and the optics, and they get it in uni and they come out probably at a level equivalent to a newly qualified optometrist but they just don't. Often they don't get to practise it so often. Those skills are lost.
That orthoptists come out with the same level. I kind of disagree with that, because in optometry. I think it's a long time ago, and so maybe things have changed a bit.
So, maybe orthoptists are getting more retinoscopy practice I hardly had any when I was an orthoptist student and then thinking back to my university when doing optometry. We do there were lots of labs where we would practise refraction. So, I think after the degree, you do have a lot more retinoscopy experience as an optometrist.

Table 43. Responses about uses of the results of refractions undertaken by orthoptists.

Aid clinical decision-making
Orthoptists may do retinoscopy, or may refract, but not for the purposes of prescribing glasses. But to inform your practice. So, if you've got a patient, you can maybe do, and you're not too sure if they need to have a refraction again or not. You might do a bit of over-ret (over-retinoscopy) just to make sure you're fairly happy with what the glasses are at. An imbalance with the vision, and that might inform kind of when you'll book them back to see the optom.
But essentially for myself personally, I will pick up a ret. But I've not got the intended idea of doing a refraction with a view to prescribe glasses. It's a ret just for your information, you know. If you're screening a child you might just ret and say, do you know what, you might just think you are myopic or probably myopic because they are usually dry just to give you a bit of background.
I think if well, if there's a result definitely, it will help on any clinical decision-making

It was just about what the refraction results are used for, whether they use for prescribing or kind of your clinical decision-making from an orthotic perspective? I mean both. Really, I think I think I keep talking about this with paeds in my mind. But actually, there's like there are other clinics where I will want the results of the refraction, but I won't necessarily be looking at prescribing. So, if it's an adult strab [strabismus] clinic, for example we tend not to give adults glasses in the hospital service. Primarily because of the cost. So, the patients should be collecting them from their own optician. But I want the results of that refraction test. Because I'm not worried about amblyopia necessarily but I am worried about your BV (binocular vision). So, if you're minus 2 and plus 2, and you can see alright. But actually, you've got a decompensating phoria. Then I want to know actually, if it there's a refractive, cause, behind that. So, I'm not always interested in prescribing. But I'm often interested in what the refractive error is and I think adults strab is a good example of that and also a lot of orthoptists now like we do our. We have an orthoptic led low vision service here. So, the orthoptists do the low vision clinic again the optoms say go get your glasses from the optician shop or from your local optometrist. We did the low LVA [low vision aid] dispensing here. So, we're not necessarily going to prescribe from that. But I want to know that your glasses are roughly right in order to do that.
To prescribe (optical prescriptions)
We have optometrists that they tend to do the new cases, and I will do follow ups. But we all agree.
That largely depends on what clinic, or if I'm working with somebody else, including, of course, that would be a joint decision. But if it's only an orthoptic clinic maybe another, orthoptist. I'm not. I'm not really confident enough, or don't really know what I'm doing the right thing, or if I have, if I think I have the knowledge and the confidence. I wouldn't give a straight away answer.
Responses about the importance for orthoptists of prescribing in the future
We are just so short on the refraction clinics at the moment. To the point that actually we've had to consider delaying annual refractions. If the vision is okay and obviously document exactly why we're doing that just because we don't have the capacity and saving those slots for those that really really need it. And yeah so I think on the other aspect. Actually, if you know, we've got those children, maybe a convergence excess that, you know, needs a bit of plus on their bifocals. You've got the accommodative squints there that they do need looking at really from an orthoptic perspective. So, it would just be really handy for an orthoptist, just to be able to step in and have a look at that.
From the adult's point of view is, I think there are a small there is a small cohort of patients that actually do probably require hospital refractions. In terms of you know the stroke patients that we see. So, a lot of the time we are saying to them, you know, once you're discharged that your vision's a bit down. We'll see them at the bedside their vision is a bit down. Go home. Once you're home book a domiciliary visit? But a lot of the time. I think there is probably a need for some of those patients to actually be refracted in the hospital. Whether it's subjective, or you know whether we even cyclo (cycloplegic refraction) then if they can't manage it.

It's just general kind of amblyopia management it's just it would change things, I think, when you need to check somebody's refraction before that annual one year time is up before you go and change your amblyopia treatment. Or you want to see if the refractions changed, or something else is going on. It would just be such a quick tool rather than booking them in to see an optometrist, you know you just got a lag or a delay. I think, from an orthoptic perspective, you'd be able to tell whether this Is a big enough change that warrants you know a prescription change, or can you just go ahead with changing, say, an occlusion regimen things like that? And I think that would save a lot of the appointments as well, just waiting for an optom if an orthoptist could just check and then just deal with their management as well.

Table 44. Responses concerning potential disadvantages to orthoptists undertaking refractions and mitigations.

Patient safeguarding and not all orthoptists can refract
To be able to do dynamic retinoscopy to formulate your clinical decisions as an orthoptist I think that's an excellent idea and I would very much encourage that. To let all orthoptists prescribe spectacles on the basis of refractions of their own refraction results. I think that is extremely dangerous.
I came in here thinking it wasn't a good idea, but I am thinking it is but I think there has to be safeguards in place.
And as things stand at the moment you're giving that to say, I sign off this person's eye, health, and these numbers, and I think that there's got to be. Where's that ownership come from?
The need for patients to be under a consultant ophthalmologist
And I think they it's very dangerous potentially to be looking at refraction as just a thing where you put some lenses up, and you give some numbers, and you give it on a bit of paper for some specs, because it's not. It's all part of that sight testing the whole routine, if you like the whole kind of comprehensive examination of the eyes. And I think that's where clinics, for example, XXXXXX where she was doing the refractions they still had to be. Every patient had to be signed off by a consultant.
But I think when I've been thinking about it, I'd be happy if it was allowed under certain circumstances, in a hospital setting like xxx says that you know you have access to the notes, so you can look at the fundus findings, or you know, if you feel there's a problem at the back of the eye. You can take them to an ophthalmologist or an optometrist and ask them to take a look so. You are in that kind of supportive system.
Would have been signed off by a consultant who would have allowed her to do the prescribing like to write the prescription because she did write and sign it.
So, prescribing to, issue an optical prescription. Yes, but I think it has to be a patient that is, under the care of a consultant ophthalmologist like most children are in in orthoptic departments. There has to be some safeguard that someone looks after the eye health and has responsibility for that.

So, all the paediatric patients will have an Optos, and that will be reviewed virtually by whether it be an orthoptist and optom, a doctor who is qualified to do that. So, you know all the children get a full eye, health, check and the orthoptist would not see currently a new patient.
The need for orthoptists to have sufficient training – students
But refracting in a university clinic room with your peers isn't the same in a hospital, and if someone told me once I had graduated to go and start refracting patients, I think I would scream because I wouldn't know what I was doing.
I think that on placement there is just not an opportunity to even really go and watch either, that I've come across yet.
I mean, we're learning about it in uni and you need so it'll be great to use it like whilst we work. I do agree with what xxxx said, though a wee bit ago, and that you would have like to get really good at something. You have to do it really, frequently.
I think in an order for us like to be good at it, and be confident, and it would need to be a sort of regular thing.
The need for orthoptists to have sufficient training – qualified orthoptists
But you know you're not very good at things you don't do very often. So, if you're going to go down that road, you kind of need to make sure it was part of your of your workflow, I think just doing it very, very occasionally is not going to be great. My only caveat in the back of my mind is in my degree. I think you get a taster of what refraction really is and I don't think many orthoptists who qualify, would feel super confident to do refractions straight out of the gates
I've worked it out about 650 a year, or something like that, so I do quite a few of them and there are certain types of lens which have these really weird split reflexes, and you have to do a lot of them to be able to work out which bit of that reflex you're looking at. So, an auto-refractor is going to get caught up with that. Someone who does ret once the month is going to get caught out on that. A lot of optometrists, who, in fact, refract a lot of the time get caught out with that sort of thing because they're not doing a lot of them. So, it's that getting good at it here you got to do the numbers to get good.
And there's a this, the art, not the science behind it, and that's the only thing you have to do a lot of those things to get good at doing.
I think it would. It would be an extended role like a lot of orthoptics extended roles. I don't think it would be a newly qualified core skill.
The first sort of few years that I work there we weren't allowed to independently prescribe ourselves. The ophthalmologist had to sign off every prescription. That was just the rule in the hospital. So, you would write a prescription out for any patient, and they would look at it, and often I don't know they would change it, depending on what they thought. You know they would ask for a re-refraction. But you know they then decided that it was up to us as optometrists to do what we wanted, and then we were given those rights to make decisions ourselves and it is difficult. I remember the first few months; you know you didn't have that person. Oh, sitting on top of you signing

everything off. So, you got independent pretty quickly, but it was because, you know, in the refraction clinic we do 40, 50 refractions a day. It was extremely busy and you just learned on the job doing things really quickly. So, I think you definitely, you know, if you are thinking of being good at refraction, you do need that experience it doesn't come.

Which is where the pre-reg year in optometry is really useful, because you get that experience but orthoptists don't have that pre-reg year, and if you're going to learn refraction fairly late on in your course there is not going to be the number of patients to see, to sign off to say, yeah, okay, you know you understand why you don't give this in that situation. Why, it's beneficial to get that in that situation. So, it's again. It's the just the numbers.

Somebody told me that you had to do a 1,000 retinoscopy episodes before you felt confident, and once I had done that, I knew what they were talking about, so it's not a newly qualified skill. It's something that you need to get lots of practice. And then you need quite a lot of with cycloplegic retinoscopy particularly. Whoever's making that prescription description decision hasn't got the security blanket of a subjective response. They basically just have to go for it. And so, I think hospital optometrists and consultants are used to saying, this is the best I can do. We're going to go for it, and I think it does take a lot of clinical confidence. And so, you need to have done lots, so I don't think it's a newly qualified skill.

Think it's definitely extended role, and I think there are plenty of ways of quality assuring it, and it's not just getting 50 within 50 you know of 0.5 diopters. It's a matter of well on a challenging case. You're only aiming to be within a diopter on a non-challenging, case you've got to be spot on, and there are sort of ways that it could be done and I think it's quite possible to do it, and I don't think as a profession. We specifically want it to be a newly qualified skill, but I think it could well be an extended role.

The need for regular ocular health assessments

I was gonna add I honestly, I've got no problem with orthoptists refracting. Obviously, we have to have that some kind of health check there, because there's a lot of eye disease in in the hospital

That's my big worry is about the again is that the eye health assessments which are integral to that number on that sheet of paper,

I sign off this person's eye, health, and these numbers, and I think that there's got to be. Where's that ownership come from?

I believe a refraction is done to find a problem and not just to give glasses. So, I think if an orthoptists is. I'm not. I'm not saying that an orthoptist is not looking for pathology, but there are certain pathologies that you know, an orthoptist would not be trained to look at.

We (orthoptists) are already doing AMD injections. We're already doing all glaucoma management glaucoma screening all sorts of other things. So, we used to. Now they are very getting very highly trained. They might not have up to experience. But the courses are getting improved and putting a lot more ophthalmology in. So, I think it's definitely a follow on qualification. But actually, they are trained to examine and look at pathology in quite a lot more detail than they used to be. And you might. You know that students

might not feel terribly confident in it. But then this isn't a newly qualified skill. So, I think there are ways that it is already being managed for fundus checks and that sort of thing.
So, all the paediatric patients will have an Optos, and that will be reviewed virtually by whether it be an orthoptist and optom, a doctor who is qualified to do that. So, you know all the children get a full eye, health, check and the orthoptist would not currently see a new patient.
Just a question, because I am not 100% on this. But I think in Australia orthoptists refract. But they don't do fundus checks. That's how I understand it and I wonder what the patient sector data or equivalent is which says whether or not this works.
But it's not just Australia.
Concerns about commercialisation if orthoptists could issue optical prescriptions
Can I just say that going back to being restricting in the hospital setting and the community setting, I think, would be ideal. I would be concerned that there is crossover, for orthoptists entering practices, high street practices and refracting because that could also be utilized by multiples to see the younger children but not necessarily with the same level of care.
I think one of the biggest reasons hospitals struggle to recruit optometrists is they just don't pay the amount that you can get in the community. Even many community optometry optometrists are stopping doing NHS eyes tests, because the NHS will pay you £22 roughly for an eye test. So, they will all need to see private patients now, and that's happening probably more and more now. And so, the concern would be if orthoptists were given the ability to prescribe issue prescriptions for glasses. Without the 'appropriate sort of safety checks in place you will see some orthoptists leaving moving to the community where they would earn a lot more, the multiples would yeah take advantage of that. And orthoptists there would be some that would leave and leaving the NHS in a bigger dilemma.
We don't, want to train orthoptists to then go off into the High Street, and just prescribe myopic prescriptions or issue you know myopic prescriptions any more than you want us doing that. And I think it's just a matter of getting together and drafting something legal that satisfies both professions.
No, I've already said. The thing that I think is a disadvantage that I am worried that it will be used inappropriately. Abused by people to make money, and that is not well. It's not what I want to see happen.

Table 45. Responses concerning potential advantages to orthoptists undertaking refractions.

Aid clinical decision-making
In your day to day orthoptic life you have got a patient who's in bifocals for example, for your convergence excess and you are trying to train them out of this bifocal. What's really useful, you know is then is being able to say, you know your refraction. You have only been refracted 6 weeks ago. The refraction's not changed, but we want to start bringing you out of this bifocal and the practicality of doing that, in an orthoptic clinic

with no optometrist is really difficult. So, if we could you know, using clinical judgement and professional etiquette you would take that base refraction and you would at least manipulate your part of the bifocals in order to manage the squint.

Or you know you have got somebody you now their refractive error you have got them on some minus lens therapy. Again, you don't want to try and tear them out their minus lenses therapy well we can't do that without. So, you come to the orthoptist to manage your squint. But then we end up booking back, depending on your setup to the optometrist to reissue the prescription, and actually that is a scenario where you want the prescription. But you don't necessarily want to repeat refraction because it's recent. It's valid. You're happy with it. We're just doing that bit where we manipulate lenses to help control the squint.

As an orthoptist I definitely think that if you have the knowledge, because the refraction is not only numbers, because the knowledge will tie in into all the diagnosis and all the symptoms, and it will definitely deliver a more well-rounded patient care.

It hasn't made sense to me why orthoptists aren't allowed to do a refraction in certain circumstances, because you know, when you are doing a BV evaluation, you do need to understand what the proper prescription is, and I've never quite understood how you can do proper care if you don't have the updated prescription. So, I would always like to make sure the patient has the right prescription, or you know, if you are trying to modify the prescription in some way.

So, I think it's really necessary to have that up to date prescription, and I've never worked out. Why, you know orthoptists haven't been allowed.

I'm sure there are many advantages definitely, and, as you say, the patient experience. And again, looking at the non-prescribing bit of refraction, I totally think that's a great idea, because then the patient gets that holistic view.

Reduce commercial pressure and improve clinical care

But there are lots of optometrists that are only interested in throwing as many people through in the day as they can and nobody really cares about binocular vision. I can talk to them until I'm blue in the teeth about the fact that so you can find that somebody's a +3. But as the kids that I had today who'd been prescribed +3 was then exotropic with it unless you're going to do the cover test etc., afterwards. Well, actually, it's meaningless because that that bits an art. So, this poor kid was eso (esotropic) without his glasses o' his prescription is +3, but because he's a bit older now he doesn't need all of that, and that was the result of his double vision. But he's been round lots of different places and in all honestly and orthoptist would have spotted that straight away.

Interestingly, we've had a fairly newly qualified optometrist recently join our team. Well, he's been. He's been in retail for like 2 years, but he felt like XXXX was describing like everyone is almost pre-checked, and there was this pressure of how many can you get through the door and there wasn't really much time, especially with the younger children, to take out that ret and see them properly, as you would want to.

So, I think it's coming back to this. If you are in a busy high street clinic, and you your fee model depends on the number of pairs of spectacles. You see, you don't want to see anybody who's anything other than either a -2 where you want to change it. Or oh,

look, you need another 0.50 [half dioptre] on your varifocals because there's no incentive. Now, not all optometry practices like that. So, lots of people aren't for example. But I honestly, I would have no problem with orthoptists refracting at all.
I have more of an issue with this, and I know this wasn't the question, but with DOs refracting and the reason for that is. It is going to be hijacked by the multiples to get more and more people through and then we've got this.
Patients with special educational needs or autism struggle to find an interested optometrist
So, lots of people will just go. We're not going to see them, because (a) we might not sell them glasses and (b) I might have to cyclo (cycloplegic refraction) them, but there are certain areas now, and it's a patchwork of there will be a pathway in place. So, if the child comes with x y or z there's a certain fee for doing the cycloplegic refraction. But I think the issue is that, as everybody said. Seeing kids and seeing people with special needs is a skill, and you need a volume of it I don't think well, certainly in Manchester there's not lots and lots of people desperate to see these kids, which is why, again, I'm getting them coming down from Lancaster. That's ridiculous. You shouldn't have to drive your kid 50 miles to see an optometrist who's actually going to be a bit interested in them. So, there are pathways, but it's patchy.
Ophthalmologists don't want to refract
Consultant paeds consultants now don't like to do as much of their refractions as they perhaps they used to be doing.
And it's just really not appropriate to be booking these all into the doctors' clinics.
Difficulty finding optometrists to refract in paediatric hospital clinics
Because I think previously. We do not have a lot of optoms on our team and people just work in different days.
Whereas a lot of optometrists are actually keen to get on with doing other stuff that hospital optometrists particularly they are very keen to get on with other extended roles.
You know sometimes there are lots of optometrists who they do it, and in other places they aren't. And you can't get hospital optometrists.
It came about because we basically didn't have enough refraction clinics we have at the time we had eight or optometrists that work within the unit. But we have trouble recruiting optometrists to refract children. They want to come into the hospital and do glaucoma clinics, retinal clinics work in the acute high service to get independent prescribing
So, you know, we've just got a backlog. We can't get the optoms, so the way forward for us is to train up the orthoptists.

Certainly, in my own Health Board we have 2 paediatric consultants, and we have in-house optometrists and we have really struggled to recruit in house optometrists once somebody had retired
The reality is that optoms coming out are not really interested in these special roles. They want to do more medical glaucoma other stuff like that
Orthoptists' skills are better than optometrists for prescribing in children with binocular vision anomalies
And BV and cyclo has always scared, I think, optoms. That's from my personal experience. So, I think orthoptists refracting is a good idea
Clinicians becoming deskilled at retinoscopy
I have had word from the College of Optometrists that retinoscopy skills are a dying skill in optometry.
I just say that I completely agree about the optometrists, not being able to do retinoscopy anymore.
So, and it, and it annoys me that optometrist don't do it because I just think, well, why? Because you learn so much, but it's because it's because all the pre-screenings done for them. There they put everyone. Sorry I know it sounds like I'm generalising. But most people go on an auto-refractor. So, you've got kids, so they they'll will cyclo (give them cycloplegic drops) them and stick them on an auto-refractor.
It's the only one day a month but you still need those skills there, so I agree it's a dying art.
He's been in retail for like 2 years, but he felt like xxxxxx was describing like everyone is almost pre-checked, and there was this pressure of how many can you get through the door and there wasn't really much time, especially with the younger children, to take out that ret and see them properly, as you would want to, and, interestingly, he was probably the only one who interviewed to say that actually I really enjoy taking the ret out and actually looking myself, which is really good.
I have lots of pre-registration optometry students] come through to my practice, and with lots of optoms that don't routinely do cycloplegic refractions or any paediatric refractions and you can see there's sometimes a bit I as to the impact of what they're going to give what it would be, how they make that final decision.
Lots of times the consultants will ask for an autorefraction. And that's done by the nurse, or sometimes the junior doctors, and they use that to check. You know, if the patient might need a refraction. That's my kind of understanding. So, I didn't know, because, you know, earlier I was imagining everybody does refraction with a retinoscope, but we know that certainly a lot of our students and optometrists in practice more are using an auto-refractor rather than actually getting there ret out) out, and you know that doesn't work too well in the paediatric population. I don't think, or certain patients.
They do use the auto-refactor on a lot of patients to decide whether they are going to refer them for a refraction or you know what they are going to do, or whether they think

something else can be done. I certainly notice that you know a lot of times that's mentioned in the records.

To use it in place of something like retinoscopy. And, as xxxxx has said, in a paediatrics. Using automated tests and things like that, then there not the best at all the kids won't sit still there's a lot of off axis errors. You'll get really weird results. I think that's when the skill of the refractor or the refractionist, if you like, comes into it. And there is no substitute at all for having a retinoscope for that purpose.

Just to add to the complexities of that question: a cyclo auto-refraction. Where does that sit in that decision-making. I would say it would create even more off axis errors and really weird and wonderful things. Now, speaking from the point of view of someone who doesn't use an auto refractor, I get my hands dirty when I do my refractions- I'm old school. I use a ret a trial frame, and if I do is subjective, I will use a trial frame. I don't use phoropters or anything like that.

Some optical practices refuse eye care to younger children

And a lot of places a lot of practices just turn children away. Sorry we don't do, children.

Because you've got an NHS contract, and that contract says that you will see everyone and you don't just get to say, oh, I'm only going to see them when they read.

When I was looking for a pre-reg post I purposefully had to make an effort to find somewhere that will actually refract children under 5. Lots of places just say we don't do children.

I think that there's this sort of financial aspect to this. So, in your community optometrists, they've having a child under 5 is not particularly cost-effective. The time it takes to dilate, maybe bring them back, etc. And the time it takes to actually refract and all that. Yeah, and whether it's cost-effective.

Dynamic retinoscopy

It kind of struck me that refraction you know. You do it with a retinoscope, but you also use the retinoscope to do dynamic retinoscopy as well and I'm not kind of sure if that's taught to people.

But the issue comes when the way our clinics is to set up is often the children are given cyclopentolate to put in a home, and so that comes to me cyclopleged. So, if I need to do dynamic ret then that on another day so I need to bring them back some other time.

I don't know what they're accommodative functions are like so the kind of patient care would improve definitely if retinoscopy were used as a tool as a cover test as used as a tool or motility, or something like that.

In a hospital setting, I would I would do it. If a child is coming in with reading and difficulties. I think it's a really good way to, you know quickly assess their cognitive function, and to see how much lag like you said how much of the prescription is significant to them.

Yes, we do dynamic ret, it's a bit hit and miss it. It's not done on all patients, because some patients come in already dilated. So, on the un-dilated ones I would do it, in the

VPD (visual perception difficulties) patients and Down's syndrome children, we would do it in as well.
All I was going to say is when I trained as an orthoptist I had never been told about dynamic retinoscopy at all. I didn't know it existed. And then, certainly, when I did my optometry training recently, that. XXXX put it through to us, and I thought it was amazing like, Wow, what is this? yeah, just didn't know about it
The orthoptists prefer that I kind of supervise or talk about it, because they don't necessarily feel comfortable.
To just say the optometrists on the whole, aren't confident doing dynamic retinoscopy. But your average orthoptist would not be either. So, yeah, I think it's this dark art for a lot of people.
With the accommodative problems dynamic retinoscopy trying to explain that to my optom colleagues is, it's very difficult. It's not well understood.
It's always struck me as bonkers that any accommodative defects come through to an orthoptic department. But then, how do you assess accommodation?
I can't answer that, as I'm not an orthoptists I love dynamic retinoscopy it lets me know whether or not a child needs a prescription
I was just like about to say I remember in second, year having the lecture, but we never actually had that sort of practical side to it, but like we did with sort of other techniques.
We did do it. We did learn it, and we did have to use it in clinic like practice and it was part of our optics practical exam in second year. So, we do it as part of the exam. But I haven't really used it on patients at all, so I would say, if somebody gave it to me now, it'd probably be back to square one.
Yes, at a very basic level. Nothing that would be confident to go and do it.
More cost-effective
We couldn't get any optoms out there at all. You know it's too far out. It's not enough money which is where the ophthalmologists would then do refraction and the fundus check.
But it's a shame that it still has to be okayed by a doctor, and you think you know what you're doing. You've been doing it for so long. But you're not getting that final sign of yourself. That's really frustrating that we can't get ourselves across the line.
I think it's a waste of NHS time because you can't book as many patients into the clinic.
I was just really going to see the major advantage would be cost-effective.
We couldn't get any optoms out there at all. You know it's too far out. It's not enough money which is where the ophthalmologists would then do refraction and the fundus check.

Patients would prefer one appointment
I mean could the advantage you're asking advantages. Could it be that the patients have to make less visits to the clinic.

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