Testing of sight - a risk-based framework

Project report

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Executive summary

- This project evaluated the potential risks and benefits associated with separating the various components of an eye examination ('sight test')[1] if conducted by different people, in different places and at different times. There were two parts to the study: (i) a scoping review, considering pertinent clinical evidence and (ii) a Delphi study, seeking the consensus views of a range of expert stakeholders.
- The scoping review identified 3,722 articles of which 51 were included in the review.
- The scoping review has shown the potential for different models of eyecare that involve separation of person, time and place to improve eyecare delivery through innovation. The strongest evidence comes from studies of telemedicine. Benefits include reduction in referrals, reduction in unnecessary hospital eye service (HES) visits, improvements in referral quality and high levels of patient satisfaction. The evidence supports that such telemedicine services can be achieved at a level that is not inferior to (i.e. equivalent to) standard HES care, e.g. glaucoma, medical retina. There appear to be no major safety concerns. However, there is a lack of randomised controlled trials (RCTs). Careful consideration of economic viability, infrastructure readiness and patient acceptance would be required prior to implementation.
- To ascertain consensus on the risks and benefits of separating eye examination components, a Delphi study was carried out with a range of stakeholders from the four nations of the UK, including clinical experts, academics and professional bodies, as well as public health and health economics specialists.
- Regarding the risk of separating components, the Delphi panel showed disparate views. In order to allow a more nuanced insight, the panel was asked to consider risks of separating eye-examination components for patients considered low-risk versus higher-risk. 'Higher-risk' was defined as a middle-aged (50+) patient who presents with no complaints or previous ocular history but had additional risk factors for ocular disease. These could include, but were not limited to, common conditions encountered in a UK population such as ocular hypertension, systemic hypertension, type 2 diabetes or elevated cholesterol levels. 'Low-risk' was defined as a young adult who presents with no complaints, no known risk factors for ocular disease and no previous ocular history.
- There was a broad lack of consensus that separating components carries risks for patients considered as low-risk, but a fairly broad consensus of risks resulting when components are separated for higher risk patients. Where there was a consensus that separating components resulted in risk, the Delphi panel identified risk of missing diagnostic patterns and potential issues with continuity of care, irrespective of the patient's risk category. Specifically for higher-risk patients the panel agreed that separating components carried a risk of missing key clinical information, delayed diagnosis, increased health inequality, created barriers to accessing care and increased the risk of vision loss.

[1] As defined in section 26 of the Opticians Act 1989 and article 3 of The Sight Testing (Examination and Prescription) (No. 2) Regulations 1989.

- The Delphi study and the extensive scoping review of the literature informed the development of a refined workflow model that includes options of separation of eye examination components by person, time and place. The model incorporates a risk stratification, which, whilst recognising the potential harm of separating eye examination components, also considers the likelihood of the harm occurring.
- Overall, this study highlights that the separation of eye examination components by person, time or place may pose some risks for both the NHS and patients. However, in the context of a routine eye examination, the likelihood of these risks occurring is likely to be low.
- While it is acknowledged that a case could be made for a review of the current primary eye care delivery models in the UK, there was no Delphi panel member consensus that separation of eye examination components would lead to benefits. This contrasts with the findings of the scoping review which revealed evidence of benefits of alternative models of eye care delivery, especially in relation to teleoptometry (carrying out an eye examination remotely).
- This Delphi study offers insight into stakeholder perspectives, covering the four nations of the UK, and suggests a preference to consider a personalised approach to risk assessment. While it is acknowledged that differences in delivery exist, the aim of the study was to be inclusive of all four UK nations. The proposed workflow model has been designed in a way that could be adapted to the needs of the four nations.
- We recognise that the nature of the Delphi methodology with focus on consensus may hinder the emergence of innovative ideas that move away from the status quo. However, tailoring eye care to individuals including prediction (e.g. of ocular conditions developing or progressing) and prevention of ocular conditions, for example through considering patients' risk profiles more thoroughly, may offer significant advantages in the prevention, diagnosis and management of ocular conditions.
- Future studies are required to determine if a personalised approach based on patient risk assessment could be considered value for money and cost-effective.

Summary of findings of the Delphi study: Risks and benefits

	Risk	Low risk patient Consensus (Yes/No)	Higher risk patient Consensus (Yes/No)
NHS risks	Risk of increase in the number of referrals		
	Risk of cost increases for the NHS		
	Risk of missing key clinical information		
	Risk of difficulties seeing diagnostic patterns		
	Risk of insufficient continuity of care		
	Risk of increase in health inequalities		
Patient risks	Risk of delaying diagnosis		
	Risk of missing ocular conditions		
	Risk of delaying treatment		
	Risk of experiencing irreversible visual impairment		
	Risk of reduction in convenience in relation to accessing care		
	Risk of reduction in continuity of care		
	Risk of increasing barriers to accessing care		

	Benefit		
NHS benefits	Better use of clinical resources and personnel		
Patient benefits	Reduced waiting times		
	More convenient locations		
	Easier or less travel		

1 Introduction

The practice and delivery of optometry and primary eye care in the UK is undergoing rapid advancements. These advancements are, in part, driven by technological innovations and increasing demand for eye care services.

This project report presents the findings of a research study commissioned by the UK General Optical Council (GOC), which aimed to explore the potential risks associated with separating the various components of an optometric sight test across the four nations of the UK. Specifically, the ITT stated: “We are seeking clinical and regulatory expert advice to develop a risk-based framework to understand the risks of the different components of a sight test not being carried out at the same time, by the same person and/or in the same place.”

The project protocol was based on previous work commissioned by the GOC (Evans et al. (2023) that already included a definition of the eye exam and risk perception. In their work, Evans and colleagues described the components of a sight test, discussed possible impacts of separating sight test components, and investigated the role of orthoptists in providing refractive services in relation to sight tests. Findings of this research showed that respondents felt that the key elements of eye examinations should be carried out by the same person that is delivering the sight test (refraction). Looking at risks, Evans et al. used a matrix to illustrate risk scores. Higher risk was perceived to be associated with inadequate training, missing key information, and lower capacity to link clinical findings from diagnostic tests to recognise diagnostic patterns. These outcomes contributed to the authors’ view that it would be inappropriate to separate sight test components without further evidence.

Another important piece of commissioned work, the Enventure research study published in July 2019, identified the highest levels of risk included detection and management of eye disease and referral decisions. Using a mixed-methods approach to generate primary data and using existing (secondary) data sources (GOC Fitness to Practise (FtP) data and Optical Consumer Complaints Service (OCCS) data), the report highlighted the perception of risk among clinicians, which showed that decisions related to disease detection and management are perceived as carrying greater risk severity as, for example, contact lens fitting. Non-clinical risk factors perceived as being associated with greater severity include time constraints, staffing, and commercial pressures. The analysis of the FtP data supported the findings from the primary data collection in that about 45% of FtP allegations were clinical in nature and related to a range of largely preventable causes such as missed or incorrect diagnosis, issues with referrals, and failing to carry out appropriate examinations. Building on and extending the previous work, this project will extend the existing evidence on separating eye test components in primary eye care settings.

One aspect that needs to be considered when reviewing risk associated with optometric practice is the asynchronous (not existing or occurring at the same time) eye care model, i.e.

care delivered outside of the traditional in-person, synchronous setting, that is now commonly used in secondary care. Such models were first set-up well before the Covid-19 pandemic and involve UK ophthalmology services utilising a number of eyecare services where virtual/remote reviews of clinical findings are conducted, with decision makers being in a geographically different location remotely reviewing data collected by technicians at a prior time-point (e.g. in uncertain macula/glaucoma-related findings). With the experience of many services moving to remote delivery during Covid-19, such services are now relatively commonplace post-Covid in secondary eye care services. It appears that these models have become accepted by clinical leads as entirely appropriate and safe, which implies a low level of associated risk.

Regulatory requirements as well as the existing geographical differences in service provision, e.g. in Wales, Scotland, Northern Ireland and across England, were carefully considered and input from professionals and professional organisations included in the project.

2 Aims and objectives

The overarching aim of this research was to develop a risk-based framework to better understand the risks of separating the different elements of an optometric sight test/eye examination in the four nations of the UK, i.e. test elements not being carried out at the same time, by the same person and/or in the same place. The project was intended to address the specific objectives in the context of impact severity, impact probability, and relevance.

2.1 Research objective 1 (RO1)

To collect suitable data that allow for assessments of the possible impact of separating eye test components on: i) adult patient care; and ii) on the likelihood of detection of specific, potentially sight-threatening chronic eye conditions (e.g. glaucoma) which are not covered by national screening programmes.

2.2 Research objective 2 (RO2)

To assess the possible impact of separating eye test components on clinical decision-making and optimum referral practice.

2.3 Research objective 3 (RO3)

To propose an eye examination workflow that outlines the segregated responsibilities for the different eye test components (e.g. by workforce cadre) taking into account advanced processing of imaging technology using artificial intelligence.

2.4 Research objective 4 (RO4)

To discuss the interrelationship between the risks identified and strategies to risk mitigation.

2.5 Research objective 5 (RO5)

To discuss how the risks might affect different adult patient populations (e.g. stratified by ethnicity, gender, geographical location, socioeconomic status).

2.6 Research objective 6 (RO6)

To define the different components of a ‘safe’ sight test as a basis for assessing potential impacts of separation of the test by time, person, or place.

3 Methods

3.1 Ethics approval

Prior to commencing the research, we have sought and received institutional ethics approval for the Delphi study. Approval was given by the School of Health and Life Sciences Research Ethics Committee at Glasgow Caledonian University on 29 August 2024 (HLS/LS/A24/001).

3.2 Methodological approach

To address the objectives of this research and to ensure validity of the outcomes, the research was co-developed and carried out between the research team and input from professional and patient representatives. A mixed-methods approach was adopted to address the multi-faceted nature of the project. The following sections provide details of the methods used to address the research objectives (ROs).

RO1. To address the first objective (defining components of a safe sight test) we used the clinical guidance of the College of Optometrists to develop a study protocol to conduct a qualitative study using a Delphi design. This established method allowed for a panel of experts to develop consensus on the sight test components required and is commonly used in medical and public health research. Specifically, we gathered views on which components should be contemporaneous and conducted by the same person. The approach ensured that a robust and meaningful set of sight test components was generated. Experts who participated in the study were practitioners involved in primary care, ophthalmology, academia, and public health experts. A full list is provided in section 3.4.2 of this report.

This work took into consideration the nation-specific requirements such as the Wales General Ophthalmic Services (WGOS) which stipulate compulsory listing on the Wales Ophthalmic or Administrative List for practitioners intending to deliver WGOS.

RO2 and RO3. Informed by the discussions and the results of the Delphi study, we developed a robust search strategy and carried out a scoping literature review to identify evidence that quantifies potential impact on the NHS (e.g. referral rates, better use of resources) and impact on patients (e.g. risk of missed diagnosis, risk of delayed treatment, benefit of easier access). While ‘economics’ has been considered in a general sense, there are other and related potential impacts of a revised sight-test model e.g. reduction/increased number of unnecessary referrals, impact on time scales for referral, and patients’ waiting time for their hospital eye service (HES) visit. Conditions considered included common and potentially sight threatening eye disease (e.g. cataract, glaucoma, age-related macular degeneration).

Assuming significant heterogeneity of the included studies, the results are presented as a narrative synthesis alongside a data extraction table and summaries.

While the focus of this research is strongly on risks (as stipulated by the funders in the invitation for tender), it was recognised that changes to the current sight test regimen may confer benefits. For example, new models may facilitate earlier detection of ocular disease. Remote data collection, and if optical coherence tomography (OCT) were more routinely included, could enable a greater detection rate of clinically relevant diagnostic signs. An attempt was thus made to capture any such benefits.

RO4. Building on the findings from ROs1–3, a sight test workflow model was developed incorporating a range of testing options, including artificial intelligence (AI) and remote assessments where appropriate. The model was designed to be adaptable across all four UK nations. Regional variations in eye care delivery, such as the broader scope of routine optometric practice in Scotland were taken into account while recognising the limitations in its broader applicability. Consideration was given to the composition of the eye care workforce and the potential for task shifting. Input from clinicians helped ensure the model was practical, robust, and broadly applicable.

RO5-6. Informed by the outcomes of the work under ROs1-4 and the scientific literature, recommendations for future research are provided to enable a discussion around the identified risks and proposed mitigation of these risks. This provides important evidence to contextualise the overall research outcomes.

3.3 Scoping review

3.3.1 Search strategy

The scoping review protocol was developed with reference to PRISMA for Scoping Reviews reporting guidelines (PRISMA-ScR) (Tricco et al., 2018) to identify available evidence on the risks and benefits associated with different eye care service delivery models and their impact on:

a) the health care system/the NHS (e.g. do models have benefits such as reducing costs, or improving the quality of referral; could a separation of sight test components affect referral numbers, or ophthalmology outpatient waiting times)

b) patients (e.g. could remote eye care delivery lead to faster initiation of treatment; could missed diagnoses lead to higher rates of visual impairment and subsequently to constrained social participation, reduced quality of life)

A search strategy was developed by the research team with support from the subject librarian at Glasgow Caledonian University and the topics were derived from the research questions as follows:

Topic 1 Asynchronous remote care models

Topic 2 Eye care

A list of keywords for each topic was generated, including medical subject headings (MeSH terms) associated with the research area and listed in Table 1.

Table 1. Search topic keywords.

Topic	**Keywords**
Asynchronous remote care models	“Teleophthalmology”, "tele-ophthalmology", “teleoptometry”, “tele-optometry”, “telemedicine”, “Telecare”, “telehealth”, “Digital health”, “e-health”, “ehealth”, “remote consultation”, “e-consultation”, “electronic consultation”, “video consultation”, “virtual consultation”
Eye care	“Optometry”, “Ophthalmology”

3.4 Delphi study

3.4.1 Participant recruitment

For the Delphi study and the expert consultation, professional networks were used to invite potential participants. Recruitment was facilitated by email and personal contacts. Relevant data protection regulations were adhered to; all participant data will be anonymised.

3.4.2 Delphi expert panel

An expert panel was composed in consultation with the General Optical Council by the study team. The panel shortlist included a mix of ages, genders, and ethnic background. All prospective panel members were required to have significant expertise in the subject area. The panel shortlist was critically reviewed to ensure the panel included representation from relevant fields and the four nations of the UK. A total of 18 expert panel members (44% female) participated in this Delphi study. The expert panel was composed of representatives of the four nations from relevant stakeholder organisations, patients, and clinical as well as academic subject experts including:

- NHS England
- Optometry Northern Ireland
- Optometry Scotland
- Optometry Wales
- The Association of British Dispensing Opticians (ABDO)
- The Association of Optometrists (AOP)
- The College of Optometrists
- The Federation of Optometrists and Dispensing Opticians (FODO)
- The Optical Suppliers' Association/industry (OSA)
- The Royal College of Ophthalmologists
- The Worshipful Company of Spectacle Makers

The experts' professional background included ophthalmology, optometry, ophthalmic dispensing, public health, health care commissioning, and optical industry. Five panel members were also affiliated with eye care charities. Thirteen of the 18 panel members (72%) had considerable professional experience with more than 20 years of time in the profession. One participant (6%) had 15-20 years, and three participants (17%) had 11-15 years of relevant professional experience.

3.4.3 Round 1 survey construction, deployment, analysis

The survey was developed based on previous work commissioned by the GOC, namely the Enventure research study published in July 2019 and Professor Bruce Evans' et al. report on refraction as a component of the sight test (2023). Several iterations of a draft survey were developed which were critically reviewed and refined to generate the final version of the survey.

Expert panel members were provided with detailed information on the purpose of the survey. Key terms used in the survey were defined; rating and scoring requirements were given. Panel members were encouraged to complete the full survey, partial completions were followed up and an opportunity was provided to allow for completion. Survey dissemination was facilitated by RedCap, a secure survey platform for building and managing online surveys and databases which is supported by Glasgow Caledonian University. Panel members were also given the option of adding qualitative perspectives in free text boxes included in each of the sections of the survey.

Key outcome metrics

Upon completion of the round 1 survey by panel members, the following metrics were calculated (Table 2).

Table 2. Metrics calculated for round 1 of the Delhi study.

Type of statement	**Metrics calculated**
Statements with answer scores ranging from 1-5	Median score, interquartile range
Statements with scores ranging from 1-10	Median score, interquartile range
Statements with the option of selecting more than one type of test or activity	Absolute and relative frequency of each answer selected

Definition of consensus

To meet the aims of the present project, consensus was defined using an adaptation of a previous recent GOC project by Will Holmes and Joy Myint ('*Modified Delphi Verification Study of GOC Optometry Learning Outcomes'* 2022; Table 3).

Table 3. Consensus thresholds used in the Delphi study.

Definition of consensus	**ROUND 1** **10-point rating scale (importance scale)** • Median score >6 and 2/3 of respondents scoring >6 **5-point rating scale (agreement scales)** • Median score >3 and 2/3 of respondents scoring >3
Definition of consensus	**ROUND 2** **10-point rating scale (importance scale)** • Median score >6 and 2/3 of respondents scoring >6 **5-point rating scale (agreement scale)** • Median score >3 and 2/3 of respondents scoring >3 **Dichotomous agreement was defined as:** Cumulative proportion of responses >=4 for 5-point questions Cumulative proportion of responses >=7 for 10-point questions

The 10-point scales were generally importance scales, i.e. used for questions and statements that assessed the importance of an item, for example of specific eye examination components. The 5-point scales were generally agreement scales and used to assess the experts' agreement with the statements.

Qualitative analysis

Free text comments were analysed by generating themes from the responses received. The comments provided a rich insight and complemented the quantitative responses of the panel members.

3.4.4 Round 2 survey construction, deployment, analysis

Following the analysis of round 1, panel members were provided with feedback on the results of the first survey. This feedback was incorporated into the round 2 survey, which was developed to allow experts to review their choices and to modify them when required. Items on which consensus had been established in round 1 were not included in round 2 except for all items relating to risks and benefits of separating eye examination components.

The rationale for choosing this approach was the importance of questions relating to risks to the study aims.

Respondents were given the opportunity to share their perspectives in free-text form. A summary of responses (where received) is included at the end of each section of the results.

A distinct feature of round 2 was the contextualisation of the questions using two generic patient strata (a low risk and a higher risk patient). Differentiating responses between these two scenarios provided greater granularity of the responses and addressed comments received from panel members on the round 1 survey. The scenarios were as follows:

> **Scenario 1: Low-risk patient.** A young adult who presents with no complaints, no known risk factors for ocular disease and no previous ocular history.
>
> **Scenario 2: Higher-risk patient.** A middle-aged (50+) patient who presents with no complaints or previous ocular history but with additional risk factors for ocular disease. These could include, but are not limited to, common conditions encountered in a UK population such as ocular hypertension, systemic hypertension, type 2 diabetes or elevated cholesterol levels.

While the overall domains of the survey and the statements/questions were only slightly modified to improve the wording, the inclusion of the scenarios led to a significant modification of the survey which will be reflected in the results section of this report. Considering experts' preference to distinguish between patients with varying risk profiles, the findings offer a more comprehensive understanding of the potential dangers linked to separating eye test components.

Key outcome metrics

Upon completion of the round 2 survey by all panel members, the following metrics were calculated (Table 4).

Table 4. Metrics calculated for round 2 of the Delphi study.

Type of statement	**Metrics calculated**
Statements with answer scores ranging from 1-5	Median score, interquartile range
Statements with scores ranging from 1-10	Median score, interquartile range
Statements with the option of selecting more than one type of test or activity	Absolute and relative frequency of each answer selected

Definition of consensus

To meet the aims of the present project, consensus has been defined based on previous GOC project by Will Holmes and Joy Myint (‘*Modified Delphi Verification Study of GOC Optometry Learning Outcomes’* 2022; see Table 3 above).

Qualitative analysis

Free text comments were analysed by generating themes from the responses received. The comments provided a rich insight and complemented the quantitative responses of the panel members.

3.5 Research team and project management

The team consisted of senior researchers and clinicians who represented a consortium of five entities (four universities and one NHS Foundation Trust) engaged in the training of optometrists and the delivery of primary eye care in England, Northern Ireland, Scotland, and Wales, bringing relevant and applicable subject-specific and regulatory expertise from the four nations. The team had considerable experience in clinical vision care, regulatory affairs in optometry, and academic research. The team’s expertise included undergraduate and postgraduate optometry education, GOC panel membership, quality assurance, as well as fitness to practise. This extensive background was also reflected within the wider professional experience and involvement in optometry professional bodies (such as the College of Optometrists, the Association of Optometrists), the National Institute for Health and Care Excellence (NICE), and NHS primary and secondary care roles. The methodological expertise of the team included the breadth of study designs including clinical trials, observational studies, systematic reviews and economic evaluations. Team members have contributed to the development of national and international clinical guidelines and are advising optometric organisations internationally (e.g. the European Council of Optometry and Optics). Their joint methodological expertise comprised quantitative and qualitative approaches in optometry, ophthalmology, primary eye care, health economics and public health, to generate high-quality, impactful research outcomes that contribute to shaping health policy, resource allocation, and clinical guidelines. The team had also considerable expertise in ‘new’ models of eye care service delivery.

The project was supported by a project advisory group which brought additional relevant expertise including in health economics and regulatory affairs, as well as representatives from patient groups.

The project was managed by the research team. Research meetings were held bi-weekly to review progress against the project's timeline and to ensure the project was on track to deliver the intended outcomes.

4 Results

4.1 Scoping review

4.1.1 Initial results returned by searches

A comprehensive literature search was conducted on 8 November 2024 across three electronic databases: MEDLINE, CINAHL Complete, and Scopus. The search targeted publications from 2004 to 2024. A total of 5,320 records were retrieved and subsequently imported into Covidence (https://www.covidence.org/) for reference management and eligibility screening. Notably, the volume of search results exceeded initial expectations.

4.1.2 Title and abstract screening, full text review

After removal of duplicates, titles and abstracts of 3,722 articles were independently screened against the eligibility criteria by two reviewers and all conflicts were resolved by a third reviewer. Articles were included in the full-text review if they 1) were in English; 2) involved any adult population; 3) were conducted in the UK or another high-income country; 4) were related to UK primary eye care. Studies were excluded if they involved paediatric population, were primarily a technical study or evaluation of investigative techniques or were related to a screening-only service (such as diabetic retinal screening) or secondary care.

A total of 174 studies included in the full-text review were screened by two members of the research team and any conflicts were resolved through discussion. Studies were included in the review if they 1) were related to optometry/primary eye care, 2) described an asynchronous eye care model and its impact on the health care system and/or patients. Studies were excluded if they were not relevant to primary eye care in the UK or focused on evaluation of investigative techniques. In total, 51 studies were included in the review and a PRISMA flow diagram is included in Figure 1. The full list of included articles is included in section 6 References at the end of this report.

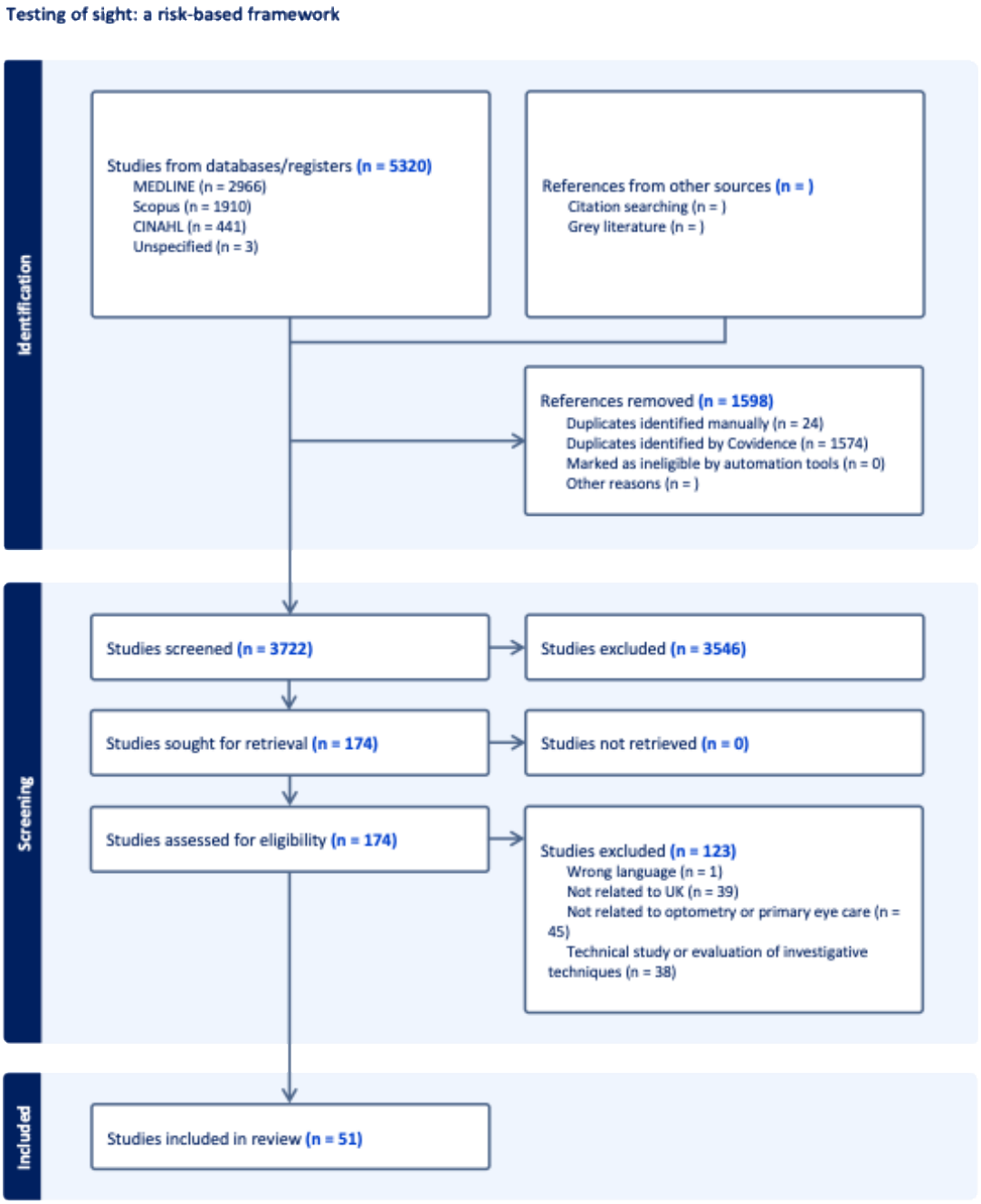

Figure 1. PRISMA flow diagram of the scoping review.

4.1.3 Findings of included articles

A data extraction template was developed, reviewed, and refined by the research team. Once agreement was reached on which variables to extract from the included papers, the final data extraction template was transferred to the Covidence software and piloted by all members of the research team, including team discussions, ensuring a consistent approach across the team. This approach involved pairs of reviewers independently extracting from included papers and discussing the results to ensure accuracy and agree a final format of the template. Once consistency had been confirmed the remaining papers were allocated to team members and extracted independently.

Scoping review synthesis

This scoping review includes studies predominantly from the UK, with some from Ireland, Canada, Australia, and other countries which have relevance to the delivery of primary eye care in the UK. The studies were published between the early 2000s and 2025, with most articles published over the last ten years.

Study characteristics

The studies included in this review comprised a mix of designs and methodological approaches including cohort studies, cross-sectional studies, qualitative research, systematic/narrative reviews, randomised controlled trials, service evaluations and economic evaluations. The studies were concerned with a wide range of eye care service delivery models, including teleophthalmology/teleoptometry, virtual clinics, referral refinement schemes, integrated care models and services adapted to the challenges posed by the COVID-19 pandemic.

Models of eye care described in the included studies

The eye care models described and/or evaluated in the studies included in this review were categorised by their core features.

Teleophthalmology models

Several models utilise teleophthalmology to streamline referral pathways, optimise triage and specialist time and reduce unnecessary hospital appointments. In asynchronous teleophthalmology, diagnostic data is collected by optometrists or technicians and reviewed at a later time by hospital-based clinicians. As part of a randomised controlled trial, Sharma

et al. (2025) described a modality for optometry referrals where community optometrists send OCT scans and referral data via a secure digital platform for remote review by hospital clinicians. The referral decisions were made remotely (different location) rather than by optometrists as in the traditional model and this approach was reported to reduce false-positive referrals and patient waiting times.

In another study, a cloud-based referral platform was reported to enhance referral efficiency by allowing optometrists to upload medical retina cases for ophthalmologist review, helping to filter unnecessary referrals before patients enter hospital pathways (Kern et al., 2020). Similarly, an email-based advice service for referral decisions between optometrists and hospital consultants was reported to help reduce the number of referrals to secondary care, offering timely guidance (Ong et al., 2023).

On the other hand, synchronous teleophthalmology uses real-time video consultations between patients, optometrists and ophthalmologists allowing instant interpretation of clinical findings, particularly in emergency or rural settings. In Australia, a teleophthalmology service connects patients in rural and western Australia with city-based consultant ophthalmologists through a mixture of store-and-forward and real-time telemedicine links (O'Day et al., 2016; Host, Turner & Muir, 2018). It improves access to specialist care for remote areas and shows high levels of patient satisfaction, including perception of saving money and time.

Teleoptometry and remote eye exams

Several models involve digital technology to facilitate remote eye exams and improve accessibility. For example, two studies reported on tele-optometric comprehensive eye exams where optometrists conduct remote eye exams using video consultation, with technicians assisting in visual acuity and imaging assessments before remote prescription and diagnosis (Patel et al., 2023; Blais, Tousignant & Hanssens, 2024). Both studies found tele-eyecare to be statistically and clinically non-inferior to in-person eye exams.

Kapur et al. (2024) described technician-led tele-refraction where trained technicians conduct objective and subjective refractions, with remote optometrist oversight and found it to be an acceptable model compared to face-to-face refraction. Armstrong et al. (2022) found that using digital technology (such as videos, apps and messaging for contact lens education and aftercare) in the contact lens journey can enhance patient experience and support. Massie and colleagues (Massie, Block & Morjaria, 2022; Massie & Morjaria, 2022) suggest that with the rapid emergence of the role of optometrists in telehealth, teleoptometry is a viable addition to eyecare delivery or offer an alternative to in-person optometric services to improve access.

Acute and urgent eye care pathways

Several models reported on acute and urgent eyecare, referring to optometric triage and digital urgent care pathways.

In the UK, the COVID-19 Urgent Eyecare Services (CUES) scheme involved primary care optometry practices as urgent eyecare hubs. Patients were managed by triaging through telephone consultations and offering face-to-face assessments when necessary. Some patients were subsequently referred to hospital ophthalmology departments, while others were managed in the community (Harper et al., 2021; Kanabaret al., 2022).

Virtual emergency eyecare services (Moorfields A&E Tele-Ophthalmology) were also described. The service involves direct video consultations between patients and hospital clinicians to reduce unnecessary emergency eye department attendances while improving access to specialist advice (Kilduff et al., 2020).

A live emergency teleophthalmology model was used to support optometrists examining a patient with an acute retinal detachment in the community (live video slit lamp technology) which allowed direct access to vitreoretinal specialists at the hospital and immediate decision-making (Ghazala et al., 2021a).

Glaucoma referral refinement pathways

Several models focus on enhancing glaucoma referral pathways through community-based refinement schemes and virtual clinics.

Glaucoma Referral Refinement Schemes (GRRS) allow optometrists with specialist glaucoma training to conduct structured assessments to support referral decisions (Ratnarajan et al., 2015; Barrett et al., 2018).

Virtual Glaucoma Clinics (GVCs) with technician-led testing can be used to assess patients in the community, with results reviewed asynchronously by hospital clinicians (Gunn et al., 2022; Gunn et al., 2018; Roberts et al., 2015).

Shared care screening programmes for glaucoma allow community optometrists to use technology to assess the retinal nerve fibre layer and visual fields to stratify risk before ophthalmologists review the data remotely (de Mul et al., 2004).

Integrated care models specific to conditions other than glaucoma (e.g. cataract, retinal disease)

In Dublin, Ireland, integrated adult eye care services used virtual consultations followed by coordinated pre-assessment and post-op management in the community to improve efficiency for cataract and glaucoma patients (Morgan et al., 2022).

Digital referral pathways for diabetic retinopathy screening involved optometrists capturing retinal images and transmitting them for remote grading and specialist triage (Labiris et al., 2018; Caffery et al., 2019).

Key findings of studies included in the scoping review

A thematic analysis was conducted to synthesise the principal findings across the included studies. This analysis identified four key themes: i) Teleophthalmology, referral pathways and referral accuracy; ii) Patient satisfaction and acceptability; iii) Clinical outcomes, diagnostic accuracy and access to care; iv) Risks and barriers to implementation.

Overall, the scoping review presents evidence supporting the potential effectiveness of teleophthalmology and teleoptometry. However, successful implementation and long-term sustainability of these models require careful consideration of economic viability, infrastructure readiness, and patient acceptance.

Theme 1: Teleophthalmology, referral pathways and referral accuracy

- Asynchronous teleophthalmology has been shown to reduce false-positive referrals, streamline triage, and improve referral accuracy (Sharma et al., 2025; Kern et al., 2020)
- Asynchronous teleophthalmology facilitates communication between healthcare providers (Sharma et al., 2025; Kern et al, 2020; Patel et al., 2024)
- Electronic referral systems can improve triage, efficiency and accuracy, reduce waiting times and unnecessary hospital visits (Annoh et al., 2019; Borooah et al., 2013; Jeganathan et al., 2017, Ong et al., 2023; Conway et al., 2021)
- AI-assisted teleophthalmology shows promise in screening and triaging referrals (Ting et al., 2020; Sharma et al., 2025)
- Referral refinement for glaucoma care improves accuracy, reducing unnecessary hospital visits and optimising specialist capacity (Barrett et al., 2018; Harper et al., 2020)
- Teleophthalmology for emergency eyecare can improve triage and minimise unnecessary hospital visits (Kilduff et al., 2020; Ghazala et al., 2021a; 2021b; Patel et al., 2024)

Theme 2: Patient satisfaction and acceptability

- Teleophthalmology is broadly accepted by patients and has been shown to improve patient and clinician experience. However, concerns remain about continuity of care and impact on patient-clinician relationship (Patel et al., 2023; Blais et al., 2024)
- Teleoptometry and tele-refraction supports patient engagement with remote consultations and can improve access to eye care (Massie et al., 2022, Massie & Morjaria, 2022; Blais et al., 2022; Blais et al., 2024)

- Glaucoma virtual clinics have been shown to be acceptable to both clinicians and patients, with patients showing high levels of confidence in staff conducting tests and reporting they would recommend the service to family and friends (Gunn et al., 2022)

Theme 3: Clinical outcomes, diagnostic accuracy and access to care

- Tele-refraction and tele-eye care exams achieve diagnostic accuracy comparable to in-person exams, supporting optometrist-led remote refraction models (Kapur et al., 2024; Blais et al., 2022; Patel et al., 2023)
- Telemedicine and technology-based eye care service models show potential for improving efficiency, reducing unnecessary hospital visits, optimising specialist time, reducing waiting time and no-show rate and improving access for some populations (Maa et al., 2017; Ghazala et al., 2021; Ratnarajan et al., 2015; Blais et al., 2022; Borooah et al., 2013)
- Optometric-led telehealth initiatives enhance service delivery and minimise unnecessary referrals (O'Day et al., 2016; Bartnik et al., 2018; Morgan et al., 2022; Host et al., 2018)
- Optometrist-led glaucoma screening in shared-care models shows high diagnostic accuracy (de Mul et al., 2004)
- Digital ophthalmology can reduce costs for both patients and healthcare systems (Labiris et al., 2018; Jørgensen et al., 2024)
- While Urgent Eyecare Service models demonstrate faster treatment initiation, improved access and reduction in emergency department attendances, concerns over diagnostic accuracy when using virtual assessment only have also been raised (Harper et al., 2021; Swystun et al., 2021; Kanabar et al., 2022)
- Glaucoma virtual clinics are rated at least equivalent to usual glaucoma care in terms of efficiency, patient safety and perception of patient acceptability (Gunn et al., 2018; Gunn et al., 2022; Roberts et al., 2015)
- Diagnostic uncertainty remains a challenge, particularly in tele-triage models of glaucoma care (Wright et al., 2014; Ratnarajan et al., 2015; Keenan et al., 2015)

Theme 4: Risks and barriers to implementation

- Infrastructure, digital divide and medico-legal concerns pose risks to widespread adoption (Ting et al., 2020; Gunasekeran et al., 2021; Massie & Morjaria, 2022)
- Data security concerns must be addressed before full integration (Gunasekeran et al., 2021; Chong et al., 2021; Caffery et al., 2019)
- Initial costs, training requirements, and workflow adaptation pose barriers to adoption (Bartnik et al., 2018; Morgan, 2022; Blais et al., 2022)
- Concerns over the doctor-patient relationship in telehealth models highlight the need for further evaluation (Patel et al., 2023; Massie et al., 2022)

- Limited feedback to patients after teleophthalmology referrals raises concerns (Patel et al., 2024)
- Missed diagnoses and referral inaccuracies remain risks in glaucoma and urgent eye care pathways (Swystun et al., 2021; Ratnarajan et al., 2015; Kanabar et al., 2022; Carmichael et al., 2023)

4.1.4 Summary

The 51 articles included in this review provide a strong body of evidence supporting in principle the notion that remote eye care/digital modes of eye care and teleoptometry were not inferior to in-person examinations. These approaches can improve access to care and contribute to fewer and more accurate referrals. Tele-refraction in particular was associated with high patient satisfaction. For glaucoma, a chronic condition that can lead to visual impairment if undetected and untreated, virtual clinics have been shown to be a safe option for low-risk patients. Overall, these findings can be interpreted as supporting the development and potential for integrating remote testing and virtual clinics into primary eye care models, enabling care delivery that is not limited by time, person, or location.

4.2 Prevalence of ocular disease

In order to contextualise the delivery of primary community-based eye care an understanding of the size and frequency of occurrence of vision and eye problems is required. For this study, the prevalence of three common conditions, cataract, primary open angle glaucoma (POAG), and neovascular age-related macular degeneration (nAMD) was obtained from a recent report produced for the Royal College of Ophthalmologists.

The data showed that the prevalence of cataract requiring surgery ranged from 0.3% in the age group 49-54 years to 17.4% in individuals older than 75 years. POAG has a prevalence of 2.5% (>age 40 years) and nAMD of up to 2.2% (>50 years of age) (Table 5). The prevalence data for nAMD includes individuals aged 40 years and older, however, a higher prevalence of AMD is expected (and has been reported) in older populations. This means that there would be a greater prevalence if, for example, only individuals aged 70 years and older were considered.

Table 5. Prevalence of cataract, primary open angle glaucoma and neovascular age-related macular degeneration.

Condition	**Age group** 49-54	**Age group** 55-64	**Age group** 65-74	**Age group** >75
Prevalence cataract requiring surgery	0.30%	1.70%	7.90%	17.40%

Prevalence POAG	**Age group** >40
	2.50%

Prevalence nAMD	**Age group** 37-73	**Age group** >50
	1.70%	1.20-2.2%

4.3 Delphi study

4.3.1 Round 1

A total of 18 expert panel members (44% female) participated in this first round of the Delphi study. All shortlisted panel members who were invited completed round 1.

The round 1 survey included a total of 91 analytical items which were separated into eight distinct but related domains (Table 6).

Table 6. Domains included in the Delphi study.

1 Demographic information
2 Criticality of eye test components
3 Professionals involved in delivering primary eye care
4 Timing: separation of components by time
5 Location: separation of components by place
6 Impact of separating components: Risks and benefits for the NHS
7 Impact of separating components: Risks and benefits for patients
8 Impact of separating components: Risks and benefits for practitioners

Responses of 86 items* were analysed using the median score of agreement. Consensus was reached for 45 out of the 86 items (52.3%).

Five items** included answer options that allowed panel experts to select multiple eye test components. These items were analysed using absolute and relative frequency of components being selected by panel experts. The same consensus definition threshold was used (>/=66%). For example, if at least 66% of experts selected the component 'subjective refraction' in item 42 as 'critical', the aggregate response represented consensus.

*(Round 1 items 11-24; 41; 43; 46; 48; 49; 54; 57-61; 64; 67-69; 71-73; 75-77; 79-81; 83-85; 84; 85; 87-89; 92-97; 99-101; 103-105; 107-109; 111-113; 115-117; 119-121; 123-125; 128-133; 135; 137; 138; 140-142; 144-146)

**(Round 1 items 42; 50; 52; 53; 63)

Overall, the first round of this Delphi study provided a range of expert perspectives on the risks and benefits of separating eye test components. While consensus was observed on many aspects, there were topics that were summarised and presented again to panel members in round 2 of this Delphi study to allow participants to revise their decision and/or perspectives. The full list of panel responses is included in Appendix 1.

Round 1 concluding reflections

All round 1 results were carefully reviewed and discussed. Following the completion of round 1, items which reached consensus in round 1 were summarised for panel members with controlled feedback on their responses.

Round 2 was developed only using those items of round 1 for which consensus was not achieved, except any items related to impact as these were core of the funding call.

All items that were exploring risks of separating eye test components in round 1 were included in round 2 due to their importance to the study's aims. The presentation of these items in the aforementioned contextual clinical case scenarios at population level provided a greater level of granularity of the results.

In round 1, we used a 5-point answer scale for some statements and questions to analyse the panel's initial responses. Upon reviewing the results, we agreed that the panel's consensus on disagreement was not always clearly evident in questions with a 5-point answer scale. We managed this in round 2 by dichotomising the responses in the subsequent analysis, i.e. by using cumulative proportions of responses.

4.3.2 Round 2

A total of 17 expert panel members completed the second round of the Delphi study, which equals a response rate of 94%. One panel member was unable to complete due to unavoidable absence from the office.

Overall, 73 items were presented to panel experts. To enhance the clarity of the responses and allow for easier interpretation of the finding, round 2 responses were dichotomised, i.e. 'agree' and 'strongly agree' responses and 'disagree' and 'strongly disagree' responses were combined and presented as a proportion of agreement and disagreement respectively. Similarly, numerical responses '1' and '2' were combined, as were responses '4' and '5'.

4.3.3 Consolidated outcomes of Delphi rounds 1 and 2

The outcomes of rounds 1 and 2 were combined and are presented side-by-side to provide a comprehensive overview of the panel expert views on separating eye test components. Eight domains were included (see Table 7). A summary of the qualitative data and analysis are presented after each domain.

Domain 1: Demographic data

Demographic data were only included in round as the expert panel membership did not change between rounds 1 and 2. Details of the Delphi panel are included in section 3.4.2.

Domain 2: Criticality

In round 1, the majority of eye examination components were considered critical. No consensus was reached for two components, pupil testing and binocular vision assessment, and these were presented again in round 2. For the low-risk scenario, experts did not reach consensus but were in agreement that both components were critical for higher-risk patients (consensus reached).

Statement Round 1	Statement Round 2
Please assign a weighting score to each of the following components of a routine sight test/eye examination in an adult patient. The components you consider to be most important should be assigned a weighting of (10); least important components a weighting of (0).	Please rate the criticality of the pupil reactions test for a low-risk patient from 0 (least important) to 10 (most important)

Item number	Component	Median score	Item number	Patient risk level	Median score	Agreement 'Criticality' (%)	Disagreement (%)
11	History, Signs, Symptoms	10					
12	Presenting vision	8.5					
13	Pupil reactions test	5.5	5	Low	4	29	53
			6	Higher	7	76	6
14	Binocular vision test	6	7	Low	6	35	35
			8	Higher	7	71	24
15	Objective refraction	7					

Item number	Component	Median score	Item number	Patient risk level	Median score	Agreement 'Criticality' (%)	Disagreement (%)
16	Subjective refraction	8.5					
17	Refractive prescribing	8.5					
18	Subjective fundus assessment	10					
19	Objective fundus assessment and imaging	7					
20	Optical Coherence Tomography (OCT)	7					
21	Assessment of intraocular pressure	7					
22	Assessment of visual fields	7					
23	Development of a patient management plan and clinical decision-making	10					
24	Communicating the results to the patient	10					

Considering the safety of an eye test and the question which components would be essential, experts agreed that most components were indeed essential. Items that had not reached consensus in round 1 were considered essential for higher-risk patients with objective refraction the only exception.

For the low-risk scenario, the consensus threshold was not reached for pupil, binocular vision, objective refraction, OCT, intraocular pressure (IOP), and visual field assessments. Consensus was reached that OCT was not essential for either risk level and that visual fields were not essential for an eye test to be safe in low-risk patients only.

Statement Round 1	**Statement Round 2**
Which elements of a sight test / eye examination do you consider essential in order for the sight test to be safe?	For a **low-risk/higher-risk** patient, which of the following components would you consider essential for the eye test to be safe?

Item number	**Component**	**Proportion agreement 'Essential' (%)**	**Item number**	**Patient risk level**	**Median score**	**Proportion agreement 'Essential' (%)**	**Disagreement (%)**
25	History, Signs, Symptoms	100					
26	Presenting vision	83					
27	Pupil reactions test	72	9	Low	N/A	59	41
			10	Higher	N/A	88	12
28	Binocular vision test	61	9	Low	N/A	53	47

Item number	Component	Proportion agreement 'Essential' (%)	Item number	Patient risk level	Median score	Proportion agreement 'Essential' (%)	Disagreement (%)
			10	Higher	N/A	71	29
29	Objective refraction	56	9	Low	N/A	47[1] 53[2]	53 47
			10	Higher	N/A	53[1] 50[2]	47 41
30	Subjective refraction	89					
31	Refractive prescribing	78					
32	Subjective fundus assessment	83					
33	Objective fundus assessment and imaging	39	9	Low	N/A	82	18
			10	Higher	N/A	88	12
34	Optical Coherence Tomography (OCT)	28	9	Low	N/A	6	94
			10	Higher	N/A	29	71
35		61	9	Low	N/A	41	59

Item number	Component	Proportion agreement 'Essential' (%)	Item number	Patient risk level	Median score	Proportion agreement 'Essential' (%)	Disagreement (%)
	Assessment of intraocular pressure						
			10	Higher	N/A	100	0
36	Assessment of visual fields	50	9	Low	N/A	12	88
			10	Higher	N/A	82	18
37	Development of a patient management plan and clinical decision-making	89	9				
			10				
38	Communicating the results to the patient	94	9				
			10				

[1]Objective refraction – Retinoscopy
[2]Objective refraction – Autorefraction

Round 1 Qualitative results	Round 2 Qualitative results
• Criticality of sight test / eye examination components depends on patient presentation and risk factors, with some elements being symptom-led and patient-dependent (such as OCT, IOPs, visual field (VF) and imaging) • Important to complete the vision/eye health assessment on a case-by-case basis	• Experts highlighted the importance of considering patient's eye care history, presentation and risk factors in order to determine the clinical indication for some components of the sight test / eye examination (e.g. OCT, VF and tonometry) • Tests for high-risk patients should depend on their respective risk factors but "*need to be more comprehensive to catch early signs*

Round 1 Qualitative results	Round 2 Qualitative results
• The definition and scope of a sight test/eye examination: *"It is unethical to perform investigations which are not clinically indicated; a sight test is not a screening test; it is an opportunistic case finding or needs-led assessment."* • *"…custom and practice has logically led us to a system in which risk-benefits-costs are well managed…"* • Removal of subjectivity reduces variables and potential bias and can result in safer and more consistent tests for patients	*of glaucoma, macular degeneration, diabetic retinopathy, and other age-related diseases.*"

Domain 3: Professionals

Considering the question whether more than one person should be eligible to perform components of an eye test, experts reached consensus in round 1, affirming this notion. Asked about the individual components and whether these should be conducted by the same person revealed a more diverse range of views.

Notably, experts indicated agreement that several components do not need to be conducted by the same person. Aggregating the responses from rounds 1 and 2, these include presenting vision, OCT, IOP (low-risk only), and visual fields.

Components that should be conducted by the same person that has overall responsibility for the examination include history and symptoms, pupils, binocular vision, refraction, prescribing, clinical decision making, and communication.

<table>
<tr><th colspan="3">Statement Round 1</th><th>Statement Round 2</th></tr>
<tr><td colspan="3">Do you agree that the different components of a sight test/eye examination can be performed by more than one person eligible to perform such tests?</td><td rowspan="3">Not presented again</td></tr>
<tr><td>Item number</td><td>Component</td><td>Median score</td></tr>
<tr><td>41</td><td>N/A</td><td>4</td></tr>
<tr><td colspan="3">Are there any components of a sight test/eye examination which should be conducted by the same person? Please select as many components as applicable.</td><td>For a low-risk/higher-risk patient, which of the following components of a sight test/eye examination should be conducted by the same person (i.e. the person taking overall responsibility for the sight test / eye examination)?</td></tr>
</table>

Item number	Component	Proportion agreement 'Same person' (%)	Item number	Patient risk level	Median score	Proportion agreement 'Same person' (%)	Disagreement (%)
42	History, Signs, Symptoms	67					
	Presenting vision	33	12	Low	N/A	24	76
			13	Higher	N/A	24	76
	Pupil reactions test	44	12	Low	N/A	82	18
			13	Higher	N/A	82	18
	Binocular vision test	44	12	Low	N/A	76	24
			13	Higher	N/A	76	24
	Objective refraction	39	12	Low	N/A	59[1] 18[2]	41[1] 82[2]
			13	Higher	N/A	59[1] 18[2]	41[1] 82[2]
	Subjective refraction	78					
	Refractive prescribing	78					

Item number	Component	Proportion agreement 'Same person' (%)	Item number	Patient risk level	Median score	Proportion agreement 'Same person' (%)	Disagreement (%)
	Subjective fundus assessment	67					
	Objective fundus assessment and imaging	22	12	Low	N/A	59	41
			13	Higher	N/A	71	29
	Optical Coherence Tomography (OCT)	22	12	Low	N/A	6	94
			13	Higher	N/A	12	88
	Assessment of intraocular pressure	22	12	Low	N/A	24	76
			13	Higher	N/A	41	59
	Assessment of visual fields	22	12	Low	N/A	18	82
			13	Higher	N/A	18	82
	Development of a patient management plan and clinical decision-making	83					

Item number	Component	Proportion agreement 'Same person' (%)	Item number	Patient risk level	Median score	Proportion agreement 'Same person' (%)	Disagreement (%)
	Communicating the results to the patient	94					

[1]Objective refraction – Retinoscopy
[2]Objective refraction – Autorefraction

Experts also considered whether the legal framework regulating primary eye care should allow flexibility on who carries out eye test components. There were a range of views and no consensus was reached.

Item number	Statement Round 1	Median score	Statement Round 2				
43	The legal framework regulating primary eye care in the UK should allow for flexibility so that specified components of a sight test/eye examination could be carried out by members of different professional groups, e.g. orthoptists, dispensing opticians, optical assistants.	3	For low-risk/higher-risk patients, the legal framework regulating primary eye care in the UK should allow for flexibility so that specified components of a sight test/eye examination could be carried out by members of different professional groups, e.g. orthoptists, dispensing opticians, optical assistants.				
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**
			14	Low	4	59	29
				Higher	3	47	41

Round 1 Qualitative results	Round 2 Qualitative results
The following themes emerged: • Optometrist / prescribers to retain the accountability and responsibility for the sight test (outcome); capturing vs. analysing and interpreting the results: *"The prescriber should retain overall clinical accountability and governance responsivities, regardless of delegation of functions"* • Delegation, supervision and multidisciplinary working: a distinction between capturing and interpreting the results: *"… [an] orthoptist can perform Binocular Vision Tests. Capturing of information and images can be carried out by OA's [optical assistants] though must analysed by an optometrist."* • *"The protected aspects of clinical function should be carried out by the same person, namely an optometrist or an ophthalmic medical practitioner while other aspects (such as objective refraction, imaging and OCT) can currently be delegated to support staff. The same is true for performing IOP and VF, however it is grey whether that is currently permitted, even although common practice."* • Working as a multidisciplinary team is the most efficient ways of working but staff competence and training is paramount • It is crucial to consider timing between the different components of a sight test / eye examination to avoid creating disjointed roles that can put patients at risk: *"This is a nuanced issue because it really depends on how broken up*	• Participants highlighted the importance of training, otherwise the outcome would be variable. • Acceptable for the "objective" elements to be conducted / captured by another practitioner (already a clinical practice) but the optometrist should retain the overall responsibility for the interpretation of the results. Essential for governance, accountability frameworks and feedback loops to be in place. • Appropriately trained technicians can perform perimetry and imaging tests and IOP assessments – this is currently done in secondary care. • Legal framework adaptations could happen, but tests should not be routinely delegated. • *"The list of tests in the text above are already offered as 'pre-screening tests' in the UK (and performed by other groups) under the existing legal framework in that they take place before the patient sees the optometrist for the sight test. There is no need to change this."*

Round 1 Qualitative results	Round 2 Qualitative results
and how remote from each other the separate components could become. I don't really have a problem with teams working together to do separate parts – but don't like remote, completely separate roles that risk patients." • Potential for using new technologies with objective measurements and better data analysis in an assistive capacity but it might require redefining supervision to factor these in, including telemedicine. • Questions have also been raised regarding what constitutes a sight test, namely when does it start and end and whether it includes measurements taken by practice staff. A key aspect was that of 'overall responsibility'. The comments reflected a reluctance to allow this responsibility to be shared or diverted from optometrists. The current practice of delegating some tasks, for example objective refraction, imaging and OCT, was supported.	

Domain 4: Timing

The panel was asked to consider whether the legal framework should allow flexibility on the timing of carrying out eye test components and specifically whether practitioners should be allowed to conduct components at different time points (i.e. non-contemporaneous). There were a range of views and no consensus was reached.

<table>
<tr><th>Item number</th><th>Statement Round 1</th><th>Median score</th><th colspan="5">Statement Round 2</th></tr>
<tr><td rowspan="4">46</td><td rowspan="4">The legal framework regulating primary eye care in the UK should allow for the components of a routine sight test/eye examination in adult patients to be carried out at different time points (i.e. non-contemporaneous).</td><td rowspan="4">2.5</td><td colspan="5">For a low-risk/higher-risk patient, the legal framework regulating primary eye care in the UK should allow for the components of a routine sight test/eye examination in adult patients to be carried out at different time points (i.e. non-contemporaneous).</td></tr>
<tr><td>Item number</td><td>Patient risk level</td><td>Median score</td><td>Proportion ‘Agreement’ %</td><td>Proportion Disagreement %</td></tr>
<tr><td>17</td><td>Low</td><td>3</td><td>35</td><td>41</td></tr>
<tr><td>18</td><td>Higher</td><td>2</td><td>29</td><td>59</td></tr>
</table>

In round 1, consensus was reached that all critical components of an eye test should be carried out at the same appointment. Experts also agreed that any non-critical components could be carried out separately from any critical components, at a different time, or at a different place including online.

Item number	Statement Round 1	Median score	Statement Round 2				
48	For a sight test/eye examination to be safe, it is essential that all critical components of a routine sight test in adult patients must be carried out at the same appointment (at the same time and place).	4					
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**

Item number	Statement Round 1	Median score	Statement Round 2				
49	Any non-critical components of a routine sight test in adult patients can be carried out separately from the critical components and thus at a different time and/or a different place or online	4					
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**

Asked about which components need to be conducted contemporaneously, experts agreed in round 1 that the key components that need to be conducted at the same time were history and symptoms, presenting vision, refraction, clinical decision-making and patient communication. In round 2, the panel reached consensus that pupil testing should be added for both risk profiles and IOP for higher-risk patients. There was also consensus of disagreement, i.e. that OCT and visual fields do not need to be conducted at the same time in low-risk patients.

Statement Round 1	Statement Round 2
In order for a sight test/eye examination to be safe, which components need to be conducted at the same time (i.e. contemporaneously)? Please select as many components as applicable.	For a low-risk/higher-risk patient, which components need to be conducted at the same time as the other critical elements of a sight test / eye examination (i.e. contemporaneously)?

Item number	Component	Proportion agreement 'Same time' (%)	Item number	Patient risk level	Median score	Proportion agreement 'Same time' (%)	Disagreement (%)
50	History, Signs, Symptoms	83					
	Presenting vision	78					
	Pupil reactions test	56		Low		71	29
				Higher		71	29

Item number	Component	Proportion agreement 'Same time' (%)	Item number	Patient risk level	Median score	Proportion agreement 'Same time' (%)	Disagreement (%)
	Binocular vision test	61	19	Low		53	47
			20	Higher		59	41
	Objective refraction	67					
	Subjective refraction	89					
	Refractive prescribing	67					
	Subjective fundus assessment	61	19	Low		53	47
			20	Higher		59	41
	Objective fundus assessment and imaging	44	19	Low		53	47
			20	Higher		59	41
	Optical Coherence Tomography (OCT)	44	19	Low		29	71
			20	Higher		47	53

Item number	Component	Proportion agreement 'Same time' (%)	Item number	Patient risk level	Median score	Proportion agreement 'Same time' (%)	Disagreement (%)
	Assessment of intraocular pressure	50	19	Low		41	59
			20	Higher		76	24
	Assessment of visual fields	39	19	Low		12	88
			20	Higher		47	53
	Development of a patient management plan and clinical decision-making	78					
	Communicating the results to the patient	83					

Round 1 Qualitative results	Round 2 Qualitative results
• Separation by time should be an exception and not common practice • Separation by time introduces risks for patients • Separation by time introduces risks for practitioners • Any separation needs to be completed in a timely manner / time-limited and defined	• Time gap between the components is significant – tighter test regime is required for higher-risk patients to catch early disease signs and correlate findings immediately • Separation by time would require a protocol in place for what happens if the results were deemed abnormal and needed urgent review e.g. IOPs over 30mmHg

Round 1 Qualitative results	Round 2 Qualitative results

• *"The components of a sight test are interdependent and can be conducted in succession over a relatively short period of time, typically 25-45 minutes. I am not convinced there is any benefit in the public interest to split this up."*
• Separation by time introduces risks for patients
  • Unnecessary confusion "*patients could then have a refraction and think their eyes were checked if there weren't strict safeguards"*
  • Missed pathology
  • Delayed referral, treatment and/or prescription for refractive correction
  • Need for duplication
• Separation by time introduces risks for practitioners with potential malpractice claims due to delayed treatment
• Any separation would need to be time-limited and defined, with sight test components completed in a timely manner
 	
Overall, the comments reflected the perspective that risks outweigh the benefits and that a separation by time is therefore not desirable.
	• Separation by time introduces the risk of a patient not returning for additional tests – particularly when they are only identified as high risk after the additional tests
	• Less convenient for the patient and single appointments for critical elements should be the norm
	• It can be helpful to have a remote pre-consultation to triage whether a sight test or Minor Eye Conditions Scheme (MECS) is required, and sometimes pre-assessment tests or a sight test cannot be completed at one appointment, e.g. driving if needing to dilate, checking suspect visual fields, patient with LD [learning disability] getting tired or losing concentration, broken equipment – scope should be given for this
	• Scope for gathering data one day and analysing another but not a broken-up model of remote refraction with a "health check" later which significantly increases the risk of missing something (IMO)

Domain 5a: Location

Considering the location at which eye tests components were to be conducted, consensus was reached that assessments of history, presenting vision, pupils, binocular vision, refraction, subjective fundus assessment, clinical decision-making and patient communication should be carried out at the same place. Revisiting this question in round 2, there was consensus that objective fundus assessment (both risk strata), IOP and visual fields (higher-risk only) should be conducted at the same place.

Statement Round 1	Statement Round 2
For a routine sight test/eye examination in adult patients to be safe, which components should be carried out in the same place? Please select as many components as applicable.	For a low-risk/higher-risk patient, which of the following components should be carried out in the same place as the other critical elements of a sight test / eye examination in order to ensure there is no increased risk of sight impairment to the patient?

Item number	Component	Proportion agreement 'Same place' (%)	Item number	Patient risk level	Median score	Proportion agreement 'Same place' (%)	Disagreement (%)
52	History, Signs, Symptoms	67					
	Presenting vision	78					
	Pupil reactions test	72					

Item number	Component	Proportion agreement 'Same place' (%)	Item number	Patient risk level	Median score	Proportion agreement 'Same place' (%)	Disagreement (%)
	Binocular vision test	72					
	Objective refraction	67					
	Subjective refraction	89					
	Refractive prescribing	67					
	Subjective fundus assessment	78					
	Objective fundus assessment and imaging	44	22	Low	N/A	71	29
			23	Higher	N/A	76	24
	Optical Coherence Tomography (OCT)	44	22	Low	N/A	35	65

Item number	Component	Proportion agreement 'Same place' (%)	Item number	Patient risk level	Median score	Proportion agreement 'Same place' (%)	Disagreement (%)
			23	Higher	N/A	53	47
	Assessment of intraocular pressure	56	22	Low	N/A	65	35
			23	Higher	N/A	88	12
	Assessment of visual fields	44	22	Low	N/A	59	41
			23	Higher	N/A	71	29
	Development of a patient management plan and clinical decision-making	67					
	Communicating the results to the patient	67					

65 = item missed consensus threshold narrowly by a single percentage point

These observations were largely mirrored when asking a related question, i.e. whether components could be carried out in different places. Panel members agreed that most components should not be carried out at different places, with the exception of objective fundus assessment/imaging and OCT.

Statement Round 1		Statement Round 2
For a routine sight test/eye examination in adult patients to be safe, which components could be carried out in different places? Please select as many components as applicable.		For a low-risk/higher-risk patient, which of the following components could be carried out in different places without compromising patient safety?

Item number	Component	Proportion agreement 'Different places' (%)	Disagreement (%)	Item number	Patient risk level	Median score	Proportion agreement 'Different places' (%)	Disagreement (%)
53	History, Signs, Symptoms	44	56	24	Low	N/A	35	65
				25	Higher	N/A	29	71
	Presenting vision	28	72					
	Pupil reactions test	22	78					

Item number	Component	Proportion agreement 'Different places' (%)	Disagreement (%)	Item number	Patient risk level	Median score	Proportion agreement 'Different places' (%)	Disagreement (%)
	Binocular vision test	33	67					
	Objective refraction	33	67					
	Subjective refraction	11	89					
	Refractive prescribing	33	67					
	Subjective fundus assessment	17	83					
	Objective fundus assessment and imaging	67	33	24	Low	N/A	18	82
				25	Higher	N/A	18	82
	Optical Coherence Tomography (OCT)	67	33	24	Low	N/A	59	41

Item number	Component	Proportion agreement 'Different places' (%)	Disagreement (%)	Item number	Patient risk level	Median score	Proportion agreement 'Different places' (%)	Disagreement (%)
				25	Higher	N/A	47	53
	Assessment of intraocular pressure	56	44	24	Low	N/A	12	88
				25	Higher	N/A	12	88
	Assessment of visual fields	61	39	24	Low	N/A	29	71
				25	Higher	N/A	24	76
	Development of a patient management plan and clinical decision-making	39	61	24	Low	N/A	29	71
				25	Higher	N/A	35	65
	Communicating the results to the patient	44	56	24	Low	N/A	29	71
				25	Higher	N/A	29	71

65 = item missed consensus threshold narrowly by a single percentage point

The question whether the legal framework should allow for components to be carried out in different places did not reach consensus.

<table>
<tr><th>Item number</th><th>Statement Round 1</th><th>Median score</th><th colspan="5">Statement Round 2</th></tr>
<tr><td rowspan="4">54</td><td rowspan="4">The legal framework regulating primary eye care in the UK should allow for the components of a routine sight test in adult patients being carried out in different places.</td><td rowspan="4">3</td><td colspan="5">For a low-risk/higher-risk patient, the legal framework regulating primary eye care in the UK should allow for the components of a routine sight test in adult patients to be carried out in different places.</td></tr>
<tr><td>Item number</td><td>Patient risk level</td><td>Median score</td><td>Proportion ‘Agreement’ %</td><td>Proportion Disagreement %</td></tr>
<tr><td>26</td><td>Low</td><td>4</td><td>53</td><td>35</td></tr>
<tr><td>27</td><td>Higher</td><td>2</td><td>41</td><td>53</td></tr>
</table>

Domain 5b: Asynchronous remote eye care

Several aspects relating to asynchronously delivered eye care were explored. Consensus was reached on two items, namely i) that asynchronous eye care models can provide greater flexibility for patients, allowing for easier access to eye care and ii) that they could carry additional risk for patients, for example delayed referral and delayed initiation of treatment, or in patients with suspected ocular hypertension/glaucoma.

<table>
<tr><th>Item number</th><th>Statement Round 1</th><th>Median score</th><th colspan="5">Statement Round 2</th></tr>
<tr><td rowspan="4">57</td><td rowspan="4">Using asynchronous eye care models to deliver primary eye care such as a routine sight test in adult patients is likely to save time.</td><td rowspan="4">2</td><td colspan="5">For a low-risk/ higher-risk patient, using asynchronous eye care models to deliver primary eye care is likely to save time.</td></tr>
<tr><td>Item number</td><td>Patient risk level</td><td>Median score</td><td>Proportion ‘Agreement’ %</td><td>Proportion Disagreement %</td></tr>
<tr><td>28</td><td>Low</td><td>2</td><td>12</td><td>59</td></tr>
<tr><td>29</td><td>Higher</td><td>2</td><td>6</td><td>53</td></tr>
</table>

Item number	Statement Round 1	Median score	Statement Round 2				
58	Using asynchronous eye care models to deliver primary eye care such as a routine sight test in adult patients can save costs for patients and/or the NHS.	3	For a low-risk/higher-risk patient, using asynchronous eye care models to deliver primary eye care can save costs for patients and/or the NHS.				
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**
			30	Low	2.5	18	47
			31	Higher	2.5	6	47

Item number	Statement Round 1	Median score	Statement Round 2				
59	Using asynchronous eye care models to deliver primary eye care such as a routine sight test in adult patients can provide greater flexibility for patients, allowing for easier access to eye care.	4					
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**

Item number	Statement Round 1	Median score	Statement Round 2				
60	Using asynchronous eye care models to deliver primary eye care such as a routine sight test in adult patients can help to increase the accuracy of referrals, for example in patients with suspected ocular hypertension/glaucoma.	3	For a low-risk/higher-risk patient, using asynchronous eye care models to deliver primary eye care can help to increase the accuracy of referrals.				
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**
			32	Low	2	12	59
			33	Higher	2	0	65

65 = item missed consensus threshold narrowly by a single percentage point

Item number	Statement Round 1	Median score	Statement Round 2				
61	Using asynchronous eye care models to deliver primary eye care such as a routine sight test in adult patients carries additional **risk** for patients, for example delayed referral and delayed initiation of treatment, or in patients with suspected ocular hypertension/glaucoma.	4					
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**

The delegation of eye test components to appropriately qualified individuals was also considered. Consensus on disagreement was reached, meaning that there should be no delegation of components, for the following components: history, pupils, refraction and refractive prescribing, subjective fundus assessment, clinical decision-making, and patient communication. While the views on binocular vision were mixed in round 1, consensus was reached in round 2 that this component should also not be delegated (both risk levels).

Components that were deemed suitable for delegation were presenting vision (low risk only), objective fundus assessment, OCT, IOP, and visual fields. This is, in part, reflecting current protocols in optometric practice, where appropriately trained individuals, e.g. support staff such as optical assistant, carry out a range of objective and non-invasive tests.

Statement Round 1	**Statement Round 2**
For a sight test/eye examination to be safe, which components could be delegated (to a person with an appropriate qualification, knowledge and skills)?	For a low-risk/higher-risk patient, which components could be delegated (to a person with an appropriate qualification, knowledge and skills) without compromising the safety of the patient?

Item number	**Component**	**Proportion agreement 'Could be delegated' (%)**	**Disagreement (%)**	**Item number**	**Patient risk level**	**Median score**	**Proportion agreement 'Could be delegated' (%)**	**Disagreement (%)**
63	History, Signs, Symptoms	28	72					
	Presenting vision	61	39	35	Low	N/A	76	24
				37	Higher	N/A	65	35

Item number	Component	Proportion agreement 'Could be delegated' (%)	Disagreement (%)	Item number	Patient risk level	Median score	Proportion agreement 'Could be delegated' (%)	Disagreement (%)
	Pupil reactions test	33	67					
	Binocular vision test	44	56	35	Low	N/A	29	71
				37	Higher	N/A	29	71
	Objective refraction	56	44	35	Low	N/A	18 88	82 12
				37	Higher	N/A	18 88	82 12
	Subjective refraction	11	89					
	Refractive prescribing	17	83					
	Subjective fundus assessment	11	89					
		78	22					

Item number	Component	Proportion agreement 'Could be delegated' (%)	Disagreement (%)	Item number	Patient risk level	Median score	Proportion agreement 'Could be delegated' (%)	Disagreement (%)
	Objective fundus assessment and imaging							
	Optical Coherence Tomography (OCT)	78	22					
	Assessment of intraocular pressure	83	17					
	Assessment of visual fields	78	22					
	Development of a patient management plan and clinical decision-making	0	100					
	Communicating the results to the patient	6	94					

65 = item missed consensus threshold narrowly by a single percentage point

No consensus was reached on whether delegated aspects should be carried out under supervision only.

<table>
<tr><th>Item number</th><th>Statement Round 1</th><th>Median score</th><th colspan="5">Statement Round 2</th></tr>
<tr><td rowspan="3">64</td><td rowspan="3">Where you have identified aspects of the sight test/eye examination that can be delegated, would you agree that every delegated aspect should be carried out under supervision, either in person or remotely?</td><td rowspan="3">3</td><td colspan="5">For a low-risk/higher-risk patient, where you have identified aspects of the sight test/eye examination that can be delegated, would you agree that every delegated aspect should be carried out under supervision, either in person or remotely?</td></tr>
<tr><td>Item number</td><td>Patient risk level</td><td>Median score</td><td>Proportion ‘Agreement’ %</td><td>Proportion Disagreement %</td></tr>
<tr><td>36</td><td>Low</td><td>4</td><td>59</td><td>24</td></tr>
<tr><td></td><td></td><td></td><td>38</td><td>Higher</td><td>4</td><td>65</td><td>29</td></tr>
</table>

65 = item missed consensus threshold narrowly by a single percentage point

Round 1 Qualitative results	Round 2 Qualitative results
The following themes emerged: • Conditions for separating (staff, IT, facilities) need to be considered • Refractive prescribing could be sent electronically, as long as communication is done in person • All information would need to be collated prior to prescribing and giving advice	• Asynchronous eye care models can have the following benefits for low-risk patients: ○ Effective for routine primary eye care (refraction, screening, monitoring) ○ Reduces unnecessary NHS appointments and specialist workload ○ Saves patient travel and consultation costs ○ Optimises NHS resources for high-risk patients

Round 1 Qualitative results	Round 2 Qualitative results

• *"Imaging could feasibly be conducted separately on the provision that those images are available for the examining clinician."*
• *"…advanced diagnostics might be more centralised - e.g. a small group of independent practices could have a single OCT at one location etc."*
• Regulatory implications (not specified)
• Separation by place could introduce risks
  ○ Low threshold screening test leading to increasing false positive referrals
  ○ Less convenient for the patient
  ○ Risk that the patient may not complete all necessary tests, e.g. due to not attending a second visit
  ○ Delayed diagnosis if there is an interval in time and place between visits
  ○ *"There is also concern that a sight test becomes a low threshold 'screening test' with a high rate of false positive referrals, especially with complex and elderly patients"*
• Risks related to carrying out tests at different times
• Conditions for separating sight test components
• Cost analysis
• Delegation: Current arrangements work well
• Accountability and responsibility should remain with the optometrist
	• However, some participants also highlighted potential risks or issues, including:
	  ○ Asynchronous models will take longer for the patient (but proposed could also save time)
	  ○ May increase likelihood of referral due to lower decision thresholds when taking clinical responsibility for others' work, also increased risk of false positive referrals
	• It was suggested that asynchronous models are more appropriate for secondary care due to capacity issues. However, rather than routine in primary care, they could be used to:
	  ○ Refine referrals, e.g. patients deemed higher risk attending an asynchronous OCT visit or to allow repeat measures or
	  ○ Has a place for triage in determining priority and whether a sight test or MECS is required
	• Some participants felt there was not enough evidence to support any of the options
	• Financial cost saving for the NHS clearly will depend on patients
	• Most low-risk patients will not have NHS funded sight tests [in England]
	• Some components already delegated as "pre-screening" tests prior to sight test by the optometrist (such as auto-refraction)
	• Emphasis on training and ability to access advice and support from the optometrist in real time

Round 1 Qualitative results	Round 2 Qualitative results
Overall, panel members shared the view that a [further] separation by place should not be introduced unconditionally but made dependent on sufficient facilities and a robust regulatory framework to minimise risks for patients. A point was made that current legislation already permits the use of fixed clinical as well as remote settings. The comments were linked to the previous sections and highlighted concerns that risks may emerge when asynchronous models were introduced unconditionally. IT systems were mentioned, and panel members remarked that costs should be considered, for example to cover the introduction of new IT systems to facilitate asynchronous models.	

Domain 6a: NHS risks

A key element of this project was the assessment of potential risks that may be associated with separating eye test components. In terms of risks to the NHS, consensus was reached on four out of six risks in round 1 (risks missing clinical information, difficulties seeing diagnostic patterns, insufficient continuity of care, and the risk of increasing health inequalities).

To validate the findings for the two different risk strata, the items were included again in round 2. The four risks mentioned also reached consensus for the higher-risk scenario. However, for the low-risk strata, only two risks, namely difficulties seeing diagnostic patterns and insufficient continuity of care reached consensus. The consensus threshold was missed by a single percentage point for missing clinical information and the risk of increasing health inequalities.

<table>
<tr><th>Item number</th><th>Statement Round 1</th><th>Median score</th><th colspan="5">Statement Round 2</th></tr>
<tr><td rowspan="4">67</td><td rowspan="4">Separating routine sight test components (e.g. carrying out components at different times/ different places/ different people) will likely lead to an increase in the number of referrals to secondary care.</td><td rowspan="4">3.5</td><td colspan="5">For a low-risk/higher-risk patient, separating routine sight test components (e.g. by time, place, person) will lead to an increase in the number of referrals to secondary care.</td></tr>
<tr><td>Item number</td><td>Patient risk level</td><td>Median score</td><td>Proportion ‘Agreement’ %</td><td>Proportion Disagreement %</td></tr>
<tr><td>40</td><td>Low</td><td>4</td><td>53</td><td>29</td></tr>
<tr><td>41</td><td>Higher</td><td>4</td><td>65</td><td>24</td></tr>
</table>

65 = item missed consensus threshold narrowly by a single percentage point

Item number	Statement Round 1	Median score	Statement Round 2
71	Separating sight test components (e.g. carrying out components at different times/ different places/ different people) will likely lead to a cost increase for the NHS.	3	For a low-risk/higher-risk patient, separating sight test components (e.g. by time, place, person) will lead to a cost increase for the NHS.

Item number	Patient risk level	Median score	Proportion 'Agreement' %	Proportion Disagreement %
42	Low	3	47	18
43	Higher	4	65	12

65 = item missed consensus threshold narrowly by a single percentage point

Item number	Statement Round 1	Median score	Statement Round 2
75	Separating routine sight test components (e.g. carrying out components at different times/ different places/ different people) will likely lead to missing key clinical information.	4	For a low-risk/higher-risk patient, separating routine sight test components (e.g. by time, place, person) will lead to missing key clinical information.

Item number	Patient risk level	Median score	Proportion 'Agreement' %	Proportion Disagreement %
44	Low	4	65	24
45	Higher	4	71	18

65 = item missed consensus threshold narrowly by a single percentage point

Item number	Statement Round 1	Median score	Statement Round 2				
79	Separating routine sight test components (e.g. carrying out components at different times/ different places/ different people) may be associated with difficulties seeing diagnostic patterns.	4	For a low-risk/higher-risk patient, separating routine sight test components (e.g. by time, place, person) may be associated with difficulties seeing diagnostic patterns.				
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**
			47	Low	4	76	18
			48	Higher	5	76	18

Item number	Statement Round 1	Median score	Statement Round 2				
83	Separating routine sight test components (e.g. carrying out components at different times/ different places/ different people) may be associated with insufficient continuity of care.	4	For a low-risk/higher-risk patient, separating routine sight test components (e.g. by time, place, person) may be associated with insufficient continuity of care.				
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**
			49	Low	4	76	24
			50	Higher	5	76	24

Item number	Statement Round 1	Median score	Statement Round 2				
87	Separating routine sight test components (e.g. carrying out components at different times/ different places/ different people) may be associated with the risk of increasing health inequalities.	4	For a low-risk/higher-risk patient, separating routine sight test components (e.g. by time, place, person) may be associated with the risk of increasing health inequalities.				
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**
			51	Low	4	65	35
			52	Higher	4	71	29

65 = item missed consensus threshold narrowly by a single percentage point

Domain 6b: NHS benefits

The separation of eye test components could not only be associated with risks but also benefits to the NHS. For patients in the higher-risk category, consensus of disagreement was reached that secondary care may experience a decrease in referrals. The low-risk scenario just failed to reach the consensus threshold.

A majority of experts disagreed that there may be cost savings to the NHS for both risk levels. No consensus was reach on whether the separation may lead to a better use of resources and personnel.

<table>
<tr><th>Item number</th><th>Statement Round 1</th><th>Median score</th><th colspan="5">Statement Round 2</th></tr>
<tr><td rowspan="4">92</td><td rowspan="4">Separating routine sight test components (e.g. carrying out components at different times/ different places/ different people) will likely lead to a decrease in the number of referrals to secondary care.</td><td rowspan="4">3</td><td colspan="5">For a low-risk/higher-risk patient, separating routine sight test components (e.g. by time, place, person) will lead to a decrease in the number of referrals to secondary care.</td></tr>
<tr><td>Item number</td><td>Patient risk level</td><td>Median score</td><td>Proportion ‘Agreement’ %</td><td>Proportion Disagreement %</td></tr>
<tr><td>54</td><td>Low</td><td>2</td><td>12</td><td>65</td></tr>
<tr><td>55</td><td>Higher</td><td>2</td><td>6</td><td>76</td></tr>
</table>

65 = item missed consensus threshold narrowly by a single percentage point

Item number	Statement Round 1	Median score	Statement Round 2				
94	Separating sight test components (e.g. carrying out components at different times/ different places/ different people) will likely lead to cost savings for the NHS.	2.5	For a low-risk/higher-risk patient, separating sight test components (e.g. by time, place, person) will lead to cost savings for the NHS.				
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**
			56	Low	2	6	71
			57	Higher	2	6	76

Item number	Statement Round 1	Median score	Statement Round 2				
96	Separating sight test components (e.g. carrying out components at different times/ different places/ by different people) will likely lead to better use of clinical resources and personnel.	3	For a low-risk/higher-risk patient, separating sight test components (e.g. by time, place, person) will lead to better use of clinical resources and personnel.				
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**
			58	Low	2	24	53
			59	Higher	2	24	53

Round 1 Qualitative results	Round 2 Qualitative results
On risks to the NHS: The following themes emerged: • Cutting corners possible • Separation of components not a suitable model for some vulnerable groups • Could increase or decrease access/inequalities • Risk – lower uptake of sight test A range of viewpoints were noted, but overall, most respondents felt that there was a risk of increasing health inequalities. However, some respondents expressed the view that separating eye test components may be associated with a reduction in health inequalities. Additional NHS risks were identified: 1) Lines of responsibility – who takes overall responsibility? 2) Increased complexity and pressure 3) Standards of care and technology – currently flawed 4) Reduced provider choice and scope of local services 5) Increased environmental impact 6) Impact on skills and training 7) Issues with referral accuracy, diagnosis accuracy and costs from inefficiency • Cost issues were raised: "*Economically speaking, the NHS pays a fixed cost. The cost it pays already does not cover the actual cost*	• Results for all individual components would need to be attached to the patient record and available to the assessor • *"One clinician talking with, listening to, and agreeing a management plan with a patient will give a more holistic "feel" for the presenting symptoms, their impact, and what matters to the patient, and what they want to get out of the interaction. Moving everything to a laboratory-type checklist risks degrading the experience, the outcome and the ability to make every contact count."* • More evidence needed to assess impact of separating sight test components • Potential risks: ○ Clinical information could be missed – but could be mitigated with processes ○ Potential for cost efficiency – but likely to be less convenient for the patient ○ Increased referrals ○ Increased cost for the NHS – especially if locums are allowed ○ Risk of more errors / misunderstandings / omissions (where a single episode of care is only 15+10 minutes) ○ Losing the element of the practitioner's "sixth sense" when testing remotely • *"Subtle signs and symptoms picked up through the sight test are likely to be missed, or not deemed important enough to record, but combined point the optometrist to consider other possibilities, and conduct further tests. Proving an increase in health*

Round 1 Qualitative results	Round 2 Qualitative results
of provision. Variations in areas like this are not likely to reduce practice costs significantly but might slightly mitigate the impact of underfunding." • Separation might disrupt the clinical decision making, which evolves during the sight test and may require change in priority of investigations. Clues and "soft signs" might be missed because of "*what is already a relatively short episode of care*." • Virtual clinics are more suited to monitoring of specific diseases but might be useful for collecting supplementary information for referral refinement • New models of primary eyecare needed: "*I can see the benefits if the sight test evolves into a much more comprehensive primary eye care model including IP [Independent Prescribing] management, e.g., WGOS, so more clinical time is allotted to the patient, rather than just getting through more sight tests in a day."* *On benefits to the NHS:* The following themes emerged: • Utilising specific areas of expertise • Optimisation of eye care practitioner's time • Cost savings through delegation • Accessibility for patients • Lack of evidence for benefits	*inequalities is a difficult area, too much focus in being placed on separating the components of the sight test when primary eye care services include much more, MECS, repeat measures by GAT [Goldmann Applanation Tonometry], cataract pre- and post-. There is already inequity in access with fragmented commissioning, and recent research highlights access to sight tests due to deprivation (even with NHS funded sight tests) and high cost of spectacles), and poor access by certain at-risk ethic groups; this will not be solved by separating the sight test, but by proactive communications and engagement with 'at risk' populations."* • Low prevalence in low-risk patients means there is low risk of health inequalities.

Round 1 Qualitative results	Round 2 Qualitative results
• *"Main 'cost benefits' are workforce savings and extending reach for optical businesses. There is a need for the NHS to address the impact of deprivation and poor access by certain ethnic groups. I see this as only having a limited impact. We also need to increase the coverage of ICB [Integrated Care Board] enhanced services in England e.g. CUES [Community Urgent Eyecare Service], MECS, and a change in sight test delivery might release more clinical time for these services. However, there is a risk of unemployed optoms if this shift in services does not occur. Maybe improved access to a sight test in very remote or underserved areas, but there are many other reasons why people do not present for a sight test e.g., GOC public perceptions survey, cost of specs etc."* Responses showed that in addition to carrying risks for the NHS, there are a number of potential benefits if eye test components were separated. Yet, it remains unclear how exactly the risks and benefits should be weighted and whether benefits would outweigh the risks (assuming benefit > risk is the intended outcome).	

Domain 7a: Patient risks

The separation of eye test components may also be associated with risks to patients. The majority of panel members agreed that for higher-risk patients, there may be a risk of a delayed diagnosis. The consensus threshold was just missed for the low-risk scenario. Similarly, the panel voiced that there may be a risk of missing ocular conditions, and delayed treatment in higher-risk but not lower-risk patients.

Consensus was also reached that separating sight test components may be associated with an increased risk of higher-risk patients experiencing irreversible visual impairment. There may also be a reduction in continuity of care for patients experiencing irreversible visual impairment (both risk levels).

<table>
<tr><th>Item number</th><th>Statement Round 1</th><th>Median score</th><th colspan="5">Statement Round 2</th></tr>
<tr><td rowspan="4">99</td><td rowspan="4">Separating sight test components may be associated with the risk of delaying any diagnosis in adult patients.</td><td rowspan="4">4</td><td colspan="5">For a low-risk/higher-risk patient, separating sight test components (e.g. by time, place, person) may be associated with the risk of delaying any diagnosis in adult patients.</td></tr>
<tr><td>Item number</td><td>Patient risk level</td><td>Median score</td><td>Proportion ‘Agreement’ %</td><td>Proportion Disagreement %</td></tr>
<tr><td>60</td><td>Low</td><td>4</td><td>65</td><td>18</td></tr>
<tr><td>61</td><td>Higher</td><td>4</td><td>76</td><td>12</td></tr>
</table>

65 = item missed consensus threshold narrowly by a single percentage point

Item number	Statement Round 1	Median score	Statement Round 2				
103	Separating sight test components may be associated with the risk of missing ocular conditions (i.e. missed diagnosis) in adult patients.	4	For a low-risk/higher-risk patient, separating sight test components (e.g. by time, place, person) may be associated with the risk of missing ocular conditions (i.e. missed diagnosis) in adult patients.				
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**
			62	Low	4	53	29
			63	Higher	4	71	24

Item number	Statement Round 1	Median score	Statement Round 2				
107	Separating sight test components may be associated with an increased risk of delaying treatment in adult patients.	4	For a low-risk/higher-risk patient, separating sight test components (e.g. by time, place, person) may be associated with an increased risk of delaying treatment in adult patients.				
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**
			64	Low	4	59	24
			65	Higher	4	71	12

Item number	Statement Round 1	Median score	Statement Round 2				
111	Separating sight test components may be associated with an increased risk of adult patients experiencing irreversible visual impairment.	4	For a low-risk/higher-risk patient, separating sight test components (e.g. by time, place, person) may be associated with an increased risk of experiencing irreversible visual impairment.				
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**
			66	Low	3	29	29
			67	Higher	4	71	12

Item number	Statement Round 1	Median score	Statement Round 2				
115	Separating sight test components may be associated with a reduction in convenience in relation to accessing care for patients experiencing irreversible visual impairment.	4	For a low-risk/higher-risk patient, separating sight test components (e.g. by time, place, person) may be associated with a reduction in convenience in relation to accessing care.				
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**
			68	Low	3	47	29
			69	Higher	3	47	29

Item number	Statement Round 1	Median score	Statement Round 2				
119	Separating sight test components may be associated with a reduction in continuity of care for patients experiencing irreversible visual impairment.	4	For a low-risk/higher-risk patient, separating sight test components (e.g. by time, place, person) may be associated with a reduction in continuity of care.				
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**
			70	Low	4	76	18
			71	Higher	4	76	18

Item number	Statement Round 1	Median score	Statement Round 2				
123	Separating sight test components may be associated with increasing barriers to accessing care for patients experiencing irreversible visual impairment.	3.5	For a low-risk/higher-risk patient, separating sight test components (e.g. by time, place, person) may be associated with increasing barriers to accessing care.				
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**
			72	Low	4	53	29
			73	Higher	4	53	24

Domain 7b: Patient benefits

The separation of components may also lead to benefits for patients. However, there was no consensus for either risk level on whether patients could benefit from reduced waiting times. The consensus threshold was just missed for items considering the questions whether eye tests may take place in locations more convenient to patients or whether there would be less or easier travel (both risk levels).

<table>
<tr><th>Item number</th><th>Statement Round 1</th><th>Median score</th><th colspan="5">Statement Round 2</th></tr>
<tr><td rowspan="4">128</td><td rowspan="4">Separating sight test components may be associated with reduced waiting times for patients.</td><td rowspan="4">3</td><td colspan="5">For a low-risk/higher-risk patient, separating sight test components (e.g. by time, place, person) may be associated with reduced waiting times for patients.</td></tr>
<tr><td>Item number</td><td>Patient risk level</td><td>Median score</td><td>Proportion ‘Agreement’ %</td><td>Proportion Disagreement %</td></tr>
<tr><td>74</td><td>Low</td><td>3</td><td>29</td><td>47</td></tr>
<tr><td>75</td><td>Higher</td><td>3</td><td>29</td><td>47</td></tr>
</table>

Item number	Statement Round 1	Median score	Statement Round 2
130	Separating sight test components may be associated with more convenient locations for patients.	4	For a low-risk/higher-risk patient, separating sight test components (e.g. by time, place, person) may be associated with more convenient locations for patients.

Item number	Patient risk level	Median score	Proportion 'Agreement' %	Proportion Disagreement %
76	Low	4	65	24
77	Higher	4	65	24

65 = item missed consensus threshold narrowly by a single percentage point

Item number	Statement Round 1	Median score	Statement Round 2
132	Separating sight test components may be associated with easier or less travel for patients.	4	For a low-risk/higher-risk patient, separating sight test components (e.g. by time, place, person) may be associated with easier or less travel for patients.

Item number	Patient risk level	Median score	Proportion 'Agreement' %	Proportion Disagreement %
78	Low	4	65	24
79	Higher	4	65	24

65 = item missed consensus threshold narrowly by a single percentage point

Round 1 Qualitative results	Round 2 Qualitative results
A wide range of comments were received: • Patients not returning for additional tests • Risks depend on patient presentation (low vs. high-risk referrals) and individual pathway (e.g. rebooking a dilation vs. all sight test split up) • The risk depends on "timings between the elements" • If the optometrist is online and anywhere in UK or abroad, they won't have knowledge of the local pathways • Risk of poor record keeping and communication • Importance of "proper processes, standards and systems" being put in place to minimise risks • Missed soft signs • It depends on patient presentation and who retains the overall responsibility • Lack of knowledge of local referral pathways if the optometrist is online • "Interface dynamics" – interfaces carry inherent risks around responsibilities, accountabilities and governance • Importance of ensuring minimal time delay between components as that would delay treatment • The risk and severity depend on pathology and whether the test is split e.g. to provide a remote model or a dilation booked on another day • With a system in place, it could lead to *"acceleration of patients that actually need to be seen and a reduction in patients that don't need to be seen"*	• Risk management through ensuring there are frameworks in place, i.e. there is not a significant time delay in care, all tests are completed as expected and all data can be shared and viewed as if the optometrist was in the room – it is possible • Potential benefits: If a wider range of ECPs are being utilised to conduct elements of the sight test, coupled with remote testing and objective analysis. More patients will be seen, more conveniently, which in turn means the high-risk patients are being dealt with and prioritised • Eye care is not just about the sight test, but contact lenses, choosing and collecting spectacles, MECS, and other primary eye care services, low vision; in England, sight tests and core enhanced services for primary care optometry should be considered as part of the same continuum of first contact care. In Scotland GOS, the sight test is deemed to be the refraction • Any benefit of less travel or more convenient access must be considered in relation to potential risks of delayed or missed diagnosis, incorrect referral etc.

Round 1 Qualitative results	Round 2 Qualitative results
• Improving the referral quality: "*A more objective testing criteria, utilising technology where applicable, that is interoperable allowing for the most objective data being collated and reviewed would allow clinicians to see the more urgent cases sooner*" • Importance of clear frameworks and governance and accountability structures • Referral risks are more likely in the over 60 yrs (10% relative risk (RR)) and over 70yrs (20% RR) • Might increase convenience and/or accessibility for patients if they can decide to spread the tests around their schedule • Triage, remote monitoring and review in and out of clinic can be more convenient for patients (particularly sight impaired) • More touch points with patients can increase patient satisfaction • Likely to reduce continuity of care with more practitioners involved • Dependent on multiple factors, such as complexity, where a patient goes for their sight test, their IT system, where the practitioner is based (UK or outside UK), and whether previous records are accessible across their network • Alternative eyecare delivery arrangements could reduce barriers, e.g. if delivered remotely, in more convenient community settings or dissociated with the sale of spectacles • Separated sight test inappropriate for patients experiencing irreversible visual impairment • Importance of rigour, particularly in relation to systems, technologies and interoperability. The current processes to	

Round 1 Qualitative results	Round 2 Qualitative results
evaluate these technologies are insufficient and proper standards and testing methodologies for remote systems need to be developed and implemented in order to ensure required standard of care • *"Where a registered optometrist is the lead clinician and arranges a sight test in accordance with existing regs/NHS contracts, and they have a clinical reason to arrange a sight test in a specific way for a specific patient (be it on the basis of reasonable adjustments or advanced tests to rule out pathology) that "separating out a sight test" might have benefits and the benefits > risks. Where a patient pathway is broken into segments and risks increase, but there is no benefit for that patient (only a benefit for a provider) then that does not work."* • Arranging multiple episodes of care is inappropriate for some patient groups, e.g. frail patients On patient benefits: • Remote or hybrid delivery of eye tests could lead to higher adoption, better compliance to medical treatments and reduce waiting times. However, some experts also commented that waiting times are not an issue in primary care • Potential benefits for the practice, such as more clinical time for CUES, MECS etc. if commissioned, reduction in costs and number of optoms within the practice, keeping the same activity	

Domain 8: Impact on practitioners

Consensus was reached for items related to the impact of separation on practitioners, with panel members agreeing that there may be a risk of lower quality of patient care, an increased risk of litigation, and the possibility that fewer patients may be attending practices for routine examinations (which may have an impact on the financial viability of a practice).

<table>
<tr><th>Item number</th><th>Statement Round 1</th><th>Median score</th><th colspan="5">Statement Round 2</th></tr>
<tr><td rowspan="3">135</td><td rowspan="3">Separating sight test components is associated with an increased risk of lower quality of patient care.</td><td rowspan="3">4</td><td colspan="5">For a low-risk/higher-risk patient, separating sight test components (e.g. by time, place, person) could be associated with an increased risk of lower quality of patient care.</td></tr>
<tr><td>Item number</td><td>Patient risk level</td><td>Median score</td><td>Proportion ‘Agreement’ %</td><td>Proportion Disagreement %</td></tr>
<tr><td>81</td><td>Low</td><td>4</td><td>71</td><td>24</td></tr>
<tr><td></td><td></td><td></td><td>82</td><td>Higher</td><td>4</td><td>71</td><td>24</td></tr>
</table>

Item number	Statement Round 1	Median score	Statement Round 2				
140	Separating sight test components is associated with an increased risk of litigation.	4	For a low-risk/higher-risk patient, separating sight test components (e.g. by time, place, person) could be associated with an increased risk of litigation.				
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**
			83	Low	4	76	18
			84	Higher	4	76	18

Item number	Statement Round 1	Median score	Statement Round 2				
144	Separating sight test components may be associated with fewer patients attending for a routine sight test, especially if it is perceived as more difficult.	3.5	For a low-risk patient, separating sight test components (e.g. by time, place, person) could be associated with fewer patients attending for a routine sight test, especially if it is perceived as more difficult.				
			Item number	**Patient risk level**	**Median score**	**Proportion 'Agreement' %**	**Proportion Disagreement %**
			85	Low	4	71	12
			86	Higher	4	71	12

Round 1 Qualitative results	Round 2 Qualitative results
• Separation might increase quality of care or perception of quality care through “digital touch points” or delegation to multidisciplinary team but equally, multiple visits could result in a worse experience • Separation may be inappropriate for patient groups with more complex needs, urgent eyecare presentations, existing conditions requiring monitoring or treatment • It is not clear if locums will be considered 'safe' to conduct online sight tests, as not resident and no responsibilities within the practice • Less holistic approach to care and risk of inconsistent approach between different practitioners • Data protection concerns were raised as was the potential for delayed decisions and patients not returning for the rest of the test • Worse relationship with care providers and communication of findings as well as less empathy due to digital detachment • Compassion fatigue with high volume remote clinical assessments • Missed subtle signs of pathology - it would be easy to rely on imaging and not the extra information provided by direct fundus assessment • Risks increased with the number of locations / people involved	• *“Most adults only see their ECP every 2 years. By having more regular touch points with patients, both in and out of clinic, the patient becomes more compliant, educated and attuned to eye health. This, unfortunately, will raise concerns of litigation, but the increase in imaging, objective analysis and regular care points will also mitigate against bad litigious outcomes.”* • Risks for practitioners unlikely – but can lead to fewer people attending as it will be perceived as more time consuming and inconvenient or not understanding changes and public education would be critical • Optometrists risk becoming technicians and not using their full scope of practice and clinical decision making, especially if IP • There is a role for remote exams but not by breaking up the sight test more than it is now with pre-screening

Round 1 Qualitative results	Round 2 Qualitative results
• Increased complexity of investigations and new medico-legal issues which involve both business and individual registrants • Apportioning responsibility may be unclear, as there may be IT system failures to consider • Interface dynamics carry inherent risks around responsibilities, accountabilities and governance • Patient perception of a "worse" service drives litigation • Increased risk of litigation but reduced/unaffected chances of successful litigation due to multiple datapoints providing strong evidence to repute litigation • The industry leaders would ensure there is no reduction in sight tests • Attendance would depend on the patient group, e.g. younger vs. older age groups if technology involved • It should be a choice and restricted to low-risk patients (19-60 with no risk for eye disease) • Might be perceived by patients as easier and patients who wait until their vision deteriorates might find remote care more convenient and appealing • Attendance would depend on the benefits for the patient • *"ECP education, training and technical understanding, I see as a risk of referral. Although essentially the same, a separated eye test will require ECP education and acceptance."* • Patients only attending one appointment due to confusion as they might think their sight test has been completed or due to personal choice and perceived outcomes of the first test	

Round 1 Qualitative results	Round 2 Qualitative results
On practitioner benefits: • Benefits for practitioners could include higher salaries, opportunities for remote and home working and environmental benefits • Benefits of hybrid care could lead to increases in retention, treatment compliance and revenue: "*Utilisation of hybrid care, objective technology has been proven in multiple other fields to increase retention, treatment compliance and therefore revenue. Chair-time is maximised, other ECP time fully utilised and treatments often lost to secondary care increase. This is seen in the UK already, with one of the multiples adopting hybrid-care & e-commerce during covid and beyond which has resulted in 2yrs of growth against the market trend.*" • Benefits of delegation could free capacity, improve access and convenience, may reduce inequalities in rural or remote communities, expend capabilities in the support team	

Reflection on round 2

This second round of the Delphi study is providing insight into expert perspectives on the risks and benefits of separating eye examination components in the UK. The inclusion of two realistic population-based case scenarios using two different risk profiles has provided additional and useful information and shown that the risks are not deemed equal for all patients.

Panel members raised concerns that evolved around the variability of patient presentations and the complexity of clinical interactions, which may be associated with missing critical nuances. Cautious optimism was conveyed that separating components may be beneficial, however panel members also expressed scepticism that patients may select eye examinations involving separated test options. Equally, there were safety concerns around separation of sight test/eye examination components which must be carefully considered and weighed.

While using two generic patient scenarios of low and moderate risk strata provided a more granular perspective on separating eye examination components, this approach may need to be adapted in future work to reflect the complexity involved in many clinical scenarios. Given the highly varied nature of ocular and systemic multimorbidity, it seems likely that assessing every conceivable morbidity scenario, or every demographic and social background combination that practitioners may encounter in practice, may be challenging.

With regards to the qualitative analysis, panel members provided a range of valuable comments. The nature of these comments should be considered in any future update of eye care policy proposals to ensure important nuances are not missed.

4.4 Workflow model

Building on the work of ROs1-3, an eye examination workflow model was created, which incorporates separation of test components by location (places), modalities (including artificial intelligence (AI)), and remote clinical assessment. The workflow model was designed as an initial step to inform future discussions of eye care planning. With adaptability in mind, it is expected that the model can be adapted to be applicable across the four nations and serve to support regional eye care delivery (e.g. the wider scope of routine optometric practice in Scotland). Options of delegating tasks and workforce cadres available in eye care settings and the possibility of task shifting have been taken into consideration (Figure 2).

4.4.1 Introductory notes

The following section outlines the proposed workflow model in detail. While the model incorporates teleoptometry options, enabling separation of care components by location, time, and person for low-risk patients, clinicians are expected to retain the option of overriding any decision within the workflow. Designed as a fully remote consultation framework for low-risk patients, this innovative teleoptometry model introduces significant flexibility and represents a substantial departure from conventional eye care delivery models. Teleoptometry/remote care could involve assessments without an optometrist on the premises and a decision on the most appropriate patient pathway would need to be made based on the risk stratification prior to any testing taking place.

4.4.2 Patient self-registration

The initial step involves the patient requesting an appointment for an eye examination* (i.e. registering their intent). This step could be done by calling a community optometry practice, visiting the practice, or sending an email requesting an appointment. The modality of contact and registration will depend on the patient's preferences and the options available at the practice of choice.

**Although various terms are used throughout the United Kingdom, the term 'sight test' is, for the purposes of this document, considered part of an eye examination, a term used by the College of Optometrists and within eye care services in Scotland.*

4.4.3 Triage tool, risk stratification, clinical decision and management

After a patient has registered and scheduled an appointment, an initial assessment will be undertaken during which their demographic information (e.g. age, ethnic background, previous ocular and systemic history) will be reviewed (triage). Any symptoms which could be indicative of an eye condition will be evaluated. This process could be done remotely with the option to ask a patient to come to the practice (as a safety backup option).

A) Asymptomatic patient

A patient presenting without any symptoms will undergo risk stratification to assess the level of risk of ocular disease/visual impairment/ the requirement for stepped-up care, with two possible outcome categories: i) low risk; ii) higher risk (similar to the risk stratification used in the Delphi study (section 3.4.4)). In future, this stratification could involve the use of artificial intelligence.

A1 Asymptomatic low-risk patient

Low-risk patients will proceed to undergoing preliminary tests which may be delegated to trained staff such as clinical/optical assistants (not optometrists). If these preliminary tests yield results within normal limits, the patient could be considered for remote optometric consultation (teleoptometry). The remote consultation allows eye care to be delivered at a different time, at a different place, and by a different person. Alternatively, low-risk patients may opt for an in-person consultation with an optometrist.

A2 Asymptomatic higher-risk patient

Similar to low-risk patients, higher-risk patients will undergo preliminary tests, followed by a mandatory in-person optometric consultation. Teleoptometry will not typically be used for this group of patients, however, optometrists can take a flexible approach depending on the specific clinical situation and requirements of a patient.

Clinical decision-making

Following completion of clinical testing and optometric consultations, the optometrist will formulate a clinical decision and devise a management plan. There are three possible outcomes:

i) the patient will be discharged (having reached the end point of this pathway) with appropriate follow-up care, or

ii) the patient will be monitored by a community optometrist, or

iii) they will be referred, for example to another community optometrist or to the hospital eye service for further investigation, confirmation of diagnosis and/or initiation of treatment.

B) Symptomatic patient

Patients who present with symptoms indicative of ocular disease or changes in vision will undergo an in-person consultation with an optometrist.

This consultation will include preliminary tests, as well as assessments of ocular health and vision. For symptomatic patients, all parts of the eye test/examination are conducted at the same time, in the same place, and by the same person.

Clinical decision-making

Following the consultation, the optometrist will formulate a clinical decision and develop a management plan. The possible outcomes include:

i) the patient will be discharged (having reached the end point of this pathway) with appropriate follow-up care, or

ii) the patient will be monitored by a community optometrist, or

iii) they will be referred, for example to another community optometrist or to the hospital eye service for further investigation, confirmation of diagnosis, and/or initiation of treatment.

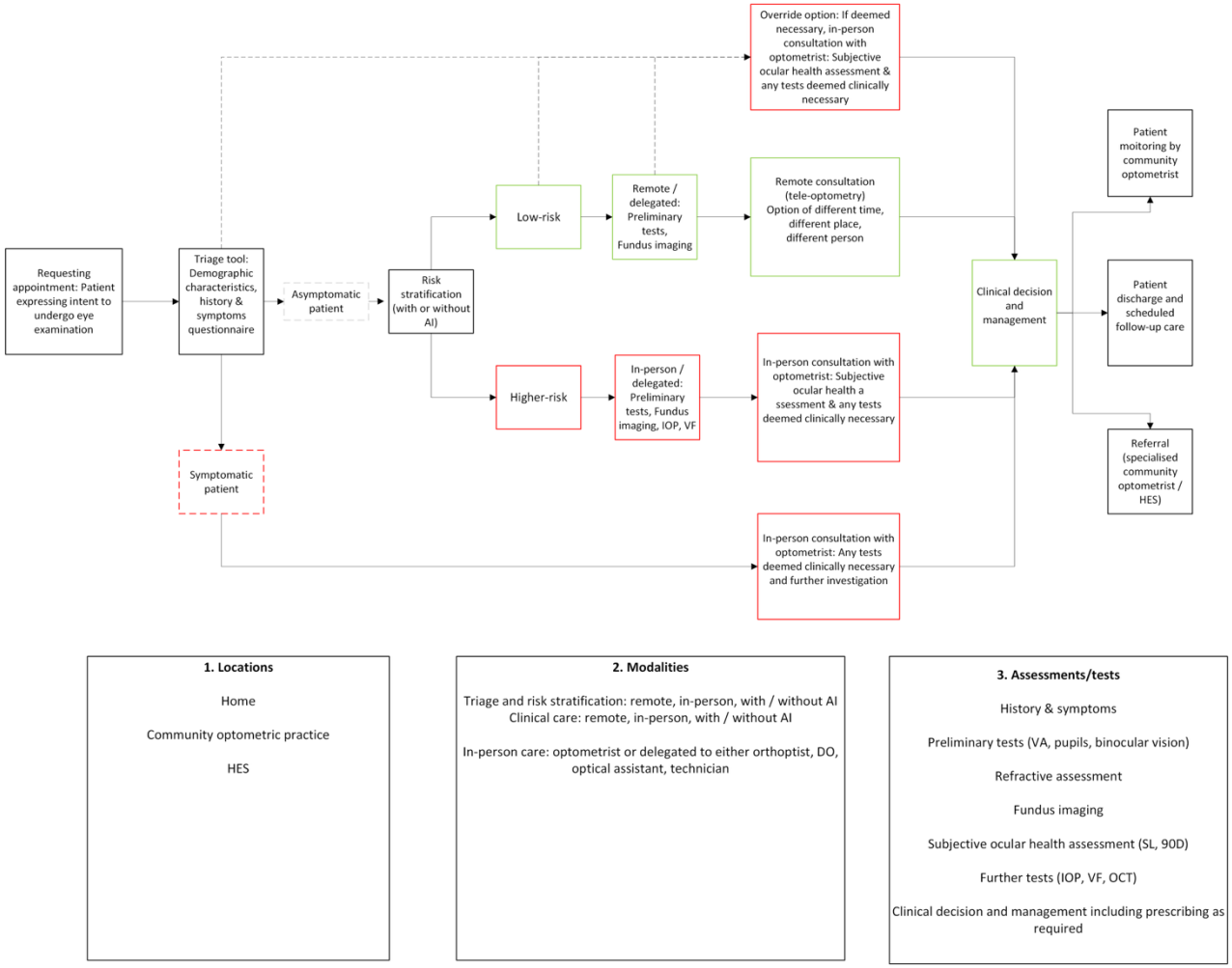

Figure 2. Workflow model of a flexible yet comprehensive primary eye care delivery model utilising artificial intelligence to inform risk stratification, task shifting, and remote testing modalities.

5 Discussion and conclusions

In this study, the risks and benefits of separating eye test components for patients attending primary eye care settings such as community optometric practice were evaluated. This research project involved a Delphi study, a scoping review of the literature, and, taking the results of these two into consideration, the development of an updated workflow model.

The Delphi panel composition was carefully designed to ensure expert views were included from industry, professional organisations, clinicians, academics, and public health experts. The Delphi study was complemented by an extensive scoping review of the literature and the development of a refined workflow model that includes separation of eye test components by person, time, and place.

The scoping review search returned more than 3,700 articles, which were screened and reviewed to ensure applicability to the project's objectives. The scoping review identified a range of telemedicine models that provide evidence of benefits to delivery of eyecare services. Examples of such benefits include that asynchronous teleophthalmology can lead to a reduction in unnecessary hospital referrals, especially urgent referrals, and freeing up capacity for patients with vision-threatening disease (Sharma et al., 2025). In a Scottish context, digital ophthalmology was shown to reduce referrals and patient waiting time, lead to better quality referrals, and generate high patient satisfaction (Annoh et al., 2019). Another UK study reported non-inferiority of a teleoptometry examination compared to a comprehensive in-person eye examination (standard care) (Patel et al., 2023). It is important to note that the majority of evidence identified in the scoping review regarding the success and benefits of eyecare delivery, particularly in terms of reducing system burden, pertains to secondary care settings. The delivery of eye care at these settings is typically characterised by significant workforce and system constraints, as well as extended waiting lists. In contrast, such challenges are generally less common in primary eye care settings.

The examples above illustrate that there are benefits associated with new models of eye care. The findings of the present Delphi study help to contextualise and extend the findings reported in the literature. For example, Delphi panel members voiced the view that it could be helpful to develop/enhance existing triage mechanisms to identify patients at risk, including risk stratification. This could lead to patients being offered an eye care pathway that is tailored to their specific needs and individual risk profile.

The Delphi study also demonstrated consensus among panel members that separating eye test components may be associated with risks to the NHS and patients, particularly difficulties in seeing diagnostic patterns, and leading to insufficient continuity of care for both low-risk and higher-risk patients. While some risks may apply to patients of low and higher risk categories, others were deemed to be associated only with patients within the higher-risk strata, for example the risks of missing key clinical information, and a potential

for increase in health inequalities. According to Delphi panel members, patients within the higher-risk category may also face delays in diagnosis, missed ocular conditions, treatment initiation being delayed, as well as a reduction in convenience of accessing care. Irrespective of risk level, the panel's view was that separating components may result in patients experiencing a reduction in continuity of care.

Overall, this project highlights that the separation of eye test components by person, time, or place may offer benefits and pose risks for both the NHS and patients.

While it is acknowledged that a case could be made for a review of the current primary eye care delivery models in the UK, there was a range of Delphi panel members' views on the separation of eye examination components. However, it is possible that the composition of the panel may have led to a bias towards the status quo and led to a risk-averse position being reflected in the findings.

This study offers insight into experts' and professional bodies' perspectives and suggests that a personalised approach to risk assessment would likely be preferable. The qualitative data gathered in this project support these findings and indicate that the perceived risks are more individual, i.e. related to patients, than systemic in nature, suggesting limited applicability of these risks across broader contexts. The model was developed to be applicable across all four nations of the UK, with careful consideration of regional differences in eye care delivery, such as the broader scope of routine optometric practice in Scotland, while acknowledging the inherent limitations in its wider applicability across different service settings.

We recognise that the nature of the Delphi model's emphasis on consensus may limit the emergence of innovative ideas that challenge the status quo. However, tailoring eye care to individuals including prediction and prevention, for example through considering patients' risk profiles more thoroughly may offer significant advantages in the prevention, diagnosis and management of ocular conditions.

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This section contains the list of the articles included in the data extraction of the scoping review (section 4.1).

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Appendices

Appendix 1 Results round 1

Domain 2 Criticality of eye test components

Statement			
The following section is concerned with obtaining your views on the criticality of individual sight test / eye examination components. The questions relate to routine sight tests /examination in adult patients only. Please indicate your answer by selecting one of the answer options provided. Please assign a weighting score to each of the following components of a routine sight test/eye examination in an adult patient. The components you consider to be most important should be assigned a weighting of (10); least important components a weighting of (0). Please use the full range of scores from 0-10 to indicate your preferred weighting. Note that you can assign the same score more than once if you consider components to be of equivalent importance.			
Item number	**Component**	**Strength of consensus (median)**	**Strength of consensus (IQR)**
11	History, Signs, Symptoms	10	0
12	Presenting vision	8.5	1
13	Pupil reactions test	5.5	4.5
14	Binocular vision test	6	5.5
15	Objective refraction	7	5
16	Subjective refraction	8.5	2.75
17	Refractive prescribing	8.5	3.75

18	Subjective fundus assessment	10	1.75
19	Objective fundus assessment and imaging	7	2
20	Optical Coherence Tomography (OCT)	7	2.75
21	Assessment of intraocular pressure	7	3.75
22	Assessment of visual fields	7	3.75
23	Development of a patient management plan and clinical decision-making	10	1.75
24	Communicating the results to the patient	10	1

Statement

Which elements of a sight test / eye examination do you consider essential in order for the sight test to be **safe**? Please indicate as many essential components as you feel are appropriate. If required, definitions of the individuals sight test components are included at the bottom of this page. Answer options '1' = Essential for safe sight test / '2' = Not essential for safe sight test

Item number	**Component**	**Proportion agreement 'Essential' (Frequency)**	**Proportion agreement 'Not essential' (Frequency)**
25	History, Signs, Symptoms	100% (18)	0% (0)
26	Presenting vision	83% (15)	17% (3)
27	Pupil reactions test	72% (13)	28% (5)

28	Binocular vision test	61% (11)	39% (7)
29	Objective refraction	56% (10)	44% (8)
30	Subjective refraction	89% (16)	11% (2)
31	Refractive prescribing	78% (14)	22% (4)
32	Subjective fundus assessment	83% (15)	17% (3)
33	Objective fundus assessment and imaging	39% (7)	61% (11)
34	Optical Coherence Tomography (OCT)	28% (5)	72% (13)
35	Assessment of intraocular pressure	61% (11)	39% (7)
36	Assessment of visual fields	50% (9)	50% (9)
37	Development of a patient management plan and clinical decision-making	89% (16)	11% (2)
38	Communicating the results to the patient	94% (17)	6% (1)

Domain 3 Professionals involved in delivering primary eye care

Item number	Statement/question	Strength of consensus (median)	Strength of consensus (IQR)

41	Do you agree that the different components of a sight test/eye examination can be performed by more than one person eligible to perform such tests?	4	1

Statement/question

Are there any components of a sight test/eye examination which should be conducted by the same person? Please select as many components as applicable.

Item number	**Component**	**Proportion agreement 'Same person' (Frequency)**	**Proportion agreement 'Not same person' (Frequency)**
42	History, Signs, Symptoms	67% (12)	33% (6)
	Presenting vision	33% (6)	67% (12)
	Pupil reactions test	44% (8)	56% (10)
	Binocular vision test	44% (8)	56% (10)
	Objective refraction	39% (7)	61% (11)
	Subjective refraction	78% (14)	22% (4)
	Refractive prescribing	78% (14)	22% (4)
	Subjective fundus assessment	67% (12)	33% (6)

	Objective fundus assessment and imaging	22% (4)	78% (14)
	Optical Coherence Tomography (OCT)	22% (4)	78% (14)
	Assessment of intraocular pressure	22% (4)	78% (14)
	Assessment of visual fields	22% (4)	78% (14)
	Development of a patient management plan and clinical decision-making	83% (15)	17% (3)
	Communicating the results to the patient	94% (17)	6% (1)
Item number	**Statement** '1' Strongly disagree; '5' Strongly agree	**Strength of consensus (median)**	**Strength of consensus (IQR)**
43	The legal framework regulating primary eye care in the UK should allow for flexibility so that specified components of a sight test/eye examination could be carried out by members of different professional groups, e.g. orthoptists, dispensing opticians, optical assistants.	3	1

Domain 4 Timing: separation of components by time

Item number	**Statement** '1' Strongly disagree; '5' Strongly agree	**Strength of consensus (median)**	**Strength of consensus (IQR)**
46	The legal framework regulating primary eye care in the UK should allow for the components of a routine sight test/eye examination in adult patients to be carried	2.5	1.75

	out at different time points (i.e. non-contemporaneous).		
48	For a sight test/eye examination to be safe, it is essential that all critical components of a routine sight test in adult patients must be carried out at the same appointment (at the same time and place).	4	1.75
49	Any non-critical components of a routine sight test in adult patients can be carried out separately from the critical components and thus at a different time and/or a different place or online.	4	1

Statement/question

In order for a sight test/eye examination to be safe, which components need to be conducted at the same time (i.e. contemporaneously)? Please select as many components as applicable.

Item number	**Component**	**Proportion agreement 'Same time' (Frequency)**	**Proportion agreement 'Not at the same time' (Frequency)**
50	History, Signs, Symptoms	83% (15)	17% (3)
	Presenting vision	78% (14)	22% (4)
	Pupil reactions test	56% (10)	44% (8)
	Binocular vision test	61% (11)	39% (7)
	Objective refraction	67% (12)	33% (6)

	Subjective refraction	89% (16)	11% (2)
	Refractive prescribing	67% (12)	33% (6)
	Subjective fundus assessment	61% (11)	39% (7)
	Objective fundus assessment and imaging	44% (8)	56% (10)
	Optical Coherence Tomography (OCT)	44% (8)	56% (10)
	Assessment of intraocular pressure	50% (9)	50% (9)
	Assessment of visual fields	39% (7)	61% (11)
	Development of a patient management plan and clinical decision-making	78% (14)	22% (4)
	Communicating the results to the patient	83% (15)	17% (3)

Domain 5 Location: separation of components by place

Statement/question			
For a routine sight test/eye examination in adult patients to be safe, which components should be carried out in the same place? Please select as many components as applicable.			
Item number	**Component**	**Proportion agreement 'Same place' (Frequency)**	**Proportion agreement 'Not at the same place' (Frequency)**
52	History, Signs, Symptoms	67% (12)	33% (6)
	Presenting vision	78% (14)	22% (4)
	Pupil reactions test	72% (13)	28% (5)
	Binocular vision test	72% (13)	28% (5)
	Objective refraction	67% (12)	33% (6)
	Subjective refraction	89% (16)	11% (2)
	Refractive prescribing	67% (12)	33% (6)
	Subjective fundus assessment	78% (14)	22% (4)
	Objective fundus assessment and imaging	44% (8)	56% (10)
	Optical Coherence Tomography (OCT)	44% (8)	56% (10)

	Assessment of intraocular pressure	56% (10)	44% (8)
	Assessment of visual fields	44% (8)	56% (10)
	Development of a patient management plan and clinical decision-making	67% (12)	33% (6)
	Communicating the results to the patient	67% (12)	33% (6)
Statement/question			
For a routine sight test/eye examination in adult patients to be safe, which components could be carried out in different places? Please select as many components as applicable.			
Item number	**Component**	**Proportion agreement 'Different places' (Frequency)**	**Proportion agreement 'Not at different places' (Frequency)**
53	History, Signs, Symptoms	44% (8)	56% (10)
	Presenting vision	28% (5)	72% (13)
	Pupil reactions test	22% (4)	78% (14)
	Binocular vision test	33% (6)	67% (12)
	Objective refraction	33% (6)	67% (12)

	Subjective refraction	11% (2)	89% (16)
	Refractive prescribing	33% (6)	67% (12)
	Subjective fundus assessment	17% (3)	83% (15)
	Objective fundus assessment and imaging	67% (12)	33% (6)
	Optical Coherence Tomography (OCT)	67% (12)	33% (6)
	Assessment of intraocular pressure	56% (10)	44% (8)
	Assessment of visual fields	61% (11)	39% (7)
	Development of a patient management plan and clinical decision-making	39% (7)	61% (11)
	Communicating the results to the patient	44% (8)	56% (10)
Item number	**Statement** '1' Strongly disagree; '5' Strongly agree	**Strength of consensus (median)**	**Strength of consensus (IQR)**
54	The legal framework regulating primary eye care in the UK should allow for the components of a routine sight test in adult patients being carried out in different places.	3	2
57	Using asynchronous eye care models to deliver primary eye care such as a routine	2	1

	sight test in adult patients is likely to save time.		
58	Using asynchronous eye care models to deliver primary eye care such as a routine sight test in adult patients can save costs for patients and/or the NHS.	3	1
59	Using asynchronous eye care models to deliver primary eye care such as a routine sight test in adult patients can provide greater flexibility for patients, allowing for easier access to eye care.	4	1
60	Using asynchronous eye care models to deliver primary eye care such as a routine sight test in adult patients can help to increase the accuracy of referrals, for example in patients with suspected ocular hypertension/glaucoma.	3	0.75
61	Using asynchronous eye care models to deliver primary eye care such as a routine sight test in adult patients carries additional **risk** for patients, for example delayed referral and delayed initiation of treatment, or in patients with suspected ocular hypertension/glaucoma.	4	1

Statement/question

For a sight test/eye examination to be **safe**, which components could be delegated (to a person with an appropriate qualification, knowledge and skills)?

Item number	**Component**	**Proportion agreement 'Could be delegated' (Frequency)**	**Proportion agreement 'No delegation' (Frequency)**
63	History, Signs, Symptoms	28% (5)	72% (13

	Presenting vision	61% (11)	39% (7)
	Pupil reactions test	33% (6)	67% (12)
	Binocular vision test	44% (8)	56% (10)
	Objective refraction	56% (10)	44% (8)
	Subjective refraction	11% (2)	89% (16)
	Refractive prescribing	17% (3)	83% (15)
	Subjective fundus assessment	11% (2)	89% (16)
	Objective fundus assessment and imaging	78% (14)	22% (4)
	Optical Coherence Tomography (OCT)	78% (14)	22% (4)
	Assessment of intraocular pressure	83% (15)	17% (3)
	Assessment of visual fields	78% (14)	22% (4)
	Development of a patient management plan and clinical decision-making	0% (0)	100% (18)
	Communicating the results to the patient	6% (1)	94% (17)

	No item could be delegated	0% (0)	100% (18)
	I don't know which items could be delegated	17% (3)	83% (15)
Item number	**Statement** '1' Strongly disagree; '5' Strongly agree	**Strength of consensus (median)**	**Strength of consensus (IQR)**
64	Where you have identified aspects of the sight test/eye examination that can be delegated, would you agree that every delegated aspect should be carried out under supervision, either in person or remotely?	3	3

Domain 6 Impact of separating components: Risks and benefits for the NHS

Item number	Statement '1' Strongly disagree; '5' Strongly agree	Strength of consensus (median)	Strength of consensus (IQR)
67	**Separating routine sight test components (e.g. carrying out components at different times/ different places/ different people) will likely lead to an increase in the number of referrals to secondary care.**	3.5	1.75
68	Likelihood (1-10)	5	4.75
69	Severity (1-10)	4	2.75
71	**Separating sight test components (e.g. carrying out components at different times/ different places/ different people) will likely lead to a cost increase for the NHS.**	3	1
72	Likelihood (1-10)	5	3.5
73	Severity (1-10)	5	3.0
75	**Separating routine sight test components (e.g. carrying out components at different times/ different places/ different people) will likely lead to missing key clinical information.**	4	1
76	Likelihood (1-10)	6.5	2.75
77	Severity (1-10)	7	3.75
79	**Separating routine sight test components (e.g. carrying out components at different times/ different places/ different people)**	4	1

	may be associated with difficulties seeing diagnostic patterns.		
80	Likelihood (1-10)	5.5	2
81	Severity (1-10)	6.5	3
83	**Separating routine sight test components (e.g. carrying out components at different times/ different places/ different people) may be associated with insufficient continuity of care.**	4	0
84	Likelihood (1-10)	7	3
85	Severity (1-10)	7	2.5
87	**Separating routine sight test components (e.g. carrying out components at different times/ different places/ different people) may be associated with the risk of increasing health inequalities.**	4	1
88	Likelihood (1-10)	5.5	3.5
89	Severity (1-10)	5.5	3.5
92	**Separating routine sight test components (e.g. carrying out components at different times/ different places/ different people) will likely lead to a decrease in the number of referrals to secondary care.**	3	1

93	Likelihood (1-10)	3.5	3.75
94	**Separating sight test components (e.g. carrying out components at different times/ different places/ different people) will likely lead to cost savings for the NHS.**	2.5	1
95	Likelihood (1-10)	3	3
96	**Separating sight test components (e.g. carrying out components at different times/ different places/ by different people) will likely lead to better use of clinical resources and personnel.**	3	1
97	Likelihood (1-10)	5	1.75

Domain 7 Impact of separating components: Risks and benefits for patients

Item number	Statement '1' Strongly disagree; '5' Strongly agree	Strength of consensus (median)	Strength of consensus (IQR)
99	Separating sight test components may be associated with the risk of delaying any diagnosis in adult patients.	4	1.75
100	Likelihood (1-10)	7	2.75
101	Severity (1-10)	7	2.75
103	**Separating sight test components may be associated with the risk of missing ocular conditions (i.e. missed diagnosis) in adult patients.**	4	0
104	Likelihood (1-10)	6	2.75
105	Severity (1-10)	8	3
107	**Separating sight test components may be associated with an increased risk of delaying treatment in adult patients.**	4	1.5
108	Likelihood (1-10)	6	2.75
109	Severity (1-10)	7	3.75

111	**Separating sight test components may be associated with an increased risk of adult patients experiencing irreversible visual impairment.**	4	1
112	Likelihood (1-10)	5	4.5
113	Severity (1-10)	8	4
115	**Separating sight test components may be associated with a reduction in convenience in relation to accessing care for patients experiencing irreversible visual impairment.**	4	1
116	Likelihood (1-10)	5.5	2.75
117	Severity (1-10)	5.5	2.75
119	**Separating sight test components may be associated with a reduction in continuity of care for patients experiencing irreversible visual impairment.**	4	1
120	Likelihood (1-10)	5	3
121	Severity (1-10)	6	2.75
123	**Separating sight test components may be associated with increasing barriers to accessing care for patients experiencing irreversible visual impairment.**	3.5	1
124	Likelihood (1-10)	5	3.5

125	Severity (1-10)	5	3.5
128	**Separating sight test components may be associated with reduced waiting times for patients.**	3	0.75
129	Likelihood (1-10)	5	2.25
130	**Separating sight test components may be associated with more convenient locations for patients.**	4	1
131	Likelihood (1-10)	5	2
132	**Separating sight test components may be associated with easier or less travel for patients.**	4	1
133	Likelihood (1-10)	5	2

Domain 8 Impact of separating components: Risks and benefits for practitioners

Item number	**Statement** '1' Strongly disagree; '5' Strongly agree	**Strength of consensus (median)**	**Strength of consensus (IQR)**
135	**Separating sight test components is associated with an increased risk of lower quality of patient care.**	4	1
137	Likelihood (1-10)	5	3
138	Severity (1-10)	6	2.75

140	**Separating sight test components is associated with an increased risk of litigation.**	4	1
141	Likelihood (1-10)	6.5	2.75
142	Severity (1-10)	6.5	2
144	**Separating sight test components may be associated with fewer patients attending for a routine sight test, especially if it is perceived as more difficult.**	3.5	1
145	Likelihood (1-10)	5	4.25
146	Severity (1-10)	5	3