RCOphth

NOD
National Ophthalmology Database Audit

National Ophthalmology Database Audit

The Second Report of Age-related Macular Degeneration Audit (AMD)

Patients starting treatment for neovascular AMD in the 2021 NHS year (01 April 2021 to 31 March 2022)

Published March 2024

The Royal College of Ophthalmologists (RCOphth) is the professional body for eye doctors, who are medically qualified and have undergone or are undergoing specialist training in the treatment and management of eye disease, including surgery. As an independent charity, we pride ourselves on providing impartial and clinically based evidence, putting patient care and safety at the heart of everything we do. Ophthalmologists are at the forefront of eye health services because of their extensive training and experience. The Royal College of Ophthalmologists received its Royal Charter in 1988 and has a membership of over 4,000 surgeons of all grades. We are not a regulatory body, but we work collaboratively with government, health and charity organisations to recommend and support improvements in the coordination and management of eye care both nationally and regionally.

The ROYAL COLLEGE of OPHTHALMOLOGISTS

Roche Products Limited have provided funding to support the conduct of this study. Roche Products Limited has had no further involvement in the project. The project has been supported by an unrestricted, hands-off grant provided by Bayer plc. Bayer plc has no involvement whatsoever in the development or implementation of the project. We are grateful for the funding received from these organisations. We also receive ongoing support through subscription fees from participating hospitals.

Document authors:

Charlotte F.E. Norridge
Marta H. Gruszka-Goh
Martin McKibbin
Michael Burdon

Contents

Contents

Foreword

It is fantastic to see this national audit's progress over the last year with increasing participation of both patients and treatment centres.

This, its second annual report, highlights alarming lost to follow-up figures in some centres that are way outside what could be considered acceptable. Understanding the reasons for such outliers is important.

More injections are being given by trained, non-medical, healthcare professionals. This makes economic sense and should now be the norm. It is astonishing, when we are so short of trained ophthalmologists, that so many injections are still being done by doctors when nurse specialists, optometrists and other allied health professionals provide a superb service in many hospitals. Compared with data from the first annual report, the median number of injections given over the first year of treatment decreased from seven to six, though visual acuity outcomes remained similar. This is encouraging and further reductions in the treatment burden may be achieved in the future with newer, longer acting agents.

Data in this report and the new data on the NOD website for consecutive years will allow centres to track performance over time. New standards will help drive improvements and reduce variation in care pathways. Modelling enables a "fair" comparison of acuity outcomes, by adjusting for differences in the baseline characteristics of the patient cohorts at each centre. This will help identify key care processes such as the importance of prompt completion of the initial three injections and may soon show whether four injections at loading really do offer an advantage or not.

Identification of treatment intervals at the end of year 1 will help determine the impact of novel, longer acting agents in future years. This is important because many trials use different retreatment regimes for different drugs within a trial making it impossible to know if it is the drug or the retreatment regime making the difference to the outcomes.

As the use of independent sector providers increases it will be important for commissioners to insist that submitting data is an essential part of the contract. Speed of referral to treatment is an essential metric. It would be interesting to see the number of patients referred up on rapid access AMD referrals who do not need treatment and how this varies between services and referrers. It would also be interesting to see rates of treatment cessation due to futility when vision has been lost to ensure that treatment is not continued when it is no longer of any benefit.

The NOD audit programme is a tremendous achievement for all those involved. It is heartening to see NHSE is pushing to expand similar audit programmes across medicine with the development of its Outcomes and Registries programme and the RCOphth will work with them to support this work.

Ben Burton
President, The Royal College of Ophthalmologists

Summary of Key Points

- **Participation:** This second report focusses on patients starting treatment for neovascular age-related macular degeneration (NvAMD) in the 2021 NHS year (April 2021 to March 2022). The number of centres included in the analysis has increased from 63 to 66 and the number of eyes with baseline, care pathway and outcome data has risen by 30% to 26,847. The growing participation and size of the dataset suggest an acceptance of the clinical application of the audit and add validity to the findings.

- **Baseline characteristics:** Most patients were aged over 80 years at the start of treatment. Median visual acuity is unchanged from the year 1 report at 60 ETDRS letters, with 27% of eyes having "good" acuity (≥70 ETDRS letters) and 17% of eyes have a baseline acuity better than the initial upper limit of 70 letters suggested by NICE. 18% of eyes have "poor" acuity (<35 ETDRS letters) at the start of treatment with 9% having a baseline acuity worse than the initial lower limit of 25 letters suggested by NICE. Socioeconomic deprivation is associated with visual acuity at the start of treatment. For the eyes with "poor" baseline acuity, diagnosis and the start of treatment may have been delayed.

- **Care pathway:** The treatment of NvAMD requires investment in resource and capacity at treatment centres and ongoing commitment by patients and their carers.

  The proportion of eyes starting treatment within 14 and 28 days of referral from primary care was 21% and 35% respectively, although the date of referral from primary care was recorded for fewer than 40% of eyes. These figures suggest that a key recommendation from NICE guidance (NG82), namely, to start treatment within 14 days of referral, is not being met.

  The initial three monthly injections were given within 10 weeks in 66% of eyes.

  The median number of injections in the first and second years of treatment was 6 (range 1 to 14) and 5 (range 3 to 8).

  Nurses and other, trained, healthcare professionals gave at least 68% of injections.

- **Visual acuity outcomes:** Vision typically improves after the start of treatment and then stabilises. Median visual acuity was 65 letters at the end of the first year of treatment.

  Compared to the natural history of untreated eyes in clinical trials, this report highlights that treatment reduces the proportion of eyes with significant visual loss (≥ 15 ETDRS letters) at the end of the first year from 50% to 10% and with legal blindness from 50% to 17%.

  After the first 12 months of treatment, the proportion of eyes with "good" visual acuity increased to 42% and the proportion with "poor" visual acuity decreased slightly to 16%. Most eyes with "good" vision at the start of treatment retained this level of vision but a "good" acuity state was only achieved in 6% of eyes with "poor" acuity at the start of treatment. This data should be used during the initial consultations with new patients to ensure that they make an informed decision about starting treatment.

  The best visual acuity outcomes are achieved in younger patients, in eyes with good visual acuity and no other ocular disease at baseline and with prompt completion of the initial phase of monthly treatment. This suggests that prompt initial assessment, starting treatment quickly and completing the initial, loading phase of monthly treatment are key elements of the care pathway.

- **Safety:** Both intraocular inflammation (IOI) and presumed infectious endophthalmitis (PIE) are complications of intravitreal injection. Even with additional and often intensive treatment, both can lead to visual

loss. Treatment appears to be safe and the incidence of both IOI and PIE was low at 3.2 and 1.5 cases per 10,000 injections respectively.

- **Data quality:** Data quality and loss to follow-up remain a cause for concern. Problems appear to be more common when centres move to electronic medical records (EMR) for the first time or from one EMR to another. Commissioners and treatment providers should ensure that EMRs facilitate collection of relevant data as part of routine care and work with EMR providers to resolve any issues with data quality.
- **Variation between centres:** There is variation in data quality, the care pathway and visual acuity outcomes between providers of treatment. In clinical practice, unwarranted variation from best practice can lead to inefficiency and waste and result in poor outcomes for patients.

As treatment is more likely to stabilise than improve vision, it is important that it is started when vision is still good. There is a need for increased public awareness of NvAMD and the promotion of pathways to enable prompt diagnosis and initial treatment.

Providers should use a multidisciplinary workforce to provide enough capacity to start treatment in most eyes within 14 days of referral, ensure that the initial three monthly injections are given within 10 weeks and that ongoing care is not delayed by appointments cancellations by the provider.

Commissioners should meet with local providers, compare performance between providers against benchmarks, adopt best practice and reduce variation in the quality and outcomes of care.

- **COVID 19:** The results in this report for the 2021 NHS year may have been affected by ongoing service disruption and cancellations due to the COVID 19 pandemic.

Recommendations

Recommendations for Patients

- Treatment for wet AMD is more likely to stabilise vision than to improve vision. Patients should seek advice promptly in the event of new difficulties with reading, distortion or a central blurred patch in one or both eyes.
- Patients and carers should ask staff in their treatment centre about expected benefits and the duration of treatment for wet AMD, particularly in eyes with levels of vision similar to their own at the start of treatment.
- During treatment for the "first" eye, patients and their carers should ask clinical staff at regular intervals if there are any signs of wet AMD in their second eye.
- If treatment for wet AMD is ever paused, patients and their carers should be aware it can become active again in the treated eye and know how to contact their local provider quickly in the event of new symptoms.
- If treatment in the first eye is stopped or was not appropriate and no further follow-up is planned, patients and their carers should be aware that more than a third (33%) of people develop wet AMD in their second eye. In the event of new symptoms in the second eye, help should be sought promptly and usually from a local optometrist.
- Patients and carers whose local AMD treatment provider is not participating in the AMD audit should encourage the clinical staff to participate. Staff can contact the NOD AMD Audit team directly by email: **noa.project@rcophth.ac.uk**
- More information and support for patients with AMD and their carers is available from the **Macular Society** or telephone **0300 3030 111** and the **Royal National Institute of Blind People** or telephone **0303 123 9999**.

Recommendations for Providers of Treatment

- All providers of treatment for neovascular AMD are encouraged to demonstrate commitment to high quality care and good professional practice, using electronic medical records to collect clinical data as part of routine care and participating in national audit.
- To improve the utility of the audit, data quality recorded and submitted must be improved. Recording of the date of referral from primary care and the planned follow-up interval remains poor. Therefore, measurement of performance against NICE Guidance and Quality Standards is unreliable.

- Providers should request that EMR providers ensure recording of relevant data is easy to do as part of routine clinical care and/or that information from third-party referral management systems is recorded as a referral within the local EMR. Nominated leads should check that available and relevant functionality is enabled at local level or submit a change request when it is absent.

- Providers should meet as a department, with colleagues from Clinical Audit / Clinical Effectiveness / Quality Improvement, to benchmark local data quality and performance in the AMD audit reports against peers, national results and the new quality markers and to track performance over time, using the NOD Audit website and reports. Areas where local practice is of high quality should be noted and shared internally. Where areas for improvement are identified, nominate clinical and quality improvements leads to engage with stakeholders, and use quality improvement methodology to deliver an impact on local pathways and outcomes. It is often helpful to focus on "Just one thing", implement the change and remeasure performance over a period of six to 12 months.

- Dedicated referral pathways for patients with suspected neovascular AMD should be promoted locally and be triaged daily. The best visual acuity outcomes are obtained when treatment is started quickly, when visual acuity remains good, and when the first three injections during the initial, loading phase of treatment is completed within 10 weeks of the first injection.

- Use a multidisciplinary workforce to ensure sufficient capacity to start treatment quickly and deliver the loading phase of treatment promptly, without causing delays elsewhere in the care pathway.

- Real-world outcomes from the AMD audit should be used to help patients and their carers make an informed decision about starting treatment, particularly in eyes with "poor" baseline visual acuity. More than half of eyes retain this level of vision after 12 months of treatment and only 6% achieve a "good" visual acuity state.

- A decrease of 15 or more letters from baseline will often be secondary to the development or permanent structural damage and/or non-responsiveness to treatment. This should prompt an open and honest discussion with the patient about the uncertain benefits of continued treatment.

- To improve service sustainability, providers should review the contents of sterile, intravitreal injection packs to ensure that all the items in each pack are needed. Rather than adding rarely used items to every pack, it will be more sustainable for these items to be supplied separately and used as needed. Every effort should be made to reduce the use of single use plastics when, for example, cardboard alternatives exist and to recycle as much of the packs contents as possible.

1. Introduction

Age-related macular degeneration (AMD) remains the primary cause of sight-impairment certification in the UK.[1] Without treatment, AMD leads to irreversible sight impairment, difficulty with many aspects of daily living and loss of independence. A meta-analysis of untreated eyes in clinical trials found that almost 50% experienced a "significant" decrease (≥ 15 EDTRS letters) in vision after 12 months and a similar proportion would be classified as legally blind (≤35 ETDRS letters) after 12 months.[2] For the "wet" or neovascular form of late AMD (NvAMD), guidance from the National Institute for Health and Care Excellence (NICE) recommends treatment with intravitreal injection of drugs that block the action of vascular endothelial growth factor (VEGF) (NICE guideline NG82). Treatment is usually given with an initial loading phase of monthly intravitreal injections, followed by further treatment, according to disease activity, in an ongoing maintenance phase. The primary goal of treatment is to maintain vision and reduce the risk of further visual loss. Many patients experience an initial improvement in vision after the loading phase of treatment, followed by a slow decrease in vision over subsequent years.[3,4] Starting treatment quickly, when vision is still "good", helps to maintain this level of function. In contrast, eyes with "poor" vision at the start of treatment often experience some improvement initially but rarely achieve "good" levels of vision after treatment.

When NvAMD develops in the first eye, patients present to their high-street optometrist and are referred directly for secondary care assessment and diagnosis, usually via a dedicated referral pathway. The NICE quality standard (QS180) on serious eye disorders recommends treatment should be started, when appropriate, within 14 days of receipt of the referral from primary care as an example of best practice to help patients retain their eyesight. Appropriate information, included with the secondary care appointment communication, on the possible diagnosis and treatment options, such as the NHS England decision support tool: making a decision about wet age-related macular degeneration, will help new patients reach an informed decision about treatment. Capture of the date of receipt of the primary care referral within the EMR is required to identify whether treatment was started within the 14-day interval. Other patients with NvAMD in the first eye may present directly to an acute referral clinic or be identified during review within another ophthalmology secondary care pathway. During treatment of the first eye, monitoring of both eyes is recommended by NICE (QS180) to identify second eye disease as quickly as possible. This approach is both highly sensitive and clinically effective.[5] For these patients, there may be no referral from primary care.

In addition to starting treatment quickly, prompt completion of the initial, loading phase of monthly treatment and ongoing treatment, based on an assessment of disease activity through regular monitoring, with few delays have been shown to improve outcomes.[6-10] NICE quality standards (QS180) recommends monitoring the proportion of appointments for patients with NvAMD that are cancelled or delayed by the hospital or other provider. Subject to relevant fields being available and utilised within ophthalmology electronic records, the AMD audit will report performance for all providers of AMD treatment against all these elements of the care pathway, with the aim of reducing variation and improving outcomes.

This second report focusses on the eyes of patients starting treatment in the 2021 NHS year (April 2021 to March 2022). Two-year outcomes are also reported for eyes starting treatment in the 2020 NHS year. As well as allowing providers to benchmark local performance against regional and national peers, the second report includes new standards for data quality, the care pathway and visual acuity outcomes, adjusted where possible for baseline differences in the patient populations. Both the opportunity for benchmarking and the inclusion of standards are intended to help providers identify areas in which improvement may be required and to track changes in performance over time.

2. Aims

Clinical audit is a quality improvement tool that enables commissioners, providers of care and people receiving care to measure and, where necessary, take steps to improve local healthcare systems. The aims are to improve the quality and efficiency of the care pathway and to reduce unwanted variation in performance. As part of clinical audit, routinely collected healthcare data is analysed to enable benchmarking of performance with peers and against standards for the delivery of care and clinical outcomes. By enabling comparison of local performance with peers and standards, clinical audit can drive change in service delivery models and enable implementation of best practice.

The project delivery team for the AMD audit is supported by a multi-disciplinary advisory group, with five consultant ophthalmologists, other healthcare professionals, a statistician and patient representatives. With input from members of the Macular Society, the advisory group selected an original six key performance measures for the audit that were important to patients as well as to clinicians. These measures included key care processes, visual acuity and safety outcomes.

Key care processes include:

- The proportion of eyes starting treatment, when appropriate, within 14 days of referral from primary care
- The proportion of eyes completing the initial loading phase of three, initial monthly injections within 10 weeks
- The proportion of patients experiencing follow-up delays of more than 14 days within the first 12 months of treatment

Visual acuity outcomes include:

- Crude and adjusted visual acuity change from baseline to one year, taking account of age and visual acuity at the start of treatment
- The proportion of eyes with "good" visual acuity (≥ 70 ETDRS letters) after one year of treatment
- The proportion of eyes with "poor" visual acuity change (≥10 ETDRS letter loss) after one year of treatment

Safety outcomes include:

- The incidence of intraocular inflammation and presumed infectious endophthalmitis within 42 days of a prior intravitreal injection

Secondary performance measures recorded in the first report included data quality, median baseline visual acuity (an indicator of access to treatment), the number of injections in the first year and non-persistence with treatment.

Both the primary and secondary performance measures are expected to change throughout the life of the audit. As an example, data quality around recording the date of referral from primary care and the planned follow-up interval was found to be poor in the first audit year. It is hoped that changes to the commercial EMRs will support improvements in data recording and the retention of these performance measures, but alternatives may be required in future.

New secondary measures in the second annual report include:

- Change in visual acuity from six to 12 months after the start of treatment
- Follow-up and outcomes from one to two years after the start of treatment for eyes starting treatment in the previous audit year
- The proportion of eyes with "good" visual acuity (≥70 ETDRS letters) after one year of treatment, adjusted for differences in baseline characteristics
- The proportion of eyes losing ≥10 ETDRS letters from baseline after one year of treatment, adjusted for differences in baseline characteristics

3. Audit framework and participation

Participation in the audit is open to all providers of NHS-funded treatment for NvAMD, both NHS trusts and independent sector organisations, provided permission for data extraction and transfer to NOD was given by clinical leads / medical directors and Caldicott guardians or other equivalent. All eyes with a recorded diagnosis of NvAMD starting treatment in the relevant NHS years are eligible for inclusion. Exclusion criteria include: eyes with any prior treatment for NvAMD (before the relevant NHS year), eyes receiving a clinical trial drug and eyes from patients aged <55 years at the start of treatment.

In the second data extraction from May 2023, data from 10 providers was excluded as there was no data for patients starting treatment in the 2021 NHS year. Data was available for reporting from 73 centres, representing 59 NHS Trusts, Health Boards or Health and Social Care Trusts, 13 independent sector treatment centres (ISTC) from four independent sector organisations and a single provider in Guernsey. Most participating centres were in England (67) with two centres in Northern Ireland, two centres in Scotland, one centre in Wales and one from the Channel Islands. The total number of providers of NHS-funded treatment for NvAMD is not known.

Among the 73 participating NHS or independent sector providers, the following EMRs were in use at the time of the data extraction:

- Medisoft electronic medical record (EMR) in 28 centres
- MediSIGHT EMR in 39 centres
- OpenEyes EMR in four centres
- Local in-house databases in two centres

4. Methodology

4.1 Context of the data collection:

This second report focusses on the first year of treatment of the eyes of patients starting treatment in the 2021 NHS year. Two-year outcome data is also available for the eyes of patients starting treatment in the 2020 NHS year.

During the 2021 NHS year, available treatments for NvAMD included ranibizumab, aflibercept, brolucizumab and bevacizumab. Both faricimab and the biosimilar forms of ranibizumab were not licensed and available for use within the NHS until Summer 2022. Results from future years may help to confirm whether there is real-world data to support the longer treatment intervals and non-inferior acuity outcomes seen in clinical trials with faricimab and the biosimilars.

The report follows an analysis of data recorded into electronic medical record (EMR) systems as part of routine clinical care in participating organisations providing NHS-funded treatment for NvAMD. All of the organisations providing data for this report used either the Medisoft or mediSIGHT software from Medisoft Limited, the OpenEyes software from the Apperta Foundation or in-house databases. In the future, it is anticipated more organisations will participate in the audit, given national EMR roll outs across Northern Ireland, Scotland and Wales. Organisations using other commercial EMRs, such as Hive or Kaleidoscope from Epic Systems Corporation, and custom EMRs are encouraged to participate and submit pilot data to confirm compatibility with planned, future analyses. Participation in national audits is encouraged by The Royal College of Ophthalmologists and participation in the NOD AMD Audit is recommended in commissioning guidance: New Guidance for Commissioning Age Related Macular Degeneration Services. The AMD audit is now included in the Healthcare Quality Improvement Partnership (HQIP) Quality Accounts list 2024-25. Prior NICE guidance and quality standards relating to the diagnosis and management of NvAMD include recommendations to ensure early referral, prompt initial assessment, diagnosis and treatment, with few delays due to hospital cancellations during ongoing follow-up (NG82 and QS180). These recommendations helped inform the choice of process measures for the audit. Data relating to other recommendations, especially around the provision of information, support and the patient experience are typically not collected within the EMR as part of the routine clinical service but may be available through patient reported experience measures planned for the future.

4.2 Data quality and completeness

The data made available by the participating organisations using and EMR system is collected as part of routine clinical care. No additional data entry is required due to the integration of EMR systems into eye care services. Most, but not all, of the data fields listed in the AMD Audit Clinical Dataset are available within current versions of the available commercial EMRs. It is expected ongoing discussion with the EMR providers will facilitate recording of all the required data fields and enable centres to mandate local data recording when data quality if found to be poor.

Good data quality is essential to ensure that the results of analysis are valid. Particular care should be taken to ensure that the number of prior injections is recorded accurately. Unless prior treatment in the same or another centre is recorded, these eyes will be identified incorrectly as being treatment naïve. This will lead to an overestimate of the number of treatment naïve eyes and is likely to be reflected in the analysis of the care pathway and visual acuity outcomes. Correct recording of prior treatment is particularly important when centres move from paper records to a new EMR or from one EMR to another. Loss to follow-up may also be falsely high when centres move to a new EMR before the 12 or 24 month follow-up is complete. In this situation, data may be extracted from the old EMR but the follow-up visits will be recorded in the new EMR.

No external validation of data quality and completeness is possible or available. Variation in data quality and completeness between centres may reflect the use of older versions of each EMR and the lack of mandatory fields, differences in the use of paper and electronic records, patient pathways and integration with other administration systems within organisations.

4.3 Small numbers policy

Organisations with <25 eligible eyes treated within the 2021 NHS year have not been included in this report. For estimates of baseline visual acuity, data from centres with <25 eligible eyes with a visual acuity measurement are also not included and the same policy applies for follow-up data.

4.4. Limitations of the data

The data submitted for analysis by NOD includes data for the treatment of NvAMD in either or both of the first and second treated eyes. The first recorded injection could be in either the patient's first or second treated eye, unless immediate sequential bilateral intravitreal treatment (ISBIVT) was performed. In some cases, data for one of the treated eyes may be missing. This may arise, for example, if treatment started prior to the centre's adoption of electronic data collection, or with one starting treatment at another organisation. Currently NOD cannot link patients' data if collected at different organisations.

Patients' age, ethnicity and the calculation of the index of multiple deprivation data rely on data entered directly onto the provider's Patient Administration System (PAS), which links into EMR systems; hence, if these data are not recorded in the PAS, it is not present in the data extract for EMR enabled centres with PAS connections. Deprivation data was often available for extractions from the Medisoft and mediSIGHT EMR systems, and from one centre using an in-house database, but not for the other sources of data. The NOD is working with providers of other EMR systems to facilitate the inclusion of deprivation data during extractions.

Date of referral can be recorded in both the Medisoft and mediSIGHT EMRs and may also be available in custom EMRs. This may be done when a referral for suspected NvAMD is received from primary care. Extraction of historic data can help to identify if the referral relates to a first or second treated eye for new patients or for those who are no longer in active review. Data on referral from primary care is most likely to be available for patients with a new NvAMD diagnosis. For patients being actively treated in the first eye, routine collection of symptoms, visual acuity data and optical coherence tomography (OCT) images for the fellow eye will often help to identify second eye disease. In this situation and/or when other hospital records are used to hold referral information and to triage results, there may be no data for referral from primary care and so calculation of the time from referral to the start of treatment may not be possible. Getting It Right First Time (GIRFT) is a national programme designed to improve the treatment and care of patients through in-depth review of services, benchmarking, and presenting a data-driven evidence base to support change. GIRFT requests information from providers on the proportion of eyes with NvAMD that are treated within 14 days of referral from primary care. This information is available for individual centres on the Model Hospital website and a summary is provided for comparison in section 6.5.1.

Recording the absence or presence of ocular post-operative complications is not mandatory within current versions of some of the EMRs. Ongoing discussions with EMR providers are expected to improve capture of any ocular post-operative complications of treatment.

While NHS trusts may provide treatment at more than one location within the same parent organisation and geographical area, results in this report are for the parent organisation. Multiple site independent sector organisations provide treatment at a number of different geographical locations, and for these organisations treatment for individual patients is expected to remain at one location, in this context, data is reported separately for each location.

Longer treatment intervals in the maintenance phase of treatment may also mean that data for annual, milestone visits is not captured within the visit windows for annual milestones. Loss to follow-up is also an issue for visual acuity outcomes, reducing data quality. The first annual report found that 11.5% of eyes starting treatment were lost to follow-up within 12 months. Other series have reported similar rates of loss to follow-up among patients with NvAMD.[11,12] Loss to follow-up may be the result of patient factors, such as comorbidity, holiday, caregiver availability, perceived treatment failure, treatment burden and death, or provider factors, such as clinic administration and lack of capacity. Extended follow-up delays and non-adherence with treatment are associated with suboptimal visual acuity outcomes. The planned follow-up interval is often, but not always, recorded within the available EMRs. For centres offering a two-stop service, with assessment and treatment on different days, the recorded follow-up may be for treatment, not for the next assessment date.

Visual acuity change and state after treatment for NvAMD are associated with patient factors, lesion characteristics and care processes.[4,13,14] Age and visual acuity at the start of treatment are the strongest predictors of visual acuity outcomes. In this report, crude or unadjusted visual acuity changes are reported, along with adjusted visual acuity outcomes. The latter take account of differences in the baseline characteristics of the different patient cohorts at participating centres and can help to identify the key care processes. Lesion characteristics at the start of treatment are variably recorded within EMRs and were not included in the adjusted outcome models.

4.5. Data extraction

Participation in the audit requires prior agreement from the centre's Caldicott guardian / medical director or governance equivalent and the medical retina lead or clinical lead for ophthalmology. The sources of data for this second report included the Medisoft, mediSIGHT, OpenEyes or in-house databases. All centres except one organisation, used only a single EMR during the 2021/22 NHS year.

4.6. Data cleaning

The analysis dataset was restricted to those eyes with data which appeared to be likely to be reliable. The injection set of data included "number of previous injections". For a treatment naïve eye, these should then be 0, 1, 2, 3, 4 etc. For some eyes the first injection in the data was a number greater than 0 but then incremented as one would expect, so 7, 8, 9, 10. Treatment for these eyes most likely started in another organisation or before the introduction of the EMR in that centre and these eyes were excluded from the data analyses. Similarly, there were other eyes for which the number of injections was not consecutive. This may have occurred when patients relocated to another centre for treatment and then returned to the original centre. These eyes were also excluded.

4.7. Dataset

A minimum NvAMD dataset has previously been defined for purposes of the audit (available on the NOD Audit website).

4.8. Modelling

A key, original aim of the audit was to report not only crude or unadjusted visual acuity outcomes but also adjusted visual acuity outcomes, taking account of differences in the baseline characteristics of the eyes treated at different centres. In this report, adjusted outcomes for the proportion of eyes at each centre achieving a "good" visual acuity state (≥70 ETDRS letters) and experiencing a "poor" visual acuity outcome (losing ≥10 letters from baseline) after 12 months of treatment are reported. For the statistical modelling for both outcomes, logistic regression analysis was performed on the sample of eligible eyes starting treatment in the 2019, 2020 and 2021 NHS years. Univariate analysis used Chi square tests for binary and categorical covariates, and univariate logistic regression for continuous

covariates. Variables considered statistically significant from univariate testing at the 10% level were considered in the multivariate model.

Potentially relevant covariates identified from univariate analysis were fitted to logistic regression models using backwards selection from the 'full' model consisting of all variables identified from the univariate analysis to the 'best fitting' model. Robust standard errors were calculated using cluster adjustment where the individual patients were considered as clusters.

Observed percentages for "good" acuity state and "poor" acuity outcome were calculated using observed data submitted to audit. Expected percentages for "good" acuity state and "poor" acuity outcome were obtained from applying model output coefficients. For calculating the adjusted rate, a 'comparator' value is required for both visual acuity outcomes. This was estimated separately for the "good" and "poor" acuity outcomes from the mean expected centre rate from the 2019 to 2021 NHS years samples used to create the statistical models. The adjusted percentages for "good" and "poor" acuity outcomes were then calculated by multiplying the observed/expected ratio by the 'comparator' value.

No formal outlier detection analysis has been performed. Please refer to the AMD audit visual outcomes statistical modelling document on the NOD Audit website.

4.9. Definitions

4.8.1. Changes to definitions

For the second audit report, the following changes have been made to definitions used in the first report:

- The window for recording baseline visual acuity has been extended from 14 to 28 days before the start of treatment. This is expected to increase the number of eyes included in the analysis.
- The window for the annual milestone visits has been changed from +/- 56 days to –28 to +84 days.
- The upper boundary of the loss to follow-up window was extended to +84 days from +14 days. Eyes with no clinical data or visits recorded during or after the month 12 or 24 visit windows were considered to have been lost to follow-up.

4.9.2. Profession of injector

For NHS funded treatment, intravitreal injections for NvAMD and other retinal diseases are most often administered by non-medical staff, under the supervision of a qualified ophthalmologist. Typically, this will be by trained eye clinic or theatre nurses but also by optometrists, orthoptists and other healthcare practitioners. Within the EMRs, the profession of the treating healthcare practitioner is identifiable from their job title and, for medical staff, from a General Medical Council number. In this report, the proportion of injections given by medical and non-medical staff is detailed. In the event of uncertainty, the profession is listed as Unknown.

4.9.3. Key care processes

NHS providers of NvAMD treatment may not have direct control of when patients first present to primary care after the onset of symptoms, but organisations can control several care processes that appear to influence outcomes, and which may also improve the patient experience and encourage persistence with treatment.

The NICE guideline (NG82) on the management of AMD recognises the importance of early diagnosis and prompt treatment to prevent sight loss. Starting treatment within 14 days of referral from primary care is recommended. Analysis of several real-world datasets has shown better visual acuity outcomes in eyes receiving the initial loading phase of treatment quickly and for patients with both good adherence to and persistence with the treatment plan.[4,8,12] While completion of the initial three

injections within eight weeks may be possible, the choice of a 10-week target allows some leeway and the difference is unlikely to be important clinically.

Patient input into the choice of key outcomes suggested that follow-up delays are a feature of the care pathway in some organisations. Prolonged delays and non-adherence with the planned treatment pathway are associated with worse visual outcomes.

4.9.4. Visual Acuity (VA)
Visual acuity definitions used were designed to maximise the usefulness of the available data with specified 'time windows' for baseline and follow up measurements and criteria for preferred choices in terms of corrected, unaided and pinhole corrected acuities.

Visual acuity is assumed to have been recorded with habitual spectacle or contact lens correction. Acuities recorded in Snellen format were converted to LogMAR. Visual acuities of count fingers or worse were converted to ETDRS letter score of zero (LogMAR 1.7). In this report, visual acuity at baseline and after treatment is presented in ETDRS letters. A change of five ETDRS letters is roughly equivalent to 0.10 LogMAR units.

Visual acuity conversions between ETDRS, LogMAR and Snellen can be found in Appendix 4 (page 59).

Baseline visual acuity was considered to have been recorded when a measurement was recorded on the day that treatment started, or at any point in the 28 days before the start of treatment. Visual acuity at the annual milestone visits was considered to have been recorded when a measurement was recorded within –28 to +84 days either side of the relevant milestone visit after the start of treatment.

4.9.5. Intraocular inflammation and presumed infectious endophthalmitis
Presumed infectious endophthalmitis (PIE) was defined if any of the following occurred within 42 days of anti-VEGF injection: a post-injection record of endophthalmitis as a complication or new diagnosis, a surgical record of vitreous biopsy and/or anterior chamber tap or an injection of intravitreal ceftazidime or vancomycin. This approach is required as recording the presence or absence of PIE as a post-operative treatment complication may not be mandatory within the EMR.

Minor complications, such as a foreign-body sensation or sub-conjunctival haemorrhage (bruising) after intravitreal injection are common but resolve spontaneously. Intravitreal injection of treatment for NvAMD may also lead to intraocular inflammation (IOI). This can vary in terms of severity and impact. Poor adherence to good manufacturing technique or to injection under aseptic conditions may increase the risk of presumed infectious endophthalmitis (PIE). Unlike sterile IOI, PIE occurs following introduction of bacteria into the vitreous. Without prompt treatment, the impact on vision can be devastating. The term PIE includes both the scenario where no bacteria were found on microscopy or culture of intraocular fluids and when bacteria were isolated. Most organisations would expect the incidence of PIE to be less than one in 3,000 injections.[15]

Both PIE and IOI may originate after treatment in one organisation but may be managed by staff at a second organisation. (Without a record of the prior intravitreal injection, the complication would not be attributed to the second organisation.) For the AMD audit, it is not currently possible to match records for patients with initial and subsequent treatment in different organisations.

Other possible complications of intravitreal injections, such as cataract and retinal detachment, were not included as safety markers. Development of cataract and worsening visual impairment is often associated with the total number of prior intravitreal injections, or other surgical procedures, rather than being a complication of a single injection. Similarly, retinal detachment is more often a complication of posterior vitreous detachment and an indirect complication of intravitreal injections.

4.9.6. "Good" acuity state and "poor" acuity outcome at one year using modelling

After one year of treatment, "good" visual acuity state was defined as a visual acuity of ≥70 ETDRS letters, and a "poor" acuity outcome as a decrease of ≥10 ETDRS letters from baseline.

No "good" or "poor" visual acuity results were reported for centres with <25 eligible eyes with visual acuity recorded at both baseline and after 12 months of treatment. For the "poor" visual acuity outcome, eyes with a baseline visual acuity ≤25 ETDRS letters are not included.

4.9.7. Loss to follow-up

Loss to follow-up was defined according to the latest date on which clinical information was available for the treated eye. If this date was less than one year +84 days from starting treatment and the eye had no visual acuity measurement at one year, the eye was considered lost to follow-up. All eyes with visual acuity data or injection data at one year were considered to have completed follow-up. Similarly, loss to follow- up at 24 months, was calculated with an +84 days threshold. This type of delineation is required due to different treatment protocols in place between centres, different timelines patients can follow, potential delays to follow-up and that, during the 2021 NHS year, there was still service disruption due to the COVID-19 pandemic. Baseline characteristics of patients lost to follow-up were compared to the baseline characteristics of eyes completing one year of treatment.

4.9.8. First and second treated eyes

NvAMD often affects both eyes, either at the same time or sequentially. Active surveillance of the second eye may identify disease during treatment of the first eye. In this situation, the disease in the second eye may be detected at an early stage, often before the onset of any symptoms and there would not be an associated referral from primary care. Alternatively, disease in the second eye may be identified when there is no longer active treatment or review of the first eye. In this situation, the prior experience of the patient will often lead to recognition of the importance of symptoms and earlier presentation.

4.9.9. Audit quality markers:

The audit cycle typically involves a comparison of local practice against quality standards. The chosen standards may be derived from relevant NICE guidance or quality standards, published clinical trial outcomes or real-world datasets, national audits or expert consensus. The standards represent the level of performance that providers should achieve and/or care that patients should expect to receive. Similar standards have applied to secondary care ophthalmology providers for several years, such as those for patients who either screen positive or have ungradable images within the guidance on diabetic eye screening (DES-S12).

For the second report, a number of quality markers are introduced. These cover performance in relation to data quality, aspects of the care pathway and adjusted visual acuity outcomes. Good data quality is required to ensure that local performance is assessed accurately and that outcomes are representative of the service provided across the whole period of the audit. Adjusted visual acuity outcomes take account of differences in the baseline characteristics of patient cohorts at each centre, especially visual acuity and age.

For this report, these new quality markers have been derived from data available for eyes treated in the 2021 NHS year. These quality markers are designed to help drive improvements within departments and to improve the quality of care that patients receive. The NOD AMD team have defined "acceptable" markers in this report as those achieved by the top 50% of providers in the 2021 audit. These units are providing a good quality service, and all departments should strive to meet this threshold in future audit cycles. The "desirable" markers are those achieved by the top 25% of providers in the 2021 audit. These units are centres of excellence, providing best practice, Section 8, (page 51) Consideration was given to having higher quality markers for the parts of the care pathway identified as best practice in NICE guidance or quality standards such as starting treatment within 14 days of referral from primary

care and reducing the number of follow-up delays (NG82 and QS180). However, these are parts of clinical practice for which data quality remains poor. When data quality is low, the quality markers are derived from available data and expert clinical input.

The NOD AMD team has utilised the 2021 audit cycle as a baseline for these quality markers but the intention is to revise the current standards every few years, as performance improves. Centres may have legitimate and acceptable reasons for not meeting one or more of the quality markers in a given year but, as part of quality improvement, every effort should be made to improve performance in future years. Centres are encouraged to compare local performance with peers, aggregate results and the quality markers.

Data quality markers:

- The proportion of eyes with a referral from primary care recorded within three months of starting treatment
- Recording of visual acuity recording within the windows for both the baseline and month 12 visits

Care pathway quality markers:

- The proportion of eyes starting treatment within 14 days for referral from primary care
- The proportion of eyes completing of the initial three intravitreal injections, during the loading phase of treatment, within 10 weeks
- The proportion of eyes with presumed infectious endophthalmitis as a post-operative ocular complication of treatment

Quality markers for adjusted visual acuity outcomes:

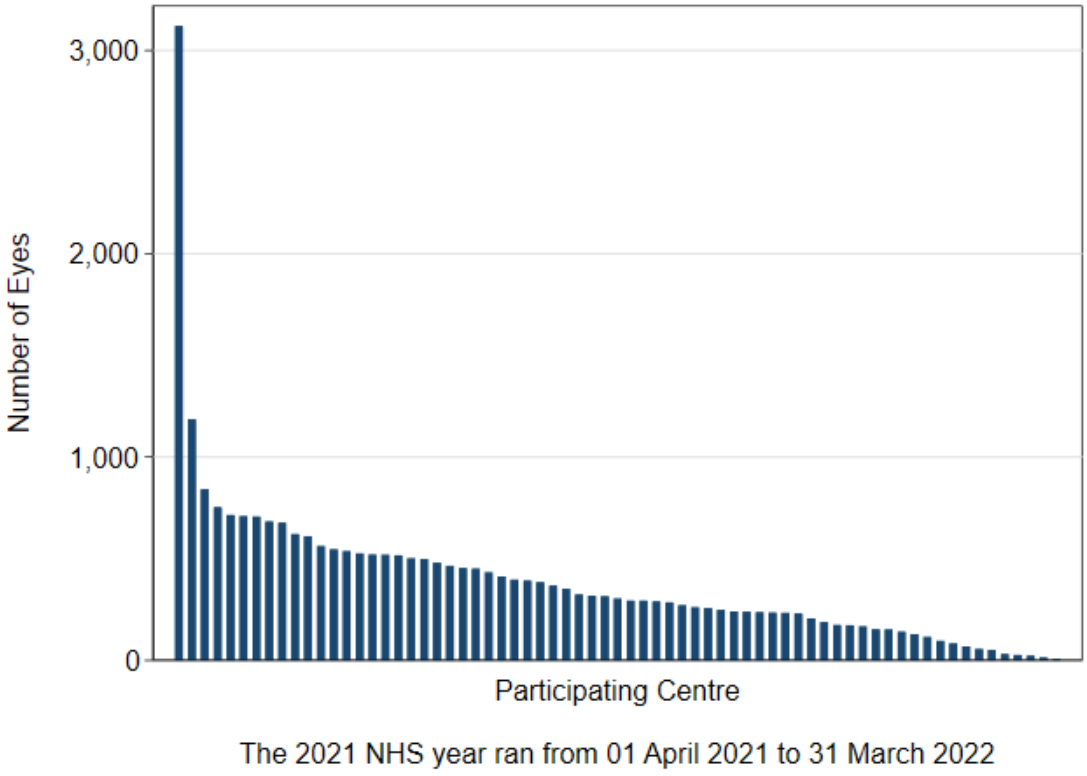
- "Good" visual acuity outcome: The proportion of eyes with "good" visual acuity (Acuity ≥70 ETDRS letters) after the first 12 months of treatment, after adjustment for differences in baseline characteristics
- "Poor" visual acuity outcome: The proportion of eyes with a "poor" visual acuity outcome (Decrease of ≥10 ETDRS letters) after the first 12 months of treatment, after adjustment for differences in baseline characteristics

5. Eligibility, follow-up and data quality

5.1. Eligibility

For the 2021 NHS year, data from three providers with data for <25 eligible eyes starting treatment in the 2021 NHS year was excluded, Figure 1, (page 21). Eligible for reporting, and included in this analysis, were 26,847 eyes from 24,300 patients commencing treatment under the care of 66 providers. The number of eyes eligible from each centre varied considerably, with a median of 520 eyes (IQR; 324 – 709) starting treatment, Figure 1, (page 21) and Appendix 5, (page 60).

Figure 1: The number of eligible eyes commencing treatment in the 2021/2022 NHS year for each participating centre – ordered by frequency for each centre



5.2. Data quality for recording of the date of referral before the start of treatment

For the 26,847 eyes starting treatment in the 2021 NHS year, information on the date of or reason for the referral was available for 10,359 (38.6%) eyes. Of these, 8,560 (82.6%) eyes had a date of referral but no reason for referral recorded in the EMR, 1,166 (11.3%) eyes had suspected NvAMD recorded as the reason for referral and 633 (6.1%) eyes had a referral due to another ocular disease.

There was a large variance in the quality of the referral data between the centres. Data from 41 centres (62.1%) had referral information for <50% of eyes. In contrast, data from 20 centres (30.3%) had referral information from >75% of eyes and a single centre (1.4%) had information for 100% of eyes.

No referral data was submitted from 8 (12.1%) of centres but it seems likely that the versions of the EMR used in these centres lacked the functionality to record this information. Recording of data for referral

information was generally better for centres using either Medisoft or in-house databases, compared to the mediSIGHT or OpenEyes EMRs. Data on referrals were recorded in >= 50% of eyes from 2.6% of the centres using mediSIGHT, 40% of the centres using custom EMRs and 57.1% of the centres using the Medisoft EMR.

For the centres with any referral data, the median percentage of eyes with data in the extraction was 42.8% with IQR (14.5%-86.8%) and ranged between 0.3% and 100%, Appendix 6, (page 63).

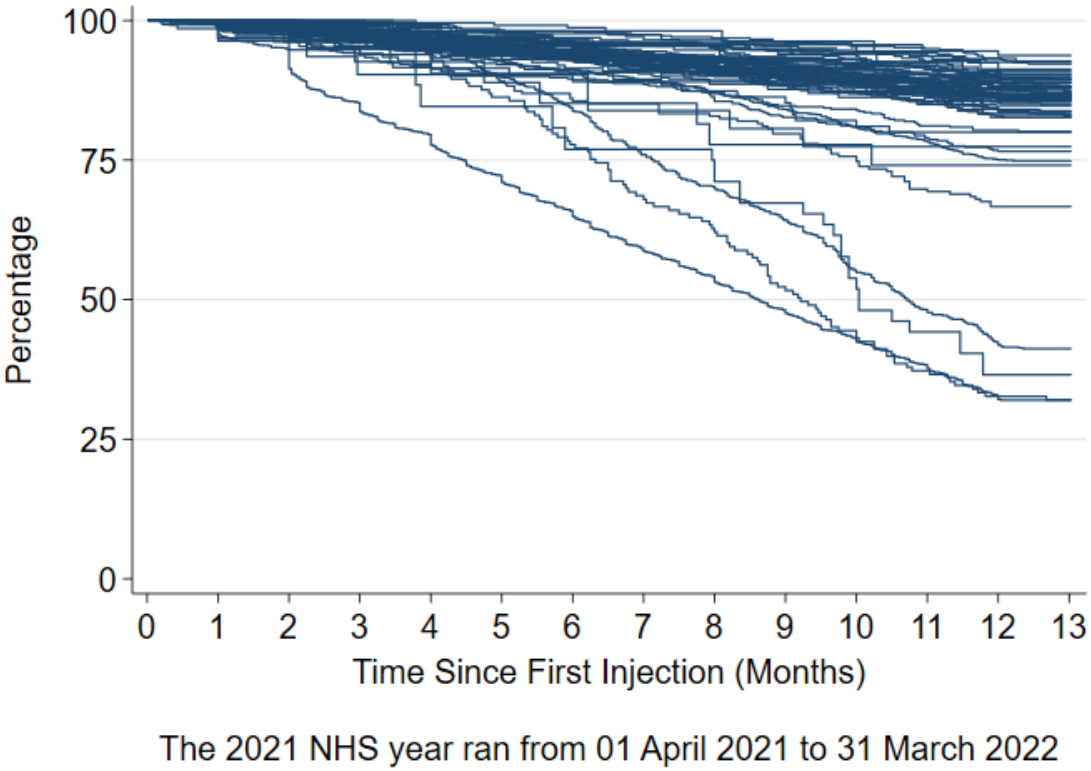
5.3. Follow-up to month 12 after the start of treatment

Of the 26,847 eligible eyes starting treatment in the 2021 NHS year, 6,439 (24.0%) eyes did not have a follow-up visit recorded within the month 12 visit window. Patient death was the reason for lack of follow-up for 513 eyes (8.0% of the eyes without follow-up to month 12). For the other patients / eyes, no reason for loss of follow-up data at month 12 was identifiable.

The percentage of eyes lost to follow-up within one year of treatment varied between centres (range; 7.0% to 69.3%). Four (6.1%) of centres have loss to follow-up more than 50.0% and 8 (12.1%) of centres more than 25.0% of eyes, Figure 2 (page 22).

Patients lost to follow-up before month 12 (6,439 eyes) tended to be slightly older at the start of treatment, with a median age of 81.4 years (IQR; 74.1 to 87.6 years), compared to those who were not lost to follow up with a median age of 80.7 years (IQR; 75.3 to 85.9 years). Those lost to follow-up also had a lower median baseline VA of 55 ETDRS letters (IQR; 35 to 68 letters) compared to those not lost to follow-up with a median of 60 ETDRS letters (IQR; 45 to 70 letters).

Figure 2: The percentage of eyes lost to follow-up within one year from first injection by participating centre



The 2021 NHS year ran from 01 April 2021 to 31 March 2022

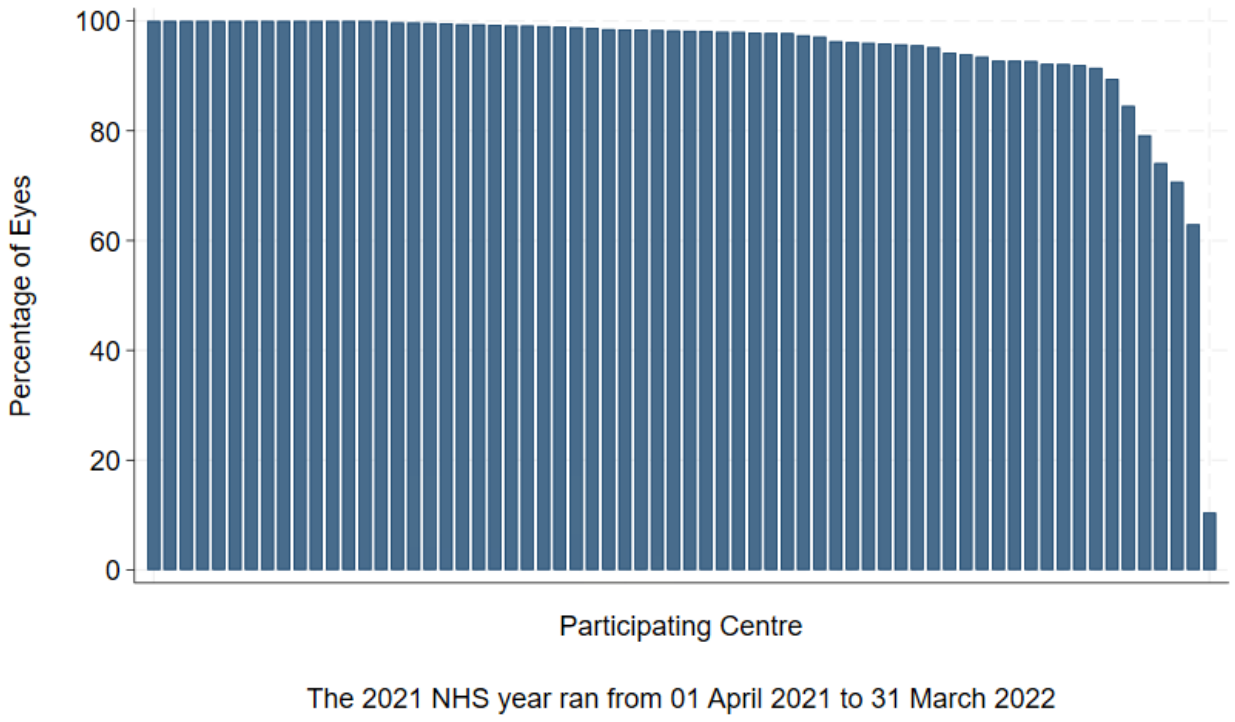
5.4. Data quality for recording of visual acuity

5.4.1. Baseline visual acuity

For the 26,847 eligible eyes, a valid baseline visual acuity was recorded for 25,498 (95.0%) eyes on or within 28 days prior to the first injection. For the 1,349 eyes without a baseline acuity in this period, 729 (54.0%) had a measurement more than 28 days prior to the first injection and 620 (46.0%) had no visual acuity measurement recorded.

There was a wide variation in the percentage of eyes with a baseline visual acuity measurement between contributing centres. A single centre (1.5%) had <50% of eyes with a baseline acuity recorded, 62 centres (93.9%) centres had a valid baseline acuity recorded for ≥75% of eyes, and 49 centres (74.2%) centres had valid baseline acuity recorded for ≥95% of eyes. At 15 centres, baseline acuity was recorded in 100% of eyes, Figure 3 (page 23) and Appendix 6 (Page 63).

Figure 3: The percentage of treated eyes supplied to the audit with a valid baseline VA by participating centre – ordered by the percentage of eyes with baseline VA data



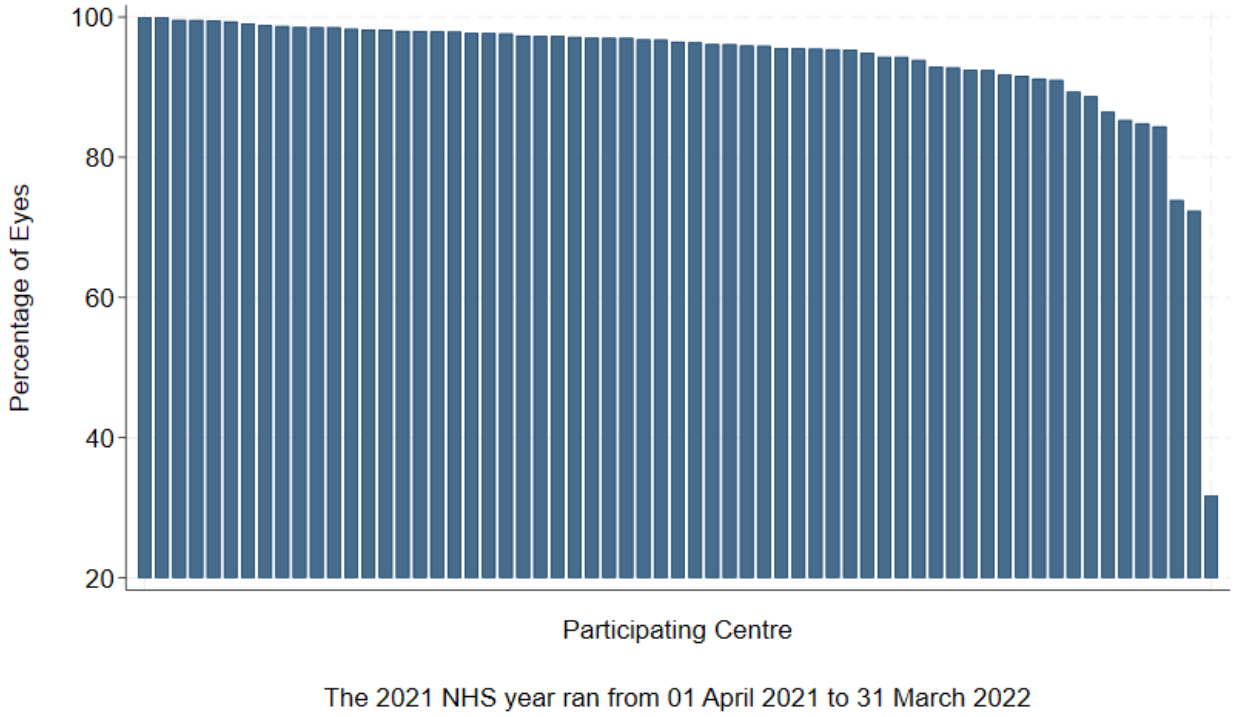
5.4.2. Month 12 visual acuity

Of the 26,847 eligible eyes, 6,439 eyes had no recorded follow-up within the month 12 visit window. Three centres had <25 eyes not lost to follow-up, thus a further 61 eyes were removed from analysis at 12 months. This left 20,347 eyes from 63 centres remaining in the sample at one year. Of these, visual acuity measurements were recorded for 19,184 (94.3%) eyes and were missing for 1,163 (5.7%) eyes. All centres had ≥25 eligible eyes with a visual acuity measurement at the end of the first year, thus 19,184 eyes from 63 centres were eligible for assessing vision at one year.

There was a wide variation in the percentage of eyes with VA recorded at one year between contributing centres (range; 31.7% to 100.0%). There was one (1.6%) centre with <50% of eyes, 60 (95.2%) centres

with ≥75% of eyes and 42 (66.7%) centres with ≥95% of eyes with VA recorded at one year (including two centres with 100% of eyes with VA recorded at one year), Figure 4 (page 24), Table 1 (page 25) and Appendix 7 (page 66).

Figure 4: Percentage of eyes with VA at one year – ordered by the percentage of eyes with data at one year



5.4.3. Baseline and month 12 visual acuity

For the 26,847 eligible eyes that started treatment, 20,347 eyes remained in the sample at one year. No visual acuity measurements were recorded at baseline for 1,003 (4.9%) eyes and after 12 months for 981 (4.8%) eyes. Therefore, 18,363 (90.3%) eyes had VA data at both baseline and after 12 months. A further three eyes from one centre were removed from results for change in VA due to having <25 eyes with change in VA measurements. This left 18,360 eyes eligible for change in VA analysis from 62 centres.

The percentage of treated eyes with both baseline VA and one year VA measurements varied between participating centres, with no centres having acuity recorded at both time points in <50% of eyes, 57 (91.4%) centres having acuity recorded in ≥75% of eyes and 31 (50.0%) centres having acuity recorded in ≥95% of their sample. One centre had acuity recorded at both timepoints for 100% of eyes, Figure 5 (page 25), Table 1 (page 25) and Appendix 7 (page 66).

Figure 5: Percentage of eyes with visual acuity recorded at both baseline and after 12 months of treatment, ordered by the proportion of eyes

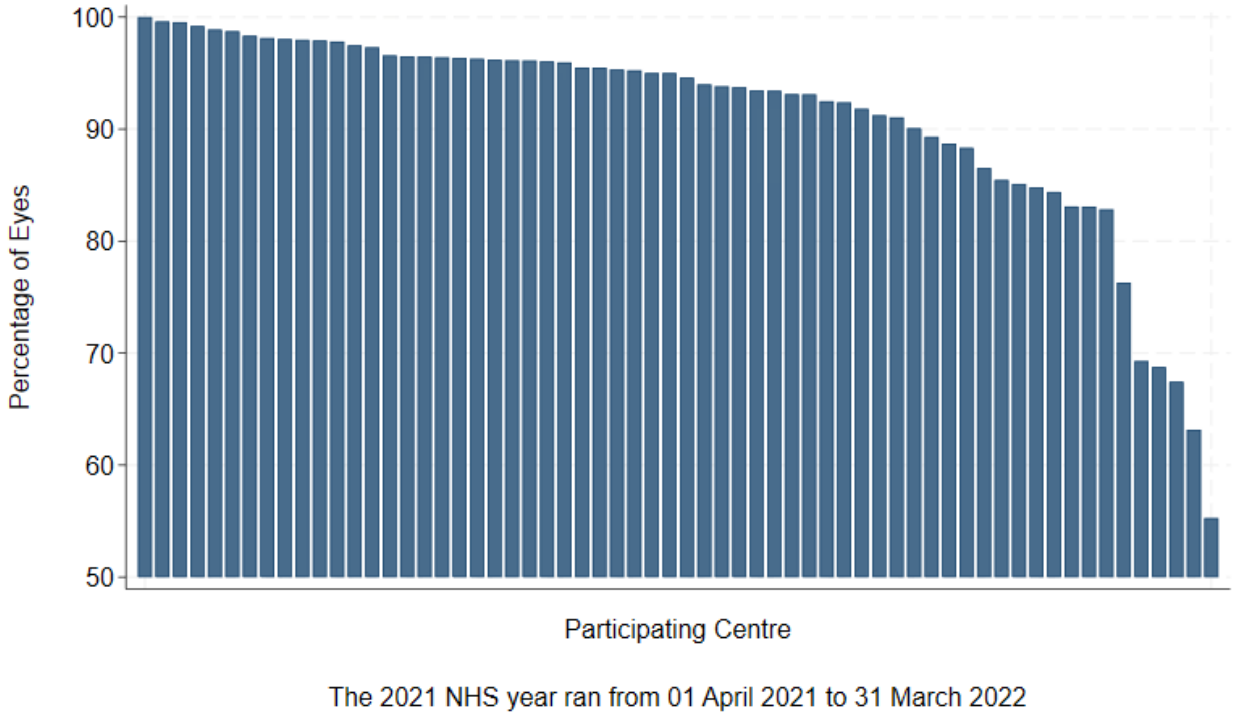


Table 1: Data recording for visual acuity at baseline, month 12 and both time points

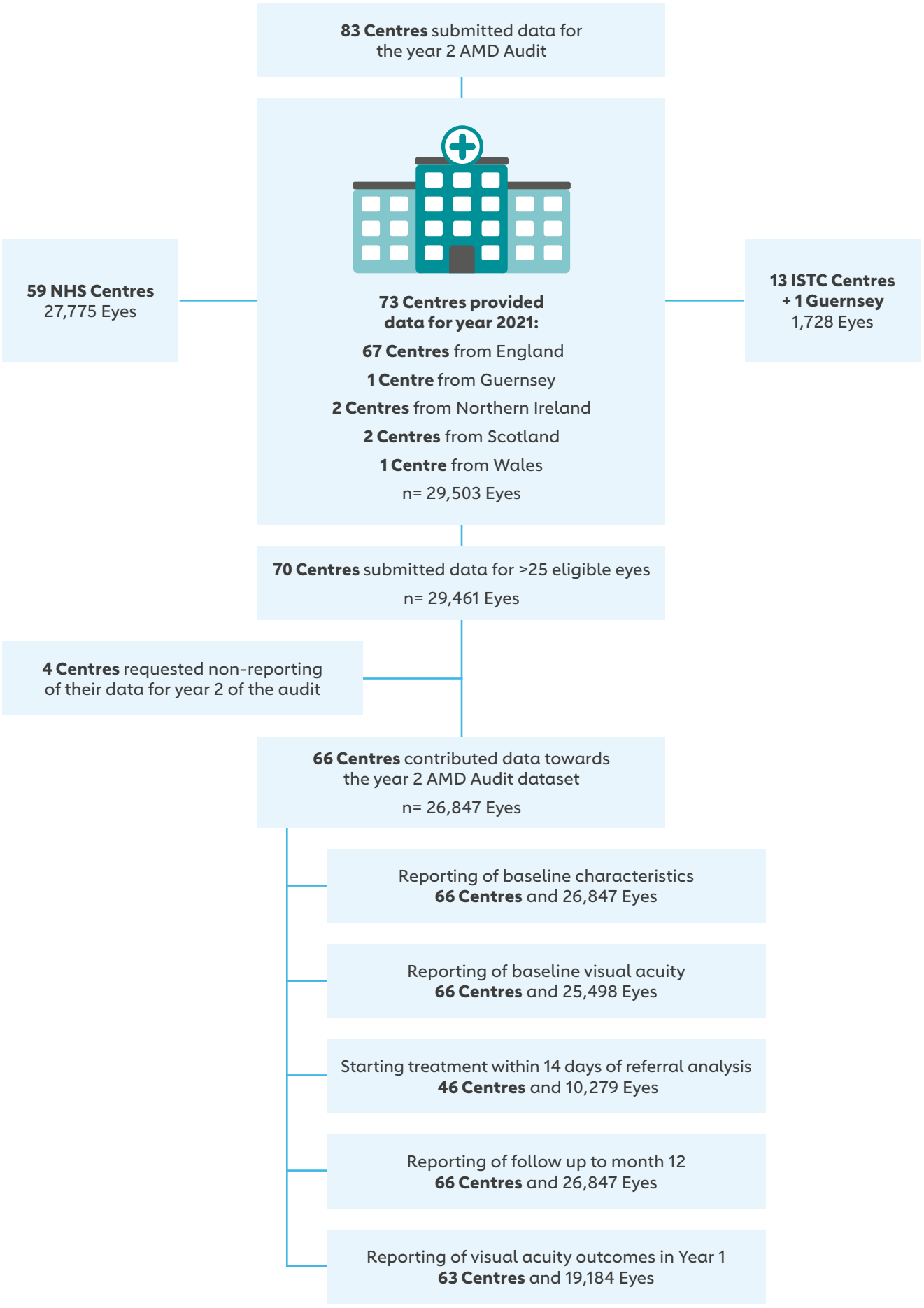
N (column %)	Baseline visual acuity	Month 12 visual acuity	Baseline and month 12 visual acuity
Number eligible eyes	26,847	20,347	20,347
Number of centres	66	63	62
Percentage of centres with;			
<50% recorded	1 (1.5)	1 (1.6)	0 (0.0)
>=75% recorded	62 (93.9)	60 (95.2)	57 (91.4)
>=95% recorded	49 (74.2)	42 (66.7)	31 (50.0)
100% recorded	15 (22.7)	2 (3.2)	1 (1.6)

5.5. Data quality for recording of the planned follow-up interval

Recording of the planned follow-up interval may be unavailable or not mandatory in some versions of the current EMRs and may also be recorded as a surgeon default value. Recording of the intended follow-up interval in the dataset was variable. Ongoing discussions with EMR providers and future EMR updates are expected to improve capture of the planned follow-up interval and aid identification of delayed follow-up. In this report, delays to the planned follow-up interval are not reported. For centres using the mediSIGHT EMR, there is currently a matching key missing from the data provided, but this should be resolved in future audit years.

The number of centres / eyes participating and available for analysis at each stage is summarised in Figure 6.

Figure 6: The number of centres and eyes at different stages of analysis



6. Results

6.1. Baseline characteristics for patients and eyes starting treatment in the 2021 NHS year

Baseline characteristics are reported for 26,847 eligible eyes from 24,300 individual patients starting treatment in the 2021 NHS year. The patients' sex was not recorded for 448 (1.8%) of patients while the majority (59.7%) were female. Ethnicity was not recorded for 35.4% of patients. For those with a recorded ethnicity, 13,361 (85.2%) were Caucasian. The number of first, second and immediately sequential bilateral treated eyes was 18,928 (70.5%), 4,707 (17.5%) and 3,212 (12.0%) respectively. The median age in years of the patients at the start of treatment of their first, second and immediately sequential bilateral treated eyes was 80.5 (IQR;74.4 – 86.1), 82.6 (IQR; 76.9 – 87.4) and 81.1 (IQR; 75.1 – 86.8) respectively.

6.2. Baseline visual acuity for eyes starting treatment in the 2021 NHS year

The median baseline visual acuity was 60 ETDRS letters (IQR: 44 to 70 letters). For 4,631 (18.2%) eyes, the baseline VA was <35 letters, for 7,199 (28.2%) eyes 36-55 letters, for 6,800 (26.7%) eyes 56-69 letters and for 6,868 (26.9%) eyes ≥70 letters. There were 18,797 (73.7%) eyes with a baseline VA between 25-70 letters (the former NICE guidelines for treatment (Snellen equivalent 6/12 to 6/96) and 2,360 (9.3%) and 4,341 (17.0%) eyes with baseline acuities of <25 and >70 letters respectively.

Baseline median visual acuity varied between centres, with one (1.5%) centre having a median baseline acuity of <35 ETDRS letters, 11 (16.7%) centres having a median baseline acuity of 35-55 letters and 54 (81.8%) centres having a median baseline of 56-69 ETDRS letters. No centres had a median baseline acuity of ≥70 ETDRS letters, Figure 7 (page 28) and Appendix 6 (page 63).

Median baseline acuity was ten ETDRS letters lower in first treated eyes than for second treated eyes. This suggests that first eye treatment may be undertaken at a more advanced stage of visual loss or that second treated eyes are identified, diagnosed and treated at an earlier stage of disease development, Table 2 (page 28).

Figure 7: Median and IQR for baseline visual acuity by participating centre – ordered by median baseline visual acuity

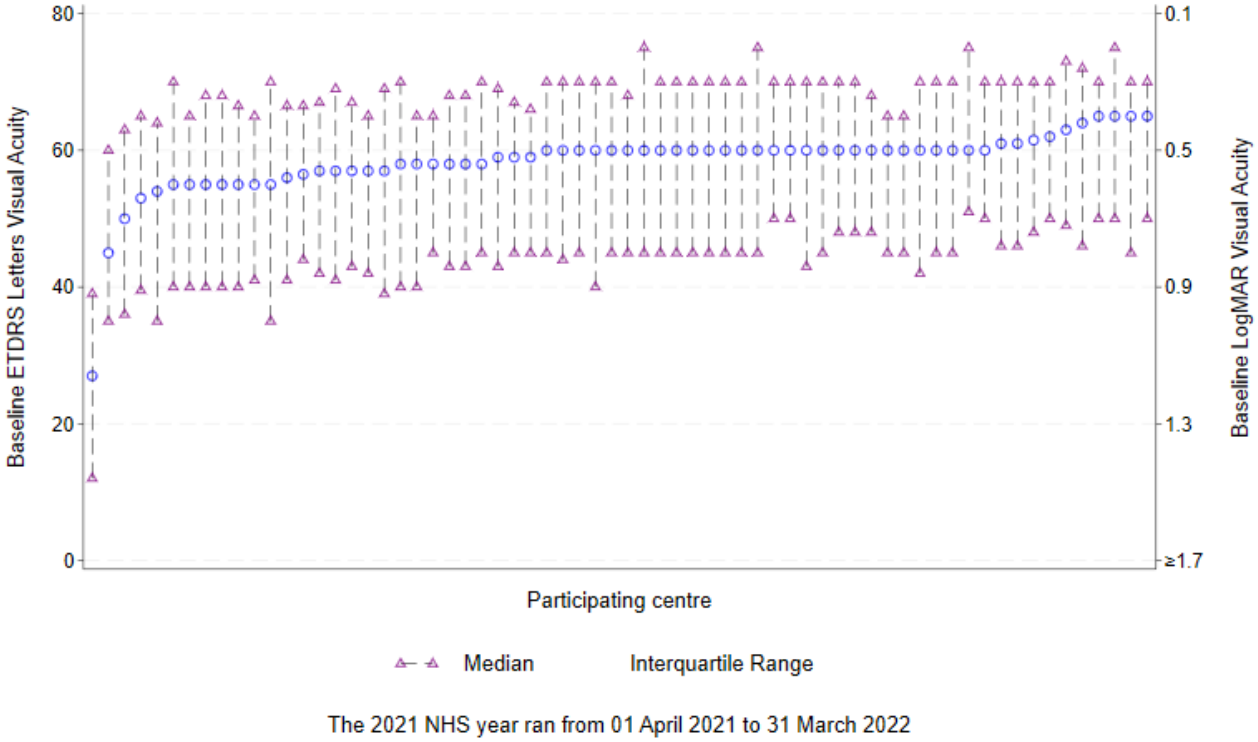


Table 2: Baseline visual acuity for first treated, second treated and ISBIVT eyes

	Number of eligible eyes	Median VA (ETDRS letters)	IQR VA (ETDRS letters)	Proportion with good VA (≥70 letters)
First treated eyes	17,921	55	40 to 69	23.9
Second treated eyes	4,504	65	53 to 73	39.8
ISBIVT eyes	3,073	59	43 to 70	25.6
Overall	**25,498**	**60**	**44 to 70**	**26.9**

Case study 1 – County Durham and Darlington NHS Foundation Trust

County Durham and Darlington NHS Foundation Trust (CDDNHSFT) had more than 37% of eyes with "good" visual acuity at the start of treatment. Mr Gordon Lau from CDDNNHSFT believes that this was achieved by having ready access to optometrists and optical coherence tomography (OCT) imaging in the community.

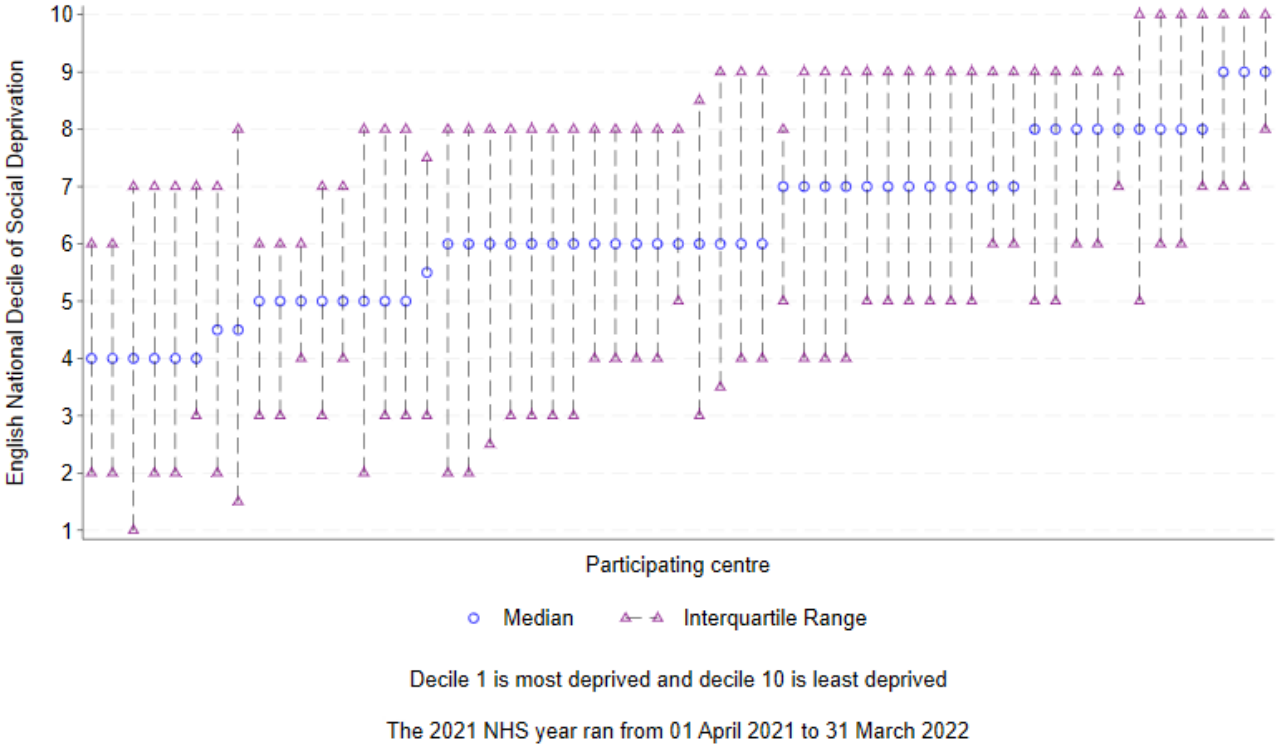
"The AMD strategy at CDDNHSFT relies on early diagnosis and prompt treatment to prevent irreversible blindness cause by Age-related Macular Degeneration. We believe that the commissioned Minor Eyecare Service (MECS) provided by optometrists removes barriers in accessing Ophthalmic services by enabling patients to be seen on the same day and much nearer to home when visual symptoms develop. Patients can be advised to attend MECS by their GP or self-refer. Whilst not unique to CCDNHSFT, MECS practitioners perform OCT scans in the community, shortening the time to diagnosis and treatment. MECS referrals are managed on a direct access pathway with dedicated Failsafe officers. MECS activity in our region is underpinned by a Consultant-led Rapid Eye Clinic which ensures that atypical cases of AMD are also appropriately managed. The Trust continues to respond to the increasing demand for treatment ensuring timely intervention."

6.3. Index of multiple deprivation (IMD)

The English index of multiple deprivation was calculated for 18,016 patients from 57 participating English centres with data recorded on the Medisoft or mediSIGHT EMRs from 56 centres, and data from one in-house database centre. All centres, except six, treated patients in the most deprived national decile of social deprivation (decile 1) and all bar four centres treated patients in the least deprived national decile of social deprivation (decile 10). There was notable variation in the median English national decile of social deprivation for the patient population at different centres, Figure 8 (page 30).

The index of multiple deprivation was not calculated for centres using the OpenEyes EMR, although that should be possible in future submissions. Results for social deprivation are only produced for English centres as different indices are used in the other home nations and too few centres in Northern Ireland, Wales and Scotland submitted data to be representative of results for these nations.

Figure 8: Median and IQR national deciles of social deprivation by participating centre in England – ordered by median national decile within each centre

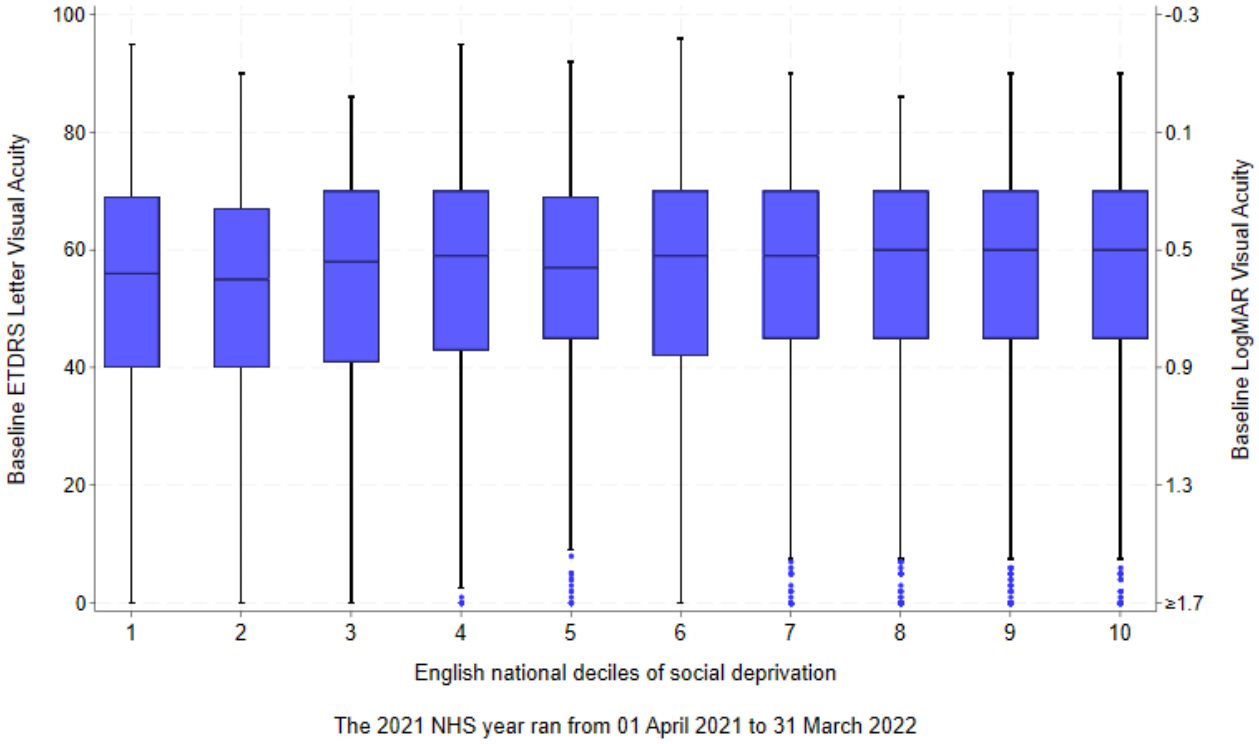


6.4. Link between baseline visual acuity and socioeconomic deprivation

Social deprivation is recognised as a factor that can impact the ability of an individual to access care for a variety of conditions. In this analysis, baseline visual acuity is used as a proxy for the severity of NvAMD to assess whether deprivation is related to timely access to treatment before symptoms of vision loss become advanced.

Variation is observed across the Index of Multiple Deprivation (IMD) for 17,003 patients treated in English centres with data on either of the Medisoft EMR systems and from one in-house database with visual acuity measurements, Figure 9 (page 31). There is evidence of slight variation between higher levels of deprivation and worse baseline acuity. For example, 26.8% of the eyes in the least deprived group (decile 10) had visual acuity ≥70 letters, compared to only 23.8% and 22.6% in the two most deprived groups (deciles 1 and 2, respectively), Table 3 (page 31). The median baseline acuity for the most deprived decile was 57 ETDRS letters (IQR; 40 to 69 letters) and the median VA for the least deprived decile was 60 ETDRS letters (IQR; 45 to 70 letters).

Figure 9: Box plots of baseline VA by English national deciles of social deprivation



The 2021 NHS year ran from 01 April 2021 to 31 March 2022

Table 3: Baseline visual acuity and social deprivation for English centres, where decile 1 is the most deprived decile and decile 10 the least deprived decile

		Baseline visual acuity (ETDRS letters)			
Decile of social deprivation	Number eyes	≤35	36 – 55	56 – 69	≥70
1 (most deprived)	1,219	20.0	28.8	27.3	23.9
2	1,252	22.4	29.7	25.2	22.6
3	1,281	19.0	28.7	27.2	25.1
4	1,541	17.4	30.5	26.5	25.6
5	1,733	16.7	31.7	27.8	23.8
6	1,712	18.9	28.2	27.4	25.5
7	1,906	16.6	30.7	26.1	26.5
8	2,003	14.6	28.7	29.2	27.5
9	2,069	15.8	29.2	27.2	27.8
10 (least deprived)	2,287	15.2	28.7	29.3	26.8
Overall	**17,003**	**17.2**	**29.5**	**27.5**	**25.8**

6.5. Key care processes for treatment started in the 2021 NHS year

6.5.1. Starting treatment within 14 days of referral from primary care:
For the 10,359 eyes with referral data, 80 eyes from 12 centres were removed from analysis due to having <25 eyes. This left 10,279 eyes for analysis. For these eyes, treatment with anti-VEGF therapy was started within 14 days of referral in 2,151 eyes (20.9%) and 3,638 (35.4%) started treatment within 28 days of referral. However, treatment started more than 28 days after receipt of the primary care referral in 6,641 eyes (64.6%). The time between referrals and the start of treatment varied dramatically between the eyes for which a referral was received (IQR; 18 to 722 days). (Given the low recording of referral information with the EMRs, there are concerns that these figures may not provide an accurate reflection of real-world practice. Self-reported data submitted to GIRFT for 2023 indicates that more than 50% of centres report starting treatment within 14 days in at least 80% of eyes.)

Case Study 2 – NHS Grampian

NHS Grampian has a high proportion of eyes with good visual acuity at the start of treatment reflecting an efficient pathway for rapid triage of referrals and access to diagnosis and treatment. Dr Cynthia Santiago from NHS Grampian believes training of and engagement with community optometrists, along with teamwork and good communication within the hospital help avoid delays in the care pathway.

"In Grampian, communication between the ophthalmology department and community optometrists is good, supported by the Grampian Eye Health Network (EHN). Most of the community practices have access to OCT imaging and, for suspected wet AMD referrals, we insist that a colour fundus photo and OCT images are attached. There are regular 'Teach & Treat' clinics in the hospital to help community optometrists improve their assessment of macular disease and understand local referral pathways. Quarterly OCT teaching within the EHN helps to reinforce the learning. If a referring optometrist is unsure about the diagnosis or imaging results, he or she is encouraged to seek advice from the clinical decision unit in the ophthalmology department.

Referrals are sent via a rapid access route and directed to the AMD team for triage. This is done every day by specialist nurses and optometrists, with an initial fast-track appointment made within two weeks when AMD seems likely. Referrals for other problems or when the diagnosis is not clear are reviewed by a senior medical retina clinician, and feedback given to the referring optician if referral is inappropriate.

These measures help the department identify patients with NvAMD at the earliest opportunity and, as we provide a one-stop service, most patients can start treatment within two weeks of the initial referral."

6.5.2. Completion of the initial loading phase of treatment within 10 weeks
For the 26,847 eyes that started NvAMD treatment in the 2021 NHS year, 17,730 (66.0%) eyes completed the initial three anti-VEGF injections during the loading phase of treatment within 10 weeks of the first injection. A further 2,769 (10.3%) eyes completed the first three injections within 10 to 12 weeks and 1,862 (6.9%) eyes completed these injections within 12 to 16 weeks. There were 1,346 (5.0%) eyes for which it took more than 16 weeks for the first three anti-VEGF injections to be given. An additional 2,390 (9.8%) eyes received fewer than three injections during the first year of treatment.

The proportion of eyes completing the initial three injections during the loading phase of treatment within 10 weeks varied between centres and ranged from 1.3% to 93.8%. There were eight (12.1%) centres with <50% eyes, 37 (56.1%) centres with ≥75% and one (1.5%) centre with ≥95% eyes completing the loading phase within 10 weeks, Figure 10 (page 33) and Appendix 9 (page 72).

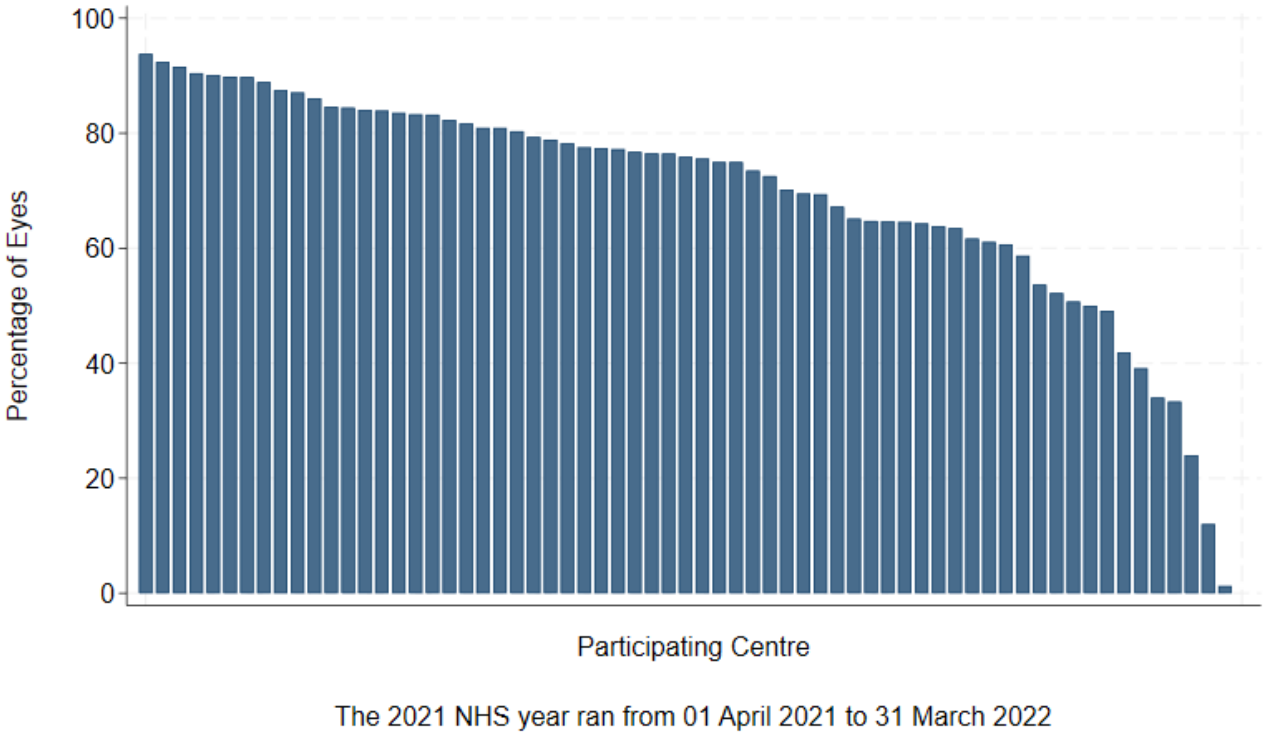
Overall, the percentage of eyes completing the loading phase within 10 weeks was 67.0% for first treated eyes, 65.0% for second treated eyes and 61.9% for ISBIVT eyes.

Case study 3 – Leeds Teaching Hospitals NHS Trust

Ms Aditi Mohla, Consultant Ophthalmologist at Leeds Teaching Hospitals NHS Trust explains the measures taken at her hospital to improve delivery of the initial loading phase of treatment:

"In the first and second reports of the AMD audit, completion of the initial loading phase of treatment in Leeds was only achieved within 10 weeks in 72% and 64% of eyes respectively. Although better than the aggregate mean, this level of performance fell short of that achieved by other providers, including local peers. After reviewing differences in local practice, a proposal to fund additional, injection-only clinics for patients completing the loading phase of treatment was submitted and approved. New non-medical injectors were recruited and trained. Limited by imaging capacity, the new clinics started in October 2022, with visual acuity testing but no routine imaging. An internal audit of 95 eyes starting treatment in 2023 found that the proportion completing the loading phase within 10 and 12 weeks has now increased to 91% and 100%."

Figure 10: Percentage of eyes completing loading phase within 10 weeks since starting treatment – ordered by the percentage of eyes completing the loading phase



6.5.3. Injections over the first 12 months

For the 26,847 eyes starting treatment for NvAMD in the 2021 NHS year, a total of 162,139 injections were administered. The proportion of injections administered for each anti-VEGF medicine was: 79.5% with aflibercept (Eylea), 16.2% with ranibizumab (Lucentis), 3.8% with bevacizumab (Avastin) and less than 1.0% each with brolucizumab (Beovu) and faricimab (Vabysmo).

For all eyes, the median number of anti-VEGF injections over the first 12 months of treatment was 6.0 (IQR; 4.0 to 8.0). The minimum number of injections per eye was one and maximum was 14.

The median value for the median number of anti-VEGF injections per eye administered at each centre ranged between two and nine, Figure 11 (page 34).

The median interval between intravitreal injections at the end of the first year of treatment was 10 weeks. The proportions of eyes treated within specific time frames at the end of the first year of treatment were: 10.1% for 4 weeks and under, 14.2% for 4-6 weeks, 23.1% for 6-8 weeks, 18.0% for 8-10 weeks, 15.9% for 10-12 weeks, 8.4% for 12-14 weeks, 4.3% for 14-16 weeks and 6.3% for over 16 weeks.

Doctors administered 38,265 (23.6%) injections, nurses administered 101,286 (62.5%) injections, and other healthcare professionals administered 8,576 (5.3%) injections. For 14,012 (8.6%) injections, the profession of the person administering the intravitreal injection was not recorded.

The proportion of anti-VEGF injections given by different professionals varied between centres and ranged from 0.0%-99.7% for doctors, 0.0%-99.6% nurses, 0.0%-37.9% other healthcare professionals and 0.0%-63.7% for unrecorded professionals, Figure 12 (page 35) and Appendix 9 (page 72).

Figure 11: Median number of anti-VEGF injections over a year by participating centre

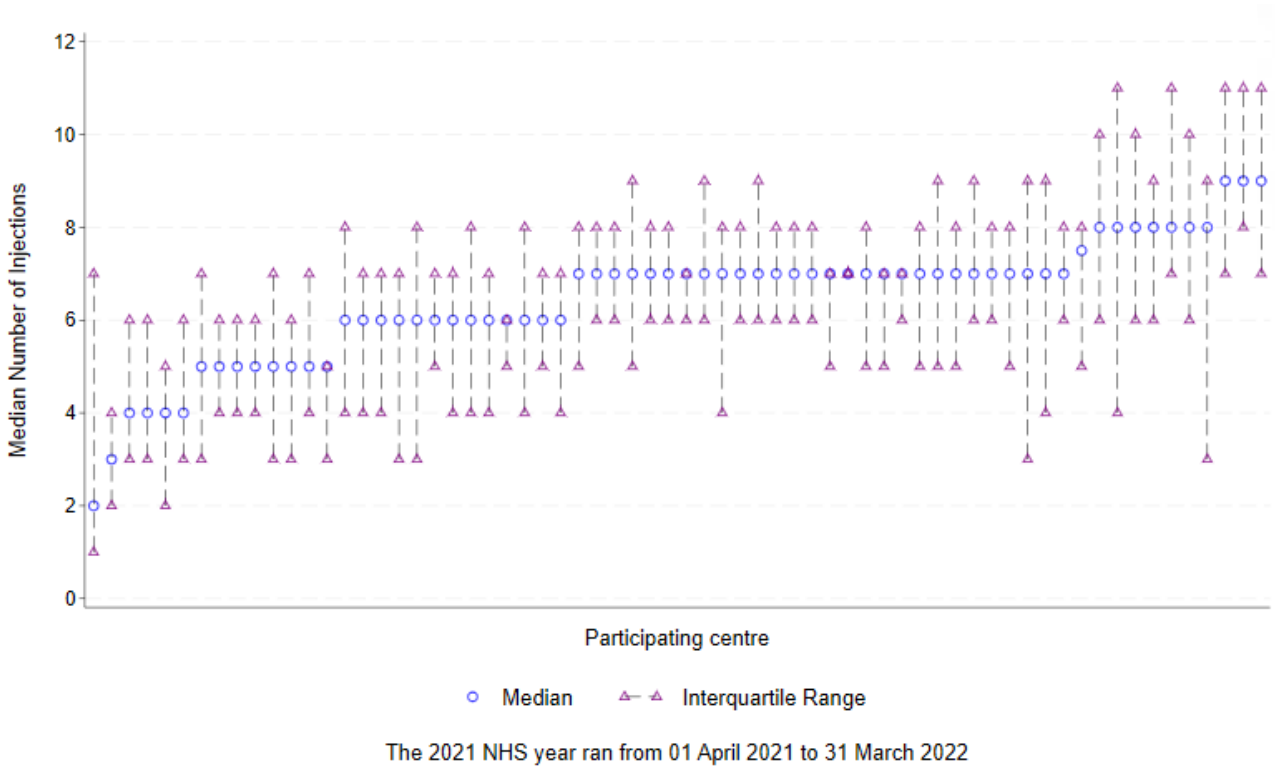
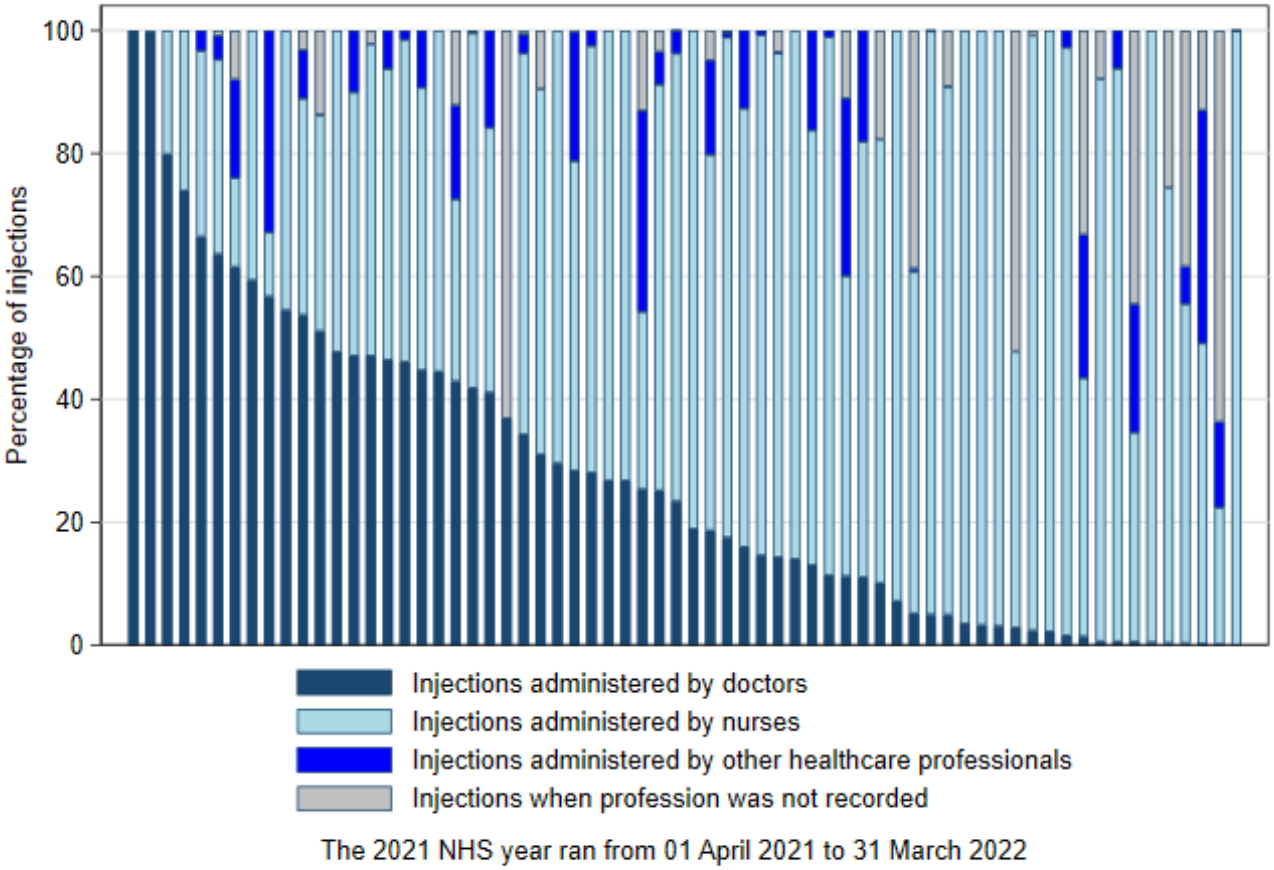


Figure 12: Percentage of anti-VEGF injections administered over a year by profession of the injector and for each participating centre



Case study 4

The proportion of injections given by non-medical staff in Bradford Hospitals NHS Foundation Trust is very high with an average of 98%. Asked to explain this high level of performance, Ms Helen Devonport, Consultant Ophthalmologist, wrote:

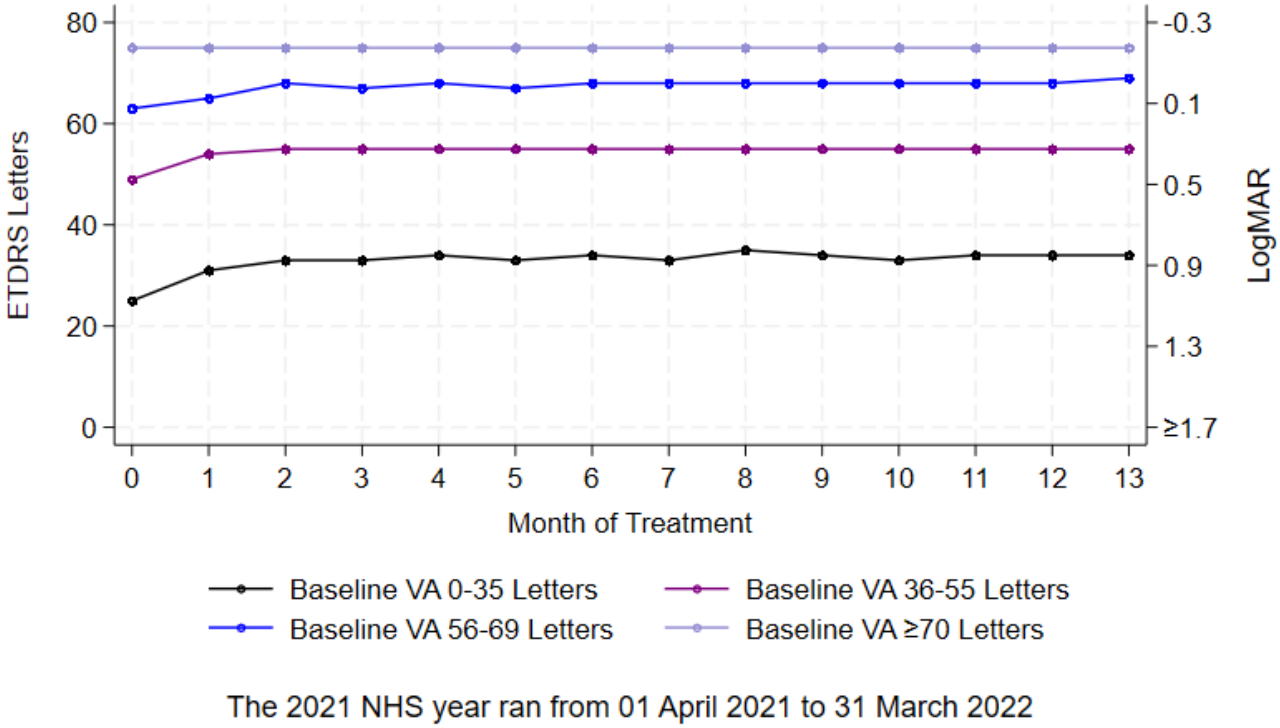
"There is a culture of nurturing and development in our department with staff encouraged and supported to learn new skills and it is expected that performing intravitreal injections will be part of the band 6 role for anyone who is interested. We train enthusiastic, motivated nurses who have worked in ophthalmology for a minimum of 12 months. Training is in-house and led by our own Medical Retina consultants who, along with experienced nurse injectors, continue to support less experienced practitioners. On average we will have at least 9 nurses trained to perform injections, providing flexibility for leave and sickness. Where possible, injectors will do half day sessions of injecting as some may find full days repetitive and less stimulating. Our injectors possess a variety of advanced skills including eye casualty triage, botulinum toxin injections, and some have advanced ENT skills, which means their work remains varied and interesting. This help with retention of skilled staff."

6.6. Visual acuity outcomes over and at completion of the first year of treatment

6.6.1. Visual acuity over the first year of treatment

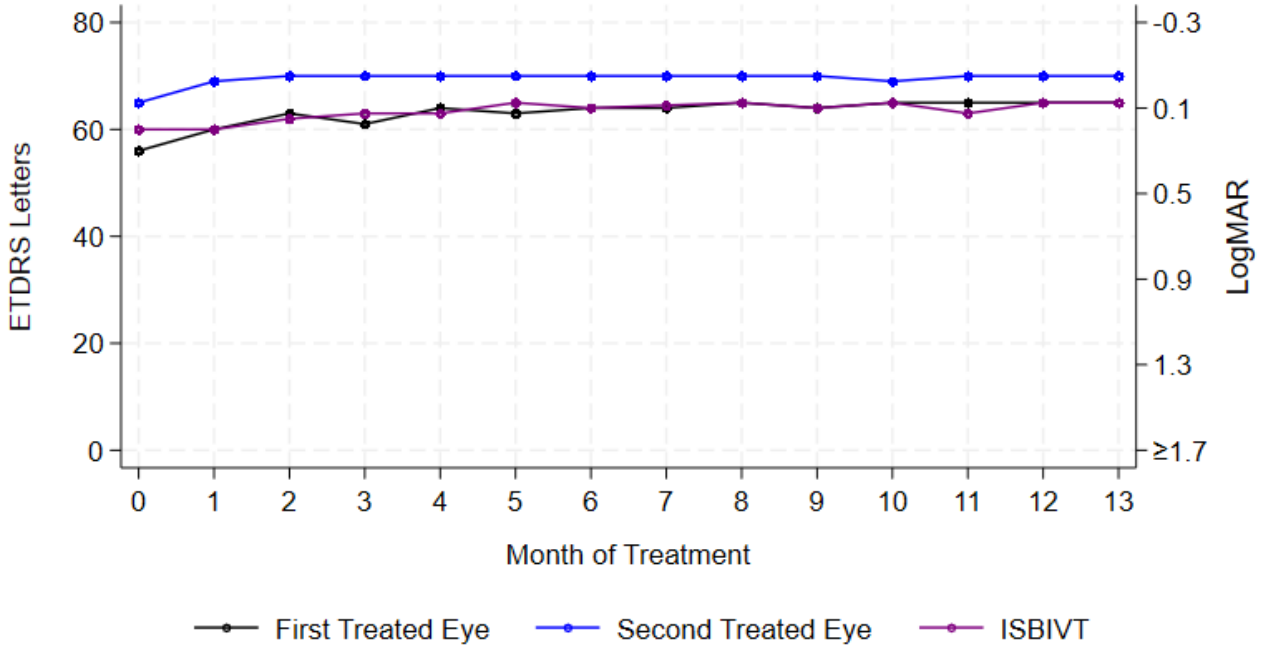
Visual acuity typically increased during the initial phase of monthly treatment and was then stable to month 12. This trend was seen across a range of baseline acuity and age categories and treated eye status. Bigger increases in acuity were seen in eyes with lower baseline visual acuity. By contrast, eyes with high levels of baseline acuity did not experience visual acuity gains but typically retained a high level of visual acuity after 12 months of treatment, Figures 13 (page 36), 14 (page 37) and 15, (page 37).

Figure 13: The median VA over the first year of treatment by baseline VA



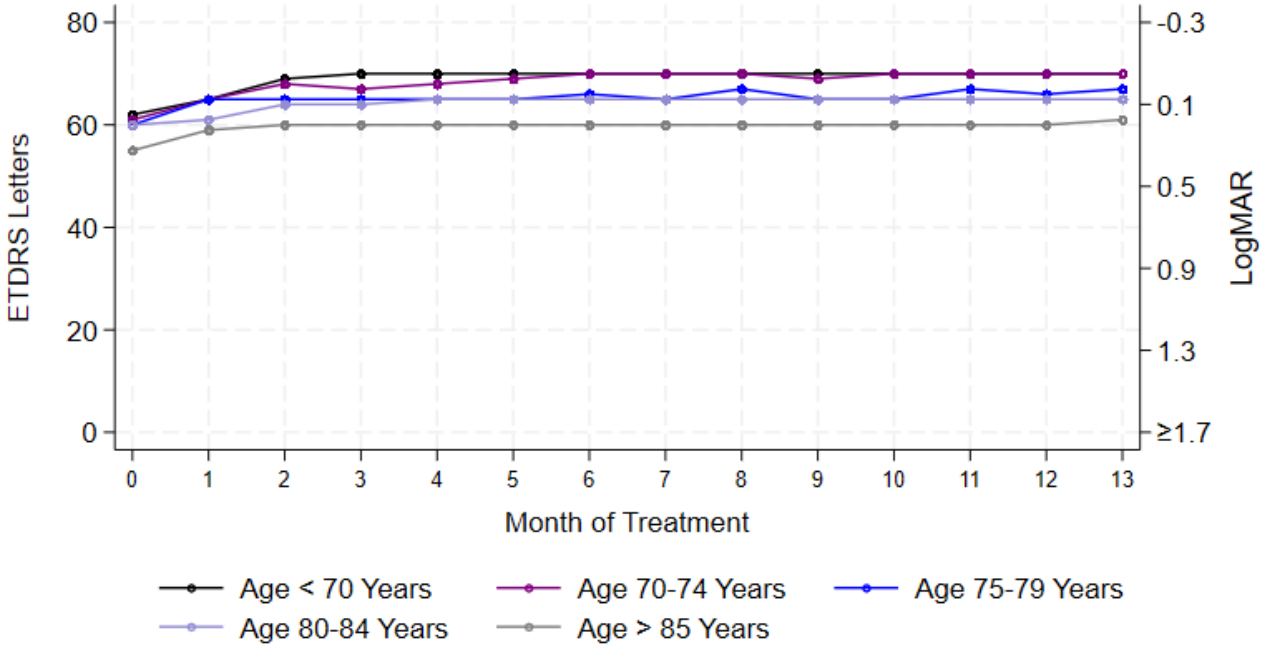
The 2021 NHS year ran from 01 April 2021 to 31 March 2022

Figure 14: The median VA over the first year of treatment by treated eye



The 2021 NHS year ran from 01 April 2021 to 31 March 2022

Figure 15: The median VA over the first year of treatment by age



The 2021 NHS year ran from 01 April 2021 to 31 March 2022

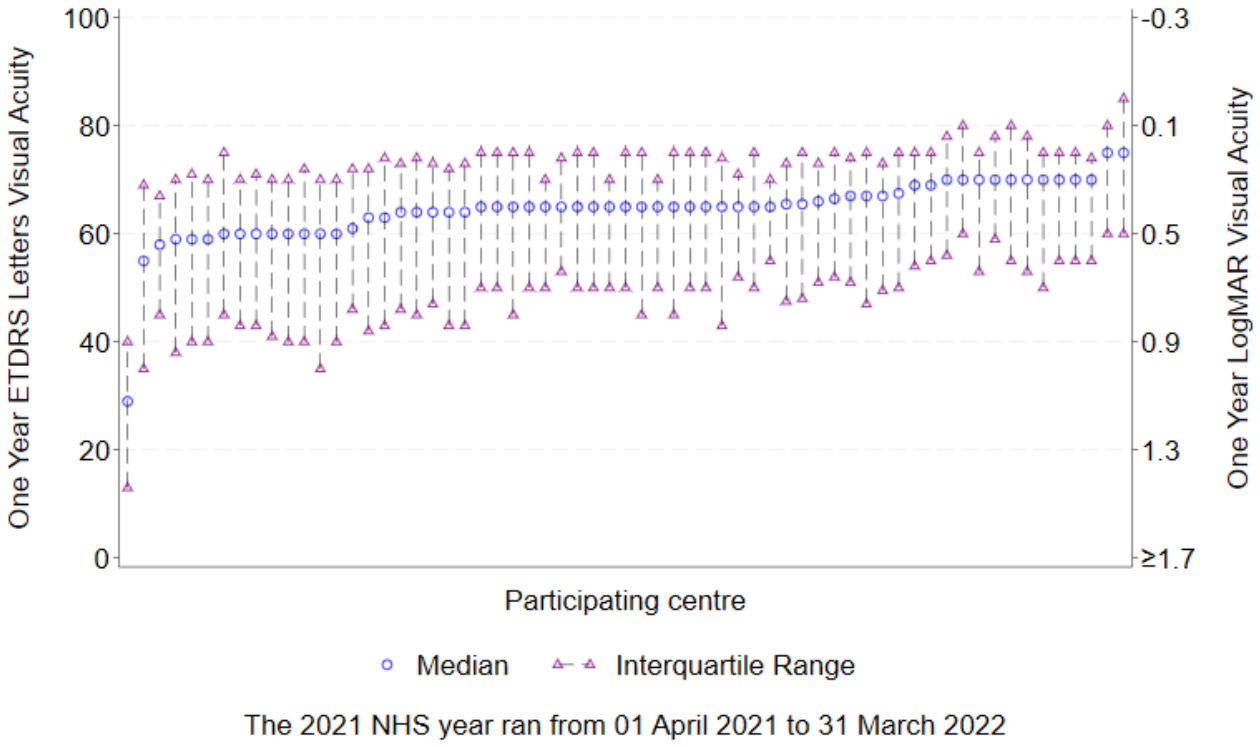
6.6.2. Visual acuity state at month 12

For 19,184 eyes with visual acuity data at one year, the median VA was 65 ETDRS letters (IQR: 47 to 75 letters). The acuity at one year was ≤35 letters in 3,090 (16.1%) eyes, between 36 - 55 letters in 3,764 (19.6%) eyes, between 56 - 69 letters in 4,364 (22.8%) eyes and ≥70 letters in 7,966 (41.5%) eyes.

There was variation in the median acuity at one year between contributing centres (range; 29 to 75 letters). A single (1.6%) centre had a median one-year acuity of ≤35 ETDRS letters. One (1.6%) centre had a median one-year acuity of 36 - 55 ETDRS letters and 49 (77.8%) centres had a median one-year acuity of 56 - 69 ETDRS letters. Twelve (19.1%) centres had a median one-year acuity of ≥70 ETDRS letters, Figure 16 (page 38) and Appendix 6 (page 63).

Overall, visual acuity outcomes were as expected, though data completeness remains an area of concern and requiring improvement and results for centres with small numbers will be subject to significant statistical uncertainty and potential bias.

Figure 16: Median and IQR visual acuity at one year for participating centres, ordered by median acuity



6.6.3. Change in visual acuity 0-12 months

For the 18,360 eyes with valid change in VA data, the median change in VA from baseline was a four ETDRS letter gain (IQR; 5 letter loss to 11 letter gain). The VA change was reasonably stable between participating centres and for all bar two (3.0%) centres, the median VA at one year was the same or better than the median VA at baseline Figure 17 (page 39).

A loss of ≥15 ETDRS letters (3 LogMAR lines) was experienced by 1,794 (9.8%) eyes and a gain of ≥15 ETDRS letters by 3,617 (19.7%) eyes, Table 4 and Figure 18 (page 40).

6.6.4. Change in visual acuity 6-12 months

For the 9,714 eyes with valid change in VA data, the median change in VA for month six to 12 was a zero ETDRS letter change (IQR; 5 letter loss to 5 letter gain). The VA change was reasonably stable between participating centres and ranged from three letters gain to five letters loss. The median VA at one year was the same or better than the median VA at six months for 71.1% of eyes.

A loss of ≥15 ETDRS letters (3 LogMAR lines) was experienced by 723 (7.4%) eyes and gain of ≥15 ETDRS letters (+3 LogMAR lines) by 546 (5.6%) of eyes, Table 4 (page 39).

Table 4: Change in visual acuity from baseline and month 6 to month 12

	GAIN in ETDRS letters, n (%)			LOSS of ETDRS letters, n (%)		
Time period	5-9	10-14	≥15	5-9	10-14	≥15
0-12 months	2,981 (16.2)	2,272 (12.4)	3,617 (19.7)	1,807 (9.8)	1,076 (5.9)	1,794 (9.8)
6-12 months	1,520 (15.7)	655 (6.7)	546 (5.6)	1,491 (15.4)	685 (7.1)	723 (7.4)

Figure 17: Median and IQR change in visual acuity from baseline to one year for participating centres, ordered by median change in visual acuity within each centre

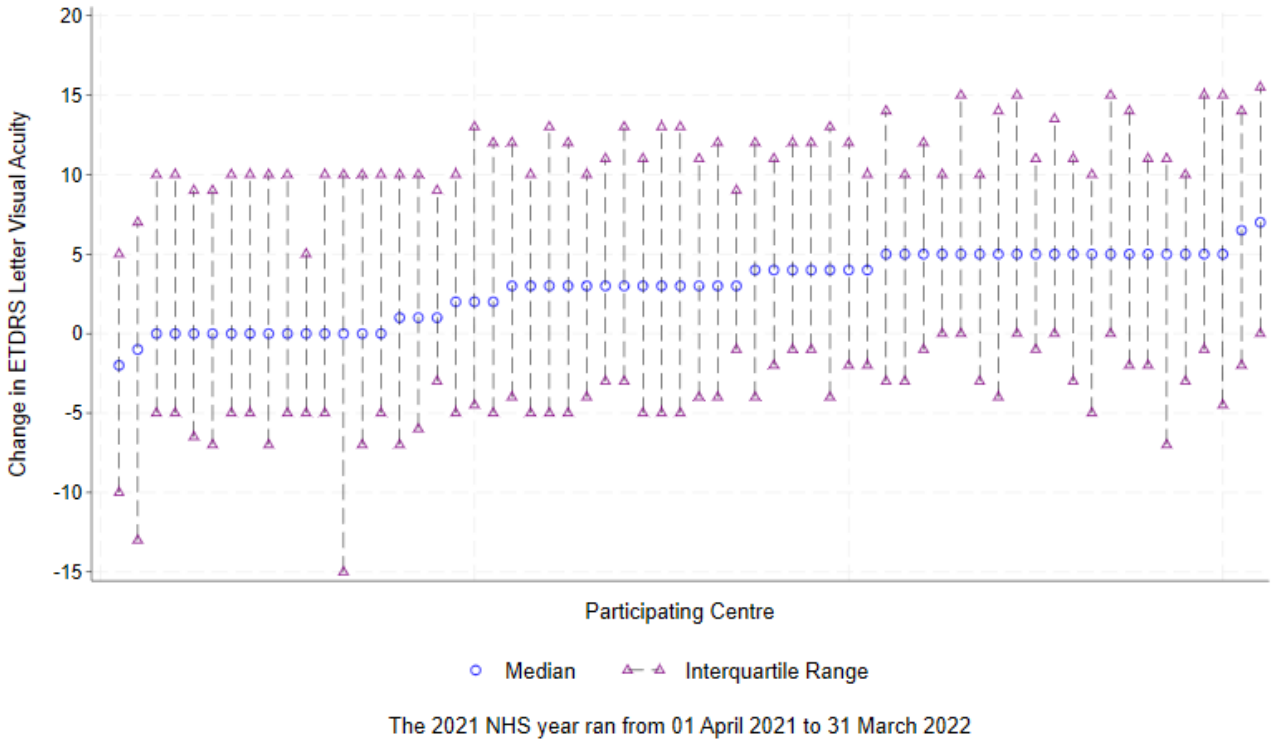
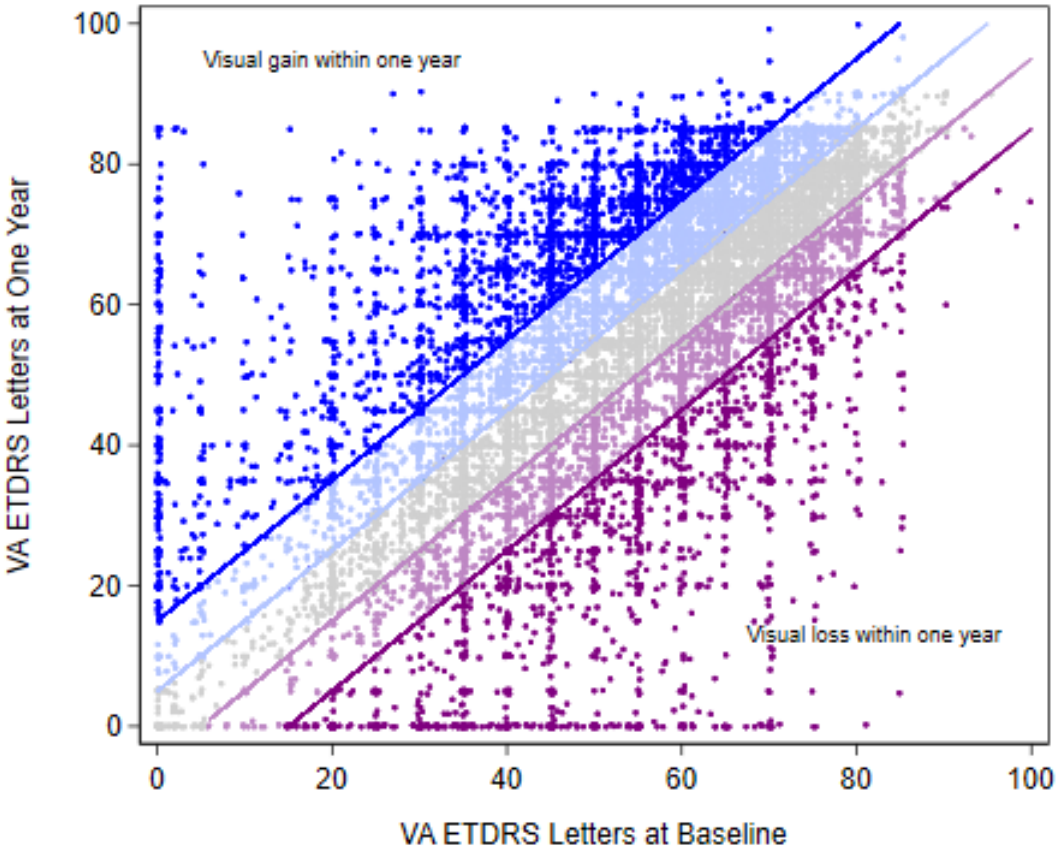


Figure 18: Visual acuity at baseline and visual acuity at one year



6.6.5. Good visual acuity state at 12 months

For the 18,360 eyes with both baseline and month 12 visual acuity recorded, the proportion with good visual acuity (≥70 ETDRS letters) after the first year of treatment was 41.7%. Good visual acuity state at 12 months was more common in eyes with better levels of acuity at baseline, in second treated eyes and in younger patients, Table 5 (page 41).

For the eyes with a baseline VA of ≥70 letters, 77.7% of eyes maintained this level of vision at one year from the start of treatment. For the eyes with baseline acuity ≤35 letters, only 6.3% achieved a "good" visual acuity after 12 months of treatment, though almost half achieved some level of visual improvement.

For the second treated eyes, there was a higher proportion of eyes with vision ≥70 letters at one year (49.8%) compared to first treated eyes (39.9%) and ISBIVT eyes (39.1%).

For 1,825 eyes from people aged <70 years at the start of treatment, 53.2% had "good" vision at one year, which was higher than all other age categories. The proportion of eyes achieving vision ≥70 ETDRS letters at one year decreased for each increase in age category, Table 5 (page 41).

The percentage of eyes with "good" vision at month 12 varied between centres, ranging from 2.2% to 65.1%, Appendix 6 (page 63).

Table 5: The percentage of eyes with a one-year visual acuity at certain levels of ETDRS letters according to baseline visual acuity, treated eye and age category

Row %		One Year ETDRS Letter Visual Acuity			
Baseline ETDRS Visual Acuity	Number of eyes	≤35	36 – 55	56 – 69	≥70
≤35	2,839	52.5	33.5	7.7	6.3
36 – 55	5,235	13.9	41.0	25.4	19.7
56 – 69	5,046	2.8	15.3	34.9	47.1
≥70	5,240	1.1	4.7	16.6	77.7
Treated Eye					
First Eyes	12,675	13.5	23.5	23.0	39.9
Second Eyes	3,465	9.7	18.0	22.5	49.8
ISBIVT Eyes	2,220	16.4	22.8	21.7	39.1
Age in years at first injection					
<70	1,825	9.8	19.0	18.1	53.2
70 – 74	2,532	9.4	19.1	20.5	51.0
75 – 79	3,888	11.8	19.9	22.8	45.5
80 – 84	4,274	13.4	22.2	24.5	39.9
≥85	5,841	16.6	26.7	23.8	32.9
Overall	**18,360**	**13.2**	**22.4**	**22.8**	**41.7**

6.6.6. Modelling for adjusted visual acuity outcomes

6.6.6.1 Good visual acuity state

For a "good" visual acuity outcome, an odds ratio (OR) greater than one means that the good visual acuity state is more likely for a given variable. The reverse holds true for an OR lower than one.
For example, each additional year of age at the start of treatment reduces the likelihood of a "good" acuity outcome by 4% and each additional ETDRS letter at baseline increases the likelihood of a "good" acuity outcome by 10%. The results of modelling are showing that covariates increasing chances of achieving "good" acuity state are:

- Baseline VA, i.e. each additional letter (OR=1.099, 95% CI 1.096 to 1.101)
- Completing the first 3 injections within 10 weeks or less (OR=1.375, 95% CI 1.302 to 1.451)
- Number of injections in the first year of treatment, i.e. each additional injection (OR=1.060, 95% CI 1.049 to 1.071)

and covariates lowering chance of achieving "good" acuity are:

- Age at first injection, i.e. each additional year (OR=0. 965, 95% CI 0.962 to 0.967)
- Diabetes mellitus (OR=0.821, 95% CI 0.769 to 0.876)
- Glaucoma (OR=0.865, 95% CI 0.775 to 0.964)
- Previous cataract surgery (OR=0.868, 95% CI 0.820 to 0.919)
- Previous vitrectomy surgery (OR=0.782, 95% CI 0.670 to 0.912)

Unadjusted and adjusted rates for "good" acuity (≥70 ETDRS letters) state at the end of the first year of treatment are shown for 61 centres in Figures 19 and 20 (page 42 and 43). The mean adjusted value for the proportion of eyes achieving a "good" acuity state was 41.2% and ranged between centres from 11.6% to 57.5%.

The observed, expected and adjusted rates for each centre can be found in Appendix 10 (page 75) for the 2021 NHS year. Adjusted rates for the 2020 and 2021 NHS years for centres can be found in Appendix 11 (page 78).

The impact of completion of the loading phase of the first three injections within 10 weeks is a key outcome for this report. The year 1 report showed the importance of starting treatment quickly, when baseline acuity is still "good", on the likelihood of achieving a "good" visual acuity state with treatment. The modelling in this second report confirms these prior findings but also shows that prompt completion of the initial three injections, during the loading phase of treatment, increases the likelihood of achieving a "good" visual acuity outcome by 38%.

Figure 19: Unadjusted percentage of eyes with "good" acuity state for each participating centre for the 2021 NHS year

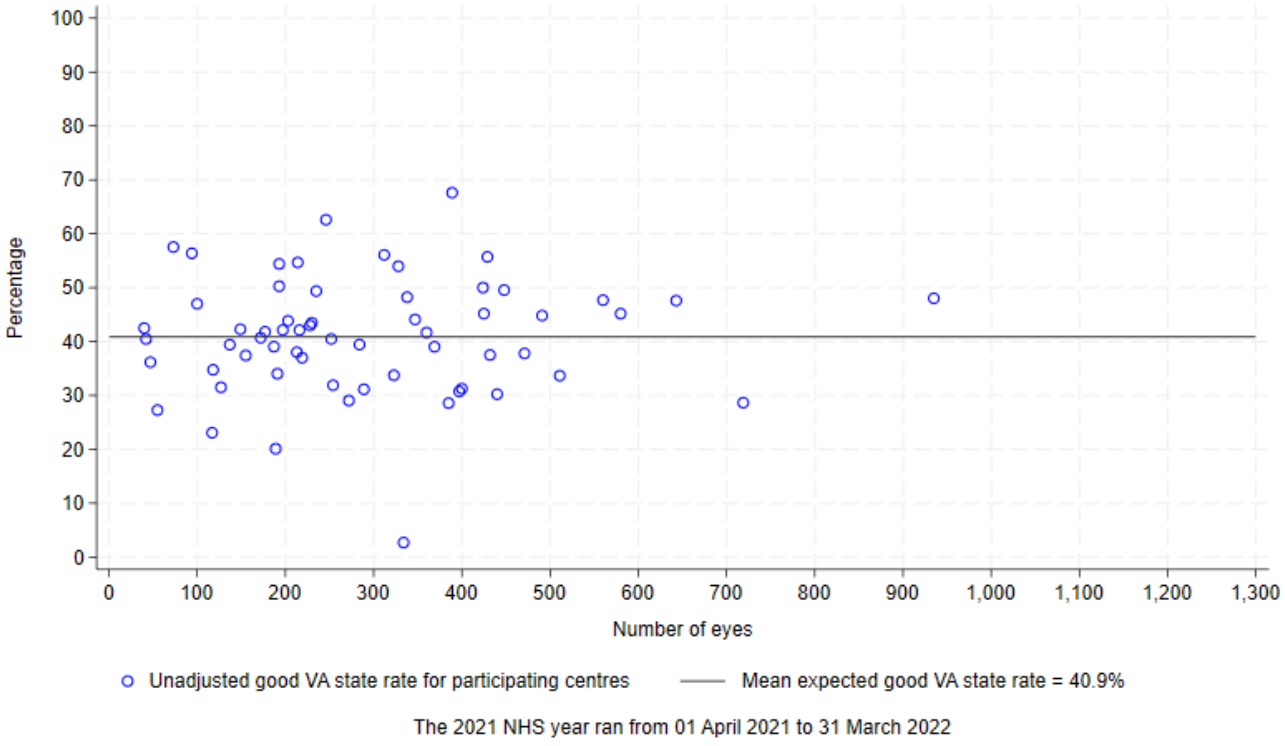
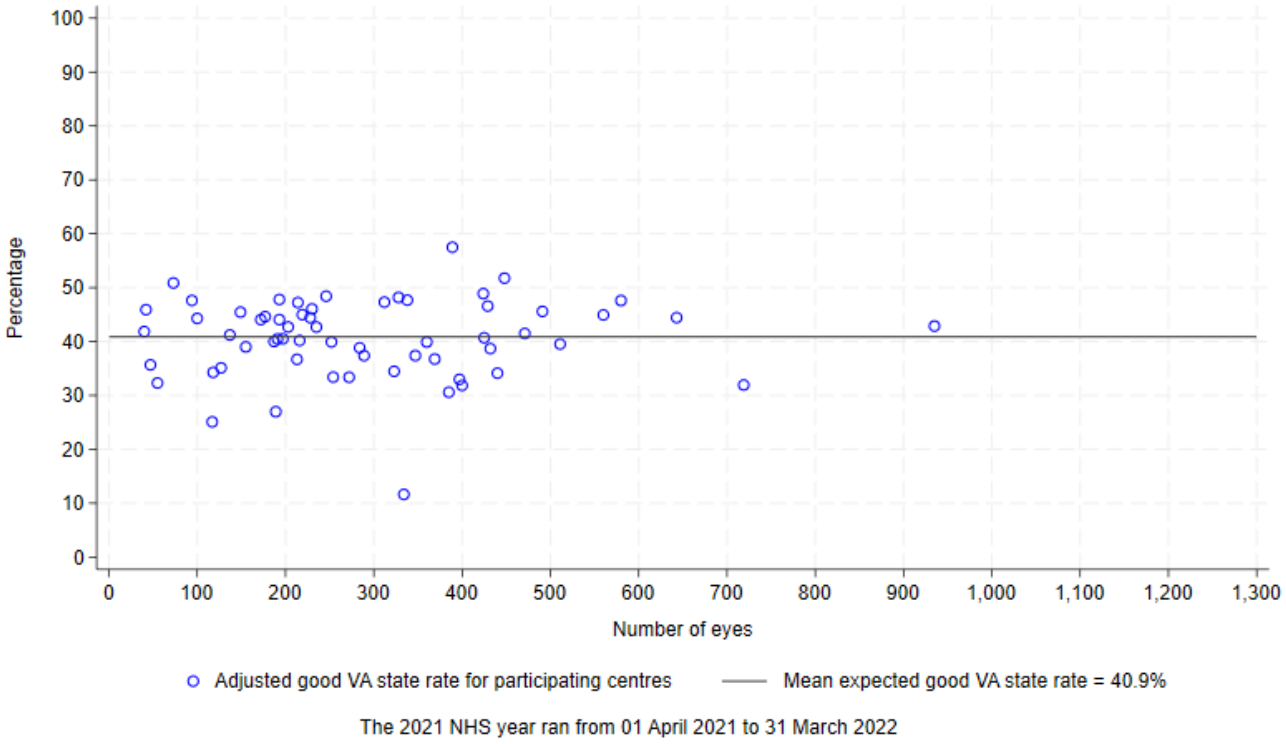


Figure 20: Plot showing the adjusted percentage of eyes achieving a "good" acuity state for each participating centre for the 2021 NHS year



6.6.6.2 Poor visual acuity outcome

For a "poor" visual acuity outcome, an odds ratio greater than one means that the outcome is more likely for a given variable. The reverse holds true for an OR lower than one. For example, each additional year of age at the start of treatment increases the likelihood of a "poor" acuity outcome by 2% and additional ETDRS letter at baseline reduces the likelihood of a "poor" acuity outcome by 1%. The results of modelling are showing that covariates increasing the chances of having a "poor" acuity outcome are:

The results of modelling showed that the covariates increasing the chances of achieving "poor" acuity state are:

- Age at first injection, i.e. each additional year (OR=1.020, 95% CI 1.016 to 1.023)
- Diabetes mellitus (OR=1.246, 95% CI 1.153 to 1.347)
- Previous cataract surgery (OR=1.138, 95% CI 1.063 to 1.218)
- Presence of glaucoma (OR=1.159, 95% CI 1.020 to 1.317)
- Previous vitrectomy surgery (OR=1.266, 95% CI 1.063 to 1.508)

and the covariates lowering the chances of having a "poor" acuity outcome are:

- Baseline VA, i.e. each additional letter (OR=0.993, 95% CI 0.991 to 0.995)
- Completing the first three injections within 10 weeks or less (OR=0.877, 95% CI 0.823 to 0.935)
- Number of injections in the first year of treatment, i.e. each additional injection (OR=0.878, 95% CI 0.867 to 0.890)

Of the 18,360 eyes starting treatment in the 2021 NHS year, with VA change data and age data there were 1,732 eyes removed from the "poor" visual acuity results due to having baseline VA of 25 or fewer letters.

Unadjusted and adjusted figures for the proportion of eyes having a "poor" acuity (≥10 ETDRS letter decrease) outcome at the end of the first year of treatment are shown for 65 centres in Figures 21 and 22 (pages 44 and 45). The mean adjusted value for the proportion of eyes having a "poor" acuity outcome was 12.8% and ranged between centres from 5.2% to 26.0%.

The observed, expected and adjusted rates for each centre can be found in Appendix 10 (page 75) for the 2021 NHS year. Adjusted rates for the 2020 and 2021 NHS years for centres can be found in Appendix 11 (page 78).

The additional information about process of creating the adjusted visual acuity outcomes models can be found on the NOD Audit website.

Figure 21: Unadjusted percentage of eyes with a "poor" acuity outcome for each participating centre for the 2021 NHS year

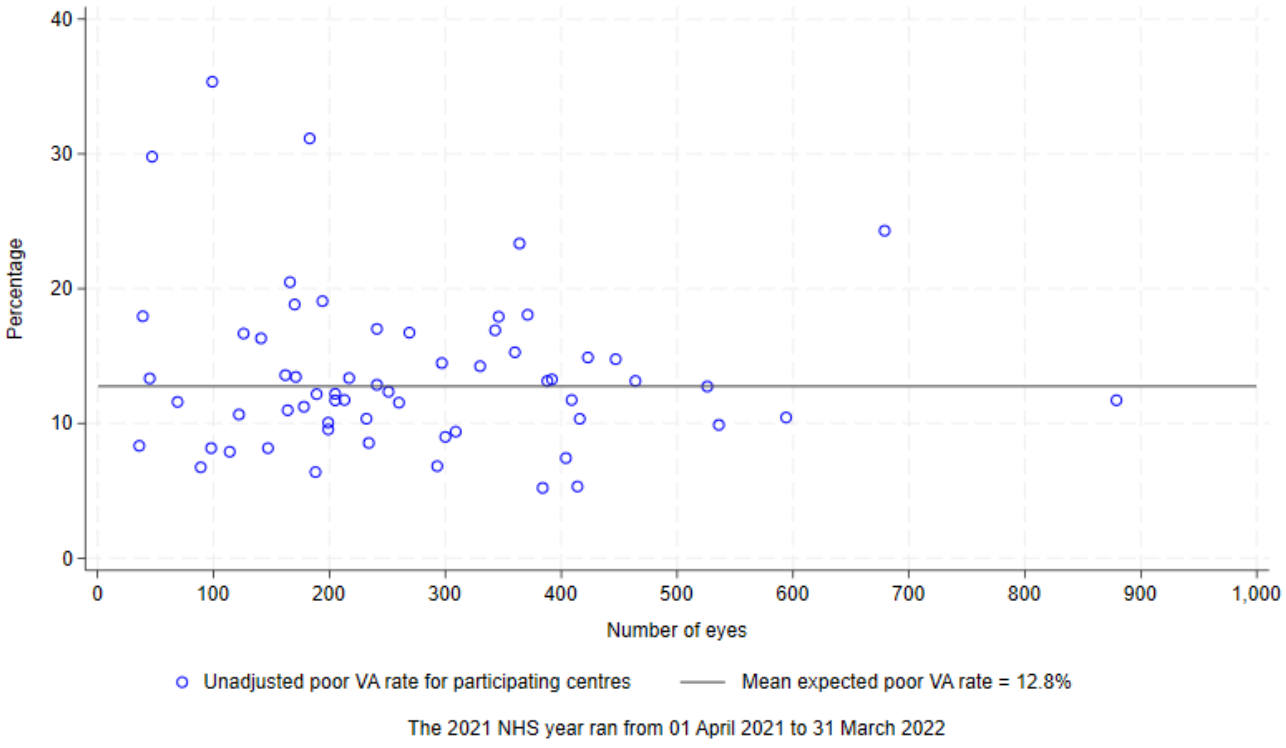
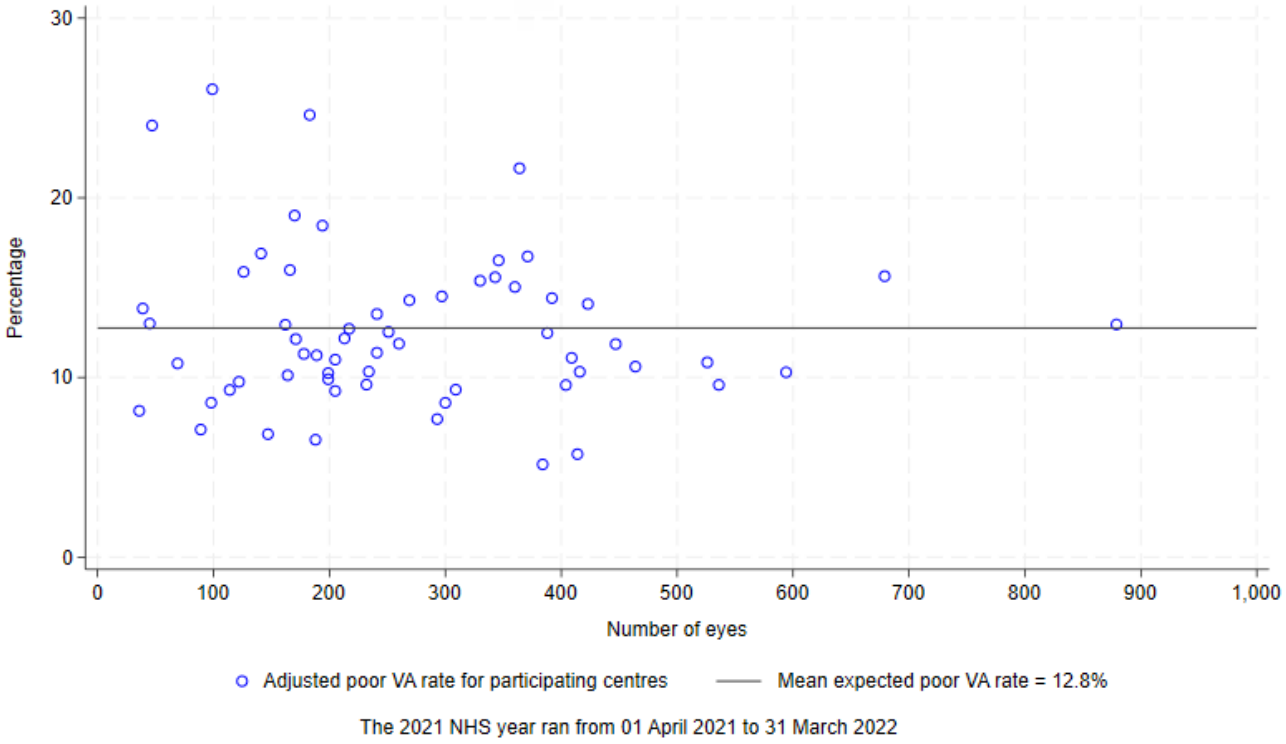


Figure 22: Plot showing the adjusted percentage of eyes with a "poor" acuity outcome for each participating centre for the 2021 NHS year

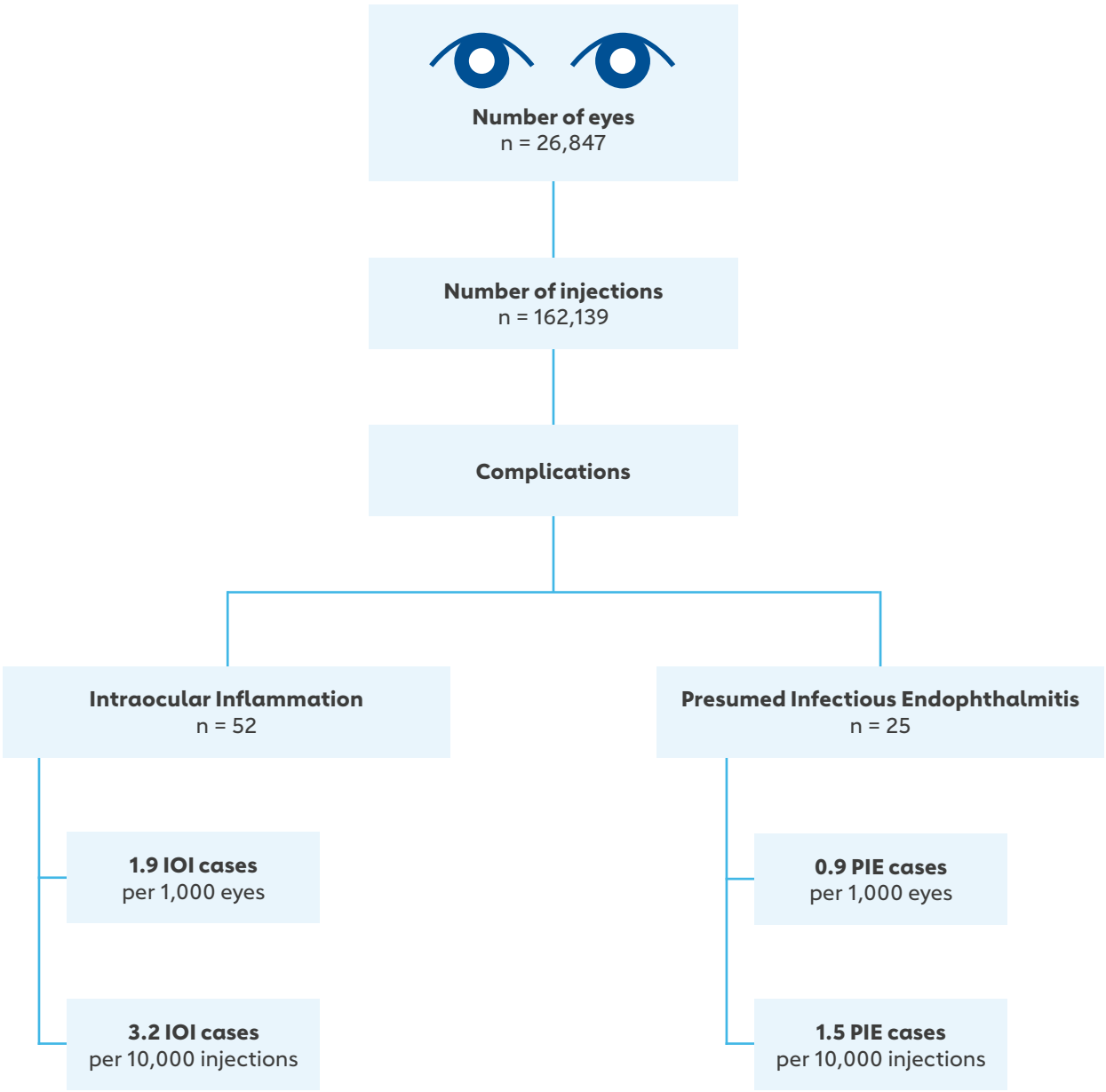


6.7. Safety outcomes: intraocular inflammation and presumed infectious endophthalmitis after intravitreal injection

The 26,847 eyes starting treatment in the 2021 NHS year received 162,139 intravitreal injections. Intraocular inflammation (IOI) was reported as a post-operative ocular complication in 52 eyes of 51 patients. This gives a rate of 1.9 IOI cases per 1,000 eyes per year and 3.2 IOI cases per 10,000 injections. Among the 66 centres, 33 (50.0%) had zero cases of IOI. There were 33 centres with at least one case of IOI (range; 1 to 5 cases) and one centre with ≥4 cases of IOI.

For the 26,847 eyes starting treatment in the 2021 NHS year, there were 25 cases of presumed infectious endophthalmitis (PIE) in 25 eyes of 25 patients. This gives a rate of 0.9 PIE cases per 1,000 eyes per year of treatment and 1.5 PIE cases per 10,000 injections. Among the 66 centres, 41 (62.1%) had zero cases of PIE. There were 20 centres with at least one case of PIE (range; 1 to 3 cases) and two centres with three cases of PIE, Figure 23 (page 46) and Appendix 12.

Figure 23: Safety outcomes



6.8. Concomitant ocular diseases

For the 26,847 eyes eligible for analysis, another ocular co-pathology was recorded for 10,912 (40.7%) of eyes. The most frequently recorded concomitant ocular diseases were the presence of other macular pathology, diabetic retinopathy, other retinal vascular pathology and glaucoma which were recorded for 8.4%, 5.5%, 5.0% and 4.3% of eyes, respectively.

For 10,428 (38.8%) eyes, cataract surgery had been performed before the start of treatment for NvAMD. For 5,872 (21.9%) eyes, cataract surgery was performed during the first year of treatment for NvAMD and, for 10,547 (39.3%) eyes, there was no record of cataract surgery prior to or during the first year of treatment for NvAMD.

7. Second year of treatment

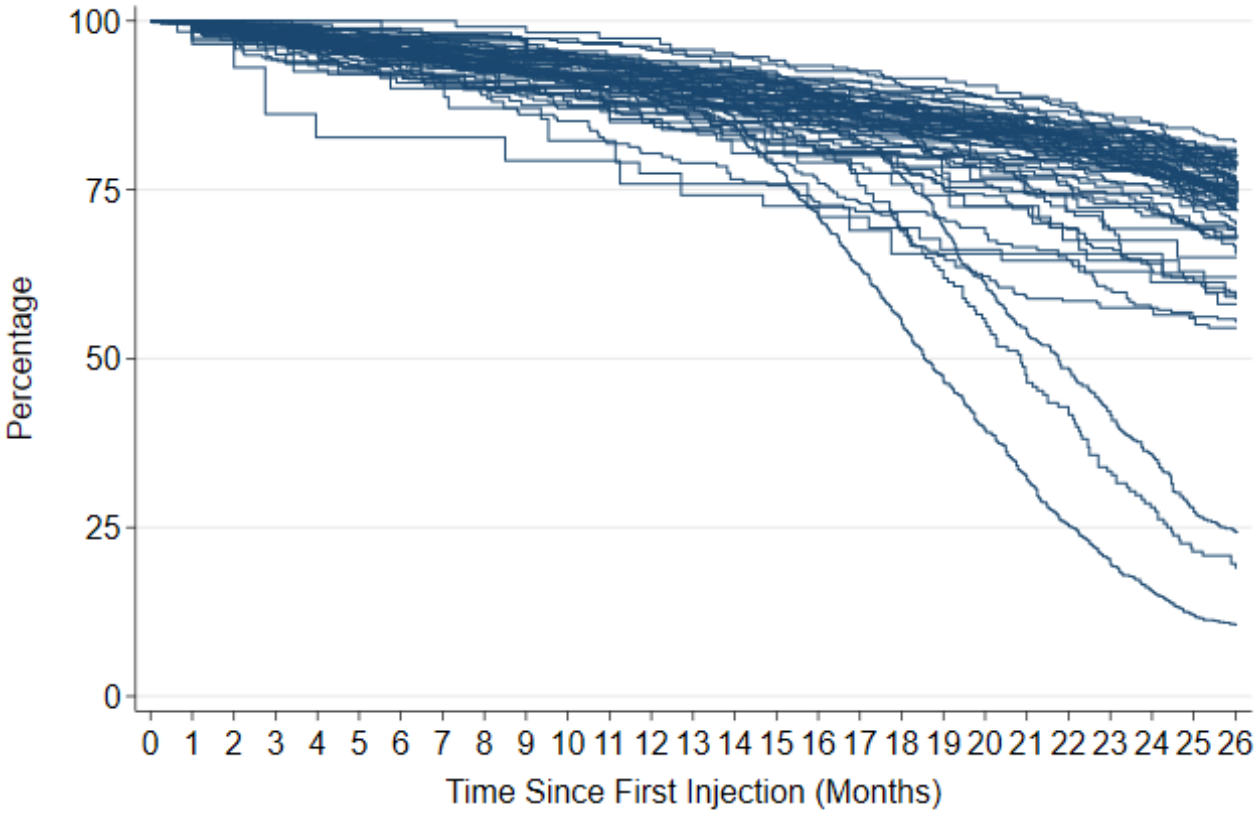
For eyes starting treatment in the 2020 NHS year there were 20,014 eyes from 18,085 patients from 64 centres. From these, 12,226 (61.1%) eyes remained in the sample at the end of two years.

7.1.Loss to follow-up at 24 months

Of the 20,014 eligible eyes starting treatment in the 2020 NHS year from 64 centres, 2,106 (10.5%) did not have a follow-up recorded in the month 12 visit window and 7,788 (38.9%) eyes did not have a follow-up visit recorded within the month 24 visit window. Patient death was the reason for loss to follow-up for 1,021 eyes, with death occurring in 532 patients in year 1 and in in 489 patients in year 2. For the remaining patients / eyes, no reason for loss of follow-up data at month 24 was identifiable.

The percentage of eyes lost to follow-up within two years of treatment varied between centres (range; 23.9% to 91.1%), Figure 24 (page 47).

Figure 24: The percentage of eyes lost to follow up within two years from first injection by participating centre



The 2021 NHS year ran from 01 April 2021 to 31 March 2022

7.2. Injections over 24 months

For the 12,171 eyes in the year 2 sample, a total of 83,465 injections were administered over the first year of treatment, where the median number of anti-VEGF injections over the first 12 months of treatment was 7.0 (IQR; 7.0 to 7.0) and ranged between centres from 4.0 to 9.0. The minimum number of injections per eye was one and maximum was 14.

In the second year of treatment, a total of 55,740 injections were administered, where the median number of anti-VEGF injections over the second year of treatment was 5.0 (IQR; 5.0 to 5.0) and ranged between centres from 3.0 to 8.0. The minimum number of injections per eye was one and maximum was 14.

Over the two years of treatment, a total of 139,205 injections were administered, where the median number of anti-VEGF injections over the first 24 months of treatment was 12.0 (IQR; 11.0 to 12.0) and ranged between centres from 6.0 to 17.0. The minimum number of injections per eye was one and maximum was 27.

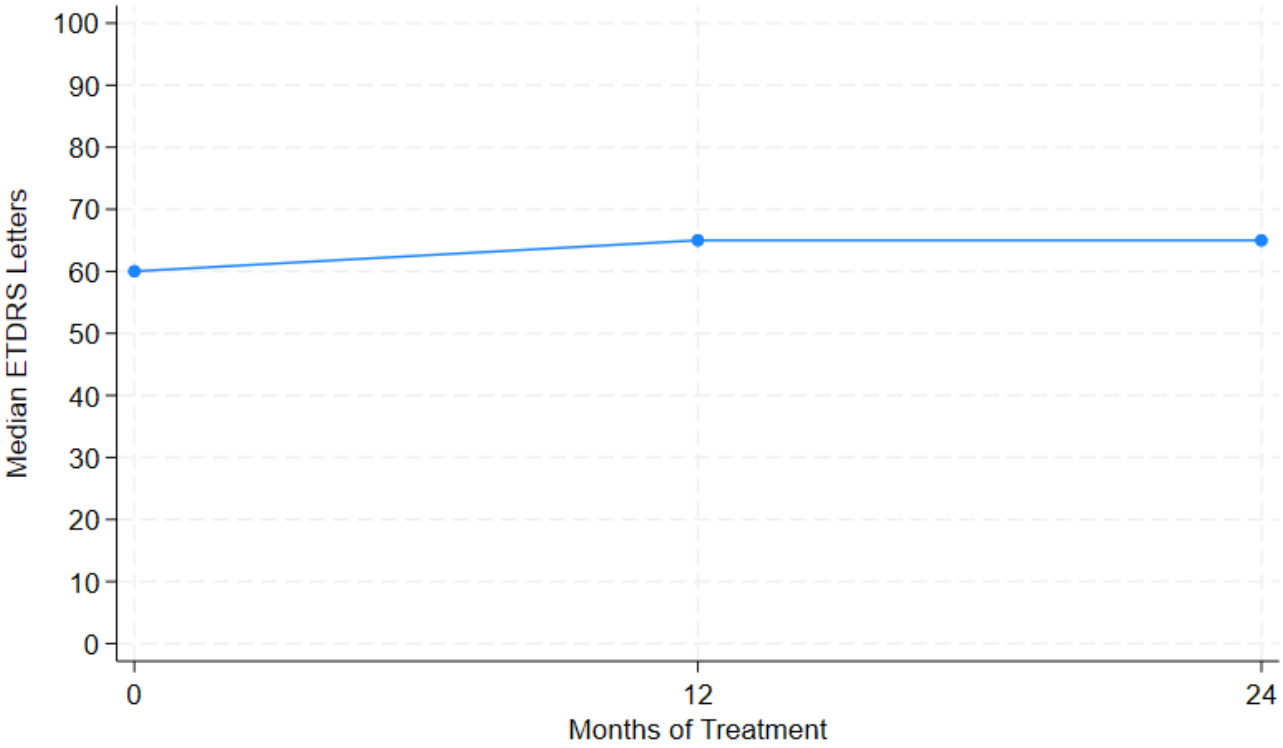
7.3. Visual acuity change at 24 months

From the 12,171 eyes in the year 2 sample, no visual acuity measurements were recorded at baseline for 875 (7.2%) eyes and after 24 months for 967 (8.0%) eyes. Therefore, 10,467 (86.0%) eyes had visual acuity data at both baseline and after 24 months. A further 31 eyes from five centres were removed from results for change in visual acuity due to having <25 eyes with change in VA measurements. This left 10,436 eyes eligible for change in visual acuity analysis from 59 centres.

For the 10,436 eyes with valid change in VA data, the median change in VA from baseline was a two ETDRS letter gain (IQR; 6 letter loss to 10 letter gain). The VA change was reasonably stable between participating centres and for all bar five (8.5%) centres, the median VA at two years was the same or better than the median VA at baseline.

A loss of ≥15 ETDRS letters (3 LogMAR lines) was experienced by 1,622 (15.5%) eyes and a gain of ≥15 ETDRS letters by 2,080 (19.9%) eyes, Figure 25 (page 49).

Figure 25: Median visual acuity at baseline, 12 months and 24 months years for all participating centres



7.4. Good visual acuity state at 24 months

For the 10,436 eyes with both baseline and month 24 visual acuity recorded, the proportion with "good" visual acuity (≥70 ETDRS letters) after the second year of treatment was 40.5%. "Good" visual acuity state at 24 months was more common in eyes with better levels of acuity at baseline, in second treated eyes and in younger patients, Table 6 (page 50).

For the eyes with a baseline VA of ≥70 letters, 67.7% of eyes maintained this level of vision at two years from the start of treatment. For the eyes with baseline acuity ≤35 letters, only 5.5% achieved a "good" visual acuity after 24 months of treatment, though almost half achieved some level of visual improvement.

For the 2,383 second treated eyes, there was a higher proportion of eyes with vision ≥70 letters at two years (46.8%) compared to first treated eyes (39.3%) and ISBIVT eyes (35.9%).

For 1,265 eyes from people aged <70 years at the start of treatment, 52.7% had "good" vision at two years, which was higher than all other age categories. The proportion of eyes achieving vision ≥70 ETDRS letters at two years decreased for each increase in age category, Table 6 (page 50).

Table 6: The percentage of eyes with a two-year visual acuity at certain levels of ETDRS letters according to baseline visual acuity, treated eye and age category

Row %		Two Year ETDRS Letter Visual Acuity			
Baseline ETDRS Visual Acuity	Number of eyes	≤35	36 – 55	56 – 69	≥70
≤35	1,303	50.3	33.9	10.3	5.5
36 – 55	3,032	15.7	39.3	22.5	22.5
56 – 69	2,988	6.3	18.5	29.3	45.9
≥70	3,113	3.1	9.5	19.7	67.7
Treated Eye					
First Eyes	6,706	14.4	24.6	21.8	39.3
Second Eyes	2,383	10.1	20.9	22.2	46.8
ISBIVT Eyes	1,347	15.5	25.1	23.5	35.9
Age in years at first injection					
<70	1,126	8.5	21.0	17.9	52.7
70 – 74	1,592	10.9	21.6	19.5	48.1
75 – 79	2,303	12.9	22.4	20.4	44.3
80 – 84	2,669	13.3	24.5	24.9	37.3
≥85	2,746	18.0	26.8	24.0	31.3
Overall	**10,436**	**13.6**	**23.8**	**22.1**	**40.5**

8. New quality markers

For the second report, a number of quality markers have been introduced. These markers cover performance in relation to data quality, aspects of the care pathway and adjusted visual acuity outcomes and are derived from performance observed in the 2021 NHS year. The NOD AMD team have defined "acceptable" markers as those achieved by 50% of providers in the 2021 audit. These units are providing a good quality service and all departments should strive to meet this threshold in future audit cycles. The "desirable" markers are those achieved by the top 25% of providers in the 2021 audit. These units are centres of excellence, providing best practice. Where possible, both acceptable and desirable markers are provided. In future years, centres are encouraged to compare local performance with peers, aggregate results and the new quality markers. It is expected that the relevant levels of performance for each quality marker will improve over time.

Data quality markers

The proportion of eyes with a referral from primary care recorded within three months of starting treatment **(see appendix 6)**

- Acceptable performance quality marker: providers should record the date of referral from primary care for ≥40% of eyes starting treatment
- Desirable performance quality marker: providers should record the date of referral from primary care for ≥86% of eyes starting treatment

Recording of visual acuity recording within the windows for both the baseline and month 12 visits **(see appendix 6)**

- Acceptable performance quality marker: providers should record visual acuity at the start and after 12 months of treatment in ≥80% of treated eyes
- Desirable performance quality marker: providers should record visual acuity at the start and after 12 months of treatment in ≥83% of treated eyes

Care pathway quality markers

Starting treatment within 14 days for referral from primary care **(see appendix 9)**

- Acceptable performance quality marker: providers should ensure that ≥40% of eyes are treated within 14 days of referral from primary care*
- Desirable performance quality marker: providers should ensure that ≥60% of eyes are treated within 14 days of referral from primary care*

**Given concerns in relation to data quality, these figures are based on expert opinion, not real-world data.*

Completion of the initial three intravitreal injections, during the loading phase of treatment, within 10 weeks **(see appendix 9)**

- Acceptable performance quality marker: providers should ensure that the first three monthly injections are completed in ≤10 weeks in ≥75% of eyes
- Desirable performance quality marker: providers should ensure that the first three monthly injections are completed in ≤10 weeks in ≥83% of eyes

Complications of treatment

- Acceptable performance quality marker: providers should record all cases of presumed infectious endophthalmitis within the EMR, review each case internally, disseminate learning outcomes and ensure that the incidence is lower than one case for every 6,000 injections

Quality markers for adjusted visual acuity outcomes:

"Good" visual acuity state outcome (see appendix 10)

- Acceptable performance quality marker: after adjustment for differences in baseline characteristics, at least 42% of eyes treated by each provider should have "good" vision (Acuity ≥70 ETDRS letters) after the first 12 months of treatment
- Desirable performance quality marker: after adjustment for differences in baseline characteristics, at least 48% of eyes treated by each provider should have "good" vision (Acuity ≥70 ETDRS letters) after the first 12 months of treatment

"Poor" visual acuity change outcome

- Acceptable performance quality marker: after adjustment for differences in baseline characteristics, fewer than 19% of eyes treated by each provider should have a "poor" visual outcome (Decrease of ≥10 ETDRS letters from baseline) after the first 12 months of treatment
- Desirable performance quality marker: after adjustment for differences in baseline characteristics, fewer than 15% of eyes treated by each provider should have a "poor" visual outcome (Decrease of ≥10 ETDRS letters from baseline) after the first 12 months of treatment

9. Conclusions

It is encouraging that the number of centres participating in the AMD Audit is increasing, with representation from all four home nations and the Channel Islands and from both NHS trusts and independent sector providers. The number of eyes included in the analysis in the year 2 report has increased by more than 30%, compared to the year 1 report.

Baseline characteristics, care processes and visual acuity outcomes after treatment are in keeping with the data reported in the year 1 report. There have been modest improvements in the proportion of eyes completing the initial three injections within 10 weeks and of injections given by trained, non-medical healthcare professionals. The median number of injections in the first year of treatment has also reduced from seven to six. Visual acuity gains are maintained during the second year of treatment, although loss to follow-up has increased.

The best visual acuity outcomes are achieved in eyes with better levels of visual acuity at the start of treatment, suggesting a need for efficient pathways for referral, initial assessment and diagnosis. In addition, prompt completion of the initial three monthly injections in the loading phase of treatment helps achieve better acuity outcomes.

Around 90% and 85% of treated eyes maintain "stable" vision and avoided moderate visual loss (a decrease of ≥15 ETDRS letters) after 12 and 24 months. Although any increase in visual acuity was common, only 20% of eyes experienced significant visual acuity gains. "Good" visual acuity outcomes were maintained by 70% of eyes with this level of acuity at the start of treatment but were achieved in only 6% of eyes with "poor" acuity at baseline. Real-world outcomes from the AMD audit should be used to help patients and their carers make an informed decision about starting treatment, particularly in eyes with "poor" baseline visual acuity.

There is variation in data quality, the care pathway and visual acuity outcomes between providers of treatment. All providers are encouraged to review local performance against peers, national aggregate data and the new quality markers and use appropriate quality improvement methodology to deliver an impact on local performance where change is needed.

10. Funding

In the three years since the formal launch in April 2021, the audit has received funding from industry partners. The audit is currently part-funded by Roche Products Limited Ltd and Bayer plc who have funded the AMD Audit since its commencement.

Roche Products Limited have provided a grant to support the development of the audit tool as a non-interventional study. Other than certification of the protocol, Roche Products Limited have had no involvement in the development of the tool or any audit outputs. The project has been supported by an unrestricted, hands-off grant provided by Bayer plc. Bayer plc has no involvement whatsoever in the development or implementation of the project. We are grateful for the donations received from these organisations. We also receive ongoing support through subscription fees from participating hospitals.

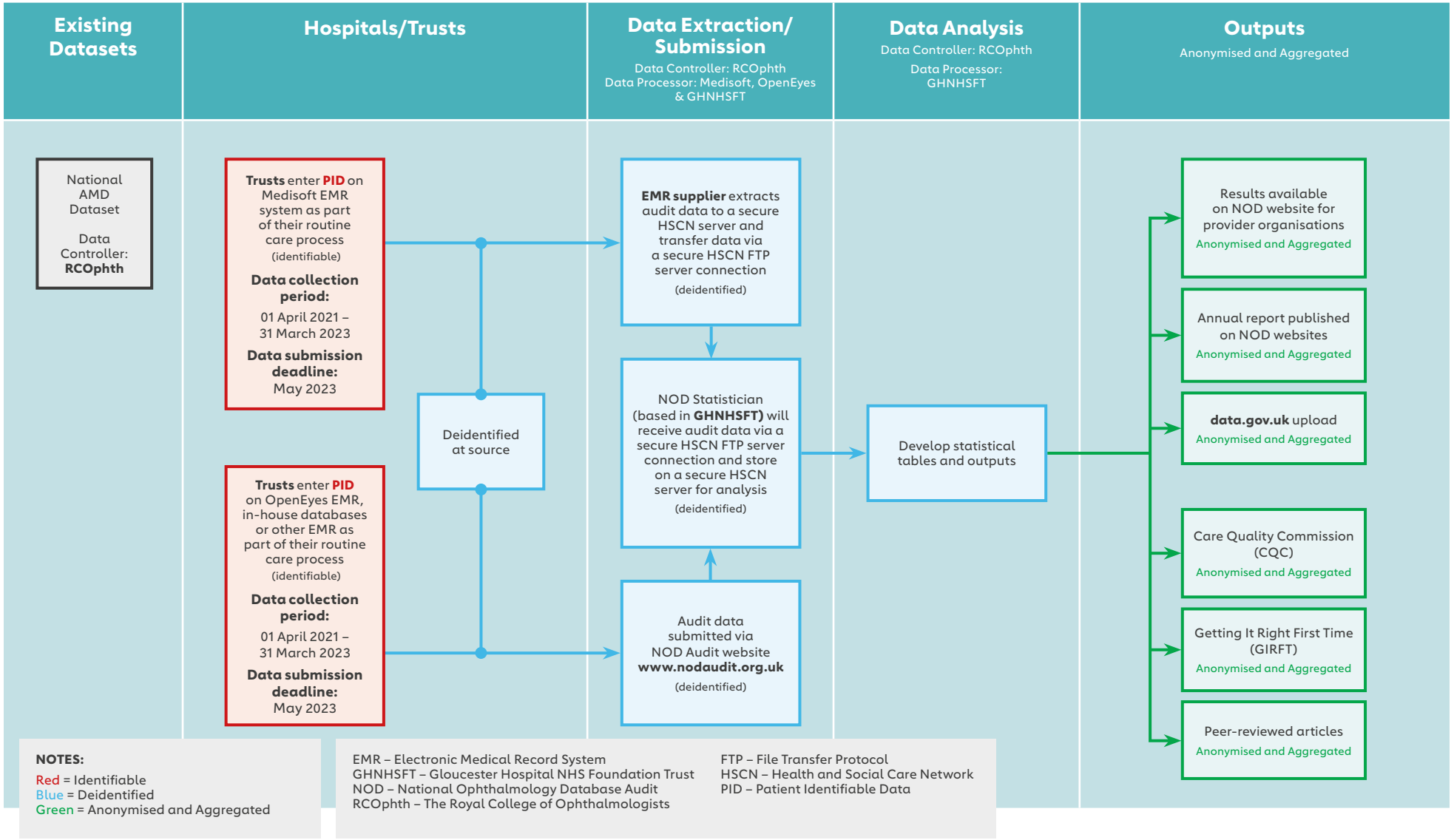
11. Acknowledgements

The NOD AMD Audit is supported and advised by a multi-disciplinary advisory group.
The members of the advisory group are listed below, and their invaluable help is acknowledged.

Person	Role	Organisation
Martin McKibbin	Chair	Clinical Lead for RCOphth National Ophthalmology Database AMD Audit
Beth Barnes	Head of Professional Support	The Royal College of Ophthalmologists
Gabriela Czanner	Independent Statistician	Ophthalmic Statistics Group
Geraldine Hoad	Patient Representative	The Macular Society
Hemal Mehta	Ophthalmology Representative	The Royal College of Ophthalmologists
Samer Elsherbiny	Ophthalmology Representative	The Royal College of Ophthalmologists
Narendra Dhingra	Ophthalmology Representative	The Royal College of Ophthalmologists
Sajjad Mahmood	Ophthalmology Representative	The Royal College of Ophthalmologists
Ian Pearce	Ophthalmology Representative	The Royal College of Ophthalmologists
Matt Broom	Lay Group Representative	The Royal College of Ophthalmologists
Aleksandra Mankowska	Practicing Optometrist	The College of Optometrists
Mark Davies	Ophthalmic Nursing Representative	The Royal College of Nursing
Bahadur Dehar	Clinical Effectiveness Project Facilitator	Sandwell and West Birmingham/N-QI-CAN representative
Paul Donachie	Senior Medical Statistician	The Royal College of Ophthalmologists

Appendix 1: Data Flow

National Ophthalmology Database AMD Audit – Data Flow



Appendix 2: Interpreting the graphs

Among the results there are seven types of graphs;

1. **Bar charts** – These are either horizontally or vertically aligned depending on the data being plotted. One axis displays the categorical element, usually contributing centre and when bar charts are sub-divided by another category, the length of each bar indicates the quantity of interest for the sub-category as read from the numeric axis. Each bar chart is ordered (sorted) by a quantity being plotted, i.e. percentage. Figure 3 (page 23) is an example of a bar chart

2. **Box and Whisker plots** – The spread for the variable of interest is shown where the central line is the median or 'middle' value. The box outlines the inter quartile range (25% and 75% centiles), and the horizontal lines above and below the inter quartile range display either the position of the furthest value or a value at a 'reasonable' stretch from the middle. Extreme values are the dots beyond that (known as outliers). Figure 9 (page 31) is an example of a Box and Whisker plot.

3. **Median and IQR plots** – These display for each contributing centre, the median and IQR for a numeric quantity as read from the vertical axis. These estimates indicate variation between centres and when not including the range, these graphs allow magnification on the y-axis and a clearer view of the distribution of the median and IQR across contributing centres. Each of these graphs are ordered (sorted) by a quantity being plotted, i.e., the median. Figure 7 (page 28) is an example of a Median and IQR graph.

4. **Scatter plots** – The display data for two quantitative variables Figure 19 (page 42) is an example of a scatter plot.

5. **Kaplan-Meier curves** – These are a graphical representation of a time to event (often survival or failure). They display the probability of surviving or failing up until a given time. In this report lost to follow up is considered as the failure and remaining under follow up as the survival. Figure 2 (page 22) is an example of a Kaplan-Meier curve where the event is loss to follow up.

6. **Median over time graphs** – These display the median value of a quantitative variable at each specified time point, for example visual acuity. Different groups can be displayed with the median for each group at each specified time point plotted and joined with a line to show the trend over time. Figure 13 (page 36) is an example of a Median over time graph.

Appendix 3: Glossary

Abbreviation	Description
AMD	Age-related Macular Degeneration
Anti-VEGF	Drug blocking the action of vascular endothelial growth factor
CF	Count Fingers
CI	Confidence Interval
CNS	Central Nervous System
COVID-19	Coronavirus Disease 2019
EMR	Electronic Medical Record
ETDRS	The Early Treatment Diabetic Retinopathy Study
HM	Hand Movements
HQIP	Healthcare Quality Improvement Partnership
IMD	Index of Multiple Deprivation
IOI	Intraocular Inflammation
IQR	Inter Quartile Range
ISBIVT	Immediate Sequential Bilateral Intravitreal Treatment
LogMAR	Logarithm of the Minimum Angle of Resolution
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
NOD	National Ophthalmology Database
NPL	No perception of light – a measure of visual acuity
NvAMD	Neovascular Age-related Macular Degeneration
OCT	Optical Coherence Tomography
PAS	Patient Administration System
PIE	Presumed Infectious Endophthalmitis
PHVA	Pin hole visual acuity
PL	Perception of light
PREMs	Patient recorded experience measures
RCOphth	The Royal College of Ophthalmologists
UDVA	Uncorrected Distance Visual Acuity

Appendix 3 continued: Glossary

Abbreviation	Description
UK	United Kingdom
VA	Visual acuity
VEGF	Vascular Endothelial Growth Factor
WHO	World Health Organisation

Appendix 4: Conversions between ETDRS Letters, LogMAR and approximate Snellen equivalent

Visual acuity is traditionally measured by the ability to distinguish letters or numbers at a given distance according to a fixed standard. We have reported VA using ETDRS letters. A "normal" ETDRS letter visual acuity would be 85 ETDRS letters and the number increases as vision improves. 70 ETDRS letters would be at the boundary for driving a car and is described here as 'good' vision. 35 ETDRS letters would be at the level of registrable severe sight impairment.

EDTRS Letters	LogMAR Value	Snellen	VA Interpretation
100	-0.30	6/3	"Good" VA
95	-0.20	6/3.75	
90	-0.10	6/5	
85	0.00	6/6	
80	0.10	6/7.5	
75	0.20	6/9	
70	0.30	6/12	
65	0.40	6/15	
60	0.50	6/18	
55	0.60	6/24	
50	0.70	6/30	
45	0.80	6/36	
40	0.90	6/48	
35	1.00	6/60	"Poor" VA
30	1.10	5/60 or 6/76	
25	1.20	4/60 or 6/96	
20	1.30	3/60 or 6/120	
15	1.40	6/152	
10	1.50	6/192	
5	1.60		
0	1.70		

Appendix 5: The number of eligible eyes per centre

Centre name	2020 NHS year		2021 NHS year	
	Number of Eligible Eyes	Number of patients	Number of Eligible Eyes	Number of patients
Barking, Havering and Redbridge University Hospitals NHS Trust	205	191	304	287
Barts Health NHS Trust	145	136	141	130
Belfast Health and Social Care Trust	657	592	707	632
Bradford Teaching Hospitals NHS Foundation Trust	182	163	234	215
Buckinghamshire Healthcare NHS Trust	352	313	413	383
Calderdale and Huddersfield NHS Foundation Trust	300	281	392	356
CHEC (Watford)			52	50
Chesterfield Royal Hospital NHS Foundation Trust	240	224	261	237
County Durham and Darlington NHS Foundation Trust	223	205	368	329
East Cheshire NHS Trust	351	267	239	204
East Kent Hospitals University NHS Foundation Trust	271	247	709	667
East Sussex Healthcare NHS Trust	396	366	465	423
Epsom and St Helier University Hospitals NHS Trust	225	218	294	276
Gloucestershire Hospitals NHS Foundation Trust	403	374	502	457
Great Western Hospitals NHS Foundation Trust	247	232	318	287
Guy's and St Thomas' NHS Foundation Trust	356	321		
Harrogate and District NHS Foundation Trust	146	135	189	168
Hull University Teaching Hospitals NHS Trust	340	316	480	440
Hywel Dda University Local Health Board	1,267	1,045	517	460
Isle of Wight NHS Trust	121	110	152	134
Kettering General Hospital NHS Foundation Trust	252	222	248	228
King's College Hospital NHS Foundation Trust	563	506	715	642
Leeds Teaching Hospitals NHS Trust	336	309	451	419
Liverpool University Hospitals NHS Foundation Trust	573	531	684	611
Manchester University NHS Foundation Trust	535	498	753	668

Appendix 5 table continued: The number of eligible eyes per centre

Centre name	2020 NHS year		2021 NHS year	
	Number of Eligible Eyes	Number of patients	Number of Eligible Eyes	Number of patients
Medical Specialists Group (Guernsey)	63	58	56	51
Mid and South Essex NHS Foundation Trust	210	195	1,187	1,048
Mid Cheshire Hospitals NHS Foundation Trust	186	179	235	211
Mid Yorkshire Teaching NHS Trust	310	286	384	346
Moorfields Eye Centre at Bedfordshire Hospitals NHS Foundation Trust	167	156	174	163
Moorfields Eye Hospital NHS Foundation Trust	1,287	1,170	3,120	2,849
NHS Grampian	340	300	526	470
NHS Tayside	270	249	352	325
North Middlesex University Hospital NHS Trust	41	38	69	65
North West Anglia NHS Foundation Trust	335	305	397	359
Northern Care Alliance NHS Foundation Trust	305	281	530	484
Optegra Eye Health Care (Manchester Eye Hospital)	222	205	294	270
Optegra Eye Health Care (Yorkshire Eye Hospital)	29	27	27	24
Oxford University Hospitals NHS Foundation Trust	348	325	499	449
Practice Plus Group Ophthalmology, Rochdale	487	428	546	491
Practice Plus Group Surgical Centre, Gillingham	64	58	96	82
Royal Berkshire NHS Foundation Trust	407	375	538	492
Royal Cornwall Hospitals NHS Trust	350	322	454	402
Royal Devon University Healthcare NHS Foundation Trust	168	149	153	141
Royal Free London NHS Foundation Trust	324	295	290	266
Royal United Hospitals Bath NHS Foundation Trust	226	213	324	303
Salisbury NHS Foundation Trust	188	170	207	184
Sheffield Teaching Hospitals NHS Foundation Trust	332	303	433	391
Somerset NHS Foundation Trust	465	411	611	545
South Warwickshire University NHS Foundation Trust	216	200	237	209
SpaMedica - Birmingham	608	471	115	102

Appendix 5 table continued: The number of eligible eyes per centre

Centre name	2020 NHS year		2021 NHS year	
	Number of Eligible Eyes	Number of patients	Number of Eligible Eyes	Number of patients
SpaMedica – Chelmsford			257	213
SpaMedica – Coventry	51	46	129	114
SpaMedica – Manchester	40	36	31	28
SpaMedica – West Lancashire	67	61	83	74
Surrey and Sussex Healthcare NHS Trust	247	226	285	268
The Hillingdon Hospitals NHS Foundation Trust	116	101	167	152
The Newcastle upon Tyne Hospitals NHS Foundation Trust	659	606	842	774
The Princess Alexandra Hospital NHS Trust	152	141	231	205
Torbay and South Devon NHS Foundation Trust	216	200		
University Hospital Southampton NHS Foundation Trust	415	385	562	508
University Hospitals Birmingham NHS Foundation Trust	341	306	520	462
University Hospitals Bristol and Weston NHS Foundation Trust	529	492	677	603
Warrington and Halton Teaching Hospitals NHS Foundation Trust	199	184	241	218
Western Health and Social Care Trust	243	223	271	253
Wirral University Teaching Hospital NHS Foundation Trust	286	262	315	283
Wrightington, Wigan and Leigh NHS Foundation Trust	175	166	173	164
York and Scarborough Teaching Hospitals NHS Foundation Trust			621	556
Overall	**20,370**	**18,406**	**26,847**	**24,300**

Appendix 6: Data quality: The proportion of eyes with referral data and visual acuity measurements at baseline, after 12 months and at both time-points (change data)

Centre name	Referral %	Baseline				One Year				
		Number of eligible eyes	Percentage with VA data	Median VA	Percentage with VA ≥70 letters	Number of eyes eligible at one year	Percentage with VA data	Median VA	Percentage with VA ≥70 letters	Percentage with Change of VA data
Barking, Havering and Redbridge University Hospitals NHS Trust	17.1	304	70.7	59.0	16.7	255	92.9	67.0	40.0	67.5
Barts Health NHS Trust	49.6	141	92.2	65.0	32.3	110	91.8	70.0	50.0	85.5
Belfast Health and Social Care Trust	73.7	707	99.2	60.0	34.0	579	85.3	65.0	38.3	84.8
Bradford Teaching Hospitals NHS Foundation Trust	88.0	234	98.7	65.0	35.9	204	95.6	70.0	48.0	94.6
Buckinghamshire Healthcare NHS Trust	0.0	413	63.0	61.5	26.5	342	96.8	67.0	40.6	63.2
Calderdale and Huddersfield NHS Foundation Trust	39.8	392	100.0	60.0	27.0	345	98.0	65.0	47.2	98.0
CHEC (Watford)	90.4	52	100.0	45.0	11.5					
Chesterfield Royal Hospital NHS Foundation Trust	90.0	261	98.5	60.0	31.5	222	96.4	65.0	36.9	95.9
County Durham and Darlington NHS Foundation Trust	90.8	368	99.7	60.0	37.6	316	98.7	70.0	55.4	98.7
East Cheshire NHS Trust	0.0	239	10.5	60.0	36.0	145	31.7	60.0	11.0	2.1
East Kent Hospitals University NHS Foundation Trust	0.0	709	98.0	61.0	29.1	396	84.8	70.0	46.0	82.8
East Sussex Healthcare NHS Trust	32.5	465	95.9	65.0	40.1	415	95.9	75.0	65.1	93.7
Epsom and St Helier University Hospitals NHS Trust	65.6	294	100.0	60.0	27.2	253	99.6	65.0	40.3	99.6
Gloucestershire Hospitals NHS Foundation Trust	84.9	502	99.6	55.0	22.6	444	97.3	64.0	36.5	97.3
Great Western Hospitals NHS Foundation Trust	7.2	318	92.8	57.0	23.1	272	73.9	63.0	28.7	68.8
Harrogate and District NHS Foundation Trust	0.0	189	95.2	57.0	16.1	161	99.4	65.5	36.6	96.3
Hull University Teaching Hospitals NHS Trust	80.0	480	99.4	60.0	29.6	436	97.9	65.0	44.3	97.5
Hywel Dda University Local Health Board	49.5	517	96.1	58.0	27.4	433	94.9	60.0	29.6	92.4
Isle of Wight NHS Trust	3.3	152	92.8	60.0	35.5	131	93.9	55.0	22.1	89.3
Kettering General Hospital NHS Foundation Trust	31.0	248	94.0	50.0	10.3	203	98.0	58.0	19.7	93.1
King's College Hospital NHS Foundation Trust	52.0	715	99.7	60.0	29.6	609	95.6	60.0	43.0	95.2
Leeds Teaching Hospitals NHS Trust	31.3	451	98.0	60.0	31.9	377	96.8	65.0	40.6	95.5
Liverpool University Hospitals NHS Foundation Trust	9.6	684	74.1	55.0	21.3	573	91.6	59.0	26.5	69.3

Appendix 6 table continued: The proportion of eyes with referral data and visual acuity measurements at baseline, after 12 months and at both time-points (change data)

Centre name	Referral %	Baseline				One Year				
		Number of eligible eyes	Percentage with VA data	Median VA	Percentage with VA ≥70 letters	Number of eyes eligible at one year	Percentage with VA data	Median VA	Percentage with VA ≥70 letters	Percentage with Change of VA data
Manchester University NHS Foundation Trust	3.3	753	96.0	60.0	26.8	304	97.0	64.0	37.5	93.4
Medical Specialists Group (Guernsey)	96.4	56	98.2	58.0	32.7	48	100.0	65.5	37.5	97.9
Mid and South Essex NHS Foundation Trust	0.0	1,187	97.8	59.0	23.6	852	86.5	59.0	24.4	84.4
Mid Cheshire Hospitals NHS Foundation Trust	18.3	235	97.9	60.0	19.1	216	95.4	65.0	41.7	94.0
Mid Yorkshire Teaching NHS Trust	32.6	384	97.4	57.0	23.0	340	97.6	64.0	33.2	95.0
Moorfields Eye Centre at Bedfordshire Hospitals NHS Foundation Trust	91.4	174	100.0	60.0	24.1	155	96.1	65.0	40.6	96.1
Moorfields Eye Hospital NHS Foundation Trust	4.7	3,120	98.4	61.0	30.2	972	97.7	69.0	46.5	96.2
NHS Grampian	45.8	526	98.5	60.0	37.6	445	97.3	70.0	53.9	96.4
NHS Tayside	94.9	352	91.5	60.0	30.4	308	84.4	69.0	41.6	76.3
North Middlesex University Hospital NHS Trust	47.8	69	100.0	55.0	29.0	62	88.7	60.0	24.2	88.7
North West Anglia NHS Foundation Trust	22.9	397	92.7	53.0	14.9	334	92.8	59.0	28.1	86.5
Northern Care Alliance NHS Foundation Trust	0.0	530	89.4	27.0	3.0	402	91.0	29.0	2.2	83.1
Optegra Eye Health Care (Manchester Eye Hospital)	0.0	294	99.7	65.0	44.7	248	99.6	75.0	62.5	99.2
Optegra Eye Health Care (Yorkshire Eye Hospital)	7.4	27	96.3	60.0	30.8					
Oxford University Hospitals NHS Foundation Trust	86.0	499	99.4	60.0	29.6	458	98.3	67.5	48.5	97.8
Practice Plus Group Ophthalmology, Rochdale	96.7	546	97.8	55.0	17.4	469	95.9	60.0	28.8	93.8
Practice Plus Group Surgical Centre, Gillingham	89.6	96	79.2	60.0	31.6	76	72.4	65.0	30.3	55.3
Royal Berkshire NHS Foundation Trust	93.5	538	98.5	60.0	21.1	440	97.7	70.0	49.1	96.4
Royal Cornwall Hospitals NHS Trust	89.0	454	100.0	60.0	28.4	399	92.5	65.0	36.1	92.5
Royal Devon University Healthcare NHS Foundation Trust	71.2	153	92.2	60.0	29.8	47	89.4	65.0	38.3	85.1
Royal Free London NHS Foundation Trust	0.3	290	98.3	60.0	29.5	240	95.4	65.0	40.8	95.0
Royal United Hospitals Bath NHS Foundation Trust	22.5	324	92.0	58.0	14.8	279	98.6	65.0	32.3	91.0
Salisbury NHS Foundation Trust	12.6	207	100.0	60.0	19.8	179	98.9	65.0	41.3	98.9
Sheffield Teaching Hospitals NHS Foundation Trust	94.7	433	99.1	60.0	32.6	364	96.2	65.0	42.3	95.3

Appendix 6 table continued: The proportion of eyes with referral data and visual acuity measurements at baseline, after 12 months and at both time-points (change data)

Centre name	Referral %	Baseline				One Year				
		Number of eligible eyes	Percentage with VA data	Median VA	Percentage with VA ≥70 letters	Number of eyes eligible at one year	Percentage with VA data	Median VA	Percentage with VA ≥70 letters	Percentage with Change of VA data
Somerset NHS Foundation Trust	25.9	611	98.9	56.0	19.0	532	97.2	64.0	32.9	96.1
South Warwickshire University NHS Foundation Trust	1.3	237	100.0	60.0	35.0	200	96.5	70.0	52.5	96.5
SpaMedica - Birmingham	7.0	115	100.0	59.0	19.1	102	98.0	67.0	46.1	98.0
SpaMedica - Chelmsford	3.9	257	100.0	54.0	14.4	220	99.5	63.0	36.8	99.5
SpaMedica - Coventry	0.0	129	100.0	57.0	20.9	120	98.3	65.0	34.2	98.3
SpaMedica - Manchester	38.7	31	100.0	57.0	22.6					
SpaMedica - West Lancashire	14.5	83	100.0	62.0	32.5	73	100.0	70.0	57.5	100.0
Surrey and Sussex Healthcare NHS Trust	0.7	285	98.9	58.0	19.1	247	94.3	66.0	41.7	93.1
The Hillingdon Hospitals NHS Foundation Trust	0.6	167	98.2	56.5	22.6	142	98.6	65.0	39.4	96.5
The Newcastle upon Tyne Hospitals NHS Foundation Trust	23.4	842	95.7	60.0	31.5	728	92.4	65.0	44.5	88.3
The Princess Alexandra Hospital NHS Trust	0.4	231	100.0	58.0	20.3	200	95.5	60.0	32.5	95.5
University Hospital Southampton NHS Foundation Trust	86.8	562	99.3	55.0	25.6	480	98.5	64.0	37.1	98.1
University Hospitals Birmingham NHS Foundation Trust	19.0	520	100.0	55.0	24.4	422	91.2	60.0	26.1	91.2
University Hospitals Bristol and Weston NHS Foundation Trust	72.5	677	93.5	60.0	30.8	610	97.0	65.0	46.6	91.8
Warrington and Halton Teaching Hospitals NHS Foundation Trust	29.9	241	99.2	60.0	28.0	204	97.1	66.5	40.7	96.6
Western Health and Social Care Trust	80.1	271	95.6	64.0	35.9	229	97.4	70.0	53.3	93.4
Wirral University Teaching Hospital NHS Foundation Trust	88.6	315	97.1	58.0	21.6	283	98.2	60.0	28.6	96.1
Wrightington, Wigan and Leigh NHS Foundation Trust	86.1	173	94.2	55.0	17.2	141	94.3	61.0	30.5	90.1
York and Scarborough Teaching Hospitals NHS Foundation Trust	100.0	621	84.5	63.0	35.6	556	99.1	70.0	52.3	83.1
Overall	**38.6**	**26,847**	**95.0**	**60.0**	**26.9**	**20,408**	**94.3**	**65.0**	**39.1**	**90.3**

Appendix 7: The percentage of eligible eyes with visual acuity data at baseline and at one year for centres in the 2020 and 2021 NHS years

Centre name	The percentage of eligible eyes with a baseline VA		The percentage of eligible eyes with VA at 1 year	
	2020	2021	2020	2021
Barking, Havering and Redbridge University Hospitals NHS Trust	67.8	70.7	82.1	92.9
Barts Health NHS Trust	97.2	92.2	89.4	91.8
Belfast Health and Social Care Trust	96.8	99.2	74.6	85.3
Bradford Teaching Hospitals NHS Foundation Trust	96.2	98.7	93.3	95.6
Buckinghamshire Healthcare NHS Trust	63.4	63.0	93.9	96.8
Calderdale and Huddersfield NHS Foundation Trust	100.0	100.0	95.8	98.0
CHEC (Watford)		100.0		
Chesterfield Royal Hospital NHS Foundation Trust	95.4	98.5	93.5	96.4
County Durham and Darlington NHS Foundation Trust	99.1	99.7	97.1	98.7
East Cheshire NHS Trust	55.3	10.5	8.7	31.7
East Kent Hospitals University NHS Foundation Trust	100.0	98.0	96.0	84.8
East Sussex Healthcare NHS Trust	95.5	95.9	95.9	95.9
Epsom and St Helier University Hospitals NHS Trust	100.0	100.0	98.1	99.6
Gloucestershire Hospitals NHS Foundation Trust	93.1	99.6	96.2	97.3
Great Western Hospitals NHS Foundation Trust	94.3	92.8	66.8	73.9
Guy's and St Thomas' NHS Foundation Trust	99.7		96.9	
Harrogate and District NHS Foundation Trust	78.1	95.2	96.2	99.4
Hull University Teaching Hospitals NHS Trust	98.5	99.4	94.6	97.9
Hywel Dda University Local Health Board	92.7	96.1	95.0	94.9
Isle of Wight NHS Trust	85.1	92.8	87.1	93.9
Kettering General Hospital NHS Foundation Trust	86.5	94.0	95.9	98.0
King's College Hospital NHS Foundation Trust	99.5	99.7	92.3	95.6
Leeds Teaching Hospitals NHS Trust	94.9	98.0	94.9	96.8
Liverpool University Hospitals NHS Foundation Trust	83.6	74.1	90.0	91.6

Appendix 7 table continued: The percentage of eligible eyes with visual acuity data at baseline and at one year for centres in the 2020 and 2021 NHS years

Centre name	The percentage of eligible eyes with a baseline VA		The percentage of eligible eyes with VA at 1 year	
	2020	2021	2020	2021
Manchester University NHS Foundation Trust	92.3	96.0	96.4	97.0
Medical Specialists Group (Guernsey)	100.0	98.2	91.7	100.0
Mid and South Essex NHS Foundation Trust	100.0	97.8	72.5	86.5
Mid Cheshire Hospitals NHS Foundation Trust	90.3	97.9	95.2	95.4
Mid Yorkshire Teaching NHS Trust	99.4	97.4	98.2	97.6
Moorfields Eye Centre at Bedfordshire Hospitals NHS Foundation Trust	92.2	100.0	96.0	96.1
Moorfields Eye Hospital NHS Foundation Trust	97.0	98.4	96.7	97.7
NHS Grampian	97.9	98.5	97.6	97.3
NHS Tayside	75.9	91.5	87.3	84.4
North Middlesex University Hospital NHS Trust	97.6	100.0	91.2	88.7
North West Anglia NHS Foundation Trust	96.4	92.7	87.5	92.8
Northern Care Alliance NHS Foundation Trust	88.5	89.4	79.1	91.0
Optegra Eye Health Care (Manchester Eye Hospital)	93.7	99.7	98.5	99.6
Optegra Eye Health Care (Yorkshire Eye Hospital)		96.3		
Oxford University Hospitals NHS Foundation Trust	100.0	99.4	95.2	98.3
Practice Plus Group Ophthalmology, Rochdale	99.4	97.8	95.3	95.9
Practice Plus Group Surgical Centre, Gillingham	85.9	79.2	83.0	72.4
Royal Berkshire NHS Foundation Trust	98.8	98.5	94.4	97.7
Royal Cornwall Hospitals NHS Trust	100.0	100.0	96.2	92.5
Royal Devon University Healthcare NHS Foundation Trust	90.5	92.2	93.6	89.4
Royal Free London NHS Foundation Trust	51.9	98.3	90.2	95.4
Royal United Hospitals Bath NHS Foundation Trust	94.2	92.0	98.0	98.6
Salisbury NHS Foundation Trust	100.0	100.0	96.6	98.9
Sheffield Teaching Hospitals NHS Foundation Trust	97.9	99.1	96.3	96.2
Somerset NHS Foundation Trust	89.5	98.9	98.1	97.2
South Warwickshire University NHS Foundation Trust	99.5	100.0	94.8	96.5

Appendix 7 table continued: The percentage of eligible eyes with visual acuity data at baseline and at one year for centres in the 2020 and 2021 NHS years

Centre name	The percentage of eligible eyes with a baseline VA		The percentage of eligible eyes with VA at 1 year	
	2020	2021	2020	2021
SpaMedica – Birmingham	99.7	100.0	98.6	98.0
SpaMedica – Chelmsford		100.0		99.5
SpaMedica – Coventry	98.0	100.0	100.0	98.3
SpaMedica – Manchester	95.0	100.0	100.0	
SpaMedica – West Lancashire	98.5	100.0	98.4	100.0
Surrey and Sussex Healthcare NHS Trust	89.9	98.9	91.7	94.3
The Hillingdon Hospitals NHS Foundation Trust	94.0	98.2	98.2	98.6
The Newcastle upon Tyne Hospitals NHS Foundation Trust	94.4	95.7	93.0	92.4
The Princess Alexandra Hospital NHS Trust	94.1	100.0	94.6	95.5
Torbay and South Devon NHS Foundation Trust	95.8		90.3	
University Hospital Southampton NHS Foundation Trust	97.1	99.3	96.6	98.5
University Hospitals Birmingham NHS Foundation Trust	100.0	100.0	90.7	91.2
University Hospitals Bristol and Weston NHS Foundation Trust	90.7	93.5	94.8	97.0
Warrington and Halton Teaching Hospitals NHS Foundation Trust	97.5	99.2	97.7	97.1
Western Health and Social Care Trust	97.5	95.6	95.3	97.4
Wirral University Teaching Hospital NHS Foundation Trust	98.6	97.1	93.6	98.2
Wrightington, Wigan and Leigh NHS Foundation Trust	96.6	94.2	96.2	94.3
York and Scarborough Teaching Hospitals NHS Foundation Trust		84.5		99.1
Overall	**92.9**	**95.0**	**82.3**	**71.8**

Appendix 8: Baseline visual acuity

Centre name	Baseline VA 2020				Baseline VA 2021			
	Number of eyes	Median	Proportion with Good VA	Proportion with Poor VA	Number of eyes	Median	Proportion with Good VA	Proportion with Poor VA
Barking, Havering and Redbridge University Hospitals NHS Trust	205	57.0	9.4	14.4	304	59.0	16.7	11.2
Barts Health NHS Trust	145	59.0	14.2	14.9	141	65.0	32.3	14.6
Belfast Health and Social Care Trust	657	60.0	35.2	14.0	707	60.0	34.0	15.4
Bradford Teaching Hospitals NHS Foundation Trust	182	60.0	33.1	16.6	234	65.0	35.9	12.1
Buckinghamshire Healthcare NHS Trust	352	62.0	33.6	12.1	413	61.5	26.5	14.2
Calderdale and Huddersfield NHS Foundation Trust	300	60.0	24.0	11.7	392	60.0	27.0	14.3
CHEC (Watford)					52	45.0	11.5	13.5
Chesterfield Royal Hospital NHS Foundation Trust	240	60.0	25.8	2.6	261	60.0	31.5	4.7
County Durham and Darlington NHS Foundation Trust	223	60.0	33.9	10.9	368	60.0	37.6	11.4
East Cheshire NHS Trust	351	55.0	30.4	11.9	239	60.0	36.0	8.0
East Kent Hospitals University NHS Foundation Trust	271	61.0	31.4	10.0	709	61.0	29.1	13.1
East Sussex Healthcare NHS Trust	396	60.0	35.2	4.5	465	65.0	40.1	2.7
Epsom and St Helier University Hospitals NHS Trust	225	60.0	23.6	11.1	294	60.0	27.2	8.2
Gloucestershire Hospitals NHS Foundation Trust	403	55.0	24.8	16.5	502	55.0	22.6	17.6
Great Western Hospitals NHS Foundation Trust	247	57.0	21.9	18.5	318	57.0	23.1	15.6
Guy's and St Thomas' NHS Foundation Trust	356	61.0	36.6	12.7				
Harrogate and District NHS Foundation Trust	146	56.0	21.9	18.4	189	57.0	16.1	16.7
Hull University Teaching Hospitals NHS Trust	340	60.0	29.3	10.1	480	60.0	29.6	10.1
Hywel Dda University Local Health Board	1,267	60.0	34.1	11.1	517	58.0	27.4	15.3
Isle of Wight NHS Trust	121	60.0	36.9	8.7	152	60.0	35.5	17.7
Kettering General Hospital NHS Foundation Trust	252	50.0	10.6	22.5	248	50.0	10.3	21.9
King's College Hospital NHS Foundation Trust	563	60.0	30.4	11.8	715	60.0	29.6	12.5
Leeds Teaching Hospitals NHS Trust	336	60.0	31.3	6.3	451	60.0	31.9	8.6
Liverpool University Hospitals NHS Foundation Trust	573	58.0	24.2	14.4	684	55.0	21.3	17.4
Manchester University NHS Foundation Trust	535	60.0	28.1	9.3	753	60.0	26.8	13.3

Appendix 8 table continued: Baseline visual acuity

Centre name	Baseline VA 2020				Baseline VA 2021			
	Number of eyes	Median	Proportion with Good VA	Proportion with Poor VA	Number of eyes	Median	Proportion with Good VA	Proportion with Poor VA
Medical Specialists Group (Guernsey)	63	63.0	39.7	7.9	56	58.0	32.7	14.5
Mid and South Essex NHS Foundation Trust	210	54.0	6.7	14.3	1,187	59.0	23.6	16.6
Mid Cheshire Hospitals NHS Foundation Trust	186	60.0	20.8	10.7	235	60.0	19.1	10.0
Mid Yorkshire Teaching NHS Trust	310	56.0	19.5	16.2	384	57.0	23.0	15.8
Moorfields Eye Centre at Bedfordshire Hospitals NHS Foundation Trust	167	60.0	27.3	3.9	174	60.0	24.1	4.0
Moorfields Eye Hospital NHS Foundation Trust	1,287	60.0	31.3	12.4	3,120	61.0	30.2	13.5
NHS Grampian	340	60.0	27.3	7.8	526	60.0	37.6	7.5
NHS Tayside	270	60.0	30.7	8.3	352	60.0	30.4	6.5
North Middlesex University Hospital NHS Trust	41	45.0	20.0	20.0	69	55.0	29.0	18.8
North West Anglia NHS Foundation Trust	335	55.0	17.0	18.6	397	53.0	14.9	16.0
Northern Care Alliance NHS Foundation Trust	305	30.0	4.8	58.5	530	27.0	3.0	62.9
Optegra Eye Health Care (Manchester Eye Hospital)	222	61.5	38.0	5.8	294	65.0	44.7	7.2
Optegra Eye Health Care (Yorkshire Eye Hospital)	29	63.0	31.6		27	60.0	30.8	
Oxford University Hospitals NHS Foundation Trust	348	55.0	27.6	15.2	499	60.0	29.6	13.9
Practice Plus Group Ophthalmology, Rochdale	487	55.0	19.2	18.6	546	55.0	17.4	18.4
Practice Plus Group Surgical Centre, Gillingham	64	60.0	30.9	7.3	96	60.0	31.6	9.2
Royal Berkshire NHS Foundation Trust	407	56.0	13.9	10.4	538	60.0	21.1	7.4
Royal Cornwall Hospitals NHS Trust	350	55.0	24.6	10.0	454	60.0	28.4	6.6
Royal Devon University Healthcare NHS Foundation Trust	168	65.0	44.1	7.9	153	60.0	29.8	12.1
Royal Free London NHS Foundation Trust	324	55.0	23.8	13.7	290	60.0	29.5	11.9
Royal United Hospitals Bath NHS Foundation Trust	226	56.0	17.8	6.6	324	58.0	14.8	6.4
Salisbury NHS Foundation Trust	188	60.0	21.3	4.8	207	60.0	19.8	12.6
Sheffield Teaching Hospitals NHS Foundation Trust	332	60.0	37.8	7.1	433	60.0	32.6	5.8
Somerset NHS Foundation Trust	465	60.0	25.0	13.5	611	56.0	19.0	15.6
South Warwickshire University NHS Foundation Trust	216	60.0	33.5	5.6	237	60.0	35.0	8.9

Appendix 8 table continued: Baseline visual acuity

Centre name	Baseline VA 2020				Baseline VA 2021			
	Number of eyes	Median	Proportion with Good VA	Proportion with Poor VA	Number of eyes	Median	Proportion with Good VA	Proportion with Poor VA
SpaMedica – Birmingham	608	59.0	26.9	10.4	115	59.0	19.1	11.3
SpaMedica – Chelmsford					257	54.0	14.4	21.8
SpaMedica – Coventry	51	56.5	14.0	10.0	129	57.0	20.9	12.4
SpaMedica – Manchester	40	59.0	26.3	2.6	31	57.0	22.6	22.6
SpaMedica – West Lancashire	67	56.0	25.8	21.2	83	62.0	32.5	9.6
Surrey and Sussex Healthcare NHS Trust	247	55.0	14.4	21.6	285	58.0	19.1	14.5
The Hillingdon Hospitals NHS Foundation Trust	116	50.0	20.2	11.9	167	56.5	22.6	16.5
The Newcastle upon Tyne Hospitals NHS Foundation Trust	659	60.0	31.5	11.7	842	60.0	31.5	14.0
The Princess Alexandra Hospital NHS Trust	152	55.0	21.0	21.0	231	58.0	20.3	16.9
Torbay and South Devon NHS Foundation Trust	216	60.0	31.4	9.7				
University Hospital Southampton NHS Foundation Trust	415	55.0	18.4	20.1	562	55.0	25.6	17.7
University Hospitals Birmingham NHS Foundation Trust	341	55.0	20.8	16.1	520	55.0	24.4	14.4
University Hospitals Bristol and Weston NHS Foundation Trust	529	60.0	33.8	12.5	677	60.0	30.8	11.7
Warrington and Halton Teaching Hospitals NHS Foundation Trust	199	60.0	30.9	10.3	241	60.0	28.0	13.8
Western Health and Social Care Trust	243	60.0	29.5	13.5	271	64.0	35.9	11.2
Wirral University Teaching Hospital NHS Foundation Trust	286	59.0	22.0	14.9	315	58.0	21.6	19.6
Wrightington, Wigan and Leigh NHS Foundation Trust	175	55.0	16.6	8.3	173	55.0	17.2	14.7
York and Scarborough Teaching Hospitals NHS Foundation Trust					621	63.0	35.6	13.0
Overall	**20,370**	**60.0**	**26.9**	**12.8**	**26,847**	**60.0**	**26.9**	**13.9**

Appendix 9: Key care processes

Centre name	2020 NHS year					2021 NHS year				
	Number of eyes	Proportion of eyes starting treatment within 14 days of referral	Completed loading phase within 10 weeks	Median number of injections	Proportion of injections given by nurses and other healthcare professionals	Number of eyes	Proportion of eyes starting treatment within 14 days of referral	Completed loading phase within 10 weeks	Median number of injections	Proportion of injections given by nurses and other healthcare professionals
Barking, Havering and Redbridge University Hospitals NHS Trust	205	2.2	71.2	7.0	62.0	304	5.8	80.9	7.0	53.8
Barts Health NHS Trust	145	16.6	71.7	7.0	73.2	141	10.0	69.5	7.0	85.4
Belfast Health and Social Care Trust	657	8.8	47.0	5.0	72.0	707	8.8	12.0	5.0	53.0
Bradford Teaching Hospitals NHS Foundation Trust	182	10.0	81.9	6.5	98.6	234	8.2	80.3	7.0	97.0
Buckinghamshire Healthcare NHS Trust	352		75.6	8.0	98.6	413		76.8	8.0	97.8
Calderdale and Huddersfield NHS Foundation Trust	300	39.2	72.3	7.0	68.2	392	32.6	75.0	7.0	74.6
CHEC (Watford)						52	57.4	0.0	5.0	10.4
Chesterfield Royal Hospital NHS Foundation Trust	240	21.4	71.3	5.0	10.4	261	15.8	65.1	4.0	45.6
County Durham and Darlington NHS Foundation Trust	223	29.6	80.3	8.0	62.4	368	29.0	79.3	7.0	53.0
East Cheshire NHS Trust	351		0.3	4.0	49.0	239		1.3	4.0	59.0
East Kent Hospitals University NHS Foundation Trust	271		81.9	7.0	96.2	709		41.9	2.0	97.2
East Sussex Healthcare NHS Trust	396	7.0	87.6	7.0	87.8	465	0.6	83.2	7.0	88.8
Epsom and St Helier University Hospitals NHS Trust	225	19.0	86.7	7.0	62.2	294	10.4	82.3	7.0	73.2
Gloucestershire Hospitals NHS Foundation Trust	403	45.2	82.6	8.0	67.0	502	39.0	75.9	8.0	71.6
Great Western Hospitals NHS Foundation Trust	247	50.0	85.4	8.0	89.8	318		84.6	7.0	88.8
Guy's and St Thomas' NHS Foundation Trust	356		57.3	6.0	96.8					
Harrogate and District NHS Foundation Trust	146		73.3	7.5	73.2	189		64.6	7.0	74.8
Hull University Teaching Hospitals NHS Trust	340	11.2	86.2	9.0	65.8	480	5.8	83.5	9.0	69.0
Hywel Dda University Local Health Board	1,267	80.2	33.5	6.0	76.8	517	69.6	73.5	6.0	76.6
Isle of Wight NHS Trust	121		77.7	4.0	48.4	152		75.0	4.0	63.2
Kettering General Hospital NHS Foundation Trust	252		26.6	6.0	57.6	248	36.4	50.0	7.0	40.6
King's College Hospital NHS Foundation Trust	563	24.0	78.2	6.0	45.8	715	17.8	76.5	6.0	58.2
Leeds Teaching Hospitals NHS Trust	336	12.0	72.0	7.0	58.6	451	7.8	64.3	6.0	55.4

Appendix 9 table continued: Key care processes

Centre name	2020 NHS year					2021 NHS year				
	Number of eyes	Proportion of eyes starting treatment within 14 days of referral	Completed loading phase within 10 weeks	Median number of injections	Proportion of injections given by nurses and other healthcare professionals	Number of eyes	Proportion of eyes starting treatment within 14 days of referral	Completed loading phase within 10 weeks	Median number of injections	Proportion of injections given by nurses and other healthcare professionals
Liverpool University Hospitals NHS Foundation Trust	573	15.4	69.5	7.0	83.0	684	0.0	52.2	6.0	81.2
Manchester University NHS Foundation Trust	535	4.0	75.5	7.0	93.4	753	0.0	64.7	6.0	95.0
Medical Specialists Group (Guernsey)	63	27.6	73.0	6.0	100.0	56	24.0	87.5	7.0	0.2
Mid and South Essex NHS Foundation Trust	210		71.0	4.0	70.4	1,187		24.0	3.0	26.0
Mid Cheshire Hospitals NHS Foundation Trust	186	22.2	86.6	7.0	28.2	235	0.0	81.7	7.0	20.2
Mid Yorkshire Teaching NHS Trust	310	1.0	92.3	7.0	95.2	384	0.0	89.8	7.0	96.6
Moorfields Eye Centre at Bedfordshire Hospitals NHS Foundation Trust	167	18.4	82.6	7.0	96.0	174	13.8	67.2	6.0	97.6
Moorfields Eye Hospital NHS Foundation Trust	1,287	24.4	70.6	7.0	88.8	3,120	23.6	61.1	5.0	94.8
NHS Grampian	340	40.4	75.6	7.0	80.2	526	33.2	69.4	7.0	89.0
NHS Tayside	270	30.2	95.2	6.0	99.8	352	24.8	89.8	6.0	99.6
North Middlesex University Hospital NHS Trust	41	17.8	65.9	6.0	66.2	69	12.2	50.7	5.0	55.4
North West Anglia NHS Foundation Trust	335	10.0	82.1	7.0	40.8	397	3.2	58.7	6.0	36.4
Northern Care Alliance NHS Foundation Trust	305		70.8	5.0	99.2	530		70.2	5.0	99.6
Optegra Eye Health Care (Manchester Eye Hospital)	222		89.2	8.5	89.6	294		87.1	8.0	95.0
Optegra Eye Health Care (Yorkshire Eye Hospital)	29		72.4	7.0	60.4	27		88.9	7.0	73.2
Oxford University Hospitals NHS Foundation Trust	348	22.6	78.4	7.0	59.0	499	19.2	72.5	7.0	57.0
Practice Plus Group Ophthalmology, Rochdale	487	68.8	92.0	6.0	99.4	546	60.8	86.1	6.0	99.4
Practice Plus Group Surgical Centre, Gillingham	64	5.0	64.1	5.0	2.8	96	4.6	33.3	5.0	49.0
Royal Berkshire NHS Foundation Trust	407	26.6	78.4	7.0	42.0	538	24.8	78.3	7.5	46.2
Royal Cornwall Hospitals NHS Trust	350	15.0	88.6	7.0	92.2	454	8.6	83.9	7.0	98.4
Royal Devon University Healthcare NHS Foundation Trust	168	4.6	86.9	7.0	81.4	153	9.2	76.5	5.0	70.4
Royal Free London NHS Foundation Trust	324		45.7	6.0	85.0	290		60.7	6.0	85.8
Royal United Hospitals Bath NHS Foundation Trust	226	46.8	86.7	7.0	73.0	324	28.8	90.1	7.0	81.4
Salisbury NHS Foundation Trust	188	21.4	70.7	7.0	39.6	207	15.4	64.7	7.0	43.2

Appendix 9 table continued: Key care processes

Centre name	2020 NHS year					2021 NHS year				
	Number of eyes	Proportion of eyes starting treatment within 14 days of referral	Completed loading phase within 10 weeks	Median number of injections	Proportion of injections given by nurses and other healthcare professionals	Number of eyes	Proportion of eyes starting treatment within 14 days of referral	Completed loading phase within 10 weeks	Median number of injections	Proportion of injections given by nurses and other healthcare professionals
Sheffield Teaching Hospitals NHS Foundation Trust	332	32.4	79.8	8.0	69.0	433	21.8	84.1	7.0	72.0
Somerset NHS Foundation Trust	465	56.4	38.5	6.0	74.4	611	40.6	39.1	6.0	84.0
South Warwickshire University NHS Foundation Trust	216		90.7	8.0	96.2	237		77.2	8.0	96.8
SpaMedica – Birmingham	608		19.9	7.0	98.0	115		90.4	8.0	99.8
SpaMedica – Chelmsford						257		83.3	9.0	99.6
SpaMedica – Coventry	51		86.3	8.0	84.6	129		93.8	8.0	98.6
SpaMedica – Manchester	40		87.5	8.0	93.0	31		77.4	8.0	99.6
SpaMedica – West Lancashire	67		85.1	7.0	98.2	83		91.6	7.0	99.8
Surrey and Sussex Healthcare NHS Trust	247		64.8	7.0	61.0	285		77.5	7.0	52.4
The Hillingdon Hospitals NHS Foundation Trust	116		61.2	7.0	73.6	167		63.5	7.0	87.0
The Newcastle upon Tyne Hospitals NHS Foundation Trust	659	3.2	80.6	7.0	77.8	842	0.0	84.4	7.0	82.6
The Princess Alexandra Hospital NHS Trust	152		52.0	5.0	85.6	231		53.7	5.0	89.8
Torbay and South Devon NHS Foundation Trust	216	47.0	44.9	6.0	84.4					
University Hospital Southampton NHS Foundation Trust	415	7.2	79.8	7.0	34.8	562	4.6	49.1	7.0	38.4
University Hospitals Birmingham NHS Foundation Trust	341	6.6	80.1	7.0	50.2	520	6.0	75.6	6.0	53.6
University Hospitals Bristol and Weston NHS Foundation Trust	529	13.0	74.1	7.0	65.8	677	7.4	78.9	7.0	65.8
Warrington and Halton Teaching Hospitals NHS Foundation Trust	199	26.8	30.7	7.0	99.6	241	45.8	34.0	7.0	99.4
Western Health and Social Care Trust	243	4.4	54.7	7.0	95.0	271	5.0	63.8	7.0	92.8
Wirral University Teaching Hospital NHS Foundation Trust	286	27.8	91.3	4.0	70.6	315	16.8	92.4	4.0	86.0
Wrightington, Wigan and Leigh NHS Foundation Trust	175	54.2	88.0	6.0	67.8	173	45.0	80.9	6.0	33.6
York and Scarborough Teaching Hospitals NHS Foundation Trust						621	25.2	61.7	9.0	100.0
Overall	**20,370**	**25.9**	**68.3**	**7.0**	**75.0**	**26,847**	**20.9**	**66.0**	**6.0**	**76.4**

Appendix 10: Observed, expected and adjusted "good" and "poor" visual acuity rates for each participating centre in the 2021 NHS year

Centre name	Good VA (≥70 Letters)				Poor VA (losing ≥10 Letters)			
	Number of eligible eyes	Observed rate	Expected rate	Adjusted rate	Number eligible eyes	Observed rate	Expected rate	Adjusted rate
Barking, Havering and Redbridge University Hospitals NHS Trust	172	40.70	37.75	44.06	162	13.58	13.39	12.93
Barts Health NHS Trust	94	56.38	48.39	47.62	89	6.74	12.11	7.10
Belfast Health and Social Care Trust	491	44.81	40.17	45.59	447	14.77	15.88	11.86
Bradford Teaching Hospitals NHS Foundation Trust	193	50.26	46.61	44.07	178	11.24	12.67	11.31
Buckinghamshire Healthcare NHS Trust	216	42.13	42.85	40.19	199	10.05	12.51	10.24
Calderdale and Huddersfield NHS Foundation Trust	338	48.22	41.34	47.68	309	9.39	12.84	9.32
Chesterfield Royal Hospital NHS Foundation Trust	213	38.03	42.35	36.70	205	11.71	16.14	9.25
County Durham and Darlington NHS Foundation Trust	312	56.09	48.46	47.31	293	6.83	11.33	7.68
East Kent Hospitals University NHS Foundation Trust	328	53.96	45.78	48.18	300	9.00	13.37	8.59
East Sussex Healthcare NHS Trust	389	67.61	48.07	57.48	384	5.21	12.87	5.16
Epsom and St Helier University Hospitals NHS Trust	252	40.48	41.44	39.92	241	12.86	14.42	11.38
Gloucestershire Hospitals NHS Foundation Trust	432	37.50	39.62	38.68	392	13.27	11.74	14.42
Great Western Hospitals NHS Foundation Trust	187	39.04	39.88	40.01	170	18.82	12.63	19.01
Harrogate and District NHS Foundation Trust	155	37.42	39.22	39.00	141	16.31	12.31	16.90
Hull University Teaching Hospitals NHS Trust	425	45.18	45.36	40.71	404	7.43	9.89	9.58
Hywel Dda University Local Health Board	400	31.25	40.10	31.85	371	18.06	13.76	16.74
Isle of Wight NHS Trust	117	23.08	37.58	25.10	99	35.35	17.31	26.04
Kettering General Hospital NHS Foundation Trust	189	20.11	30.46	26.98	171	13.45	14.13	12.14
King's College Hospital NHS Foundation Trust	580	45.17	38.79	47.60	526	12.74	14.99	10.84
Leeds Teaching Hospitals NHS Trust	360	41.67	42.67	39.91	343	16.91	13.84	15.58
Liverpool University Hospitals NHS Foundation Trust	397	30.73	38.08	32.98	364	23.35	13.76	21.64
Manchester University NHS Foundation Trust	284	39.44	41.50	38.84	260	11.54	12.39	11.88
Medical Specialists Group (Guernsey)	47	36.17	41.45	35.67	45	13.33	13.08	13.00
Mid and South Essex NHS Foundation Trust	719	28.65	36.67	31.93	679	24.30	19.82	15.64

Appendix 10 table continued: Observed, expected and adjusted "good" and "poor" visual acuity rates for each participating centre in the 2021 NHS year

Centre name	Good VA (≥70 Letters)				Poor VA (losing ≥10 Letters)			
	Number of eligible eyes	Observed rate	Expected rate	Adjusted rate	Number eligible eyes	Observed rate	Expected rate	Adjusted rate
Mid Cheshire Hospitals NHS Foundation Trust	203	43.84	41.98	42.69	194	19.07	13.18	18.45
Mid Yorkshire Teaching NHS Trust	323	33.75	40.01	34.48	297	14.48	12.72	14.51
Moorfields Eye Centre at Bedfordshire Hospitals NHS Foundation Trust	149	42.28	38.02	45.45	147	8.16	15.21	6.85
Moorfields Eye Hospital NHS Foundation Trust	935	48.02	45.78	42.88	879	11.72	11.54	12.95
NHS Grampian	429	55.71	48.88	46.58	414	5.31	11.82	5.73
NHS Tayside	235	49.36	47.27	42.68	232	10.34	13.74	9.60
North Middlesex University Hospital NHS Trust	55	27.27	34.50	32.31	47	29.79	15.81	24.03
North West Anglia NHS Foundation Trust	289	31.14	34.06	37.37	269	16.73	14.92	14.30
Northern Care Alliance NHS Foundation Trust	334	2.69	9.47	11.64	183	31.15	16.14	24.61
Optegra Eye Health Care (Manchester Eye Hospital)	246	62.60	52.85	48.41	234	8.55	10.56	10.33
Oxford University Hospitals NHS Foundation Trust	448	49.55	39.13	51.76	409	11.74	13.50	11.09
Practice Plus Group Ophthalmology, Rochdale	440	30.23	36.20	34.13	388	13.14	13.44	12.47
Practice Plus Group Surgical Centre, Gillingham	42	40.48	36.03	45.91	39	17.95	16.54	13.84
Royal Berkshire NHS Foundation Trust	424	50.00	41.80	48.89	416	10.34	12.78	10.32
Royal Cornwall Hospitals NHS Trust	369	39.02	43.40	36.75	360	15.28	12.96	15.03
Royal Devon University Healthcare NHS Foundation Trust	40	42.50	41.51	41.85	36	8.33	13.05	8.14
Royal Free London NHS Foundation Trust	228	42.98	39.55	44.42	205	12.20	14.15	10.99
Royal United Hospitals Bath NHS Foundation Trust	254	31.89	39.03	33.40	251	12.35	12.57	12.53
Salisbury NHS Foundation Trust	177	41.81	38.31	44.61	164	10.98	13.83	10.12
Sheffield Teaching Hospitals NHS Foundation Trust	347	44.09	48.21	37.38	330	14.24	11.81	15.38
Somerset NHS Foundation Trust	511	33.66	34.81	39.52	464	13.15	15.81	10.60
South Warwickshire University NHS Foundation Trust	193	54.40	46.51	47.80	188	6.38	12.46	6.53
SpaMedica – Birmingham	100	47.00	43.37	44.29	98	8.16	12.12	8.59
SpaMedica – Chelmsford	219	36.99	33.60	44.99	213	11.74	12.30	12.17
SpaMedica – Coventry	118	34.75	41.43	34.28	114	7.89	10.82	9.30
SpaMedica – West Lancashire	73	57.53	46.22	50.87	69	11.59	13.71	10.78

Appendix 10 table continued: Observed, expected and adjusted "good" and "poor" visual acuity rates for each participating centre in the 2021 NHS year

Centre name	Good VA (≥70 Letters)				Poor VA (losing ≥10 Letters)			
	Number of eligible eyes	Observed rate	Expected rate	Adjusted rate	Number eligible eyes	Observed rate	Expected rate	Adjusted rate
Surrey and Sussex Healthcare NHS Trust	230	43.48	38.59	46.05	217	13.36	13.41	12.71
The Hillingdon Hospitals NHS Foundation Trust	137	39.42	39.09	41.21	126	16.67	13.39	15.88
The Newcastle upon Tyne Hospitals NHS Foundation Trust	643	47.59	43.77	44.44	594	10.44	12.94	10.29
The Princess Alexandra Hospital NHS Trust	191	34.03	34.37	40.47	166	20.48	16.35	15.98
University Hospital Southampton NHS Foundation Trust	471	37.79	37.22	41.50	423	14.89	13.48	14.09
University Hospitals Birmingham NHS Foundation Trust	385	28.57	38.17	30.59	346	17.92	13.84	16.52
University Hospitals Bristol and Weston NHS Foundation Trust	560	47.68	43.37	44.93	536	9.89	13.16	9.58
Warrington and Halton Teaching Hospitals NHS Foundation Trust	197	42.13	42.51	40.51	189	12.17	13.82	11.23
Western Health and Social Care Trust	214	54.67	47.30	47.24	199	9.55	12.30	9.90
Wirral University Teaching Hospital NHS Foundation Trust	272	29.04	35.57	33.37	241	17.01	16.04	13.53
Wrightington, Wigan and Leigh NHS Foundation Trust	127	31.50	36.66	35.11	122	10.66	13.93	9.76
Overall	**17,898**	**41.38**	**40.68**	**41.57**	**16,571**	**13.31**	**13.55**	**12.64**

Appendix 11: Adjusted "good" and "poor" visual acuity rates for each participating centre in the NHS years 2020 and 2021

Centre name	Good VA (≥70 Letters)				Poor VA (losing ≥10 Letters)			
	2020		2021		2020		2021	
	Number of eyes	Adjusted rate	Number of eyes	Adjusted rate	Number of eyes	Adjusted rate	Number of eyes	Adjusted rate
Barking, Havering and Redbridge University Hospitals NHS Trust	102	46.62	172	44.06	96	16.10	162	13.05
Barts Health NHS Trust	109	42.51	94	47.62	100	10.61	89	7.16
Belfast Health and Social Care Trust	438	40.32	491	45.59	401	17.09	447	11.96
Bradford Teaching Hospitals NHS Foundation Trust	146	46.20	193	44.07	125	13.70	178	11.41
Buckinghamshire Healthcare NHS Trust	185	41.86	216	40.19	177	12.01	199	10.33
Calderdale and Huddersfield NHS Foundation Trust	254	45.09	338	47.68	239	8.96	309	9.40
Chesterfield Royal Hospital NHS Foundation Trust	195	35.49	213	36.70	190	8.25	205	9.33
County Durham and Darlington NHS Foundation Trust	196	50.47	312	47.31	187	8.66	293	7.75
East Kent Hospitals University NHS Foundation Trust	242	48.91	328	48.18	230	10.11	300	8.66
East Sussex Healthcare NHS Trust	320	49.77	389	57.48	312	8.73	384	5.21
Epsom and St Helier University Hospitals NHS Trust	204	42.86	252	39.92	187	10.51	241	11.48
Gloucestershire Hospitals NHS Foundation Trust	328	39.67	432	38.68	299	12.32	392	14.54
Great Western Hospitals NHS Foundation Trust	142	36.33	187	40.01	125	11.65	170	19.18
Guy's and St Thomas' NHS Foundation Trust	283	42.04			261	13.47		
Harrogate and District NHS Foundation Trust	97	29.70	155	39.00	87	14.28	141	17.05
Hull University Teaching Hospitals NHS Trust	292	41.25	425	40.71	276	12.94	404	9.66
Hywel Dda University Local Health Board	1,016	37.19	117	25.10	75	18.78	99	26.27
Isle of Wight NHS Trust	76	28.99	76	28.99	99	26.27	75	18.78
Kettering General Hospital NHS Foundation Trust	181	31.46	189	26.98	166	13.03	171	12.24
King's College Hospital NHS Foundation Trust	465	47.43	580	47.60	423	14.38	526	10.93
Leeds Teaching Hospitals NHS Trust	284	37.65	360	39.91	273	12.49	343	15.71
Liverpool University Hospitals NHS Foundation Trust	385	31.47	397	32.98	359	16.51	364	21.83
Manchester University NHS Foundation Trust	423	33.22	284	38.84	403	19.86	260	11.98

Appendix 11 table continued: Adjusted "good" and "poor" visual acuity rates for each participating centre in the NHS years 2020 and 2021

Centre name	Good VA (≥70 Letters)				Poor VA (losing ≥10 Letters)			
	2020		2021		2020		2021	
	Number of eyes	Adjusted rate	Number of eyes	Adjusted rate	Number of eyes	Adjusted rate	Number of eyes	Adjusted rate
Medical Specialists Group (Guernsey)	44	43.41	47	35.67	44	12.66	45	13.11
Mid and South Essex NHS Foundation Trust	121	32.85	719	31.93	119	21.57	679	15.77
Mid Cheshire Hospitals NHS Foundation Trust	146	47.37	203	42.69	140	14.48	194	18.61
Mid Yorkshire Teaching NHS Trust	270	38.57	323	34.48	253	8.88	297	14.64
Moorfields Eye Centre at Bedfordshire Hospitals NHS Foundation Trust	133	49.04	149	45.45	128	8.50	147	6.91
Moorfields Eye Hospital NHS Foundation Trust	1,104	41.72	935	42.88	1,003	13.68	879	13.06
NHS Grampian	283	47.56	429	46.58	271	8.22	414	5.78
NHS Tayside	163	39.72	235	42.68	157	13.37	232	9.69
North Middlesex University Hospital NHS Trust	30	36.59	55	32.31			47	24.24
North West Anglia NHS Foundation Trust	251	40.64	289	37.37	232	13.06	269	14.42
Northern Care Alliance NHS Foundation Trust	189	32.17	334	11.64	104	15.37	183	24.83
Optegra Eye Health Care (Manchester Eye Hospital)	190	54.24	246	48.41	183	8.61	234	10.42
Oxford University Hospitals NHS Foundation Trust	315	43.70	448	51.76	284	14.08	409	11.19
Practice Plus Group Ophthalmology, Rochdale	421	37.99	440	34.13	372	11.89	388	12.58
Practice Plus Group Surgical Centre, Gillingham	38	39.37	42	45.91	35	21.82	39	13.96
Royal Berkshire NHS Foundation Trust	335	47.13	424	48.89	317	10.37	416	10.41
Royal Cornwall Hospitals NHS Trust	307	37.91	369	36.75	297	13.70	360	15.16
Royal Devon University Healthcare NHS Foundation Trust	131	41.72	40	41.85	125	14.38	36	8.22
Royal Free London NHS Foundation Trust	140	47.60	228	44.42	124	9.31	205	11.09
Royal United Hospitals Bath NHS Foundation Trust	190	40.52	254	33.40	182	12.53	251	12.64
Salisbury NHS Foundation Trust	173	44.94	177	44.61	169	11.64	164	10.21
Sheffield Teaching Hospitals NHS Foundation Trust	280	41.67	347	37.38	263	10.02	330	15.52
Somerset NHS Foundation Trust	374	36.84	511	39.52	351	14.36	464	10.70
South Warwickshire University NHS Foundation Trust	181	37.57	193	47.80	174	13.72	188	6.59

Appendix 11 table continued: Adjusted "good" and "poor" visual acuity rates for each participating centre in the NHS years 2020 and 2021

Centre name	Good VA (≥70 Letters)				Poor VA (losing ≥10 Letters)			
	2020		2021		2020		2021	
	Number of eyes	Adjusted rate	Number of eyes	Adjusted rate	Number of eyes	Adjusted rate	Number of eyes	Adjusted rate
SpaMedica – Birmingham	500	31.96	100	44.29	483	12.29	98	8.67
SpaMedica – Chelmsford			219	44.99			213	12.28
SpaMedica – Coventry	43	29.85	118	34.28	42	10.79	114	9.38
SpaMedica – Manchester	33	43.69			33	5.64		
SpaMedica – West Lancashire	62	37.37	73	50.87	58	16.40	69	10.88
Surrey and Sussex Healthcare NHS Trust	187	50.77	230	46.05	175	12.39	217	12.82
The Hillingdon Hospitals NHS Foundation Trust	102	37.59	137	41.21	95	8.11	126	16.01
The Newcastle upon Tyne Hospitals NHS Foundation Trust	513	47.07	643	44.44	479	13.79	594	10.38
The Princess Alexandra Hospital NHS Trust	116	37.95	191	40.47	99	16.63	166	16.12
Torbay and South Devon NHS Foundation Trust	159	37.91			154	10.48		
University Hospital Southampton NHS Foundation Trust	360	43.99	471	41.50	319	14.48	423	14.21
University Hospitals Birmingham NHS Foundation Trust	282	38.24	385	30.59	258	10.93	346	16.66
University Hospitals Bristol and Weston NHS Foundation Trust	404	45.63	560	44.93	380	7.17	536	9.67
Warrington and Halton Teaching Hospitals NHS Foundation Trust	167	45.37	197	40.51	164	7.99	189	11.33
Western Health and Social Care Trust	197	48.09	214	47.24	181	8.56	199	9.99
Wirral University Teaching Hospital NHS Foundation Trust	246	37.66	272	33.37	229	13.57	241	13.65
Wrightington, Wigan and Leigh NHS Foundation Trust	145	28.68	127	35.11	139	12.65	122	9.84
Overall	**15,688**	**41.16**	**17,898**	**41.57**	**14,578**	**12.57**	**16,571**	**12.64**

Appendix 12: Safety outcomes for each centre

Centre name	Number of eligible eyes	Number of injections	Number of PIE cases	PIE Rate per 1,000 eyes	PIE rate per 10,000 injections	Number of IOI cases	IOI Rate per 1,000 eyes	IOI rate per 10,000 injections
Barking, Havering and Redbridge University Hospitals NHS Trust	304	2,006	0	0.0	0.0	0	0.0	0.0
Barts Health NHS Trust	141	929	0	0.0	0.0	1	7.1	10.8
Belfast Health and Social Care Trust	707	3,503	0	0.0	0.0	1	1.4	2.9
Bradford Teaching Hospitals NHS Foundation Trust	234	1,575	1	4.3	6.3	1	4.3	6.3
Buckinghamshire Healthcare NHS Trust	413	3,199	1	2.4	3.1	1	2.4	3.1
CHEC (Watford)	52	221	0	0.0	0.0	0	0.0	0.0
Calderdale and Huddersfield NHS Foundation Trust	392	2,614	0	0.0	0.0	1	2.6	3.8
Chesterfield Royal Hospital NHS Foundation Trust	261	1,223	0	0.0	0.0	0	0.0	0.0
County Durham and Darlington NHS Foundation Trust	368	2,655	0	0.0	0.0	1	2.7	3.8
East Cheshire NHS Trust	239	848	0	0.0	0.0	0	0.0	0.0
East Kent Hospitals University NHS Foundation Trust	709	2,871	1	1.4	3.5	0	0.0	0.0
East Sussex Healthcare NHS Trust	465	3,097	0	0.0	0.0	1	2.2	3.2
Epsom and St Helier University Hospitals NHS Trust	294	1,762	0	0.0	0.0	0	0.0	0.0
Gloucestershire Hospitals NHS Foundation Trust	502	3,852	0	0.0	0.0	2	4.0	5.2
Great Western Hospitals NHS Foundation Trust	318	2,120	0	0.0	0.0	0	0.0	0.0
Harrogate and District NHS Foundation Trust	189	1,398	0	0.0	0.0	1	5.3	7.2
Hull University Teaching Hospitals NHS Trust	480	4,332	0	0.0	0.0	0	0.0	0.0
Hywel Dda University Local Health Board	517	2,951	0	0.0	0.0	1	1.9	3.4
Isle of Wight NHS Trust	152	649	0	0.0	0.0	0	0.0	0.0
Kettering General Hospital NHS Foundation Trust	248	1,508	0	0.0	0.0	0	0.0	0.0
King's College Hospital NHS Foundation Trust	715	3,966	0	0.0	0.0	3	4.2	7.6
Leeds Teaching Hospitals NHS Trust	451	2,758	0	0.0	0.0	2	4.4	7.3
Liverpool University Hospitals NHS Foundation Trust	684	3,852	1	1.5	2.6	1	1.5	2.6
Manchester University NHS Foundation Trust	753	4,500	0	0.0	0.0	3	4.0	6.7
Medical Specialists Group (Guernsey)	56	383	0	0.0	0.0	0	0.0	0.0
Mid Cheshire Hospitals NHS Foundation Trust	235	1,535	0	0.0	0.0	2	8.5	13.0

Appendix 12 table continued: Safety outcomes for each centre

Centre name	Number of eligible eyes	Number of injections	Number of PIE cases	PIE Rate per 1,000 eyes	PIE rate per 10,000 injections	Number of IOI cases	IOI Rate per 1,000 eyes	IOI rate per 10,000 injections
Mid Yorkshire Teaching NHS Trust	384	2,653	1	2.6	3.8	2	5.2	7.5
Mid and South Essex NHS Foundation Trust	1,187	3,814	3	2.5	7.9	1	0.8	2.6
Moorfields Eye Centre at Bedfordshire Hospitals NHS Foundation Trust	174	1,019	0	0.0	0.0	0	0.0	0.0
Moorfields Eye Hospital NHS Foundation Trust	3,120	16,306	0	0.0	0.0	1	0.3	0.6
NHS Grampian	526	3,589	0	0.0	0.0	2	3.8	5.6
NHS Tayside	352	1,975	0	0.0	0.0	0	0.0	0.0
North Middlesex University Hospital NHS Trust	69	364	0	0.0	0.0	0	0.0	0.0
North West Anglia NHS Foundation Trust	397	2,167	0	0.0	0.0	0	0.0	0.0
Northern Care Alliance NHS Foundation Trust	530	2,677	1	1.9	3.7	0	0.0	0.0
Optegra Eye Health Care (Manchester Eye Hospital)	294	2,393	1	3.4	4.2	1	3.4	4.2
Optegra Eye Health Care (Yorkshire Eye Hospital)	27	191	0	0.0	0.0	0	0.0	0.0
Oxford University Hospitals NHS Foundation Trust	499	3,368	1	2.0	3.0	0	0.0	0.0
Practice Plus Group Ophthalmology, Rochdale	546	3,269	0	0.0	0.0	0	0.0	0.0
Practice Plus Group Surgical Centre, Gillingham	96	458	0	0.0	0.0	0	0.0	0.0
Royal Berkshire NHS Foundation Trust	538	3,589	1	1.9	2.8	2	3.7	5.6
Royal Cornwall Hospitals NHS Trust	454	2,917	1	2.2	3.4	5	11.0	17.1
Royal Devon University Healthcare NHS Foundation Trust	153	822	0	0.0	0.0	0	0.0	0.0
Royal Free London NHS Foundation Trust	290	1,737	1	3.4	5.8	2	6.9	11.5
Royal United Hospitals Bath NHS Foundation Trust	324	2,221	0	0.0	0.0	0	0.0	0.0
Salisbury NHS Foundation Trust	207	1,282	1	4.8	7.8	1	4.8	7.8
Sheffield Teaching Hospitals NHS Foundation Trust	433	3,039	0	0.0	0.0	0	0.0	0.0
Somerset NHS Foundation Trust	611	3,397	0	0.0	0.0	0	0.0	0.0
South Warwickshire University NHS Foundation Trust	237	1,682	0	0.0	0.0	0	0.0	0.0
SpaMedica – Birmingham	115	897	0	0.0	0.0	1	8.7	11.1
SpaMedica – Chelmsford	257	2,219	0	0.0	0.0	3	11.7	13.5
SpaMedica – Coventry	129	1,088	0	0.0	0.0	0	0.0	0.0
SpaMedica – Manchester	31	211	1	32.3	47.4	0	0.0	0.0

Appendix 12 table continued: Safety outcomes for each centre

Centre name	Number of eligible eyes	Number of injections	Number of PIE cases	PIE Rate per 1,000 eyes	PIE rate per 10,000 injections	Number of IOI cases	IOI Rate per 1,000 eyes	IOI rate per 10,000 injections
SpaMedica – West Lancashire	83	572	0	0.0	0.0	2	24.1	35.0
Surrey and Sussex Healthcare NHS Trust	285	1,860	1	3.5	5.4	1	3.5	5.4
The Hillingdon Hospitals NHS Foundation Trust	167	1,121	0	0.0	0.0	0	0.0	0.0
The Newcastle upon Tyne Hospitals NHS Foundation Trust	842	5,399	3	3.6	5.6	1	1.2	1.9
The Princess Alexandra Hospital NHS Trust	231	1,137	0	0.0	0.0	0	0.0	0.0
University Hospital Southampton NHS Foundation Trust	562	3,818	2	3.6	5.2	2	3.6	5.2
University Hospitals Birmingham NHS Foundation Trust	520	3,148	1	1.9	3.2	1	1.9	3.2
University Hospitals Bristol and Weston NHS Foundation Trust	677	4,500	0	0.0	0.0	1	1.5	2.2
Warrington and Halton Teaching Hospitals NHS Foundation Trust	241	1,499	0	0.0	0.0	0	0.0	0.0
Western Health and Social Care Trust	271	1,732	0	0.0	0.0	0	0.0	0.0
Wirral University Teaching Hospital NHS Foundation Trust	315	1,473	1	3.2	6.8	1	3.2	6.8
Wrightington, Wigan and Leigh NHS Foundation Trust	173	1,005	1	5.8	10.0	0	0.0	0.0
York and Scarborough Teaching Hospitals NHS Foundation Trust	621	5,224	0	0.0	0.0	0	0.0	0.0
Overall	**26,847**	**162,139**	**25**	**0.9**	**1.5**	**52**	**1.9**	**3.2**

Appendix 13: References

1. Brown K, Bunce C, Onabanjo O, Strong SA, Patel PJ. Is preventable sight loss truly preventable? An exploration of a public health indicator for sight loss due to age-related macular degeneration in England. Eye (Lond). 2023 Feb;37(3):516-523.

2. Wong TY, Chakravarthy U, Klein R, Mitchell P et al. The natural history and prognosis of neovascular age-related macular degeneration: a systematic review of the literature and meta-analysis. Ophthalmology. 2008 Jan;115(1):116-26.

3. Chakravarthy U, Harding SP, Rogers CA, Downes SM et al. Alternative treatments to inhibit VEGF in age-related choroidal neovascularisation: 2-year findings of the IVAN randomised controlled trial. Lancet.2013;382(9900):1258-67.

4. Ying GS, Maguire MG, Daniel E, Ferris FL et al. Association of Baseline Characteristics and Early Vision Response with 2-Year Vision Outcomes in the Comparison of AMD Treatments Trials (CATT). Ophthalmology. 2015;122(12):2523-31.

5. Banister K, Cook JA, Scotland G, Azuara-Blanco A et al. Non-invasive testing for early detection of neovascular macular degeneration in unaffected second eyes of older adults: EDNA diagnostic accuracy study. Health Technol Assess. 2022;26(8):1-142.

6. Weber M, Dominguez M, Coscas F, Faure C et al. Impact of intravitreal aflibercept dosing regimens in treatment-naïve patients with neovascular age-related macular degeneration: 2-year results of RAINBOW.BMC Ophthalmol. 2020;20(1):206.

7. Hanhart J, Wiener R, Totah H, Gelman E et al. Effects of delay in anti-vascular endothelial growth factor intravitreal injections for neovascular age-related macular degeneration. Graefes Arch Clin Exp Ophthalmol 2022;260(6):1907-1914.

8. Chandra S, Gurudas S, Burton BJL, Menon G et al. Associations of presenting visual acuity with morphological changes on OCT in neovascular age-related macular degeneration: PRECISE Study Report 2. Eye (Lond). 2023. https://doi.org/10.1038/s41433-023-02769-5

9. Zarranz-Ventura J, Escobar-Barranco JJ, Gómez-Baldó L, Gallego-Pinazo R; Study Investigators. Reasons for Delayed Anti-VEGF Treatment During COVID-19 Lockdown and Clinical Impact in Neovascular Age-Related Macular Degeneration. Ophthalmol Ther. 2023;12(5):2537-2555.

10. Eter N, Hasanbasic Z, Keramas G, Rech C et al. PERSEUS 24-month analysis: a prospective non-interventional study to assess the effectiveness of intravitreal aflibercept in routine clinical practice in Germany in patients with neovascular age-related macular degeneration. Graefes Arch Clin Exp Ophthalmol. 2021;259(8):2213-2223.

11. Obeid A, Gao X, Ali FS, Aderman CM et al. Loss to Follow-up Among Patients With Neovascular Age-Related Macular Degeneration Who Received Intravitreal Anti-Vascular Endothelial Growth Factor Injections. JAMA Ophthalmol. 2018;136(11):1251-1259.

12. Jones R, Stratton IM, Scanlon PH, Theodoropoulou S. Disengagement and loss to follow-up in intravitreal injection clinics for neovascular age-related macular degeneration. Eye (Lond). 2023;37(15):3186-3190.

13. Regillo CD, Busbee BG, Ho AC, Ding B, Haskova Z. Baseline Predictors of 12-Month Treatment Response to Ranibizumab in Patients With Wet Age-related Macular Degeneration. Am J Ophthalmol. 2015 Nov;160(5):1014-1023.

14. Izquierdo-Serra J, Martin-Pinardel R, Moll-Udina A, Bernal-Morales C et al. Macular Neovascularization type influence on anti-VEGF intravitreal therapy outcomes in Age-related Macular Degeneration. Ophthalmol Retina. 2023:S2468-6530(23)00573-0.

15. Hemal Mehta, Adnan Tufail, Vincent Daien, Aaron Y. Lee et al. Real-world outcomes in patients with neovascular age-related macular degeneration treated with intravitreal vascular endothelial growth factor inhibitors, Progress in Retinal and Eye Research, Volume 65, 2018, Pages 127-146, ISSN 1350-9462, https://doi.org/10.1016/j.preteyeres.2017.12.002.

National Ophthalmology Database Audit
The Royal College of Ophthalmologists
18 Stephenson Way, London NW1 2HD

T. 020 7935 0702
noa.project@rcophth.ac.uk
nodaudit.org.uk