

**Analysis of changes in care pathways for
glaucoma**

Specsavers Optical Group Limited

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Glossary.

Acronym	Full name
APCOS	Acute Primary Care Ophthalmology Service
COAG	Chronic Open Angle Glaucoma
CUES	COVID 19 Urgent Eyecare Service
CVI	Certificate of Vision Impairment
EETC	Emergency Eyecare Treatment Centre
FOI	Freedom of Information
GOS	General Ophthalmic Services
GRFS	Glaucoma Referral Filtering Schemes
ICB	Integrated care boards
ICP	Integrated care partnership
IOP	Intraocular pressure
IP	Independent Prescriber
LES I	Level I Enhanced Services
LES II	Level II Enhanced Services
NES	NHS Education for Scotland
NESGAT	NHS Education for Scotland Glaucoma Award Training
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
NOD	National Ophthalmology Database
OCT	Optical Coherence Tomography
ODTC	Ophthalmic Diagnostic Treatment Centre
OHT	Ocular hypertension
POAG	Primary open angle glaucoma
SLT	Selective laser trabeculoplasty
UK	United Kingdom

Executive summary.

Glaucoma is a group of diseases that damages the eye's optic nerve.¹ Damage to the optic nerve disrupts the signals from the retina (the light sensitive cells at the back of the eye) to the brain, which results in irreversible sight loss and blindness.² It is estimated that there are 708,000 people living with glaucoma in the United Kingdom (UK), or approximately 1.1% of the population.³ There are an additional 1.39 million people with ocular hypertension (OHT; increased pressure in the eye but no damage to the optic nerve or vision) who are at an increased risk of developing glaucoma.⁴

Glaucoma is often asymptomatic in early disease. Without effective screening, early detection of glaucoma is limited. There are substantial supply side constraints which have long driven lower than optimal levels of detection and care for glaucoma in the UK. Decades of under-funding and low levels of support for training have resulted in a shortage of trained ophthalmologists and optometrists. Coupled with delayed and fragmented uptake of technologies, this has constrained the rate at which patients can be seen, diagnosed and appropriately managed. The backlog in ophthalmology services creates delays in appointments and treatment, resulting in long wait times and increased rates of progression of glaucoma in the population. This supply constraint occurs against a backdrop of burgeoning demand – driven by the ageing population and – in recent years - the underdiagnosis and treatment caused by the access barriers created during COVID-19.

Yet, through disruption to traditional care pathways during COVID-19, pockets of innovation in care have been observed across the UK. In many instances, these innovations have highlighted the criticality – and potential – of primary care in the glaucoma diagnosis and care pathway. They have brought to light opportunities to consider whether there is cause for permanent change in the way in which glaucoma diagnosis and care is approached.

Deloitte Access Economics was engaged by Specsavers Optical Group Limited to **consider innovations in glaucoma care pathways** and to identify **alternative models of care** practiced across the UK. The purpose of this report is to inform **improvements in the model of care for glaucoma treatment and detection** which may be embedded into glaucoma care pathways, with a *focus on care pathways in England* where the system experiences the greatest level of fragmentation.

Methodology

This analysis used a mixed-method approach. This included a review of relevant literature and data sources which were validated through stakeholder consultations. Ten semi-structured consultations with key stakeholders across the UK were undertaken. The purpose of the stakeholder consultations was to gather insights on the observed impact of the COVID-19 pandemic on the glaucoma care pathway, identify key innovations and steps undertaken to continue the detection, diagnosis and treatment of glaucoma during the pandemic and consider how these innovations could be embedded into the care pathway for glaucoma care in England.

The findings of the data, literature and stakeholder analysis is presented thematically in this report.

The current glaucoma care pathway

The National Institute for Health and Care Excellence (NICE), recommends biennial sight tests to be conducted in primary care settings (predominantly by optometrists) with suspected cases of glaucoma to be referred to ophthalmology led services for further examination and – if required – treatment and management planning.⁵ The management plan developed will be dependent upon the patient's risk level, with the highest risk patients remaining in the ophthalmology service, while low risk patients may return to the primary care setting for monitoring.

The care pathway for glaucoma diagnosis and treatment – and adherence to the pathway specified within the NICE Guidelines -- varies across the UK. Indeed, it varies within each nation and is particularly inconsistent within England owing to the fragmented funding and commissioning framework for eye care.

Notably, the role of primary care optometry is particularly subject to variation. In some cases, the role is expansive where higher qualified optometrists play an integral role in glaucoma management from the primary care setting. In others, it is highly constrained where optometrist are funded to only perform measures under one routine sight test, and then must make a decision on whether a patient should be referred onward to an ophthalmology service from this single visit. While the driver of this variation is inconsistency in funding and commissioning approaches, there are also considerable ideological differences held by various stakeholders within the sector with reference to the role which primary care optometry could and should play in glaucoma care.

The imperative for change: an escalating challenge

The increasing prevalence of glaucoma is primarily driven by an ageing population. The increasing severity of glaucoma is driven by the delayed diagnosis owing to supply side constraints. In the absence of investment or change, the prognosis for glaucoma in the UK appears to be marked by high costs and poor outcomes. Indeed, cases of glaucoma are estimated to increase by 44% in the UK by 2035.⁶

Levelled on top of this are the reverberating effects of lockdown through COVID-19 on underdiagnosis and missed treatment and management opportunities – concentrated amongst the elderly who are also the highest risk population for glaucoma. The provision of care for glaucoma patients was strained prior to the COVID-19 pandemic. There were approximately 440,000 people on waiting lists for ophthalmology services at any point in time in 2019, with the National Health Service (NHS) unable to meet 18-week referral to treatment times for approximately 15% of patients. The COVID-19 pandemic exacerbated waiting list challenges. Closure of clinics, social distancing requirements and staff redeployment led to large reductions in hospital referrals, reduced outpatient appointments and cancellation of waiting list surgery.

As of May 2022, the waiting list for ophthalmology was 633,000 people. Ophthalmology is the largest outpatient service, accounting for 9.4% of all outpatient attendances.⁷ It is estimated that glaucoma accounts for approximately 20% of all ophthalmology outpatient attendances in England.⁸ In the first five months of 2022, only 64% of ophthalmology patients have been seen within an 18-week timeframe. Chart i shows that the median waiting time in the first half of 2022 was 12.2 weeks, 4.6 weeks higher than the median waiting times in 2019.

Chart i: Consultant-led referral to treatment waiting times, ophthalmology, 2019-2022



Source: NHS (2022).

Stakeholder consultations reported that patient visits to an ophthalmologist may have been delayed by an additional six to 12 months due to COVID-19. This is reflected in the waiting list data, there were approximately 24,200 people waiting longer than one year for treatment in May 2022.⁹ As a result, health care professionals have reported seeing glaucoma patients who have lost significant sight as they re-emerge from lockdowns.¹⁰

The cost of lost vision due to COVID-19 in the UK is high. Analysis on the economic impact of COVID-19 estimates that if it takes three years to clear the backlog, people will wait an aggregate additional 57.2 million days for their eye surgery. In economic costs, sight loss and blindness due to COVID-19 was estimated to be £2.5 billion between 2021 and 2024. The net additional impact on the cost of sight loss and blindness in the UK between 2020 and 2024 due to the pandemic is estimated at £1.7 billion.

The challenges precipitated by COVID-19 in addition to existing challenges within the care system have significant consequences for people with glaucoma, which may result in unnecessary and irreversible sight loss and blindness. This permanent change can have a substantial impact on a person’s quality of life, independence, and mobility.¹¹

Innovations and opportunities for the delivery of glaucoma care

The COVID-19 pandemic amplified the need to address existing challenges in the delivery of glaucoma care across the UK. This offered the opportunity for the role of optometrists in the UK to be further expanded and enhanced. Optometrists have been integral to the referral refinement and risk stratification processes, prioritising referrals to ophthalmology services to those at highest risk of sight loss from glaucoma. Further, optometrists have continued to provide care to risk appropriate patients in the primary care setting, empowering them to play a greater role in the shared care of glaucoma patients with ophthalmology.

Three key areas of opportunity to meet the challenges for glaucoma care – highlighted through the COVID-19 pandemic and through learnings from the four nations which make up the UK – were identified within this study.

Given the fragmented and inconsistent approach to glaucoma care that is particularly pronounced in England, these examples of good practice/innovation may provide lessons to transform glaucoma care and delivery in England. They are:

- **Consistency in care models.** The regionalised funding model within England drives regional differences in the roles that optometrists play in glaucoma care delivery. This is different from Scotland, Wales and Northern Ireland where a dedicated and shared national funding model drives consistency within the nations. The variation could be mitigated by applying a standardised approach to glaucoma patient referrals. This would help create consistency and lead to efficiency gains in the care pathway across England. By way of example, the way in which referral filtering models - known as Glaucoma Referral Filtering Schemes (GRFS) – are applied is a point of substantial variation within England. While GRFS are widely utilised across England, they are not routinely utilised for the purpose of enhancing the role of optometrists in reducing the backlogs within ophthalmology services through – for example, retesting in specified circumstances to reduce the rate of false positive referrals to ophthalmology services. The utilisation of GRFS for this purpose will require that commissioning models across England routinely recognise the value of shared care approaches to glaucoma care in their funding of services.
- **Enhanced role for optometrists.** There is potential to further expand the role of optometrists in the glaucoma care pathway in the UK. The restrictions which COVID-19 imposed on access to traditional care pathways, drove innovations which included expanded roles for optometrists in diagnosis, treatment and management of glaucoma. For example, higher qualified optometrists can contribute to patient risk sharing, by providing primary care-based management for lower risk glaucoma patients. Enhancing the role of higher qualified optometrists from the primary care setting may open opportunities for telemedicine to be further integrated into the care model, with the potential for a glaucoma patient to be seen by the optometrist in the primary care setting and the ophthalmologist attending remotely. This will place optometrists at the heart of patient-centred care in the UK, making full use of their skills and playing a central role in leading and delivering new models of care to improve patient outcomes. Further, optometrists can take on greater responsibility in the testing/retesting of measurements to reduce the rate of false positive referrals to ophthalmology services with the appropriate frameworks in place.
- **Investing in enablers of optimised care delivery.** A critical enabler of care delivery though COVID-19 was the availability of the optometry workforce, including higher qualified optometrists who were trained with increased capabilities to deliver glaucoma care (there are three higher qualifications in glaucoma for optometrists in the UK: Professional Certificate in Glaucoma, Professional Higher Certificate in Glaucoma or Professional Diploma in Glaucoma)¹² and specifically in Scotland the NHS Education for Scotland Glaucoma Award Training (NESGAT).¹³ Higher qualified optometrists were shown to be very valuable through the pandemic in supporting glaucoma care delivery. The proportion of the optometry workforce that holds this additional qualification is growing quickly. Scotland, Northern Ireland, and Wales all have well established programs and protocols in place for the use of higher qualified optometrists in the glaucoma care pathway supported by coordinated funding for training of a higher qualified optometrist workforce. With growing pressures on the glaucoma care delivery pathway, there is reason to continue to build, invest and formalise the role of the optometry workforce in glaucoma care across England.

A further enabler of better shared care noted in consultation was information sharing technology. Both optometrists and ophthalmologists consulted raised the need for better information sharing across all providers of the care pathway, and more effective central recording of data. Currently, there is a lack of multi-directional communication between primary and secondary care providers. Without two-way communication between optometrists and ophthalmologists, individual patient targets are not known to the primary care professionals. Staggered implementation of electronic medical referral systems across England limits the potential to realise the full benefits of the momentum gathered in relation to shared care through COVID-19 and should be considered a priority in investments made into addressing the identified challenges within the glaucoma care in England.

Conclusion

The current challenges facing glaucoma care in the UK pre-date the pandemic. However, the challenge has been accelerated and exacerbated through the lack of access to diagnostics, treatment and management experienced through the pandemic.

At the same time, however, the pandemic has served to highlight opportunities to systematically adopt efficient and effective shared care approaches between optometrists and ophthalmologists into the glaucoma care pathway. This is true across the UK, however, is particularly the case in England where glaucoma care is highly fragmented and inconsistent across regions.

Effective implementation of learnings from COVID-19 garnered from across the UK can be used to improve glaucoma care and effectively mitigate the escalating burden of glaucoma, particularly in England.

Whilst this is a complex issue the two key areas that need to be addressed to improve glaucoma care are:

Analysis of changes in care pathways for glaucoma

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- Reducing the numbers of patients who need to be seen in secondary care, for example by using referral filtering models consistently;
- And increasing capacity for those who need care by wider adoption of shared care services for risk appropriate patients, constantly innovating to improve patient outcomes.

Deloitte Access Economics

1 Introduction.

This section presents the project's background and context and outlines the purpose of the report.

Glaucoma is a group of diseases that damages the eye's optic nerve (see 'Glaucoma Fact Sheet' on following page).¹⁴ Damage to the optic nerve disrupts the signals from the retina (the light sensitive cells at the back of the eye) to the brain, which results in irreversible sight loss and blindness.¹⁵ It is estimated that there are 708,000 people living with glaucoma in the United Kingdom (UK), or approximately 1.1% of the population.¹⁶ The risk of glaucoma increases with age, with the condition affecting up to 2% of those aged over 40 and almost 8% of those over the age of 80.¹⁷

The demand for glaucoma care is increasing and expected to rise given the ageing population. It is predicted that the number of people in the UK with glaucoma will rise by 44% (from 2015 to 2025).⁴⁴ The increased demand for glaucoma care is met with substantial supply constraints which have long driven lower than optimal levels of detection and care for glaucoma in the UK. Significant shortages in a specialised eye care workforce (namely optometrists and ophthalmologists) are adding to the backlog in ophthalmology services.¹⁸

The growing demand and constrained supply is particularly significant in England. Decades of under-funding and low levels of support for training have resulted in a shortage of trained ophthalmologists and optometrists. Coupled with delayed and fragmented uptake of technologies, this has constrained the rate at which patients can be seen, diagnosed and appropriately managed. The backlog in ophthalmology creates delays in appointments and treatment, resulting in long wait times and increased rates of progression of glaucoma in the population.

The consequences of the COVID-19 pandemic, implications of social distancing measures and subsequent lockdowns have had a significant toll on patients and the healthcare system. This is particularly true for older people where the prevalence of eye conditions such as glaucoma and age-related macular degeneration are the highest, and who are considered 'clinically vulnerable' to the COVID-19 virus. Individuals aged 70 years and older were instructed to strict home isolation during the peak of the pandemic, and as a result, experienced the greatest drop in elective admissions per-capita.¹⁹

The cost of lost vision due to COVID-19 in the UK is high. Analysis on the economic impact of COVID-19 estimates that if it takes three years to clear the backlog, people will wait an aggregate additional 57.2 million days for their eye surgery. In economic costs, sight loss and blindness due to COVID-19 was estimated to be £2.5 billion between 2021 and 2024. The net additional impact on the cost of sight loss and blindness in the UK between 2020 and 2024 due to the pandemic is estimated at £1.7 billion. The impact of COVID-19 is expected to be even larger, given subsequent lockdowns, restrictions and distribution to eye care provision. Section 2 discusses the impact of COVID-19 in more detail.

The COVID-19 pandemic has challenged the way glaucoma delivery is delivered and has caused life-changing sight loss to people with glaucoma. However, it has also been the catalyst to enabling change in the delivery of glaucoma care to address existing and future needs. The learnings from the COVID-19 pandemic have brought to light opportunities to consider whether there is cause for permanent change in the way in which glaucoma diagnosis and care is delivered in the UK.

1.1 Objective of the report

Deloitte Access Economics was engaged by Specsavers Optical Group Limited to **consider innovations in glaucoma care pathways** and to identify **alternative models of care** practiced across the UK. The purpose of this report is to inform **improvements in the model of care for glaucoma treatment and detection** which may be embedded into glaucoma care pathways, with a *focus on care pathways in England* where the system experiences the greatest level of fragmentation.

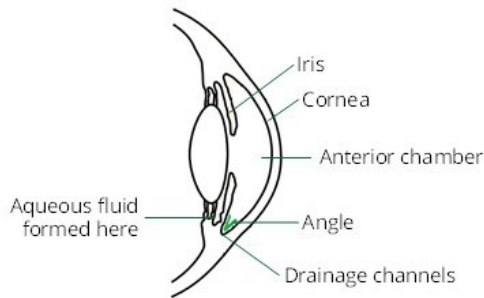
GLAUCOMA

FACT SHEET



What is glaucoma?

Figure 1.1: Image of the eye



Source: Deloitte Access Economics.

Glaucoma is a group of diseases that, while initially asymptomatic, can **damage the eye's optic nerve and result in irreversible sight loss.**ⁱ

A clear fluid (known as aqueous humour) flows in and out of the anterior chamber (front of the eye) through a spongy meshwork.ⁱⁱ This fluid is responsible for maintaining the pressure in the eye.

When the pressure is above normal, this is usually due to the flow of fluid out of the eye being restricted. This can cause damage to the optic nerve at the point where it leaves the back of the eye, which disrupts the signals from the retina, the light sensitive cells at the back of the eye, to the brain, which leads to sight loss and blindness.ⁱⁱⁱ

The main types of glaucoma include primary open angle glaucoma (POAG), closed angle glaucoma, secondary glaucoma and congenital glaucoma.

Prevalence of glaucoma in the UK

In 2021:

- **708,000** people living with glaucoma
- **1.39 million** people living with ocular hypertension (increased pressure in the eye but no damage to the optic nerve or vision).^{iv}

By **2035:**

- Prevalence of glaucoma is expected to **increase by approximately 44%.**^v



Risk factors

Some risk factors increase a person's risk of developing glaucoma such as (but not limited to)^{vi,vii}:



Age – Glaucoma becomes more common with age.



Blood pressure – High blood pressure can lead to an increase in IOP and low blood pressure can lead to insufficient blood supply to the optic nerve causing damage.



Ethnicity – People of African-Caribbean origin or east Asian origin have a higher risk of POAG.



Short sightedness – People with short sight (myopia) are at increased risk of developing glaucoma.



Family history – Increased risk if a close blood relative is diagnosed with glaucoma



Long sightedness – People with long sight are at increased risk of developing POAG.



Diabetes – Can increase your risk of developing glaucoma.



Steroid use – People with prolonged use of steroids have increased risk of developing glaucoma.

Management

Left untreated, glaucoma causes gradual loss of vision or blind spots in the eye.^{viii} However, there are several effective treatments for glaucoma, primarily aimed at lowering the IOP and reducing the risk of progression. This can be achieved through laser therapy, medicines or surgery^{ix,x,xi}:



Laser therapy

The most common type of laser therapy is selective laser trabeculoplasty (SLT), used to treat POAG or OHT. A low-energy laser beam is directed at cells in the trabecular meshwork and then re-built so that it works properly to allow the aqueous fluid to flow better, thereby lowering the IOP.



Medicines

For most people with glaucoma, treatment with eye drops to lower eye pressure is the only treatment they need to manage their condition. The eye drops work by either reducing the amount of aqueous fluid that the eye produces or by helping the aqueous fluid drain away more quickly.



Surgery

In some cases of advanced glaucoma and/or where drug therapy is not successful in reducing the IOP, patients may undergo surgery. The most common type of procedure is called a trabeculectomy, which permanently creates a new drainage channel to restore normal aqueous fluid flow, lowering the eye pressure. Other types of procedures for glaucoma include aqueous shunts or tube implants.

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- x. Royal National Institute of Blind People (2022) Understanding Glaucoma. <https://www.rnib.org.uk/sites/default/files/Understanding_Glaucoma.pdf>, accessed on 29 June 2022.
- xi. Glaucoma UK. The Impact of COVID-19 on glaucoma care, in numbers, Winter 2021, accessed on 21 July 2022.

1.2 The current diagnostic and care pathway for glaucoma

In most cases, glaucoma slowly and progressively causes the loss of sight, it is often asymptomatic until the late stages of the disease. By this time there will be irreversible loss of sight, often with a large percent of the peripheral vision being lost without a person noticing.²⁰ **The signs of glaucoma are usually first detected at a routine sight test, highlighting the importance of following national guidance on routine eye examination at least every two years.**²¹ Early diagnosis is key to ensuring that the condition can be monitored and treated to stop the sight loss and/or reduce the rate of further sight loss.

The National Institute for Health and Care Excellence (NICE), provides national guidance and advice on the diagnosis and management of glaucoma across the UK.²² This includes recommendations on testing and referral (case-finding) for chronic open angle glaucoma (COAG) and OHT and on effective diagnosis, treatment and reassessment to stop glaucoma from progressing.

In the UK, the overwhelming majority of sight tests are undertaken by primary care optometrists. The purpose of the sight test is to detect any signs of disease, to assess vision and prescribe any correction that may be needed. There are a number of clinical procedures and tests which the primary care optometrist may perform dependent on the risk profile of the patient. Within these there are key tests which can be used to check the health of the eyes and detect for signs of glaucoma, these include perimetry (visual field test), tonometry (measuring the intraocular pressure [IOP] within the eye) and ophthalmoscopy (visual examination of the optic nerve). Other additional tests that aid in the detection of glaucoma which may be performed on people with suspected glaucoma include gonioscopy (examination of the drainage angle of the eye), Optical Coherence Tomography (OCT; a scan used to measure the retinal nerve fibre layers around the optic nerve) and pachymetry (measuring the thickness of the cornea). These tests assess whether there are clinical signs of glaucoma, if a person's optic nerve is damaged, the effect on their vision and lifetime risk of sight loss, which can be used to inform a risk assessment. This is discussed further in detail in Section 3.1. If any of these tests show signs that a person may have increased risk of glaucoma, they can be assessed further where referral filtering models exist or referred onward to an ophthalmology service for additional assessment.

Most sight tests are provided under a General Ophthalmic Services (GOS) contract which also includes other preventative and corrective eye care services and are free to the patient at the point of delivery.²³ Patients are eligible for National Health Service (NHS) funded sight tests if they are aged over 60; are aged over 40 with a close family member diagnosed with glaucoma; or are considered at risk of glaucoma by an ophthalmologist.²³ In Scotland, routine eye tests are fully funded for all of the population.²⁴ In Wales, routine eye tests are fully funded by Eye Health Examination Wales and are eligible to people who meet certain criteria such as being diagnosed with diabetes or glaucoma, or they have been advised by an ophthalmologist that they are at risk of glaucoma.²⁵

Where there is no suspected glaucoma, the patient does not require any further testing. Guidance from the UK National Health Service recommends that people have regular sight tests (every two years) so that glaucoma can be effectively diagnosed before it severely affects vision.²⁶ People with elevated risk of glaucoma (see Fact Sheet) may require testing more regularly.

For cases of suspected glaucoma, either following a sight test or a subsequent referral filtering model, the person will then be referred to an ophthalmology service for further examination. The ophthalmology service is led by a consultant ophthalmologists, whose role is to diagnose glaucoma and provide a management plan for the person. The management plan will be dependent upon the patient's risk level, with the highest-risk patients remaining in an ophthalmology service, while lower-risk patients may return to the primary care setting for monitoring. The burden on ophthalmology services can be reduced by discharging lower risk glaucoma patients to primary care professionals such as higher qualified optometrists, with appropriate glaucoma or Independent Prescriber (IP) certification, to manage their care in the primary care setting.

The role of primary care in glaucoma care

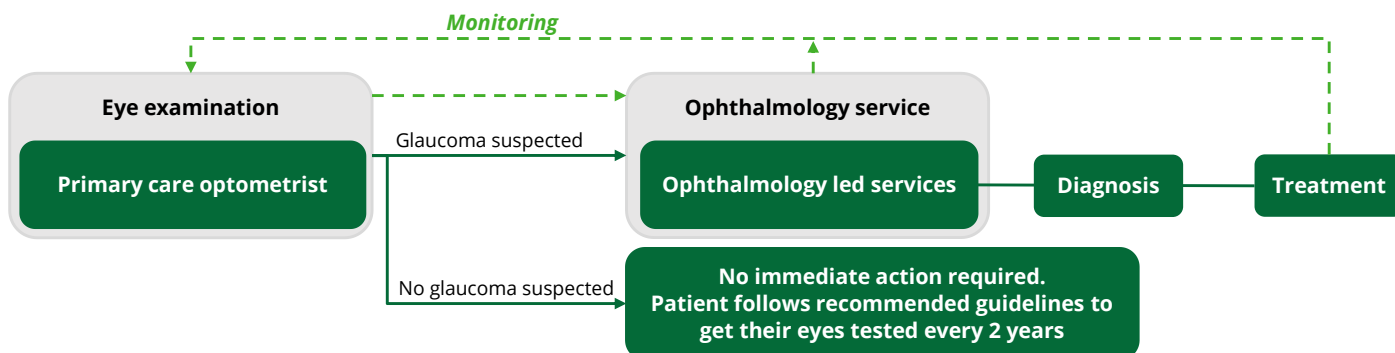
At present, there are two key roles of primary care in the delivery of glaucoma care across the UK – noting these are applied to varying degrees depending on geographic location. These include:

1. Undertaking routine sight tests to detect for glaucoma suspects in the community. These tests are predominately the responsibility of primary care optometrists, who assess the risk of sight loss, which can be used to inform a risk assessment. Where available, patients at risk are subject to referral filtering examinations. Patients at highest risk of sight loss are referred onward to ophthalmology services. This is the more common and consistent role of primary care optometrists across the UK.

2. Monitoring of lower risk glaucoma patients in the primary care setting. Lower risk glaucoma patients who are discharged from or remain under monitoring by ophthalmology services can be managed in the primary care setting by higher qualified optometrists with appropriate certification and in shared care model in synergy with ophthalmology. This is an enhanced role of primary care optometrists, though its adoption varies across the UK.

A simplified illustration of the diagnostic and care pathway for glaucoma in the UK as per the NICE guidelines is shown in Figure 1.1.

Figure 1.1: Diagnostic and care pathway for glaucoma



Source: Deloitte Access Economics using NICE (2017) and Harper et al (2020). Note 1: the diagnostic and care pathway and the involvement of primary and secondary care health professionals varies across the UK. Note 2: The majority of eye examinations are performed by primary care optometrists. Only a small proportion (0.5%) of sight tests are performed by other health professionals such as some general practitioners and ophthalmologists.

1.3 Methodology and report structure

This analysis used a mixed-method approach to assess the changes to the care pathway for glaucoma in the UK. This included a review of relevant literature and data sources (i.e., Specsavers and Freedom of Information [FOI] data requests) and a series of semi-structured stakeholder consultations.

Trends in health service utilisation related to glaucoma over the period of the pandemic were extracted from the Specsavers UK database. FOI data requests (submitted in 2021) from several trusts and boards across the UK provided information on ophthalmological procedures and services utilisation. Data requested included monthly glaucoma-related procedure and service activity in inpatient and outpatient settings. Both Specsavers and FOI data has been used to support the overall service utilisation trend observations during the COVID-19 period.

Findings from the review of the literature and data sources were validated through stakeholder consultations. Ten targeted semi-structured interviews via video conferencing with key stakeholders were undertaken with the purpose of these consultations to gather insights on:

- The impact of COVID-19 on the care pathway
- Key innovations and steps undertaken to continue access to sight tests and accelerate the delivery of treatments to patients during COVID-19
- The strengths and limitations of changes in glaucoma care arising from COVID-19 across the UK
- How desired changes in glaucoma care arising from COVID-19 could be implemented in England
- The ideal care pathway for glaucoma care in the UK.
- A summary of the stakeholder consultations can be found in Appendix B.

The remainder of the report is structured as followed:

- Section 2 discusses the challenge which the UK – in particular, England – faces with respect to meeting the need for glaucoma care
- Section 3 highlights the opportunities to embed efficient and effective practice into standardised glaucoma care from good practices/innovations stemming from the COVID-19 pandemic
- Section 4 describes the challenges facing glaucoma care and summarises the learnings during the COVID 19 pandemic which may help to transform the future of glaucoma care in the UK, and notably in England.

2 Glaucoma: an escalating challenge.

The provision of care for glaucoma patients was strained prior to the COVID-19 pandemic. Growing demand met with constrained supply was already driving long wait lists relative to best practice guidelines and delayed commencement of treatment and management. COVID-19 has escalated the pace at which demand outstrips supply. This section discusses the challenge which the UK – in particular, England – faces with respect to meeting the need for glaucoma care.

2.1 Growing demand, constrained supply: a long-standing trend

There is a significant and increasing demand for glaucoma care. The UK population has been steadily ageing, with this trend expected to continue in the future. In 2016, there were 11.8 million UK residents aged 65 years and over, or approximately 18% of the total population. It is estimated that by 2041 there will be 20.4 million people aged 65 years and over, representing approximately 26% of the total population.²⁷ The ageing population in the UK will place increased demand on glaucoma care. It is predicted that the number of people in the UK with glaucoma will rise by 44% (from 2015 to 2025). This is estimated to be accompanied by an 18% increase in glaucoma suspects.⁴⁴

Early detection of glaucoma is critical. Glaucoma is often asymptomatic in early disease, however, once progressed, there can be irreversible damage and sight loss. Screening for glaucoma in the UK is opportunistic, most frequently assessed by an optometrist in the community. It has been estimated that up to 50% of prevalent glaucoma is undiagnosed.⁴⁴ There are substantial supply side constraints which have long driven lower than optimal levels of detection and care for glaucoma in the UK. Significant shortages in optometrists and ophthalmologists are adding to the backlog in ophthalmology services.²⁸ Furthermore, approximately 27% of ophthalmologist consultants are aged 55 and over – meaning that supply constraints may be increased as these ophthalmologist consultants exit the workforce.

The growing demand and constrained supply is particularly significant in England. Decades of under-funding and low levels of support for training have resulted in a shortage of trained ophthalmologists.²⁹ Coupled with delayed and fragmented uptake of technologies, this has constrained the rate at which patients can be seen, diagnosed and appropriately managed.³⁰ The supply constraints for ophthalmology (including for glaucoma) are evidenced by the scale of NHS consultant-led referral to treatment waiting times. There were approximately 440,000 people on waiting lists for ophthalmology services at any point in time in 2019, with the NHS unable to meet 18-week referral to treatment times for approximately 15% of patients. Ophthalmology is the largest outpatient service, accounting for 9.4% of all outpatient attendances.³¹ It is estimated that glaucoma accounts for approximately 20% of all ophthalmology outpatient attendances in England.³² The backlog in ophthalmology creates delays in appointments and treatment, resulting in long wait times and increased rates of progression of glaucoma in the population.

2.2 Glaucoma care during lockdowns of the COVID-19 pandemic

The spread of the viral respiratory infection, coronavirus (COVID-19) has led to major disruptions to the delivery of health services, including hospital surgeries and procedures, globally. In early 2020, the public health bodies across the UK recommended eye units suspend all elective operations and postpone non-urgent outpatient clinics to prepare for the surge of COVID-19 cases. Although urgent and essential eye services at NHS trusts continued to provide face-to-face consultations and eye care for urgent cases, there was substantial reduction in the volume of emergency surgeries across the UK.³³ This has led to millions of missed eye tests, delays in treatment and extended waiting times for patients. Previous analysis has estimated that 4.3 million sight tests were not delivered in the UK in 2020, leading to a 23% decline in sight tests when compared to services delivered in 2019.³⁴

The consequences of the COVID-19 pandemic, implications of social distancing measures and subsequent lockdowns have had a significant toll on patients and the healthcare system. This is particularly true for older people where the prevalence of eye conditions such as glaucoma and age-related macular degeneration are the highest, and who are considered 'clinically

vulnerable' to the COVID-19 virus. Individuals aged 70 years and older were instructed to strict home isolation during the peak of the pandemic, and as a result, experienced the greatest drop in elective admissions per-capita.³⁵

Reduced access to optometrists and GPs due to COVID-19 resulted in a fall in new Certificate of Vision Impairment (CVI) registrations. A CVI certifies a person as either sight impaired (partially sighted) or severely sight impaired (blind). CVIs provide a formal referral route for someone with sight loss from the ophthalmology department to social care services. In England there were 136,399 people registered blind and a further 140,390 people registered as partially sighted.³⁶ Prior to COVID-19 there was a stable rate of new CVI certifications, averaging 13 new CVIs per 100,000 population aged 40 years and over per year.³⁷ This equated to 3,485 new CVIs for glaucoma in the 2017-18 financial year.³⁷ During COVID-19, CVIs for all types of sight loss declined. For glaucoma, 2,613 new CVIs were recorded, which was a rate of 9.2 per 100,000 population aged 40 and over. This drop is likely related to a reduction in the rate of certification during the pandemic. This decline is indicative that some people with glaucoma who would normally have sought care remain undetected in the population. Health care professionals have reported seeing glaucoma patients who have lost significant sight as they re-emerge from lockdowns.³⁸ As expected, early data from 2022 shows that the number of new CVIs has increased to above pre-COVID levels.³⁹

Guidance from the UK National Health Service recommends that people have regular sight tests (every two years) to monitor for sight conditions such as glaucoma.⁴⁰ The COVID-19 pandemic, particularly lockdowns and closures of some health services, significantly impacted on glaucoma services. Closure of clinics, social distancing requirements and staff redeployment led to large reductions in hospital referrals, reduced outpatient appointments, cancellation of waiting list surgery. Chart 2.1 shows the trend in referrals for glaucoma between January 2019 to June 2022.

Chart 2.1: Referrals for glaucoma in England, January 2019 to June 2022

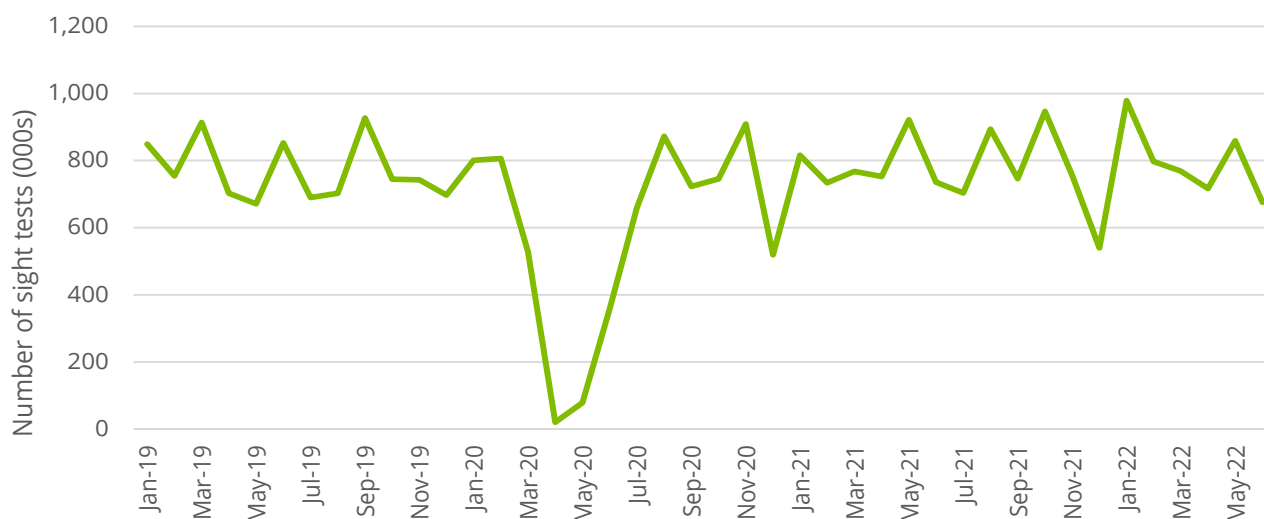


Source: Specsavers referral data (2022).

Referrals for glaucoma dropped from a monthly average of 6,482 across 2019 to 93 referrals in April 2020 (a 98.6% decrease) and 266 referrals in May 2020 (a 95.9% decrease). From July 2020 to June 2022 there were an average of 6,974 referrals for glaucoma per month, an increase on referral numbers from the same period prior to the pandemic. Chart 2.1 show the slight increase in trend in glaucoma referrals post the initial COVID-19 lockdowns. For sight tests, there was an average of 770,000 sight tests per month in the 2019 calendar year. This dropped to 20,428 sight tests in April 2020 and 79,008 in June 2020. The number of sight tests has been increasing post lockdowns, with 776,000 tests per month in the 2021 calendar year and 799,000 tests per month from January 2022 – June 2022. This data is shown in Chart 2.2. Despite the increase in sight tests and referrals post lockdowns, there is a potential many people with glaucoma remain undetected in the community given the large volume of missed sight tests in the UK in 2020,⁴¹ calling for an urgent need for people to get their eye tests now.

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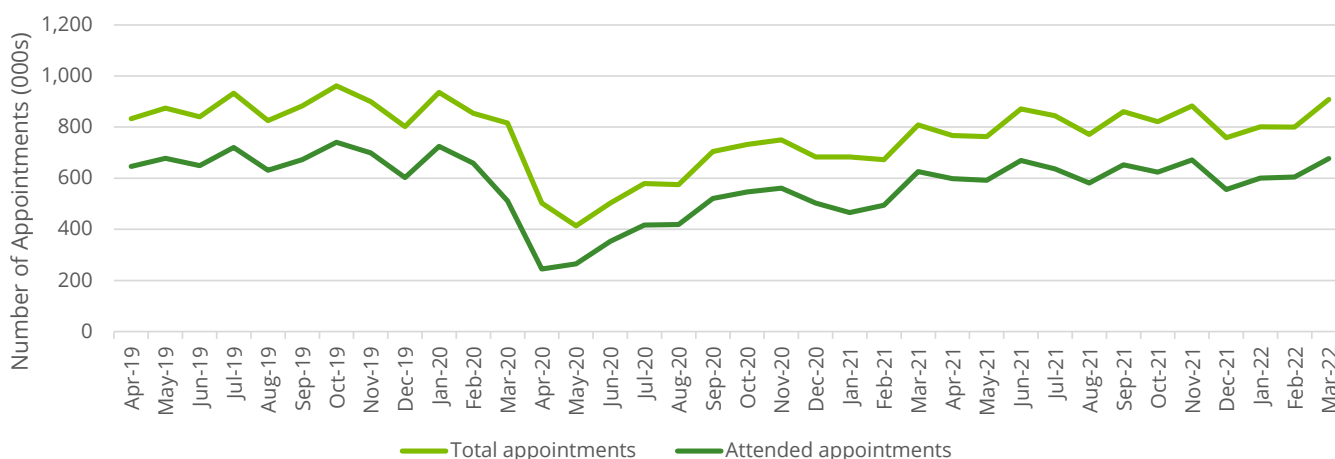
Chart 2.2 Sight tests in England, January 2019 to June 2022



Source: Specsavers sight test data (2022).

Similar trends in service utilisation were seen in NHS data on hospital services. Monthly outpatient activity for all of ophthalmology services fell from an average of 870,000 appointments per month in 2019 to an average of 470,000 appointments from April to June 2020. From July 2020 onwards, monthly outpatient activity was still below pre-COVID levels, with an average of 764,000 appointments per month from July 2020 to March 2022 (Chart 2.3). Importantly, there were an average of 829,000 appointments per month over the last six months of available data, suggesting that ophthalmology outpatient activity is recovering to pre-COVID levels. This trend has been reported in the literature, which has seen NHS England achieve its first milestone in its plan to eliminate backlogs caused by COVID-19, with the number of people waiting longer than two years for routine operations in England fall from 22,500 to below 200.⁴²

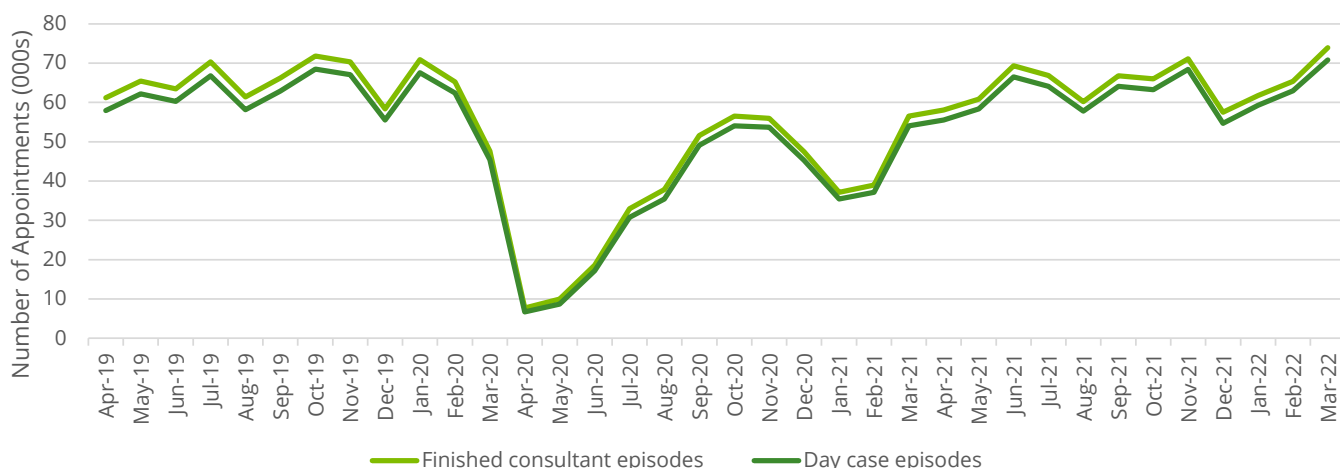
Chart 2.3: Monthly ophthalmology outpatient activity, UK, 2019-21



Source: NHS digital (2021).

Inpatient activity for ophthalmology services experienced an even more significant decline, falling from an average of 64,000 monthly finished consultant episodes prior to April 2020 to 12,000 from April to June 2020. Inpatient activity was still below pre-COVID levels, with an average of 57,000 monthly finished consultant episodes from July 2020 to March 2022 (Chart 2.4). The last six months of available data suggest that inpatient activity has returned to pre-COVID levels.

Chart 2.4: Monthly ophthalmology inpatient activity, UK, 2019-21



Source: NHS digital (2021).

Outpatient appointments for glaucoma reflect the overall trends observed for ophthalmology. Glaucoma outpatient appointments in Moorfields Eye Hospital were significantly reduced in April and May 2020, with zero appointments occurring in May 2020 (Chart 2.6). Similar trends were observed in FOI data retrieved from other trusts across the UK.

Chart 2.5: Glaucoma outpatient appointments, Moorfields Eye Hospital



Source: Moorfields Eye Hospital FOI request (2021).

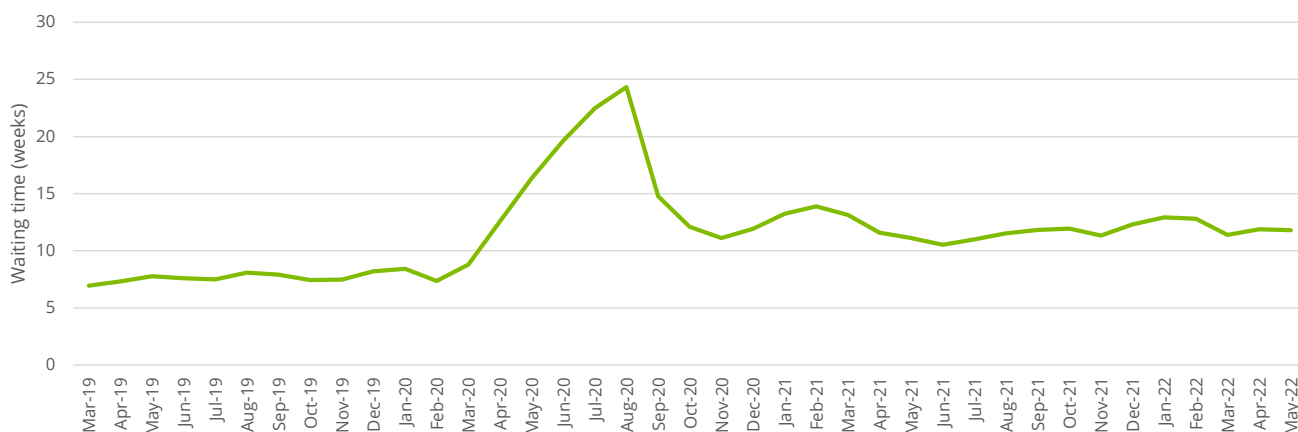
2.3 Burgeoning backlog: an impetus for change

The provision of care for glaucoma patients was strained prior to the COVID-19 pandemic. There were approximately 440,000 people on waiting lists for ophthalmology services at any point in time in 2019, with the NHS unable to meet 18-week referral to treatment times for approximately 15% of patients. The COVID-19 pandemic exacerbated waiting list challenges. Closure of clinics, social distancing requirements and staff redeployment led to large reductions in hospital referrals, reduced outpatient appointments and cancellation of waiting list surgery.

As of May 2022, the waiting list for ophthalmology was 633,000 people. In the first five months of 2022, only 64% of ophthalmology patients were seen within an 18-week timeframe. There were approximately 24,200 people waiting longer than one year for treatment in May 2022.⁴³

Chart 2.6 shows the change in median wait times for ophthalmology patients. COVID-19 lockdowns meant that elective treatments were placed on hold. The full extent of this impact was not felt until August 2020 where the median waiting time for ophthalmology treatment was 24.3 weeks. While median waiting times for ophthalmology have since decreased, the median waiting time in the first half of 2022 was 12.2 weeks, 4.6 weeks higher than the median waiting times in 2019.

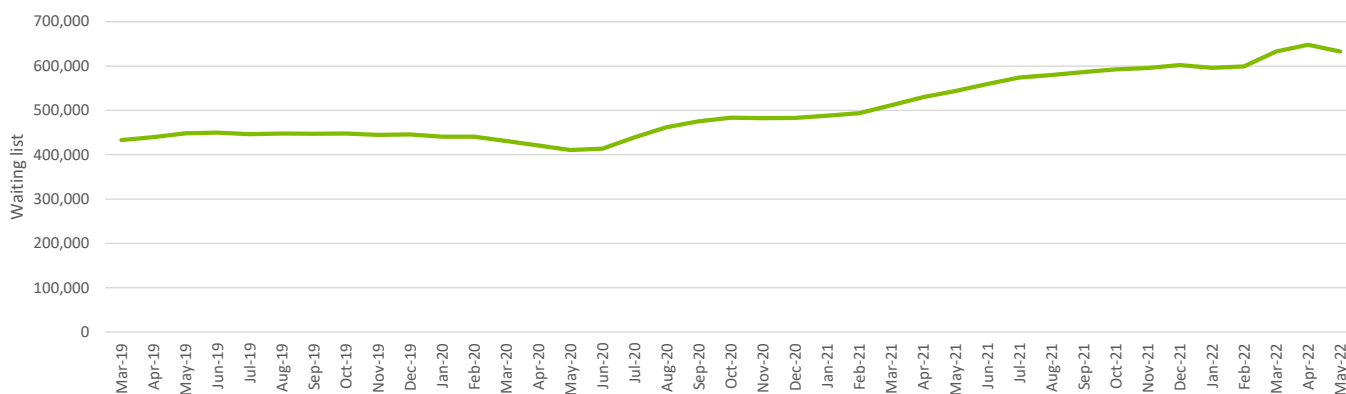
Chart 2.6 Consultant-led referral to treatment waiting times, ophthalmology, 2019-2022



Source: NHS (2022).

The increase in median waiting times means that the overall waiting list for ophthalmology continues to grow. While this waiting list was already significant prior to COVID-19, it has since grown from 441,000 in February 2020 to 633,000 as of May 2022, representing an increase of 44%.

Chart 2.7 Incomplete waiting list for ophthalmology, 2019-2022



Source: NHS (2022).

In the first five months of 2022, only 64% of ophthalmology patients have been seen within an 18-week timeframe. The 92nd percentile is waiting approximately 42 weeks for treatment. Furthermore, there are now approximately 24,200 people waiting longer than one year for treatment.⁴³

2.3.2 The cost of lost time

It is estimated that approximately 50% of glaucoma remains undiagnosed.⁴⁴ Routine sight tests represent an opportunity for early identification of glaucoma in the primary care setting. Sight lost due to glaucoma is not recoverable, and thus early detection is essential to prevent irreversible sight loss and blindness. The COVID-19 pandemic significantly restricted access to sight tests, particularly in April and May 2020. The impact of this is likely going to be reflected by an increase in patients with irreversible sight loss from glaucoma re-emerging from lockdowns, particularly while backlogs continue to be cleared. This impact has already been reported by eye care professionals in the UK.⁴⁵

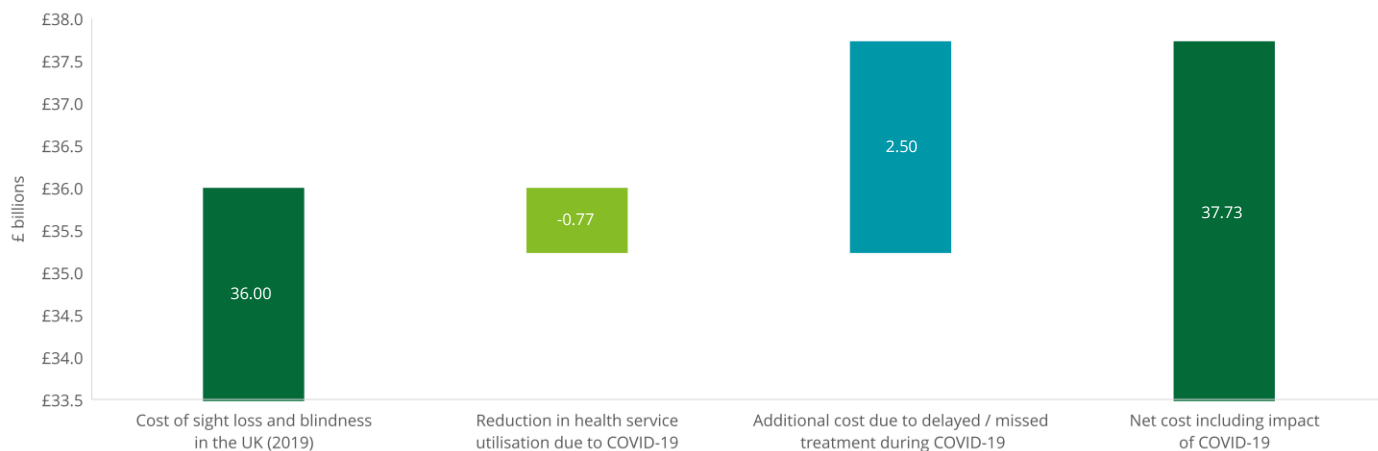
The cost of lost vision due to COVID-19 in the UK is high. Prior to the pandemic, the annual UK cost of sight loss and blindness was estimated at £36 billion.⁴⁶ From March to December 2020, approximately 3,000 people in the UK experienced sight loss due to delayed sight tests and treatments in 2020.⁴⁷ In the same year, the cost of sight loss and blindness to the UK healthcare system declined by £778.3 million due to reduced use of services. This reduction may have serious, ongoing, and permanent implications in the coming years, not least for those who have lost vision. The backlog of services is likely to impose significant costs for individuals living with sight-threatening eye conditions. In part, these costs occur due to an increased risk of falls while waiting for services, but also because individuals may have a reduced quality of life while waiting.

Analysis on the economic impact of COVID-19 estimates that if it takes three years to clear the backlog, people will wait an aggregate additional 57.2 million days for their eye surgery. In economic costs, sight loss and blindness due to COVID-19 was estimated to be £2.5 billion between 2021 and 2024. The net additional impact on the cost of sight loss and blindness in the

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UK between 2020 and 2024 due to the pandemic is estimated at £1.7 billion. The economic cost of COVID-19 on sight loss and blindness is shown in Chart 2.8.

Chart 2.8: Impact of COVID-19 on the economic cost of sight loss and blindness in the UK



Source: Deloitte Access Economic using Deloitte Access economics (2021)⁴⁸.

There are other impacts on people with sight loss due to the pandemic as there are other services required by people living with sight loss and blindness. For example, people who develop sight loss rely on local authority social service teams (often called social care or community care) who can provide support in visual impairment rehabilitation, provision of equipment, aids, adaptations to the home, and help with shopping, to maximise their independence.⁴⁹ During lockdowns, low vision services (provided through hospital eye services, primary care optometrists and charities) which provide or sell low vision aids, such as magnifiers, lighting and eye shields to help people with everyday tasks had either closed completely, while others continued to provide some level of services remotely.⁵⁰ This may have prevented people with sight loss, who depend on low vision aids, from accessing everyday services such as healthcare. Prior to the pandemic, there was a substantial backlog of people in England waiting for vision rehabilitation assessments and services, upwards of 12 months in some areas. The existing backlog is likely to be made worse during the COVID-19 pandemic, as local authorities are likely to prioritise the completion of care needs and financial assessments before specialist rehabilitation assessments.⁵¹

The accumulation of a substantial backlog will require additional time and resources to clear, resulting in a substantial cost for the health and social services in coming years.⁵² This cost will be both perpetuated and exacerbated if inefficiencies in the current treatment pathway for glaucoma persist. It is imperative that the system reconsiders its approach to glaucoma care if it is to manage cost and mitigate unnecessary but irreversible sight loss and blindness in the population.

3 A fresh perspective: embedding innovation in standard practice.

COVID-19 exacerbated the pre-existing challenges in Glaucoma care. However, across the UK, COVID-19 also served to accelerate change in glaucoma care pathways – leaning more heavily on the role of primary care. The lessons learned from this period highlight opportunities to embed efficient and effective practice into standardised glaucoma care pathways. The potential for this is particularly pronounced in England where care pathways are inconsistent between regions.

3.1 A chance for change

By 2035, cases of glaucoma are estimated to increase by 44% in the UK.⁵³ This in part is driven by an ageing population, and the presence of substantial supply side constraints (i.e., undersupply of optometrists and ophthalmologists) which have long driven the lower than optimal levels of detection and care for glaucoma in the UK. The consequences of unmet demand for care over the next decades will be met with delayed diagnosis and treatment of the condition, longer wait times and increased rates of progression of glaucoma in the population. Equally, this will be met with escalating costs of care as patients present at later stages of disease progression requiring higher – and more expensive – intervention and care.

The reverberating effects of the COVID-19 pandemic and implications from lockdowns and restrictions on underdiagnosis and missed treatment and management opportunities have disproportionately impacted the older population, who are at the highest risk for glaucoma. The provision of care for glaucoma patients was strained prior to the COVID-19 pandemic, with a substantial number of people on waiting lists for ophthalmology services. The COVID-19 pandemic exacerbated waiting list challenges. Closure of clinics, social distancing requirements and staff redeployment led to large reductions in hospital referrals, reduced outpatient appointments and cancellation of waiting list surgery. Now, the number of people waiting for ophthalmology services has increased and, in some cases, delayed as the healthcare system works to the clear backlog.

The challenges precipitated by COVID-19 in addition to existing challenges within the healthcare system have significant consequences for people with glaucoma, which may result in unnecessary and irreversible sight loss and blindness. This permanent change can have a substantial impact on a person's quality of life, independence, and mobility.⁵⁴

Yet, through disruption to traditional care pathways during COVID-19, pockets of innovation in care have been observed across the UK. In many instances, these innovations have highlighted criticality – and potential – of primary care in the glaucoma diagnosis and care pathway. They have brought to light opportunities to consider whether there is cause for permanent change in the way in which glaucoma diagnosis and care is approached. These examples of good practice/innovation may provide lessons to transform glaucoma care and delivery across the UK are discussed throughout this section.

3.2 Consistency in care delivery models

The eye care workforce in the UK is made up of a multidisciplinary team of health professionals, including technicians, nurses, opticians, optometrists and ophthalmologists. Collaboration between professionals across the primary and secondary care setting means there is a network of capabilities and skills which can be used to improve health outcomes, enhance satisfaction for patients and facilitate greater efficiency in resource use.

Across the UK, a variety of referral filtering models, known as Glaucoma Referral Filtering Schemes (GRFS) have been developed to help address capacity constraints in the eye care system, by reducing false positive referrals to ophthalmology services and costs to the healthcare system. The types of GRFS include:

- 'Repeat measures' schemes in which tests such as intraocular pressure (IOP) measurements or visual field assessments, or both, are repeated at a separate optometry visit

- 'Enhanced case-finding' referral enhancement schemes in which IOP measurements are repeated, visual fields are performed with automated perimetry and detailed disc assessment is undertaken
- 'Referral refinement' schemes, which require tests sufficient for the diagnosis of OHT and suspected COAG, including gonioscopy, and the interpretation of these clinical findings.

The high rate of false positive referrals of glaucoma creates challenges and inefficiencies as outlined in Box 1.

Box 1: The challenge facing the UK

- The rate of false positive referrals of glaucoma across the UK is approximately 40%.⁵⁵ This creates unnecessary backlog within ophthalmology services, anxiety for patients and increased cost to the healthcare system.
- There is lack of a consistent UK-approach to glaucoma referral, diagnosis and management. Standardised approaches that utilise referral filtering methods may reduce duplication and increase efficiency in care delivery.

GRFS were used widely across the UK prior to the pandemic, but their importance in reducing the impact on ophthalmology services has been amplified throughout the COVID-19 pandemic. The result of GRFS have been positive, with one hospital reporting a 53% reduction in the number of false positive referrals to ophthalmology services. Potential cost savings to the NHS has also been shown, if more than 2.22 visits to hospital eye services are avoided through GRFS.⁵⁶ Both optometrist and ophthalmologist stakeholders consulted highlighted the importance of GRFS or similar filtering schemes and commented that it is likely such schemes continue to support in the efforts to alleviate pressure on ophthalmology services as they continue to clear backlog.

GRFS allows trained primary care professionals to repeat, enhance or refine their findings for patients who have suspected glaucoma in the primary care setting before onward referral to ophthalmology services. The role of GRFS has been emphasised by the Royal College of Ophthalmologists, whom recommended primary eye care providers to set up glaucoma referral filtering or referral refinement services if they had not done so already to support the clearing of backlog in the recovery phase of the COVID-19 pandemic.⁵⁷ This helped avoid and reduce unnecessary referrals to ophthalmology services, relieving demand on overstretched ophthalmology services and reducing wait times for glaucoma patients, many of whom can continue to receive care to in the primary care setting.

Unlike Scotland, Wales and Northern Ireland, where there is dedicated and shared national funding available for primary and secondary eyecare services, England distributes eyecare funding at the regional level through commissioning arrangements¹, which can vary in size and complexity across the country. This naturally introduces variation in referral practices and relatedly the application of the NICE guidelines (which detail the referral practices guidance) within optometry at the regional level. For example, one region of England may have commissioning arrangements (and therefore funding) for primary care optometrists to undertake repeat measures, whereas, in another region, these services may not be commissioned and therefore no funding is available for these services to be performed. As a result, in some regions across England, optometrists must make a decision on whether a patient should be referred onward to an ophthalmology service on a single sight test.

The variation in referral practices and application of NICE guidelines could be mitigated by applying a standardised approach to glaucoma patient referrals. This would help create consistency in the care model and lead to efficiency gains in the care pathway across England. The Royal College of Ophthalmologists has published extensively on referral pathways to improve capacity and provide potential efficiency savings.⁵⁸ A consistent approach to referral through the care pathway throughout England would be valuable.

Box 2: Learnings for England

- Referral filtering methods such as GRFS help to reduce unnecessary referrals to ophthalmology services, whilst ensuring patients continue to receive care in the primary care setting.
- There is an opportunity to embed referral filtering into glaucoma care in a standardised way across England to capitalise on its value and create consistency in the care model.

¹ Commissioning is the process by which health and care services are planned, purchased and monitored. Services are commissioned by integrated care boards (ICBs) overseen by NHS England on a regional and national basis. ICBs manage the NHS budget and arrange for the provision of health services in an integrated care partnership (ICP) area. The ICP is a statutory committee who are responsible for producing an integrated care strategy on how to meet the health and wellbeing needs of the population in the ICP area.

In addition to filtering systems, risk stratification in the context of glaucoma care helps to ascertain which patients are at the highest-risk of sight loss. In 2022, the Royal College of Ophthalmologists released the GLAUC-STRAT-FAST tool to provide guidance on how patients with glaucoma can be stratified based on the lifetime risk of developing sight loss (see Appendix A).⁵⁹ This approach and others such as the blended approach used at Moorfields Eye Hospital can be utilised to identify priority patients and create a shared-care approach between primary care and secondary care health professionals.⁶⁰ The process of risk stratification was already utilised across the UK prior to the COVID-19 pandemic. However, its use is paramount to opening capacity of ophthalmology services by prioritising glaucoma patients at highest-risk of sight loss.

Box 3: The challenge facing the UK

- The backlog in ophthalmology services is exacerbated by inefficient allocation of limited eye care resources that are not prioritised to patients with the highest care needs.

During the COVID-19 pandemic, risk stratification helped to provide guidance on which patients were suitable for virtual clinic appointments or face-to-face appointments. Prior to COVID-19, Wales had an established national stratification system to minimise avoidable sight loss. This placed Wales in a good position to identify priority glaucoma patients and determine which service model should be used to provide care during the heights of the pandemic.⁶¹ That is, patients who are considered low risk to sight loss were able to receive care in virtual clinics whereas higher risk glaucoma patients could continue to be seen in face-to-face appointments.

In Scotland, those involved in shared care receive funding from the Scottish Government, fostering an environment where primary and secondary care health professionals efficiently collaborate to delivery care to the patient. For glaucoma, 'shared care' services have been active in Scotland since 2004.⁶² In this model, a glaucoma consultant vets new glaucoma referrals to decide whether patients are seen by the accredited glaucoma optometrist or in the ophthalmology service. This allowed accredited glaucoma optometrists to diagnose, treat and manage patients with glaucoma depending on their level of experience, referring patients at higher risk of sight loss to ophthalmology services.

Both optometrists and ophthalmologists consulted highlighted the importance of risk stratification tools in the ongoing COVID-19 pandemic climate, which will see subsequent waves of COVID-19 cases place stress on the healthcare system. The adoption of risk stratification presents an opportunity for England to shift towards a shared care approach, allowing primary care optometrists to monitor the care needs for lower risk patients in the primary care setting. It was noted by stakeholders that the accuracy of any risk stratification system is dependent on the extent and precision of the available clinical information used to inform decision making.

Box 4: Learnings for England

- To open capacity for ophthalmology services to prioritise care to highest-risk patients, England should continue to utilise risk stratification tools to prioritise patients with the highest-risk of sight loss to ophthalmology services.
- Funding mechanisms that incentivise a shared care approach to care delivery may help to alleviate the dependence on ophthalmology services.

These innovations were present across the UK in varying degrees prior to the COVID-19 pandemic. However, their importance in glaucoma care provision has been amplified since the COVID-19 pandemic. These innovations are integral to achieving consistent and better outcomes for the patient and facilitating a coordinated approach to shared care across the eye care workforce.

3.3 Enhanced role of optometrists

Optometrists and ophthalmologists, and their working relationship, are integral to the diagnosis, treatment and monitoring of glaucoma care. The eye care workforce across the UK faces ongoing shortages. Significant shortages in optometrists and ophthalmologists are adding to the backlog in ophthalmology services.⁶³ Furthermore, approximately 27% of ophthalmology consultants are aged 55 and over. Supply constraints will increase as these consultants leave the workforce.

Box 5: The challenge facing the UK

- Missed opportunity to rely on higher qualified optometrists to support in the delivery of glaucoma care from the primary care setting.

The COVID-19 pandemic highlighted the expanded role of optometrists in the glaucoma care pathway in the UK. This saw optometrists play a greater involvement in the diagnosis, treatment and management of glaucoma patients in the primary care setting. Through risk stratification, patients that were considered to have the highest risk of sight lost were referred

onward to ophthalmology services to receive the complex care they required. This meant that higher qualified optometrists could continue to provide primary care-based management for lower risk glaucoma patients and contribute to patient risk sharing.

During COVID-19, the role of higher qualified optometrists, was paramount to delivering eye care in the primary care setting. One example is the Acute Primary Care Ophthalmology Service (APCOS) operating in West Kent, Medway, Swale, Dartford and Gravesham, Northern Parishes of East Sussex and South-East London falling within Kent.⁶⁴ The existing capacity provided by APCOS helped mitigate the number of cases seen in ophthalmology services by 96%, with only 4% of cases referred to ophthalmology services. The important role played by optometrists with higher qualifications were highlighted across stakeholder consultations.

Alongside this, optometrists took on greater responsibility in the testing/retesting of measurements to reduce the rate of false positives referrals to ophthalmology services as previously mentioned in Section 3.2.

Enhancing the role of higher qualified optometrists from the primary care setting may open the opportunity for telemedicine to be better integrated in the glaucoma care delivery model. For example, there may be the potential for a glaucoma patient to be seen by the optometrist in the primary care setting and the ophthalmologist attending remotely. This will place optometrists at the heart of patient-centred care in the UK, making full use of their skills and playing a central role in leading and delivering new models of care to improve patient outcomes. This collaborative way of working will foster greater trust and relationship building between primary and secondary care providers, who will be able to call upon each other to provide the best care to the patient.

To ensure optometrists continue to maximise their role in the delivery of glaucoma care, they should be incentivised and provided with opportunities to develop new skills and play a central role in leading and delivering new models of care. This is discussed in detail in Section 3.4.1.

Box 6: Learnings for England

- Empower optometrists to be at the heart of patient-centred eye care in the UK, by making full use of their skills and available technology to ensure they play a central role in leading and delivering new models of care to improve patient outcomes.

3.4 Enablers to optimised care delivery

The health system has developed many innovative solutions to manage glaucoma care across England during the COVID-19 pandemic. The intent of these innovations is to continue to provide high quality glaucoma care in the primary care setting whilst opening up additional capacity in ophthalmology services and ensuring a streamlined and coordinated approach to care provision. Examples of these innovations observed in the UK included the set-up of primary eye care treatment centres/diagnostic hubs or drive-through eye services, the accelerated use of telemedicine, changes to treatment and monitoring pathways and the implementation of a national and coordinated approach to electronic medical records and referral systems. The challenge facing England to implement such innovations are outlined in Box 6.

Box 7: The challenge facing the UK

- Inadequate investment to support the capability building of primary care optometrists in supporting risk sharing approaches.
- Outdated technology and a fragmented approach to implementing new technologies creates inefficiencies and lack of coordination in the care pathway.
- Staggered implementation of electronic medical records and referral systems across England limits the potential to achieve the full benefit of these innovations.

3.4.1 Invest in training opportunities for optometrists

A critical enabler of the extent to which optometrists could support care delivery through COVID-19 was the availability of the optometry workforce, including higher qualified optometrists who were trained with increased capabilities to deliver glaucoma care. There are three higher qualifications in glaucoma for optometrists in the UK. These include the Professional Certificate in Glaucoma, Professional Higher Certificate in Glaucoma or Professional Diploma in Glaucoma.⁶⁵ In March 2021, over 20% of optometrists in Wales had any one of the three higher qualifications in glaucoma.⁶⁶ Across the UK, the best estimate of optometrist with accredited higher qualifications in glaucoma and IP certification is approximately 1,610 and 1,038 respectively.⁶⁷

While higher qualified optometrists were shown to be very valuable through the pandemic in supporting glaucoma care delivery, the proportion of the optometry workforce that holds this additional qualification is small. In Scotland, Northern Ireland, and Wales all have well established programs and protocols in place for the use of higher qualified optometrists in the glaucoma care pathway supported by coordinated funding for training of a higher qualified optometrist workforce.

In Scotland, the first cohort of IP optometrists have graduated from the NHS Education for Scotland (NES) Glaucoma Award Training (NESGAT), fully funded by the Scottish Government.⁶⁸ This qualification allows IP optometrists in Scotland to manage patients (from ophthalmology services) in the primary care setting and contributes to building the skills and knowledge in the primary care workforce to support glaucoma care in the primary care setting, easing the strain on ophthalmology services, and allowing primary care optometrists to consider these career pathways. Similarly in Wales, optometrists with advanced clinical qualifications in glaucoma have played an integral role in ensuring care continues to be provided in the primary care setting. This includes IP optometrists having access to their own NHS prescription pads from their country's Health Board.⁶⁹ Similarly, the Welsh Government currently funds educational resources for health professionals including Wales Glaucoma Referral Refinement, incentivising practitioners to continue to develop their scope of practice.⁷⁰

In Northern Ireland, optometrists can undertake Level I Enhanced Services (LES I) and Level II Enhanced Services (LES II; provided they hold the College of Optometrists' Professional Certificate Level in Glaucoma) accreditation, to enhance their capabilities to perform repeat IOP measurement and undertake enhanced case finding for suspect glaucoma and suspected OHT respectively.⁷¹ Optometrists with LES I and LES II accreditation have the option to be involved in an enhanced training program called Project ECHO, which connects eyecare professionals across Northern Ireland and enables them to learn and share information regarding glaucoma care, empowering primary care optometrists to review and provide care to low risk glaucoma patients in the primary care setting.⁷²

Scotland, Northern Ireland, and Wales all have well established programs and protocols in place for the use of higher qualified optometrists in the glaucoma care pathway supported by coordinated funding for training of a higher qualified optometrist workforce. In light of growing pressures on the glaucoma care delivery pathway, there is reason to continue to build, invest and formalise the role of the optometry workforce in glaucoma care across the UK, and notably in England, particularly those who hold higher optometry qualifications such as glaucoma or IP. A workforce vision for the UK, which places optometrists at the heart of patient-centred eye care, maximises their skills, provides them with opportunities to develop new skills and play a central role in leading and delivering new models of care to improve patient outcomes is envisioned by The College of Optometrists.⁷³

Stakeholder consultations indicated that the largest barrier to greater use of higher qualified optometrists throughout the primary care setting is workforce capacity and training requirements. Though it was noted that IP training was encouraged throughout the COVID-19 pandemic, the IP qualification requires a clinical placement which has restricted the number of participants able to complete the training throughout the pandemic.

The prevalence of optometrists with advanced qualifications is expected to increase over the next few years as more optometrists seek to advance their skill sets and continue to play an integral role in the diagnosis, delivery and management of glaucoma care.⁷⁴ In light of growing pressures on the glaucoma care delivery pathway, there is reason to continue to build, invest and formalise the role of the optometry workforce in glaucoma care across England.

3.4.2 Technology

Both optometrists and ophthalmologists consulted raised the need for better information sharing across all providers of the care pathway, and more effective central recording of data. Currently, there is a lack of multi-directional communication between primary and secondary care providers. For example, IOP management strategies differ amongst patients and there exists no uniform IOP target for all patients. Without two-way communication between optometrists and ophthalmologists, individual patient targets are not known to the primary care professionals.

This is not a new issue, and there is a longstanding commitment to roll out electronic patient record systems across the NHS initially by 2020, which is now reinforced by the commitment in the NHS Long Term Plan for all providers, across acute, primary and secondary health settings to be fully digitised by 2024.⁷⁵ Prior to the COVID-19 pandemic, both Scotland and Wales had rolled out *OpenEyes*, a national digital eye care patient record system.⁷⁶ Similarly electronic medical record platforms have already been used across England.

The benefits of electronic medical record for glaucoma care include:

- **Standardisation of patient information.** This will ensure patients receive complete information regarding their care and management and treatment options and improve patient safety and experience.
- **Enable an efficient and shared care pathway between primary and secondary care eye care.** This is important when primary care optometrists are responsible for monitoring people with glaucoma, consulting with ophthalmologists as disease progression changes.

- **Hospital Eye Services can access their performance in care delivery and outcomes achieved.** For example, the data collected could be used to analyse outcomes and inform decisions about optimal care management and pathways.

It is acknowledged that there exists some challenges associated with the national roll out of an electronic medical record system, including delays due to changes in processes and training, and constraints in shifting historic data from paper notes to a digitised system.⁷⁷ Similar views were shared during stakeholder consultations, which emphasised recording keeping practices (i.e., paper vs digitised) are fragmented across the UK. One solution could be to include data sharing practices to the NICE guidelines, which will allow for a uniformed approach across primary and secondary care settings across the UK. This will allow health professionals to access patient information but ensure that NICE guidelines are consistently being implemented and followed by health professional at any point of the care pathway.

In 2010, the Royal College of Ophthalmologists developed the National Ophthalmology Database (NOD), a central registry for cataract surgery, that captures detailed clinical, surgical and outcome data from cataract operations in England. The database enables a cataract surgeon to compare their performance against that of their peers nationally. This has been a vital safeguard of patient safety and a promoter of best practice, reducing variation in the provision of cataract surgery and patient care. Since its inception, this has resulted in a 38% reduction in intraoperative complications since 2010, equivalent to approximately £2 million saving to the NHS.⁷⁸

Like the NOD, there is a need for a national ophthalmology registry, which collates outcome data for glaucoma, and other common sight-threatening conditions. A key enabler for this would be to establish a reliable, consistent and efficient IT connectivity system across the UK.

3.5 Other innovations

3.5.1 Emergency eyecare treatment centres

A new measure introduced throughout the COVID-19 pandemic to help patients with emergency eye problems, reducing the need for people to attend hospitals, was the establishment of Emergency Eyecare Treatment Centres (EETCs) or diagnostic hubs. Scotland introduced EETCs in all health board areas, staffed with as many IPs optometrists as possible to facilitate treatment in the primary care setting.⁷⁹ Patients were assessed via a virtual consult (delivered by an optometrist) prior to attending a face-to-face appointment at an EETC. The success of EETCs in Scotland can be attributed to the collaboration between NHS Boards and the optometry and ophthalmology professions, which has allowed more patients to be immediately diagnosed and treated in primary care while gaining an expert opinion from the secondary care ophthalmology team through teleophthalmology technology.⁸⁰

In England, eye care hubs have been set up to support the immediate and recovery phase of the COVID-19 pandemic and continue to deliver urgent eye care services to people.⁸¹ One example is the use of previously occupied commercial offices in Hoxton, England to perform tests within a 45-minute visit.⁸² Each patient's results are then individually reviewed online by the consultants and their teams. Patients receive a letter informing them of the outcome of their tests, while some were offered a virtual video or telephone appointment to discuss their particular results. Patients were asked to attend a subsequent hospital visit if the consultant flagged a need for further investigation or follow-up.

Prior to the COVID-19 pandemic, Ophthalmic Diagnostic Treatment Centres (ODTCs) had been established in Wales to keep patients in the primary care setting and to minimise hospital visits.⁸³ ODTCs form an important part of monitoring long-term conditions such as glaucoma in the primary care setting, providing care to patients closer to home. Health Boards in Wales have reported a 98% patient satisfaction rate with care and service provided at ODTCs.⁸⁴ This is in part due to the good working relationship between optometrists and ophthalmologist, whom have a 'shared-care' approach to providing care.

However, it is important to recognise the differences in the role of ODTC throughout Wales. For example, some ODTCs are for information gathering only, with decision making being deferred to ophthalmologist based in ophthalmology services. In other centres, primary care optometrists with appropriate higher qualifications can make clinical decisions regarding patient care and management. Whilst the former is more efficient than face to face appointments, one stakeholder indicated that this could add more pressure to an ophthalmologist's workload who are also providing face-to-face care. The same stakeholder commented that the success of ODTCs and their equivalents in each country requires the appropriate and trained workforce to ensure optimal primary care is delivered to patients, as well as ongoing trust and relationship building between primary care and secondary care eye care professionals.

3.5.2 Drive-through eye services

A novel innovation stemming from the COVID-19 pandemic was the setup of drive-through glaucoma services in England and Northern Ireland.^{85, 86} For example, the Royal Surrey NHS Foundation Trust's drive-through glaucoma service saw more than 400 patients each week, who had their eye pressure checked through the car window and their eye drops changed if needed in a portacabin. Not only was testing through a car window convenience, but it also helped to relieve some of the anxiety that patients felt about entering a hospital during the pandemic.⁸⁷

The Belfast Trust's IOP drive-through clinic was set up in a car parking lot and staffed with nurses, optometrists and ophthalmologists ready to measure a patient's IOP. This innovation was highly convenient (and thus had high attendance rates) and mitigated some of the risks and uncertainty associated with attending a hospital setting during COVID-19. These services can detect patients with dangerously high eye pressures, ensuring that treatment for these patients is prioritised. In Northern Ireland, health services are regionalised, which means all major glaucoma services and care are delivered out of the Shankill Wellbeing and Treatment Centre in Belfast. Patients measured as having higher than expected IOP from the Belfast Trust's IOP drive-through clinic were then instructed to come into the centre to start them on new treatment to control their IOP. While it is not expected that this innovation will be a long-term initiative, it highlights a means for primary care to support secondary care to help alleviate backlog and continue providing care in the primary care setting.

3.5.3 Telemedicine

Telemedicine encompasses any healthcare service provided remotely, typically through information and communication technology, for example via the video conference or telephone.⁸⁸ Telemedicine has been present in the healthcare setting over the last decade, although uptake remained fairly modest for a period of time. With social distancing measures in place to limit face-to-face contact with patients, there has been a greater reliance on telemedicine during the COVID-19 pandemic throughout the healthcare setting and to some degree, in the provision of eye care services.

One method of delivery which was accelerated due to COVID-19 was the delivery of virtual consultations by a primary care optometrist in the primary care setting. The gold standard of virtual assessment is via video slit lamp.⁸⁹ The Attend Anywhere platform is a secure NHS video call service designed to allow patients to attend their appointment with an optometrist virtually. The COVID-19 Urgent Eyecare Service (CUES), another virtual service was recommended to reduce the need for face-to-face consultations and therefore reduce ophthalmology attendances in ophthalmology services.⁹⁰ It is noted that the CUES system was designed to treat patients with red or painful eyes, or patients who are experiencing sudden changes to vision. As such, the majority of glaucoma cases were not covered by this system.

While telemedicine was already used prior to the COVID-19 pandemic and its use was critical during the pandemic, there is still a view from some stakeholders that patients should be seen face-to-face for diagnostic tests. Stakeholder consultations noted that glaucoma is difficult to observe via a virtual consultation.

Stakeholder consultations also mentioned that access to and use of telemedicine varied considerably throughout each country. Ophthalmology services which had already well-established telemedicine platforms was better placed to provide virtual eye care during the early months of the COVID-19 pandemic. Early investment in telemedicine and other alternative routes of care delivery is important in ensuring there is no delay to care provision and may prevent avoidable sight loss or blindness.

Telemedicine can be embedded in care pathways both through real-time consultations and through store-and-forward care.⁹¹ The challenges with real-time consultations could be mitigated through group calls between patient, optometrist and ophthalmologist. This model could see optometrist and patient meet in person (to allow for face-to-face diagnostic tests) with the ophthalmologist dialling in remotely. This structure also presents an opportunity for ophthalmologists to deliver consultations in underserved areas.

Similarly, store-and-forward telemedicine would involve in-person testing by an optometrist, with the patient's electronic medical records, laboratory results, slit lamp and fundus images, and other audio or video clips (such as eye movements or pupillary examination) forwarded to an ophthalmologist to review at a convenient time.⁹² Examples of this include the *OpenEyes* electronic system in Scotland and Wales which is used to upload images and digitally share patient data with ophthalmologists for their virtual review.⁹³ Combined with enhanced training of optometrists with higher qualifications, this pathway provides opportunity for the majority of lower-risk glaucoma patients to be treated within primary care.

3.5.4 Treatment and monitoring

Patients with higher risk of vision loss from their glaucoma are likely to require surgical treatments to manage their condition. While these surgeries need to occur within ophthalmology services, the patient may require a significant number of post-operative visits. As eye care professionals face the challenge of minimising irreversible sight loss due to treatment delays while being mindful that attending a ophthalmology service increases the risk of COVID-19 infection for glaucoma patients, the COVID-19 pandemic has impacted the choice of surgical procedure for glaucoma patients.

One study identified that 61% of glaucoma specialists has modified their surgery practice following the onset of the pandemic.⁹⁴ Although trabeculectomy is the most commonly performed procedure to treat glaucoma, it was performed with reduced frequency during the COVID-19 pandemic due to the number of postoperative visits required.⁹⁵ Alternative surgeries such as conventional and micropulse diode laser, glaucoma drainage devices, deep sclerectomy and Preserflo have been used more frequently.⁹⁶ While surgical choice and practice patterns have shifted for some glaucoma specialists during the COVID-19 pandemic, they are not expected to be significant long-term changes to practice patterns following the pandemic. However, they do propose alternative means of treatment and could be used to assist regional and national

Health Service bodies in providing guidance regarding service delivery during the recovery phase of the pandemic and in subsequent waves of the COVID-19 pandemic.

Home IOP-monitoring devices for glaucoma have the potential to identify IOP fluctuations that would otherwise be missed through regular monitoring.⁹⁷ These devices may have a role in monitoring of IOP in postoperative patients to limit the frequency of postoperative visits. Example devices include Icare HOME and the Sensimed Triggerfish. Home IOP-monitoring devices are typically purchased by ophthalmic practices and loaned to patients. The use of home IOP-monitoring devices within the UK is limited due to their relative expense as well as their reliability. At least one third of patients have been shown to struggle to obtain reliable IOP measurements despite previous training.⁹⁸ There are other sensors such as Eyemate that can be implanted in the eye during glaucoma surgery and can be used to measure IOP at any point in time. These sensors were valuable during the initial lockdowns when face-to-face appointments were not feasible. For patients with IOP within their target range, the sensors provided additional reassurance and avoided unnecessary visits. For patients with elevated IOP, additional medication could be delivered, or the patient could be prioritised for surgery.⁹⁹

4 Conclusion.

The COVID-19 pandemic has challenged the way glaucoma delivery is delivered and has caused life-changing sight loss to people with glaucoma. However, it has also been the catalyst to enabling change in the delivery of glaucoma care to address existing and future needs. This chapter describes the challenges facing glaucoma care and summarises the learnings during the COVID-19 pandemic which may help to transform the future of glaucoma care in the UK, and notably in England.

Even before COVID-19, the eye care profession recognised the need to do things differently. The wait list for ophthalmology services in the UK was high, people were presenting with more complex health problems and an ageing population meant there was an urgency to make changes in the way eye services were being delivered.

In response to the pandemic, eye care services in the UK were suspended, reduced or restricted, which has led to millions of missed eye tests, delays in treatment and compounded the waiting times for patients. The backlog of services is likely to impose significant costs for individuals living with sight-threatening eye conditions, further compounded by the impacts of COVID-19 and the implications of lockdowns and restrictions.

At the same time, however, the pandemic has served to highlight opportunities to systematically adopt efficient and effective shared care approaches between optometrists and ophthalmologists into the glaucoma care pathway. This is true across the UK, however, is particularly the case in England where glaucoma care is more highly fragmented and inconsistent across regions.

The need to address the existing challenges in the delivery of glaucoma care necessitated that the role of optometrists in England be further expanded and enhanced. Optometrists have been integral to the referral refinement and risk stratification processes, prioritising referrals to ophthalmology services to those at highest risk of sight loss from glaucoma. Further, optometrists have continued to provide care to lower risk patients in the primary care setting, empowering them to play a greater role in the shared care of glaucoma patients.

Despite the changes to the glaucoma care pathway and innovations brought forward from the COVID-19 pandemic, there remains a large patient backlog. As of May 2022, the waiting list for ophthalmology was 633,000 people. There were approximately 24,200 people waiting longer than one year for treatment in May 2022.⁴³ Optometrists and ophthalmologists have reported seeing patients with more progressed glaucoma, and therefore more progressed sight loss as a result of the pandemic.

Further, the economic impact of COVID-19 is substantial. Modelling analysis estimates that if it takes three years to clear the backlog, people will wait an aggregate additional 57.2 million days for their eye surgery. In economic costs, sight loss and blindness due to COVID-19 was estimated to be £2.5 billion between 2021 and 2024. The net additional impact on the cost of sight loss and blindness in the UK between 2020 and 2024 due to the pandemic is estimated at £1.7 billion. Coupled with an ageing population and increasing rates of glaucoma which is expected to grow by 44% by 2035, the UK is faced with an increasing demand for glaucoma services.

The current challenges facing glaucoma care in the UK pre-date the pandemic. However, the pandemic has accelerated changes to the glaucoma care pathway. The momentum generated by the COVID-19 pandemic could be used to transform glaucoma care in England, emphasised by the capability and role of optometrists in a shared care approach. This window of opportunity for change calls for the UK to act on these identified transformative opportunities for sustainable development, to provide timely glaucoma care to patients, reduce the cost to the healthcare system and empower eye care health professionals to work effectively and efficiently moving forward.

Glaucoma care can be streamlined based on learnings from the COVID-19 pandemic and examples of effective practice from across the UK to achieve improved outcomes for patients with glaucoma.




Whilst this is a complex issue the two key areas that need to be addressed to improve glaucoma care are:

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- Reducing the numbers of patients who need to be seen in secondary care, for example by using referral filtering models consistently;
- And increasing capacity for those who need care by wider adoption of shared care services for risk appropriate patients, constantly innovating to improve patient outcomes.

The key findings based on evidence from the literature review and stakeholder consultations undertaken as part of this analysis are summarised in Table 4.1.

Table 4.1: Key learnings following COVID-19 for glaucoma care in the UK, and notably in England

Key theme	Learnings for England
 <p>Consistency in care delivery models</p>	<ul style="list-style-type: none"> • The glaucoma care pathway in England is fragmented. A standardised approach to glaucoma patient referrals (through GRFS and NICE guidelines) will help create consistency and drive efficiency in the care pathway across the country. • This care pathway may need to adopt Eyecare Treatment Centres and referral filtering, which will empower primary care optometrists to continue to provide care from the primary care setting, whilst reducing the number of people referred to ophthalmology services. • To open capacity for ophthalmology services to prioritise care to highest-risk patients, England should continue to utilise risk stratification tools and ensure only patients with the highest-risk of sight loss from glaucoma are referred to services at ophthalmology services. • There is an opportunity for a more consistent shared care approach, which will allow primary care optometrists to monitor the care needs for lower risk patients in the primary care setting.
 <p>Enhanced role for optometrists</p>	<ul style="list-style-type: none"> • There is potential to further expand the role of optometrists in the glaucoma care pathway in the UK. For example, higher qualified optometrists can contribute to patient risk sharing, by providing primary care-based management for lower risk glaucoma patients. • Enhancing the role of higher qualified optometrists from the primary care setting may open opportunities for telemedicine to be further integrated in the care model, with the potential for a glaucoma patient to be seen by the optometrist in the primary care setting and the ophthalmologist attending remotely. • Optometrists can take on greater responsibility in the testing/retesting of measurements to reduce the rate of false positives referrals to ophthalmology services.
 <p>Enablers to optimised care delivery</p>	<ul style="list-style-type: none"> • Continued investment in building the qualifications of the eye care workforce, particularly primary care optometrists, is needed. This will ensure that there are more highly qualified primary care professionals who are able to diagnose, treat and manage low-risk glaucoma patients in the primary care setting. National funding may be required to support the expansion of this workforce. • Addition investment will be required to enable better information sharing across all providers of the care pathway, and more effective central recording of data. • The roll out of a national electronic medical record should continue to be prioritised to reduce the information barriers that exist between primary and secondary care. This will ensure a streamlined approach to information sharing throughout the patient’s full glaucoma care journey.

Source: Deloitte Access Economics.

The impacts of the existing backlog in glaucoma care, the continued impact of COVID-19 and the future needs of an ageing population present significant challenges to the healthcare system in England. Despite the obvious negative consequences of the pandemic, there is hope to use the momentum from COVID-19 to widely implement good practice/innovations in glaucoma care across the UK, to ensure consistent care models are delivered across the care continuum. Effective implementation of learnings from COVID-19 garnered from across the UK can be used to improve glaucoma care and effectively mitigate the escalating burden of glaucoma.

Appendix A: GLAUC-STRAT-FAST Guidelines.

The GLAUC-STRAT-FAST guidelines are summarised in Figure A.1. These guidelines also specify the level of qualifications required for practitioners to practice autonomously or to provide clinical assessment when supervised via virtual review based on the patient’s risk category. The current guidelines indicate that any core competent optometrist can provide clinical assessment of all patients (regardless of risk stratification) so long as there is adequate supervision via virtual review by a practitioner with the appropriate level qualification. This therefore highlighting the importance of upskilling primary care optometrists in playing a key role in the care pathway.

Figure A.1: GLAUC – STRAT – FAST guidelines

R1 Advanced 1° Open Angle / Angle-Closure Glaucoma	R2 Advanced 2° Glaucoma Developmental Glaucoma	R3 Advanced Glaucoma + high IOP Surgical Glaucoma (peri-operative) Progressive Glaucoma (reliable VF changes)	<div style="border: 1px solid red; padding: 2px; margin-bottom: 5px;">>8 dB</div> <div style="border: 1px solid yellow; padding: 2px; margin-bottom: 5px;">4-8 dB</div> <div style="border: 1px solid yellow; padding: 2px; margin-bottom: 5px;"><4 dB If loss <5° from fixation or Angle-Closure / 2° Glaucoma</div> <div style="border: 1px solid green; padding: 2px;"><4 dB</div>	<div style="border: 1px dashed black; padding: 5px;"> <p>Red Flag (Considered as RED)</p> <ul style="list-style-type: none"> >2 dB VF change in a single year Only eye Unexplained visual acuity loss Current glaucoma drug reaction IOP>40 mmHg at any stage Neuro-ophthalmic tumour <p>Plus (+) Factors (more complex)</p> <p>Ophthalmic Co-morbidity</p> <ul style="list-style-type: none"> Orbital / Plastic / Neuro-Ophth / Tumour Ocular surface cicatricial disease Multiple drop reactions Keratoconus / thin cornea (<490) Uveitis Significant retinal disease Extremes of Axial length Previous glaucoma surgery <p>Systemic / Social Factors</p> <ul style="list-style-type: none"> Relevant systemic conditions Mental / physical disability Socio-economic deprivation Needs transport </div>
A1 Moderate 1° Open Angle Glaucoma (<3 drops) Early 1° Angle Closure Glaucoma (<4dB) Early 2° Glaucoma (<4dB)	A2 Moderate 1° Open Angle Glaucoma (3 or more drops) Moderate 1° Angle Closing Glaucoma	A3 Moderate 2° Glaucoma		
G1 Untreated 1° OHT Glaucoma Suspect	G2 Treated 1° OHT 1° Angle Closure Suspect	G3 2° OHT 1° Angle Closure Early 1° Open Angle Glaucoma		

Source: Deloitte Access Economics (2022) adapted from The Royal College of Ophthalmologists (2022). Note: VF (visual field), OHT (ocular hypertension), IOP (intraocular pressure).

Appendix B: Stakeholder consultations.

Table B.1: Thematic observations of optometrist and ophthalmologist consultations

Themes	Optometrist (n = 6)	Ophthalmologist (n = 4)
The impact of COVID-19 on the care pathway	<ul style="list-style-type: none"> Both optometrists and ophthalmologists commented that COVID-19 reduced service delivery. Sight tests carried on in an emergency basis. Many patients were deferred, some for 12 months or more. Glaucoma patients were particularly affected by this because they don't know they're getting worse. Opportunity for case detection by optometrists was limited. Routine eye checks/informal screening process did not occur. Secondary care did not have the capacity to see these patients in a timely manner due to the pre-existing backlog. 	
Key innovations and steps undertaken to continue access to sight tests and accelerate the delivery of treatments to patients during COVID-19	<ul style="list-style-type: none"> Optometrists highlighted the innovations which enabled shared care or an enhanced role for optometrists in the delivery of glaucoma care. For example, IOP Drive-through services were used in Northern Ireland. These were particularly successful as testing staff knew the patients IOP range because they were sent the patients care plan via email. It was noted that while the system worked well, that it would not be embedded in the care pathway moving forward. In Northern Ireland, NICE guidelines are followed, and low risk patients are discharged and monitored in the community. Telemedicine was critical during the pandemic. However, glaucoma is particularly difficult to observe on a video call – with some optometrists of the view that full in person eye tests should be resumed. There were movements towards virtual ways of work where primary care data was shared with consultants. Referral filtering was seen prior to COVID-19 and seen as best practice but there is significant variation in how these care pathways are delivered in England. 	<ul style="list-style-type: none"> Ophthalmologists highlighted the prioritisation of risk stratification tools. These were used to ensure that patients at highest risk of sight loss from glaucoma have been identified early and were given priority for appointments. Ophthalmologists noted the accelerated delivery of virtual clinics. Often optometrists are involved in the community, they collect data on the patients, and that data is piped up to the consultant in the hospital setting. It was highlighted that there is a need to ensure the quality of the data is good (including images). Use of home IOP monitoring devices has been tried, though the effectiveness depends upon the patient's use of the device.
The strengths and limitations of changes in glaucoma care arising from COVID-19 across the UK	<ul style="list-style-type: none"> Hub based system within Scotland were effective. This was largely because there are higher volumes of optometrists with higher qualifications, and more dedicated training pathway to support this workforce. It was noted that there is limited two-way communication between primary and secondary care. The ability of optometrists to manage a patient are limited if they do not have access to specific targets (e.g., patient's target IOP). If patients are not seen as part of a shared care pathway, then optometrists do not know if a patient is getting better or worse. In Scotland the GOS funding model enables optometrists to see patients for repeat measures. This helps to reduce false positive referrals. Shared 	<ul style="list-style-type: none"> Ophthalmologists highlighted that there is a significant shortage of glaucoma specialists in the system. There are additional shortages of nurses and doctors nationally. Ophthalmologists commented that optometry services in Scotland and Wales are much more mature. More optometrists have higher qualifications and the appropriate diagnostic equipment to do clinical work. Significant advantages for hospitals with electronic systems, allowing for patients to be analysed remotely, without having to wait for the patient to come into hospital. Some ophthalmologists considered optometrists to be risk averse and only few have in depth experience with glaucoma.

Themes	Optometrist (n = 6)	Ophthalmologist (n = 4)
	<p>care schemes in Scotland are being used to stratify care across primary and secondary care based on the patient's glaucoma risk.</p> <ul style="list-style-type: none"> In Northern Ireland there is the ECHO network which allows for knowledge sharing, best practice guidance and support, available to both optometrists and ophthalmologists. This network has improved the relationship between optometrists and ophthalmologists. LES I and LES II accreditation for optometrists allows for enhanced testing (fact finding, visual field, pressure testing) in addition to sight tests. There are technological barriers which limit the flow of clinical data across the care pathway. Within England, data on sight testing in primary care is not linked to NHS systems or hospitals (some using paper records still). There are opportunities to improve multi-directional flow of data. There is no electronic referral across England. There is a need to include GPs in the loop, patients in the loop as well as primary and secondary care. There are significant workforce limitations. Even with optometrists and technicians collecting data, there are not enough consultant ophthalmologists to review that data and attend to appointments. 	<p>They noted that once patients are referred into ophthalmology they do not leave the system and it gets clogged.</p> <p>Chronic underfunding in the NHS. The workforce has been overworked and understaffed.</p>
<p>The ideal care pathway for glaucoma care in the UK.</p>	<ul style="list-style-type: none"> It was highlighted that the ideal pathway in England would involve a national approach to care. There would be repeat testing before referring to hospital. This allows for more substantial and certain referrals and provides ophthalmologists with more information. There is the opportunity for visual field and IOP tests to be carried out by optometrists, and the data shared with ophthalmologists. Data sharing between primary and secondary care was highlighted. There is a need for funding for increased training of optometrists. This would allow for optometrists to manage lower risk patients and free up capacity in secondary care. The health system must commit to gathering foundational level population data. Without access to this data, it is difficult to evaluate the effectiveness of changes to the care pathway. 	<ul style="list-style-type: none"> Ophthalmologists indicated a need to have a nationally coordinated implementation of NICE guidelines. Community optometrists would be able to follow NICE guidelines if they were funded fully, that would allow fewer patients to come into the hospital. There was a view that glaucoma specialists are needed at the top of all decision pathways. To achieve this, there is a need for an expanded workforce of glaucoma specialists.

Source: Deloitte Access Economics analysis of stakeholder consultation material (2022).

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