

National Ophthalmology Database Audit

Year 3 Annual Report – The Second Prospective Report
of the National Ophthalmology Database Audit

2018

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.



Healthcare Quality Improvement Partnership (HQIP) is led by a consortium of the Academy of Medical Royal Colleges, the Royal College of Nursing and National Voices. Its aim is to promote quality improvement in patient outcomes, and in particular, to increase the impact that clinical audit, outcome review programmes and registries have on healthcare quality in England and Wales. HQIP holds the contract to commission, manage and develop the National Clinical Audit and Patient Outcomes Programme (NCAPOP), comprising around 40 projects covering care provided to people with a wide range of medical, surgical and mental health conditions. The programme is funded by NHS England, the Welsh Government and, with some individual projects, other devolved administrations and crown dependencies.



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We would like to acknowledge the support and guidance we have received from the National Audit Steering Committee (see appendix 2 for list of members) which includes professional members, ophthalmologists, optometrists, and patient and public representatives with individual lay members as well as patient support groups being represented. We are particularly grateful to our Patient and Public Representatives who have engaged fully with discussion relating to the design of the audit and the primary and secondary outcomes. Their guidance has helped us to ensure that the audit has relevance for not only the professional readership but also patients, their relatives and carers. We thank all the members of the Steering Committee for reviewing this report.

We also acknowledge the support of the hospitals that are participating in the prospective audit and thank our medical and non-medical colleagues for the considerable time and effort devoted to data collection. All participating centres are acknowledged on the NOD audit website www.nodaudit.org.uk

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It is with deep regret that we note the death of our friend and colleague Robert Johnston, who sadly died in September 2016. Without his inspirational vision, determination and career long commitment to quality improvement in ophthalmology this work would not have been possible.


Foreword

Earlier this year Jeremy Hunt, former Secretary of State for Health and Social Care, identified safety, quality, adoption of best practice and leadership by values as key criteria by which the NHS should be assessed. In this context, the second prospective audit of cataract surgery undertaken in England and Wales, is essential reading for all those who use or provide eye services. It contains key information by which to assess the safety and quality of cataract surgeons and builds on the contributions that national ophthalmology database (NOD) audits have already made to best practice. Strikingly, it shows a 30% fall in the unadjusted posterior capsule rupture rate from 2.0% in 2010 to 1.4% in 2016-2017. This may well reflect an increased use of risk stratification data provided by previous NOD audits, data that has now been incorporated into NICE cataract guidelines.

It is gratifying to see evidence of increased clinician engagement with the NOD project. Seventy seven of the 122 eligible NHS Trusts in England and Wales and one independent provider (six sites) of NHS funded cataract surgery submitted data on over 180,000 operations and data completion has improved. This allows meaningful recommendations to be made to patients, commissioners, providers and surgeons.

On behalf of the members of The Royal College of Ophthalmologists, I would like to thank Professor John Sparrow and his team, Beth Barnes, Paul Donachie, Kathy Evans, Martina Olaitan and Peter Scanlon for the huge amount of work they have put in to the production of this report. I would also like to thank the Healthcare Quality Improvement Partnership (HQIP) for commissioning the audit and NHS England and the Welsh Government for funding it.

This audit is essential for both patients and clinicians. The College is actively looking for sustainable long-term funding that will allow the work to continue and expand. Hopefully this can be achieved in time for next year's report.



Mr Michael Burdon

President, The Royal College of Ophthalmologists

Executive Summary

Background and aims of the audit

Cataract surgery remains the most frequently undertaken NHS surgical procedure with approximately 400,000 cataract operations undertaken in England and 20,000 in Wales during 2016-2017. The Health Quality Improvement Partnership (HQIP) has commissioned the National Ophthalmology Database (NOD) Cataract Audit to report on all NHS funded cataract surgery in England and Wales. A fuller national picture of the quality of delivery of this high volume surgical activity is emerging as adoption of electronic working and participation in this national audit increases.

The current report includes data from one independent sector provider of NHS services; a development which we hope will encourage other such providers to join. There remain ongoing reports of restrictions of access to surgery which may compromise certain population groups in relation to locality or deprivation. The current report documents prospectively collected cataract surgery data and reports results for named NHS centres. These include operations performed and recorded by all surgeons of all grades within centres. Outcomes for named consultant surgeons will be separately published on the [NHS Choices](#) and [NOD Audit websites](#) through the Clinical Outcomes Publication (COP) programme.

Two primary indicators of surgical quality are audited. These are, firstly, the index surgical intraoperative complication of rupture of the posterior lens capsule or vitreous prolapse or both (abbreviated as PCR), and secondly Visual Acuity (VA) Loss (doubling or worse of the visual angle) related to surgery. As an adverse operative event PCR is relevant because it results in a significantly higher risk of harm to the eye and may impact recovery of vision. For example, there is an approximately 40 fold higher risk of a retinal detachment occurring following cataract

surgery if PCR occurred. Retinal surgery imposes additional risks, morbidity and cost. Since VA Loss from surgery is the opposite of the intended effect, these key primary outcomes together capture relevant safety elements of surgical quality. These outcomes are presented as risk adjusted rates for surgical centres supported by relevant contextual information including surgical volumes, data completeness, case complexity, access to surgery and deprivation. The updated overall rates of 1.1% for PCR and 0.9% for VA Loss are based on the average rates for consultant surgeons during the current period. The risk indicators for each of these adverse events were derived from earlier data collections.

Determination of VA Loss depends on availability of VA measurements at both pre- and postoperative time points. Rates of missing VA data are thus important and are reported for centres. Case complexity is known to be an important determinant of outcome and a case complexity index has been introduced to document the complexity of surgery being recorded. The audit is designed to avoid duplicate data collection through utilization of data which is collected as part of routine clinical practice. The vast majority of data were obtained through extraction from Electronic Medical Record (EMR) systems, with a small number of centres choosing to submit data from their pre-existing audit databases.

The audit is intended to quality assure NHS cataract surgical services for patients whose vision is adversely affected by cataract to the point where they seek surgical intervention. This is achieved through assessing key indicators of cataract surgical quality within the frames of data completeness, case complexity and access by centre and deprivation. Should performance fall short of what can reasonably be expected by NHS patients this will be highlighted.

Results

Included in this second prospective report are operations undertaken between 1st September 2016 and 31st August 2017. For comparisons with results from the first year of the prospective audit, the comparison is with operations performed between 1st September 2015 and 31st August 2016. Reported operations for the current period were performed in 75 English and two Welsh NHS Trusts.



Approximately 63% of the 122 eligible NHS trusts in England and Wales are thus represented. In addition, for the first time **an independent provider of NHS cataract surgery has joined the audit**, supplying data for

six individual sites. Around 6% of cataract operations were excluded for a variety of reasons such as being done for indications other than visual improvement, or being combined with other significant intra-ocular surgery.



183,812

183,812 eligible cataract operations were available for analysis which approximates to 44% of all NHS funded cataract surgery undertaken in England

and Wales during the audit period (the lower overall figure compared with the percentage of trusts being mainly due to recent joiners reporting partial years). Data completeness was excellent (100%) for the PCR outcome as this is a compulsory operative field in the EMRs. **Overall, 1.4% of operations were affected by PCR, slightly above the updated consultant**

based overall average rate of 1.1% used for risk adjustment. Case complexity indices have been included in the current report for PCR and VA Loss to reflect patient complexity and the accuracy of the recording of such complexity. An eligible preoperative distance VA was recorded for 86.2% of eyes and a postoperative VA for 71.2% of eyes, 63.8% of eyes had both a preoperative and a postoperative VA measurement. **There was significant variation between centres for completeness of VA data**, a reflection of variations in current modes of use of the data collection systems and diverse patient pathways. The median preoperative VA was 0.50 LogMAR units (6/19 Snellen Equivalent); the median postoperative VA was 0.10 LogMAR units (6/7.5 Snellen); and the median change in VA was a 0.34 LogMAR gain. **A 'good' postoperative VA of 0.30 (=6/12) or better was achieved in 89.2% of eyes overall**, 94.9% of eyes with no ocular co-pathology and 82.0% of eyes with a recorded co-pathology. Overall the VA Loss rate was 0.7%, close to the 0.9% rate used for risk adjustment.

Overall, the audit findings are favourable indicating high quality surgery is being delivered to NHS patients. Specifically, no outlying centres or surgeons have been identified. Whilst the audit is able to report on encouragingly large numbers of procedures, there remain centres from which data for the current period are not available. Many centres have indicated that they wish to participate in future audit cycles and it is anticipated that the next report will provide a more comprehensive picture of the quality of surgery being undertaken in the NHS.

1. Recommendations for Patients



1.1 Information has been made easily accessible to the general public.

1.1.1 Patients, carers and those with an interest in cataract surgery are encouraged to access and view data regarding their local services. Information about the quality of cataract surgery can be viewed online on the [National Ophthalmology Audit Database website](#) and the [HQIP website](#). In addition, data can be accessed on the [NHS Choices website](#)

1.1.2 Patients should ensure they discuss and understand the risks and outcomes of any eye surgery with their consultant.

1.1.3 Information on cataract surgery is available from hospital trusts and Health Boards. Further information about cataracts can also be obtained from the charity organisations such as [RNIB](#) (Royal National Institute of Blind).

2. Recommendations for Providers of cataract surgery



2.1 Publicly promote your commitment to fostering good professional practice by involvement in the audit

2.2 Support the improved use of electronic data collection and data completeness in your organisation, enable staff to implement change. Complete data helps ensure all relevant factors such as case complexity are submitted to the audit and can be included in the NOD analysis

2.3 Identify specific areas that need improvement by

comparing your results against past performance

2.4 Promote use of the audit information in medical revalidation and appraisal

2.5 Encourage use of the EMR audit tools for continuous monitoring of results for early detection and correction of possible increases in adverse event rates

2.6 Care providers should review their patient pathways to maximise the recording of both preoperative and postoperative VA data for every operation

3. Recommendations for Surgeons



3.1 Use your audit outcomes report in appraisal discussions

3.2 Identify specific opportunities for improvement by comparing your results against peers and your own past performance

3.3 Use the EMR audit tools for continuous monitoring of your results for early detection and correction of possible increases in adverse event rates

4. Recommendations for Commissioners



4.1 An increase of around 50% in cataract operations is predicted over the next 20 years (25% increase over the next 10 years - [RCOphth Way Forward](#)), plan services appropriately using NOD and other data

4.2 Check the 2017 [NICE guidelines](#) on cataract surgery, (recommendations for commissioners 1.9)

4.3 Include submission of data to the NOD as a lever of quality in supplier contracts

4.4 Establish quality focused contracts with providers which include requirements for reporting of National Audit based outcomes

4.5 Establish contracts with community services which require return of postoperative VA and refractive data back to the surgical provider through use of the audit tools

5. Recommendations for the Regulator



5.1 When inspecting NHS organisations, information regarding national audit commissioning, participation and performance should be routinely requested from commissioners and providers of cataract care

5.1.1 Regulators should expect participation in national audits with audit results made available to them when inspecting NHS organisations

5.1.2 All providers of care should be expected to be in a position to provide quality assurance regardless of whether they are traditional NHS centres or independent providers

1. Introduction

In the 2016-2017 year, around 400,000 NHS cataract surgery procedures were undertaken in England and 20,000 in Wales, this being the most frequently performed surgical procedure in the UK. A widely accepted indicator of surgical quality is the frequency of rupture of the posterior capsule or the lens zonules with or without vitreous prolapse into the anterior chamber of the eye, abbreviated here as PCR. This surgical event is emphasised in the [NICE Cataract Surgery Guideline](#) in the context of surgical risk and is similarly used as a clinical outcome (adverse event) by the [International Consortium for Health Outcome Measurement](#). This operative complication arises on average in approximately one operation in 70 but the risk of this event varies by as much as 50-fold depending on preoperative risk factors associated with the patient and their eye. PCR is relevant as an adverse operative event because it results in a significantly higher risk of harm to the eye and may impact recovery of vision. For example, there is an approximately 40-fold higher risk of a retinal detachment occurring following cataract surgery if PCR occurred, and retinal surgery imposes additional risks, morbidity and cost. Importantly, when PCR occurs there is a six-fold higher chance of loss of vision from pre- to postoperatively in the eye undergoing surgery.

Some weeks following cataract surgery, most patients attend their community optometrist (high-street optician) for updating of their glasses prescription and then only is the final 'best-corrected' visual acuity established. The results of this follow-up episode are currently inconsistently communicated back to the hospital to allow a definitive measure of visual acuity benefit from surgery. A web-based data return tool has been developed and offered as a free EMR software enhancement to centres to encourage and facilitate these data returns. Since VA Loss from surgery is the opposite of the intended effect, these key primary outcomes together capture relevant safety elements of surgical quality. VA Loss is emphasised in the [NICE Cataract Surgery Guideline](#) in the context of surgical risk.

Providing risk adjusted results for centres and surgeons will facilitate their ability to benchmark their own performance against that of their peers and act as a prompt to reviewing practice where outcomes are less good. Past experience has indicated that showing individual surgeons their performance stimulates them to be more mindful of quality generally and to improve performance where needed. Since safety is a key domain for the NHS, embodied in the often quoted phrase "do no harm", the audit is primarily focussed on these two chosen safety metrics. The audit tools we provide allow real time tracking of outcomes which empowers centres and surgeons to monitor their results and to detect adverse signals early with a view to minimising patient harm through prompt action. The contextual information presented provides centres and surgeons with secondary outcomes in terms of case complexity, access to surgery by centre and deprivation, and data completeness.

In the prospective reports of the National Ophthalmology Database Audit we report the case complexity adjusted rates of PCR and monocular visual acuity (VA) loss for named centres (including all surgeons). On the RCOphth NOD website we present case complexity adjusted rates of PCR and VA Loss for participating centres and surgeons, and on the NHS choices website will be risk adjusted outcomes for named consultant surgeons for both PCR and VA Loss. Incomplete data will be highlighted and where <40% of outcome data are available for a particular centre (e.g. for VA Loss) the rate will not be reported as deemed too unreliable. Increasing participation is anticipated for the next audit cycle round of data collection as the data collection tools are 'rolled out' to further currently paper-based cataract surgical centres in England and Wales.

Eleven sources of data have been included in the second prospective year of the national cataract audit, 71 centres used the Medisoft EMR, two centres the Open Eyes EMR, one very large London eye hospital used both the Medisoft and OpenEyes EMR systems, one centre used the EPIC patient record system and eight

centres used in-house data collection systems. The data for analysis were extracted in September/October 2017. Case complexity adjustment for the reported period used risk adjustment models based on 287,000 cataract operations from 34 centres over a four-year time frame up to March 2015. Centres joining the audit towards the end of the data collection period would be expected to have reduced volumes of data. The date for the first submitted operation is included in the results to clarify which centres submitted data for less than the full one-year period.

2. Audit Framework

The national cataract audit data in this report covers all adult phacoemulsification cataract surgical operations recorded on either the Medisoft EMR at 71 contributing centres, the OpenEyes EMR in use at two centres, both EMR systems at one centre, the EPIC patient record system in one centre or in-house cataract data collection systems used in eight contributing centres. For the PCR outcome, the audit included all reported cataract operations performed in the period between 1st September 2016 and 31st August 2017. For the risk adjusted VA Loss outcome and postoperative complications and visual acuity results the reported period was between 1st September 2016 and 30th June 2017 in order to allow time for postoperative data to become available following recovery from surgery. Cataract operations which were not done by phacoemulsification, operations which were done as combined procedures along with another significant intra-ocular procedure (e.g. a trabeculectomy or a pars plana vitrectomy combined with other vitreoretinal procedures), operations done on eyes previously damaged by ocular trauma, operations done on eyes with significant congenital or developmental abnormalities and operations on individuals aged <18 years were excluded. Data on privately funded cataract surgery undertaken by participating surgeons in private hospitals were unavailable and are therefore not included in this report (see Appendix 3 for further details). Centres are identified by name and number in tables and graphical presentations.

3. Aims

The specific aims are to report risk adjusted rates for two primary patient safety outcomes, PCR and VA Loss in cataract surgery. In this report, prospectively collected data are used with application of risk adjustment from models developed over a four-year period of historical data from 34 centres. It is expected that data on PCR will have high levels of completeness for all participating centres as recording of the absence or presence of specified operative complications has always been mandatory in ophthalmology EMR systems. The preoperative risk indicator and follow up VA data are however expected to be less complete.

The quality improvement aims of this report include:

- Reporting of the intra-operative risk adjusted complication rates, drawing attention to the need for careful risk profiling of cases in advance of surgery in order to anticipate and minimise avoidable surgical complications
- Reporting the rates of VA Loss, drawing attention to potentially avoidable visual harm where rates are elevated

There will be a number of secondary aims developed throughout the life of the audit; in this annual report for example the contextual information includes: case complexity metrics, rates of recorded valid VA data at pre- and postoperative time points and access (preoperative VA) by centre and overall by deprivation.

4. NHS Trust / Health Board and Surgeon Participation

The audit brief is to include all NHS funded cataract surgery in England and Wales where Caldicott Guardians and Clinical Leads have given permission for inclusion of their data. As part of the prospective audit the cataract module of an EMR has been made available to currently paper-based, non-EMR enabled centres. In this report, the majority of centres were in England with two centres in Wales. This report includes 75 currently EMR enabled centres and eight centres using an in-house data collection system. Of the 122 eligible NHS trusts, 77 (63%) NHS trusts are represented, plus for the first time, data from an independent sector provider of NHS services (six sites), in all, results for 83 centres are reported.

5. Methodology

5.1 Context of the data collection

The audit data derive from routine data collection in NHS ophthalmology departments. Complications data depend on surgeons recording these faithfully, unlike mortality figures there is no external validation of the reported complications, although certain cross checks are undertaken within the extracted data. The EMR requires the surgeon recording the operation note to specifically indicate a Yes/No response to whether a surgical complication occurred and at all centres the EMR record (or its printed copy for the paper notes) constitutes the medicolegal document of the patient's operation record. Accurate follow up data on VA and refraction often depend on patients attending their optometrist for updating of spectacles following surgery and for this information to then be returned to the hospital electronic data collection system. Although some centres have good paper-based systems in place for optometrists to return this information and for staff at the hospital to enter the data electronically, it is anticipated that this outcome will be incomplete and the audit team have taken steps to enhance returns from optometrists through encouraging proactive local engagement with community optometrists, an active programme of engagement with national optometric professional bodies, and provision of a web based data return tool for the National Ophthalmology Audit.

5.2 Limitations of the data

The RCOphth NOD includes data for cataract operations to the first treated eye, the second treated eye and in some cases simultaneous bilateral surgery, but for some patients the record for the first treated eye may be missing. This may arise for example if the first eye operation was performed prior to the centre adopting an electronic data collection system, or the first treated eye operation could have been performed in a different centre. At present the RCOphth NOD cannot link patients' data if collected at different centres; this will be possible if a legal basis is established in the future. Patient's age, and calculation of index of multiple deprivation (IMD) data¹⁰ rely on data entered directly onto the Hospital's Patient Administration System (PAS) which links into EMR systems. If this data is not recorded in the PAS it is not present in the data extract for EMR enabled centres with PAS connections. Centres opting for an EMR installation without a PAS connection would need to record this information along with the other audit data. IMD data was available for many operations recorded on the Medisoft EMR system, but not for the other sources of data as the complete patient postcode would be needed to derive the IMD data and The RCOphth NOD does not currently have permission to receive this. For future cycles of the national cataract audit, the OpenEyes EMR will include IMD data calculated during extraction and transferred to the RCOphth NOD audit, and the audit will provide information to non-EMR centres on how they can submit IMD data without transferring the patients' postcode.

5.3 Case ascertainment

Exact estimation of the number of cataract operations submitted to the audit as a proportion of the number of cataract operations performed in each participating centre is not possible because:

1. Not all participating centres were collecting their cataract operations in an electronic format for the whole audit period.
2. The national cataract audit has exclusion criteria that would not be in place in other reported sources of the number of cataract operations performed in any centre e.g. surgery combined with another procedure.
3. The estimate of case ascertainment uses the number of completed phacoemulsification procedures centres supply to NHS digital and NHS Wales Informatics Service (NWIS), for this reason case ascertainment estimates are calculated for all cases recording a phacoemulsification procedure which are supplied to the audit by participating centres (i.e. prior to exclusions).

The estimate of case ascertainment uses the number of cases supplied before exclusion of eligible operations and, within the above limitations, estimates of the proportion of cataract operations performed in each participating centre that are included in the audit analysis (Table 1). 'For centres joining the audit during the audit period, the number of completed phacoemulsification episodes reported to NHS Digital for English centres, and to NHS Wales Informatics Service (NWIS) for Welsh centres for the full audit period, was adjusted for the proportion of time a centre had recorded data, to provide a pro-rata estimate of the number of operations a centre could have recorded. From this adjusted number, an estimate of case-ascertainment was calculated where the range in the percentage of cases submitted to the audit was 7.0% to 100% and for 54 centres this estimate was >80%.

5.4 Data quality and completeness

Among the advantages of EMR data collection are compulsory collection of key data items (e.g. operative complications) and automatic range checking of variables (e.g. axial length) at the time of data entry improving data completeness and accuracy. In addition, the richness of EMR data provides a more complete picture of the patient and their state of health making it possible to infer important information through cross checking. (For example an undetected breach of the capsule may have occurred at the time of surgery which later became apparent at an outpatient visit. If vitreous was detected in the anterior chamber at the outpatient visit then it can be inferred that a complication must have occurred at the time of surgery and the operation can accordingly be correctly classified).

Completeness of preoperative VA and postoperative VA outcome remain variable and an area for improvement in many centres. The audit tools include a web based data return tool for use by community optometrists which is intended to facilitate return of postoperative data. This works best when optometrists are commissioned to undertake postoperative follow up in the community as contracting can make payment contingent upon data having been received by the surgical centre.

5.5 Small numbers policy

Centres with <50 operations have not been included in this report and the COP report for individual surgeon results will likewise not report results for surgeons who have undertaken <50 procedures. (This is done for statistical reasons as the estimates would be unreliable and meaningless.) Issues related to reporting on small numbers are therefore not relevant to this audit.

5.6 Outliers policy

The audit outliers' policy has been developed directly from the HQIP outliers' policy and is available on the NOD Audit website at www.nodaudit.org.uk/resources/policies. An outlying centre or surgeon is identified where the risk adjusted adverse event rate (i.e. case complexity taken into account) is above the national threshold set by the mean rate plus approximately three Standard Deviations (3SD). The method considers statistical uncertainty related to sample size and there is a less than one in 700 chance that a surgeon or centre would fall above this threshold purely due to 'bad luck'. Where initial analysis suggests a potential outlier may have been identified the centre or surgeon or both are notified and invited to check the accuracy and completeness of the data received by the audit. Where corrections are relevant these are made prior to any results being released into the public domain.

6. Data Extraction, Cleaning and Statistical Methods

There are eleven sources of data included in the prospective second year of the national cataract audit, where 71 centres used the [Medisoft EMR](#) (Medisoft Ophthalmology, Medisoft Limited, Leeds, UK), two centres used the [OpenEyes EMR](#), one very large London NHS Trust used both the Medisoft and the OpenEyes EMR systems, one centre used the [EPIC patient record system](#) and eight centres used in-house data collection systems. The audit data extractions were performed in September/October 2017, with a further extraction of data in March/April 2018 from two Medisoft EMR centres and one in-house data collection system to address problems identified during the data validation exercise in February/ March 2018.

All analysis was conducted using STATA version 14, (StataCorp. 2015. Stata Statistical Software: Release 14. College Station, TX: StataCorp LP). Centre participation was affirmed by agreement from the Trust Caldicott Guardian and Clinical Lead for Ophthalmology.

Full details regarding eligibility and analysis criteria can be found on the [NOD audit website](#) following registration.

7. Definitions

7.1 Dataset

A minimum cataract dataset has been defined for purposes of the audit (<https://www.nodaudit.org.uk>). These variables include those required for case complexity adjustment of outcomes.

7.2 Surgeon grade

The grade of surgeon was categorised as consultant surgeons, career grade non-consultant surgeons (associate specialists, staff grade and trust doctors), experienced trainee surgeons (fellows, registrars, speciality registrars years 3 – 7 and specialty trainees years 3 – 7) and less experienced trainee surgeons (SHO, speciality registrars years 1 – 2, specialty trainees years 1 – 2 and foundation doctors years 1 – 2).

7.3 Posterior Capsular Rupture (PCR)

Posterior capsular rupture (PCR) is defined for the purposes of the National Audit as “*posterior capsule rupture with or without vitreous prolapse or zonule rupture with vitreous prolapse*” and abbreviated as PCR. It should be noted that the definition excludes zonule dehiscence where no vitreous prolapse has occurred. PCR is thus intended to capture significant breach of the lens-zonule barrier. Detailed criteria for case definitions are in Appendix 3.

7.4 Visual Acuity (VA)

VA definitions used were designed to maximise the usefulness of the available data with specified ‘time windows’ for pre- and postoperative measurements and criteria for preferred choices in terms of corrected VA, unaided VA and pin hole corrected VA. The detailed criteria are given in Appendix 3 along with interpretations for levels of VA. The percentage of eyes with VA data for each centre and different time windows are given in Appendix 4.

7.5 Mixed effects modelling of PCR and visual loss

The categorisation of each covariate under investigation in the PCR and VA Loss mixed effects logistic regression models are detailed for registered users on the RCOphth [NOD Audit website](#) with operations performed in the four-year period 2011-12 to 2014-15 NHS years used to develop the current models.

The risk adjustment model equations for PCR and Visual Acuity Loss respectively were applied to the audit data for the respective results in this report where the case mix adjusted graphs have 99.8% error lines displayed which are created from consultant based means of 1.1% for PCR and 0.9% for Visual Acuity Loss. These percentages reflect the unadjusted adverse event rates for consultants performing surgery. They are slightly lower than the overall rate for all surgeons and have been used because the consultant results appear in the public domain, as such it would be inappropriate for the average consultant rate to be artificially inflated to reflect the slightly higher overall average rate. The audit stipulates that at least 40% of operations with both pre and postoperative VA data are required in order to report a result for VA Loss. On the centre level case mix adjusted funnel plots, data for all surgeons is included (i.e. including trainee surgeons whose results are risk adjusted accordingly).

7.6 Case complexity index

Based on the risk prediction models a case complexity index has been provided for each centre. This is taken as the overall predicted probability of an adverse outcome based on the reported case complexity for the centre. Separate complexity indices have been provided for PCR and VA Loss.

7.7 Sample size independent metrics

Small samples are associated with greater statistical uncertainty. This has caused difficulty in interpreting results for which the limits of acceptable practice vary according to the number of operations undertaken. This issue will be addressed in future reports by introducing a metric based purely on standardised deviations (SD) from the consultant average. In future, presentation of results in this format will provide a more directly and intuitively interpretable measure. Based on this approach the 'limit of acceptable practice' would remain statistically unchanged.

7.8 Changes in performance between years

The change between the current year and the most recent previous year has been presented graphically for a number of measures. Trivial change is denoted by a diagonal band with centres largely unchanged lying within this zone. The zone above this diagonal denotes improved performance in the current year and vice versa.

8. Results

8.1 Case ascertainment

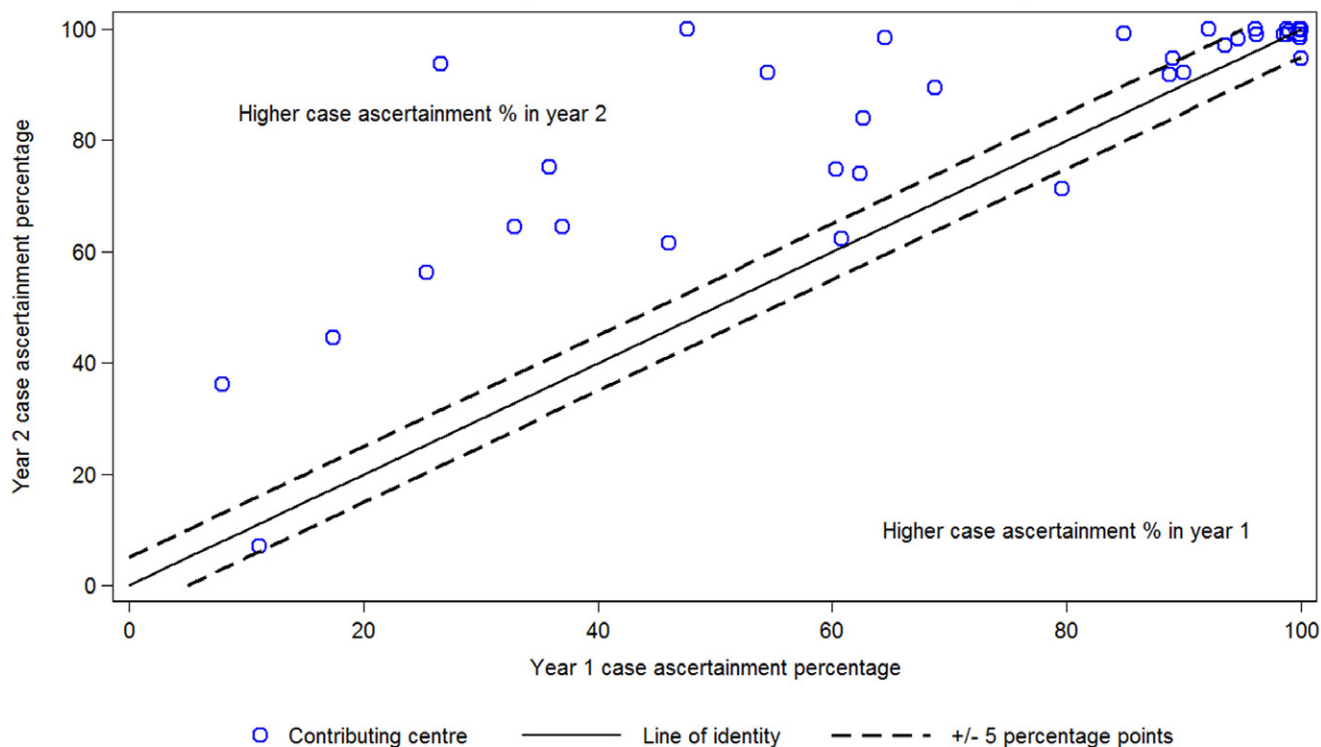
As the national cataract audit has exclusion criteria the estimate of case ascertainment is calculated using the number of operations submitted to the audit before the exclusion criteria are applied.

In total 194,357 operations were submitted to the audit by 88 centres, of which 193,024 (99.3%) were performed using phacoemulsification. The estimate of case ascertainment was not calculable for five centres as they are excluded from the cataract audit analysis (see next section).

For the 83 centres where an estimate of case ascertainment was calculable, 54 (65.1%) centres had a case ascertainment rate of >80% and 43 (51.8%) centres >95%, Table 1.

For 50 centres with case ascertainment data in both the first and second prospective audit years, 18 (36%) had >5% points higher case ascertainment rate in year 2 (1st September 2016 to 31st August 2017) than year 1 (1st September 2015 to 31 August 2016), for 30 (60%) centres year 2 case ascertainment rate was within $\pm 5\%$ points of their year 1 rate and 2 (4%) centres had >5% higher case ascertainment rate in year 1 than year 2, Figure 1.

Figure 1: Case ascertainment rates for 50 participating centres with case ascertainment data in both audit years 1 and 2



The first prospective year of the national cataract audit ran from 1st September 2015 to 31st August 2016

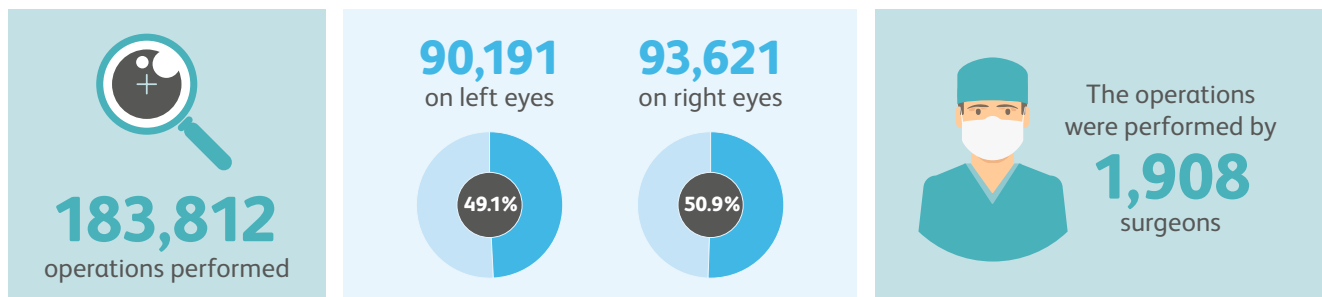
The second prospective year of the national cataract audit ran from 1st September 2016 to 31st August 2017

8.2 Eligible Cataract operations

In total 194,357 operations were submitted during the audit period (1st September 2016 to 31st August 2017), of these 10,545 (5.4%) operations are excluded from analysis; the reasons for exclusion were as follows:

- 1,333 operations had no record of phacoemulsification \pm IOL
- 96 operations were performed on patients <18 years old
- 5,164 operations had a non-cataract indication for surgery
- 2,629 operations included ineligible combined operative procedures
- 16 operations were excluded as they were traumatic cases
- 19 operations were performed under general anaesthesia and also had examination under anaesthetic recorded
- 1,185 operations had no recorded surgeon grade
- 103 operations from five centres were excluded as they contributed <50 eligible operations, this included one centre that was included in the year 1 report, but had only four eligible operations submitted for year 2 therefore of the 88 centres from which data were extracted five centres were excluded)

This left 183,812 operations performed in 83 participating centres eligible for analysis. The operations were performed on 90,191 (49.1%) left eyes and 93,621 (50.9%) right eyes from 148,785 patients. These operations were performed by 1,908 surgeons where 164 surgeons had performed surgery at more than one grade. Whilst these are encouragingly large numbers of procedures, there remain many centres from which data for the current period are not available. As the audit becomes further established, increasing uptake will provide a more comprehensive picture of the quality of surgery being undertaken across the NHS.



The number of surgeons and operations at each surgeon grade were:

- 918 consultant surgeons performed 116,979 (63.6%) operations
- 237 career grade non-consultant surgeons performed 17,503 (9.5%) operations
- 745 more experienced trainee surgeons performed 40,574 (22.1%) operations
- 172 less experienced trainee surgeons performed 8,756 (4.8%) operations

The percentage of operations performed by each grade of surgeon within each centre varied reflecting catchment area, NHS trust differences and training opportunities for junior surgeons within England and Wales, see Table 1 and Figures 2a and 2b (the centre number on the figures can be used to identify the named centre in the table).

For 52 centres with data in both audit years, 37 (71.2%) supplied more eligible operations in year 2 than year 1 and 15 (28.8%) more eligible operations in year 1 than year 2, Figure 3.

The median number of operations each surgeon had performed was 61 operations (IQR; 18 – 125: range; 1 – 3,119), five surgeons had data for >1,000 operations, all worked in the contributing Independent Sector Treatment Centre (ISTC) and one of them also works in a contributing NHS Trust. For the previous audit year (September 2015 to August 2016), 1,051 (55.1%) surgeons had performed >50 operations, Figure 4.

Of the 1,908 surgeons, 1,169 (61.3%) surgeons were male, 655 (34.3%) surgeons were female and the surgeon’s gender was unknown for 84 (4.4%) surgeon’s. 241 (12.6%) surgeons had data for operations performed in two participating centres, 17 (0.9%) in three participating centres two surgeons had data for operations performed in six participating centres.

Table 1: The number of eligible operations with the percentage performed by each grade of surgeon for the participating centre

Centre name	Centre number	Date of first cataract operation during the audit period	Number of eligible operations	Estimate of cases submitted to the audit (%)*	Number of surgeons	The percentage of operations performed by			
						Consultant surgeons	Career grade non-consultant surgeons	More experienced trainee surgeons	Less experienced trainee surgeons
Moorfields Eye Hospital NHS Foundation Trust	1	01/09/2016	18,659	100.0	256	42.1	8.5	44.7	4.7
The Newcastle upon Tyne Hospitals NHS Foundation Trust	2	01/09/2016	8,761	99.6	65	68.5	6.8	23.6	1.0
Norfolk and Norwich University Hospitals NHS Foundation Trust	3	01/09/2016	4,407	100.0	32	61.9	17.1	21.0	0.1
Leeds Teaching Hospitals NHS Trust	4	01/09/2016	4,409	100.0	49	51.7	0.4	29.7	18.3
York Teaching Hospital NHS Foundation Trust	5	01/09/2016	4,238	92.1	35	80.9	0.0	18.2	0.9
Oxford University Hospitals NHS Foundation Trust	6	01/09/2016	4,229	99.0	48	19.7	18.9	58.0	3.3
University Hospitals Bristol NHS Foundation Trust	7	01/09/2016	4,504	100.0	64	58.9	0.0	41.1	0.0
Gloucestershire Hospitals NHS Foundation Trust	8	01/09/2016	3,532	100.0	35	52.1	25.6	16.8	5.5
Sheffield Teaching Hospitals NHS Foundation Trust	9	01/09/2016	3,417	71.3	37	76.0	3.0	9.7	11.3
Sandwell and West Birmingham Hospitals NHS Trust	10	01/09/2016	3,542	94.7	80	42.0	15.5	27.7	14.9

*The estimate of the proportion of cases submitted to the audit is derived from the number of completed cataract operations supplied to NHS digital for English centres and NHS Wales Informatics Service (NWIS) for Welsh centres for the audit period. This estimation uses a pro-rata calculation for a centre’s denominator where the proportion of time during the audit cycle that a centre had been recording cataract operations was multiplied by the number of cataract operations supplied to NHS digital or NWIS. The numerator was the number of operations a centre had supplied to the audit. Centre’s that had more operations submitted to the national audit than in the NHS digital or NWIS were all assumed to have a complete submission rate as the actual rate was not possible to estimate.

Table 1 continued: The number of eligible operations with the percentage performed by each grade of surgeon for the participating centre

Centre name	Centre number	Date of first cataract operation during the audit period	Number of eligible operations	Estimate of cases submitted to the audit (%)*	Number of surgeons	The percentage of operations performed by			
						Consultant surgeons	Career grade non-consultant surgeons	More experienced trainee surgeons	Less experienced trainee surgeons
University Hospital Southampton NHS Foundation Trust	11	01/09/2016	2,862	100.0	49	70.7	1.3	27.0	1.0
Royal Berkshire NHS Foundation Trust	12	01/09/2016	3,132	62.3	34	60.1	3.7	33.2	3.0
Calderdale and Huddersfield NHS Foundation Trust	13	01/09/2016	2,600	100.0	30	85.2	7.0	6.5	1.3
Mid Cheshire Hospitals NHS Foundation Trust	14	01/09/2016	2,403	98.9	24	51.4	36.7	10.9	1.0
The Mid Yorkshire Hospitals NHS Trust	15	01/09/2016	2,295	99.8	15	72.4	20.1	2.0	5.4
Cardiff & Vale University LHB	16	01/09/2016	2,625	92.9	33	57.1	1.4	41.5	0.0
Epsom and St Helier University Hospitals NHS Trust	17	01/09/2016	2,335	100.0	22	66.6	0.0	23.9	9.4
Barts Health NHS Trust	18	01/09/2016	2,656	91.8	40	46.0	8.7	37.4	7.9
Frimley Health NHS Foundation Trust	19	01/09/2016	3,021	100.0	33	52.3	17.6	22.2	7.8
Bradford Teaching Hospitals NHS Foundation Trust	20	01/09/2016	2,344	94.7	30	73.4	0.0	16.1	10.5
Plymouth Hospitals NHS Trust	22	01/09/2016	2,625	99.2	24	48.3	28.8	22.9	0.1
University Hospitals Birmingham NHS Foundation Trust	23	01/09/2016	1,819	100.0	40	63.3	0.8	33.5	2.5
Hampshire Hospitals NHS Foundation Trust	24	01/09/2016	2,098	74.8	13	89.6	0.0	10.4	0.0
Royal Cornwall Hospitals NHS Trust	25	01/09/2016	1,878	98.9	16	56.2	36.7	7.1	0.0
Central Manchester University Hospitals NHS Foundation Trust	26	01/09/2016	2,792	61.4	61	48.9	9.6	34.3	7.2
King's College Hospital NHS Foundation Trust	27	01/09/2016	4,862	83.9	79	62.4	10.1	25.3	2.2
Shrewsbury and Telford Hospital NHS Trust	28	01/09/2016	1,971	100.0	27	85.6	0.5	8.2	5.7

*The estimate of the proportion of cases submitted to the audit is derived from the number of completed cataract operations supplied to NHS digital for English centres and NHS Wales Informatics Service (NWIS) for Welsh centres for the audit period. This estimation uses a pro-rata calculation for a centre's denominator where the proportion of time during the audit cycle that a centre had been recording cataract operations was multiplied by the number of cataract operations supplied to NHS digital or NWIS. The numerator was the number of operations a centre had supplied to the audit. Centre's that had more operations submitted to the national audit than in the NHS digital or NWIS were all assumed to have a complete submission rate as the actual rate was not possible to estimate.

Table 1 continued: The number of eligible operations with the percentage performed by each grade of surgeon for the participating centre

Centre name	Centre number	Date of first cataract operation during the audit period	Number of eligible operations	Estimate of cases submitted to the audit (%)*	Number of surgeons	The percentage of operations performed by			
						Consultant surgeons	Career grade non-consultant surgeons	More experienced trainee surgeons	Less experienced trainee surgeons
The Hillingdon Hospitals NHS Foundation Trust	30	02/09/2016	2,052	98.9	24	45.3	7.1	31.5	16.1
Aintree University Hospital NHS Foundation Trust	31	01/09/2016	1,303	100.0	26	65.3	3.5	26.6	4.6
Royal United Hospitals Bath NHS Foundation Trust	32	01/09/2016	1,498	98.2	18	58.7	8.9	7.1	25.2
Chesterfield Royal Hospital NHS Foundation Trust	33	01/09/2016	1,558	98.4	16	91.6	8.4	0.0	0.0
Mid Essex Hospital Services NHS Trust	34	01/09/2016	1,631	97.1	15	74.7	19.2	5.8	0.2
Harrogate and District NHS Foundation Trust	35	01/09/2016	1,450	100.0	12	77.5	10.1	8.7	3.7
North West Anglia NHS Foundation Trust	36	01/09/2016	2,908	100.0	28	73.6	10.0	12.0	4.4
Northern Devon Healthcare NHS Trust	37	01/09/2016	1,283	100.0	11	48.9	23.6	27.4	0.0
Wirral University Teaching Hospital NHS Foundation Trust	39	01/09/2016	1,107	100.0	16	69.8	0.0	28.5	1.6
South Warwickshire NHS Foundation Trust	40	02/09/2016	1,408	100.0	9	74.1	25.9	0.0	0.0
Isle of Wight NHS Trust	41	05/09/2016	1,293	100.0	13	54.4	33.1	12.5	0.0
St Helens and Knowsley Teaching Hospitals NHS Trust	42	01/09/2016	1,472	74.0	14	81.8	10.2	6.9	1.2
Wrightington, Wigan and Leigh NHS Foundation Trust	43	01/09/2016	1,381	98.4	8	86.0	14.0	0.0	0.0
Warrington and Halton Hospitals NHS Foundation Trust	44	01/09/2016	1,273	89.4	16	76.9	4.3	6.0	12.8
South Tees Hospitals NHS Foundation Trust	45	01/09/2016	1,843	56.2	24	73.3	0.0	26.7	0.0

*The estimate of the proportion of cases submitted to the audit is derived from the number of completed cataract operations supplied to NHS digital for English centres and NHS Wales Informatics Service (NWIS) for Welsh centres for the audit period. This estimation uses a pro-rata calculation for a centre's denominator where the proportion of time during the audit cycle that a centre had been recording cataract operations was multiplied by the number of cataract operations supplied to NHS digital or NWIS. The numerator was the number of operations a centre had supplied to the audit. Centre's that had more operations submitted to the national audit than in the NHS digital or NWIS were all assumed to have a complete submission rate as the actual rate was not possible to estimate.

Table 1 continued: The number of eligible operations with the percentage performed by each grade of surgeon for the participating centre

Centre name	Centre number	Date of first cataract operation during the audit period	Number of eligible operations	Estimate of cases submitted to the audit (%)*	Number of surgeons	The percentage of operations performed by			
						Consultant surgeons	Career grade non-consultant surgeons	More experienced trainee surgeons	Less experienced trainee surgeons
The Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust	46	02/09/2016	2,276	64.5	26	60.3	12.1	22.8	4.7
Barking, Havering and Redbridge University Hospitals NHS Trust	47	01/09/2016	1,544	64.4	19	73.1	8.2	12.0	6.7
Royal Free London NHS Foundation Trust	48	01/09/2016	2,200	44.6	44	46.4	7.5	36.8	9.4
University Hospitals Coventry and Warwickshire NHS Trust	49	01/09/2016	2,343	93.8	38	47.5	40.9	7.9	3.7
Barnsley Hospital NHS Foundation Trust	50	01/09/2016	564	69.4	5	81.6	18.4	0.0	0.0
Salisbury NHS Foundation Trust	51	06/09/2016	1,279	100.0	12	80.3	12.4	6.7	0.5
London North West University Healthcare NHS Trust	52	01/09/2016	546	92.2	13	55.7	0.0	20.9	23.4
University Hospitals of Morecambe Bay NHS Foundation Trust	54	01/09/2016	226	7.0	2	100.0	0.0	0.0	0.0
Nottingham University Hospitals NHS Trust	55	05/09/2016	1,198	36.0	28	50.9	0.3	48.3	0.5
Yeovil District Hospital NHS Foundation Trust	56	05/09/2016	744	75.2	5	100.0	0.0	0.0	0.0
SpaMedica (Manchester)	57	02/09/2016	4,570	100.0	12	100.0	0.0	0.0	0.0
SpaMedica (Wakefield)	58	05/09/2016	4,214	100.0	9	100.0	0.0	0.0	0.0
East Sussex Healthcare NHS Trust	59	01/09/2016	3,356	99.9	19	75.0	14.0	9.3	1.7
Imperial College Healthcare NHS Trust	60	01/09/2016	3,114	100.0	62	39.9	0.0	40.3	19.8
Portsmouth Hospitals NHS Trust	61	01/09/2016	2,905	100.0	33	59.1	8.1	24.2	8.5
Heart of England NHS Foundation Trust	62	01/09/2016	2,465	98.8	28	65.4	5.6	25.4	3.7

*The estimate of the proportion of cases submitted to the audit is derived from the number of completed cataract operations supplied to NHS digital for English centres and NHS Wales Informatics Service (NWIS) for Welsh centres for the audit period. This estimation uses a pro-rata calculation for a centre's denominator where the proportion of time during the audit cycle that a centre had been recording cataract operations was multiplied by the number of cataract operations supplied to NHS digital or NWIS. The numerator was the number of operations a centre had supplied to the audit. Centre's that had more operations submitted to the national audit than in the NHS digital or NWIS were all assumed to have a complete submission rate as the actual rate was not possible to estimate.

Table 1 continued: The number of eligible operations with the percentage performed by each grade of surgeon for the participating centre

Centre name	Centre number	Date of first cataract operation during the audit period	Number of eligible operations	Estimate of cases submitted to the audit (%)*	Number of surgeons	The percentage of operations performed by			
						Consultant surgeons	Career grade non-consultant surgeons	More experienced trainee surgeons	Less experienced trainee surgeons
Cambridge University Hospitals NHS Foundation Trust	63	01/09/2016	2,380	100.0	29	34.0	0.0	28.4	37.6
East Kent Hospitals University NHS Foundation Trust	64	05/12/2016	1,764	88.2	24	50.4	48.6	1.0	0.0
The Ipswich Hospital NHS Trust	65	05/12/2016	1,754	96.6	17	75.8	1.4	19.0	3.8
SpaMedica (Wirral)	66	01/09/2016	1,710	100.0	4	100.0	0.0	0.0	0.0
County Durham and Darlington NHS Foundation Trust	67	01/09/2016	1,692	100.0	20	68.8	13.0	12.9	5.3
United Lincolnshire Hospitals NHS Trust	68	01/09/2016	1,683	46.8	10	83.5	0.0	16.5	0.0
SpaMedica (Newton-le-Willows)	69	05/09/2016	1,629	100.0	4	100.0	0.0	0.0	0.0
Northampton General Hospital NHS Trust	70	03/09/2016	1,470	78.1	20	82.7	7.9	7.1	2.3
SpaMedica (Liverpool)	71	02/09/2016	1,005	100.0	5	100.0	0.0	0.0	0.0
James Paget University Hospitals NHS Foundation Trust	72	18/11/2016	942	77.1	15	78.9	7.0	11.5	2.7
Bolton NHS Foundation Trust	73	10/01/2017	871	86.1	14	52.0	40.4	6.9	0.7
Kingston Hospital NHS Foundation Trust	74	15/10/2016	829	47.7	16	72.5	0.8	23.5	3.1
Northern Lincolnshire and Goole NHS Foundation Trust	75	01/09/2016	803	34.1	19	65.0	21.2	13.8	0.0
The Rotherham NHS Foundation Trust	76	17/10/2016	734	36.5	10	83.5	1.5	15.0	0.0
Torbay and South Devon NHS Foundation Trust	77	17/02/2017	585	71.3	19	71.8	12.1	10.4	5.6
Great Western Hospitals NHS Foundation Trust	78	08/09/2016	576	38.5	15	91.1	5.7	1.0	2.1
SpaMedica (Bolton)	79	18/05/2017	425	100.0	8	100.0	0.0	0.0	0.0

*The estimate of the proportion of cases submitted to the audit is derived from the number of completed cataract operations supplied to NHS digital for English centres and NHS Wales Informatics Service (NWIS) for Welsh centres for the audit period. This estimation uses a pro-rata calculation for a centre's denominator where the proportion of time during the audit cycle that a centre had been recording cataract operations was multiplied by the number of cataract operations supplied to NHS digital or NWIS. The numerator was the number of operations a centre had supplied to the audit. Centre's that had more operations submitted to the national audit than in the NHS digital or NWIS were all assumed to have a complete submission rate as the actual rate was not possible to estimate.

Table 1 continued: The number of eligible operations with the percentage performed by each grade of surgeon for the participating centre

Centre name	Centre number	Date of first cataract operation during the audit period	Number of eligible operations	Estimate of cases submitted to the audit (%)*	Number of surgeons	The percentage of operations performed by			
						Consultant surgeons	Career grade non-consultant surgeons	More experienced trainee surgeons	Less experienced trainee surgeons
The Princess Alexandra Hospital NHS Trust	80	01/09/2016	357	40.1	9	70.6	9.2	20.2	0.0
Wye Valley NHS Trust	81	20/12/2016	346	22.4	10	85.5	0.0	13.3	1.2
Cwm Taf University LHB	82	16/01/2017	320	34.5	14	68.1	21.6	10.3	0.0
Sherwood Forest Hospitals NHS Foundation Trust	83	09/02/2017	309	30.4	8	78.6	1.3	20.1	0.0
Royal Surrey County Hospital NHS Foundation Trust	84	01/09/2016	252	13.3	5	100.0	0.0	0.0	0.0
East Lancashire Hospitals NHS Trust	85	04/05/2017	150	18.8	15	64.7	27.3	2.7	5.3
Southport and Ormskirk Hospital NHS Trust	86	15/06/2017	142	64.4	7	46.5	45.1	8.5	0.0
Stockport NHS Foundation Trust	87	28/06/2017	64	18.2	8	67.2	31.3	1.6	0.0

*The estimate of the proportion of cases submitted to the audit is derived from the number of completed cataract operations supplied to NHS digital for English centres and NHS Wales Informatics Service (NWIS) for Welsh centres for the audit period. This estimation uses a pro-rata calculation for a centre's denominator where the proportion of time during the audit cycle that a centre had been recording cataract operations was multiplied by the number of cataract operations supplied to NHS digital or NWIS. The numerator was the number of operations a centre had supplied to the audit. Centre's that had more operations submitted to the national audit than in the NHS digital or NWIS were all assumed to have a complete submission rate as the actual rate was not possible to estimate.

Figure 2a: The number of eligible cataract operations supplied to the national cataract audit for each participating centre.

Established centres with data in the first year report

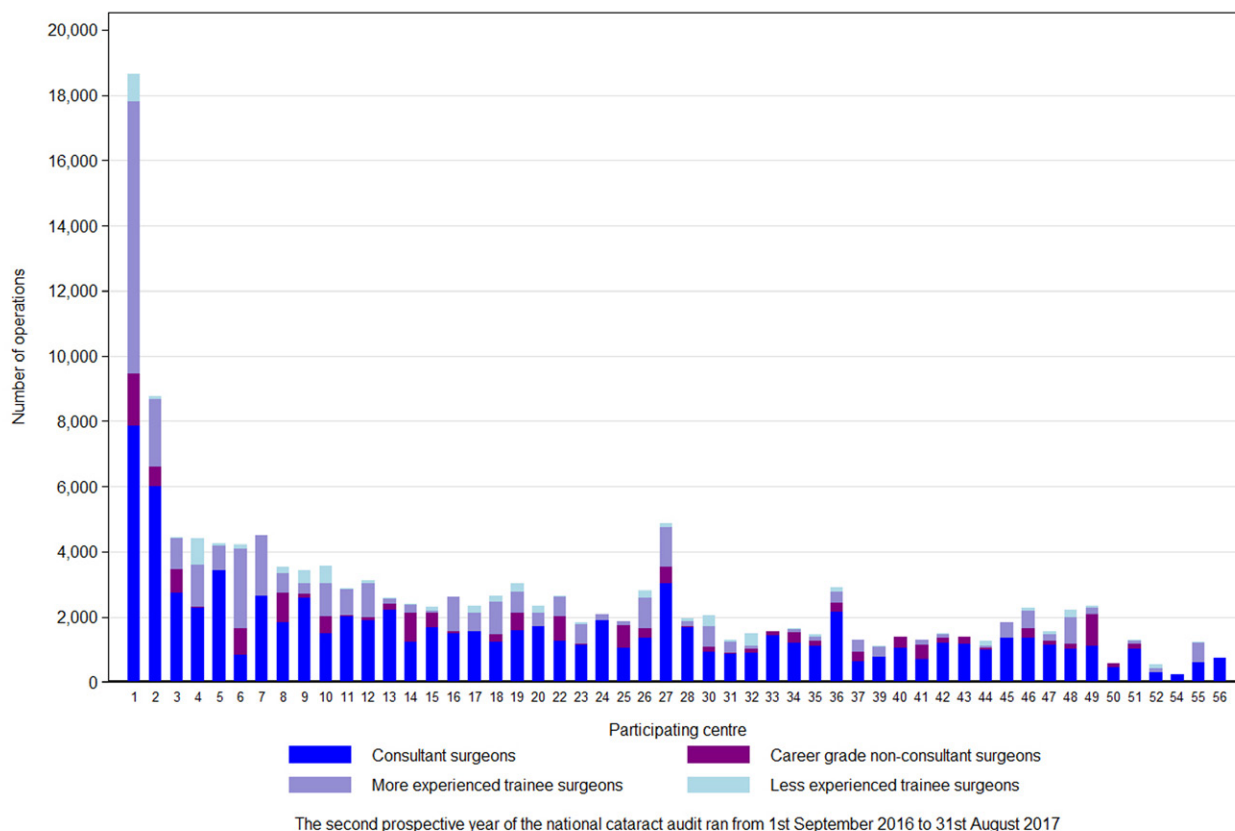


Figure 2b: The number of eligible cataract operations supplied to the national cataract audit for each participating centre

Recently joining centres without data in the first year report

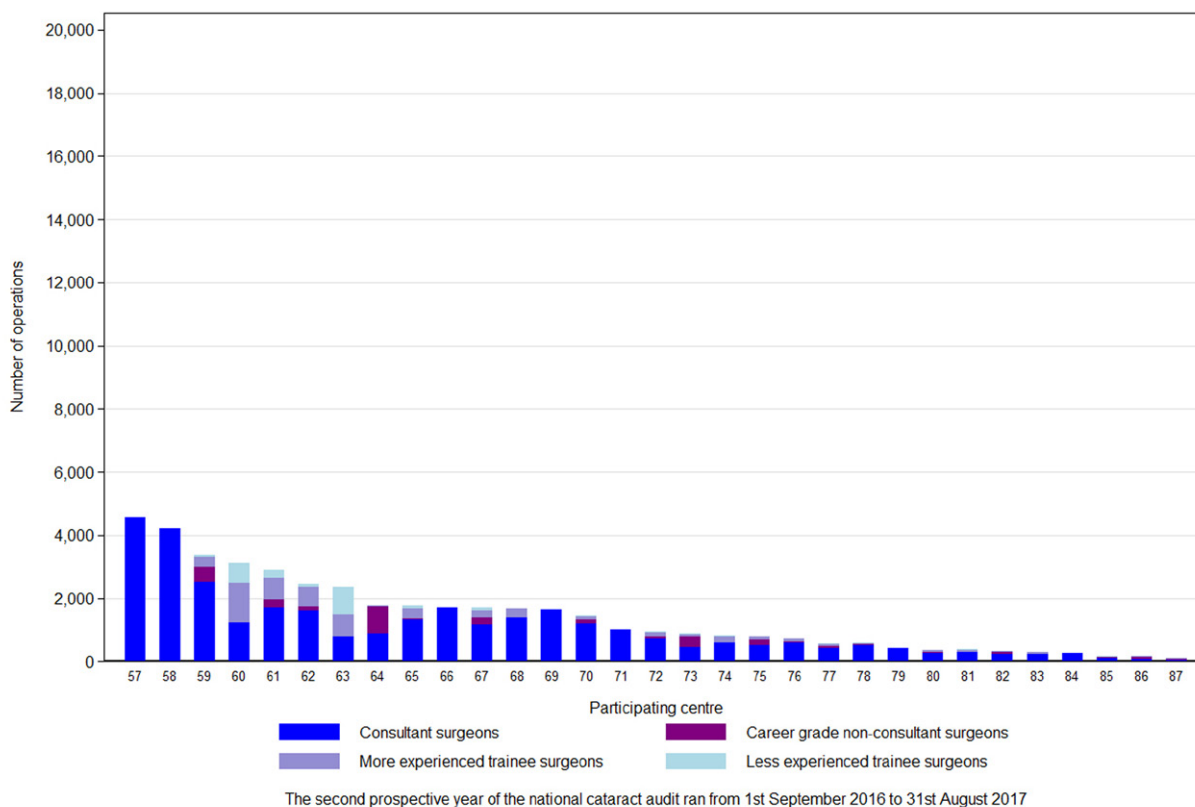
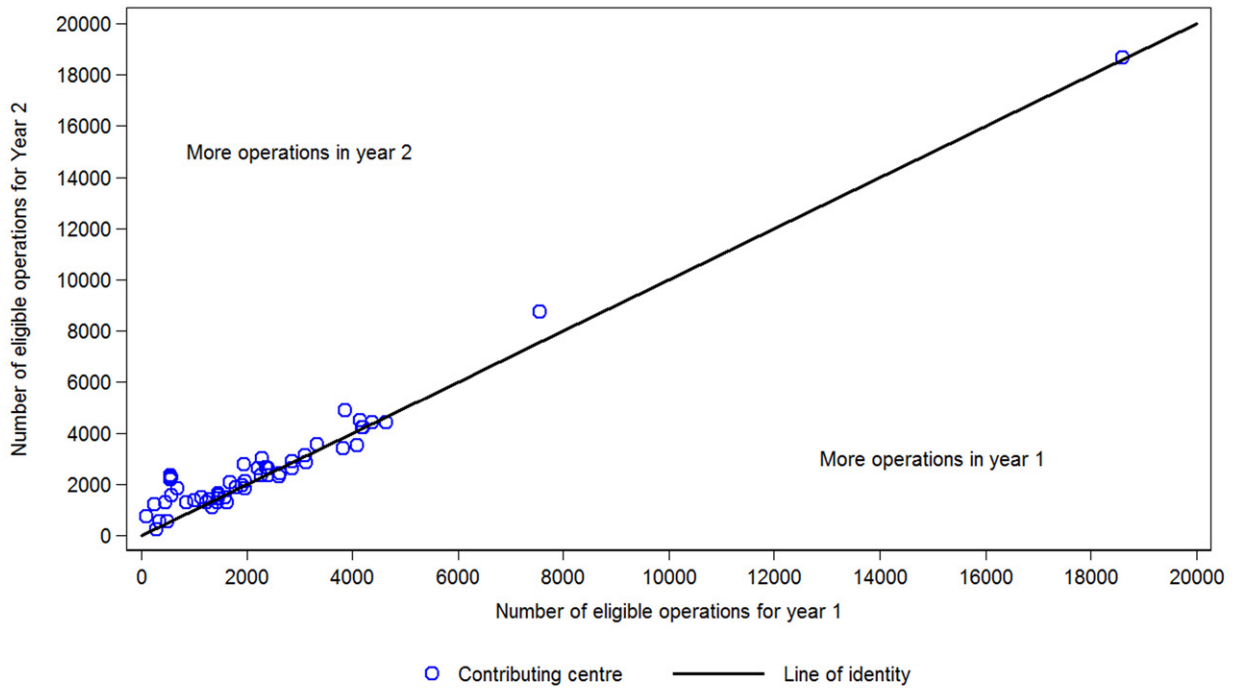


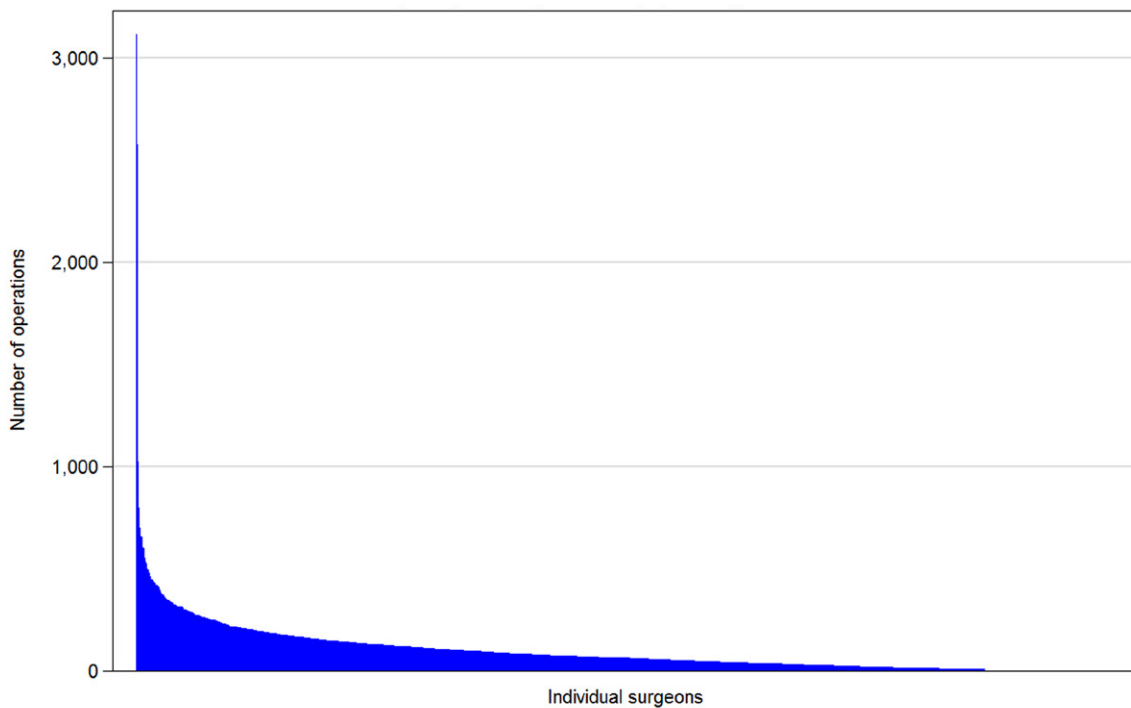
Figure 3: The number of eligible cataract operations supplied to the national cataract audit for 52 participating centres with data in both audit years 1 and 2



The first prospective year of the national cataract audit ran from 1st September 2015 to 31st August 2016
 The second prospective year of the national cataract audit ran from 1st September 2016 to 31st August 2017

Figure 4: The number of eligible cataract operations supplied to the national cataract audit for each surgeon

N = 183,812 operations performed by 1,908 surgeons from 83 participating centres



The second prospective year of the national cataract audit ran from 1st September 2016 to 31st August 2017

8.3 Patient characteristics – Age and Gender

Summary details of the 148,785 patients undergoing cataract surgery in the second year of the prospective audit were as follows:



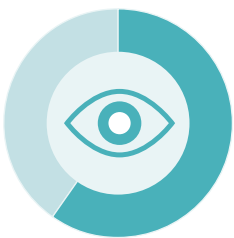
- 147,602 patients with median age 76.4 years
- 63,449 (42.6%) patients were men with median age 75.7 years.
- 84,920 (57.1%) patients were women with median age 76.8 years.
- The gender was not recorded for 416 (0.3%) patients with median age 76.7 years.
- The ethnicity was not recorded for 67,218 (45.2%) patients.

8.4 First eye, second eye and simultaneous bilateral surgery

All cataract operations performed during the audit cycle would be in either the patient's first or second treated eye unless simultaneous bilateral surgery was performed. The RCOphth NOD Audit may not have the record for both operations or the first treated eye could have had the operation at another centre or prior to electronic data collection within the centre. For these reasons, no results on time between operations are provided in this report.

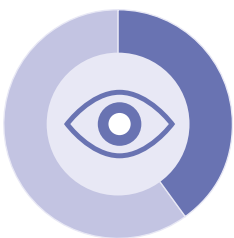
Results for first and second treated eye operations are reported for the 183,410 operations performed that were not simultaneous bilateral operations.

First treated eye cataract surgery;



- First eye cataract surgery was performed for 110,228 (60.1%) operations
- The median age at first treated eye surgery was 75.9 years (range; 18.1 – 107.7)
- 27,610 (25.0%) patients were recorded as having diabetes mellitus at the time of their first cataract operation
- 1,073 (1.0%) patients were recorded to be unable to lie flat
- 1,335 (1.2%) patients were recorded to be unable to cooperate during the operation

Second treated eye cataract surgery;



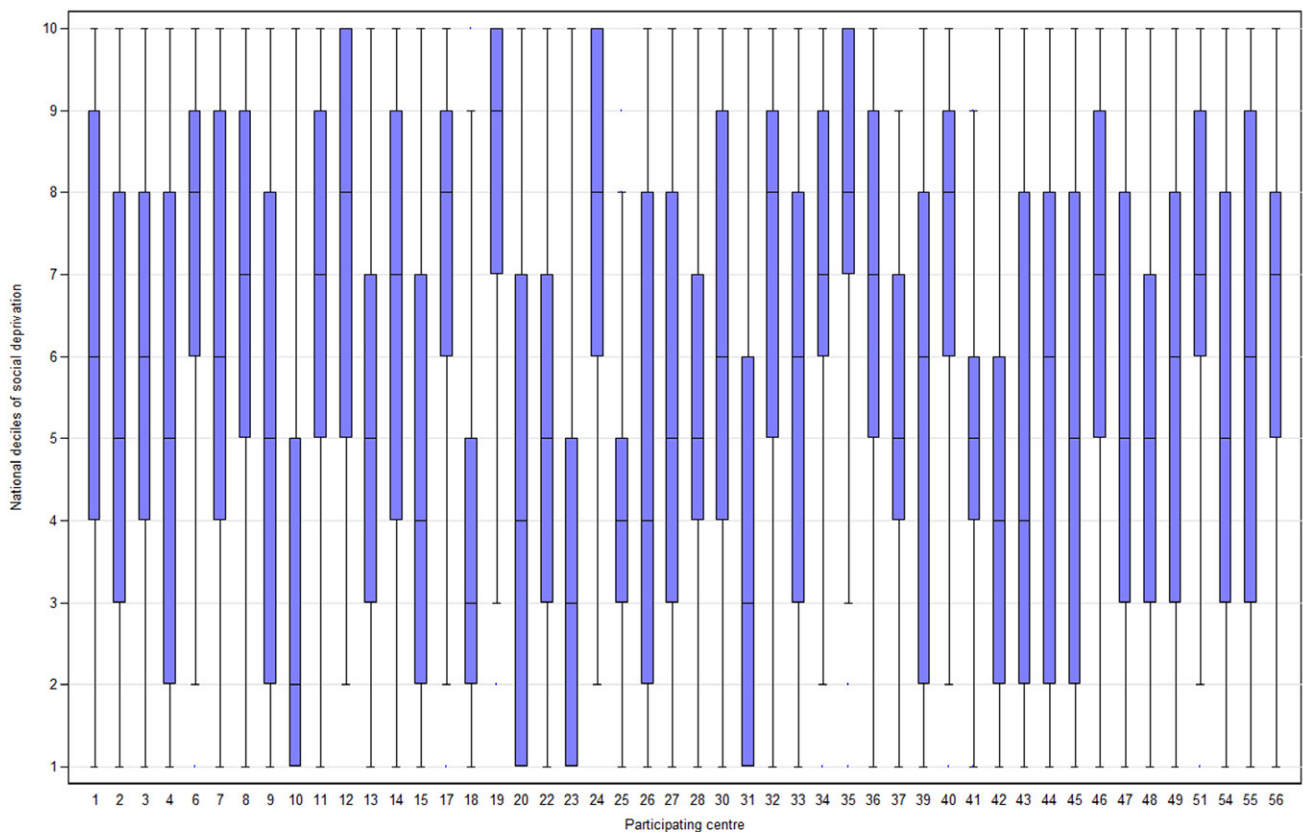
- Second eye cataract surgery was performed for 73,182 (39.9%) operations
- The median age at second treated eye surgery was 77.0 years (range; 18.4 – 104.9)
- 19,718 (26.9%) patients were recorded as having diabetes mellitus at the time of their second treated eye surgery
- 516 (0.7%) patients were recorded as being unable to lie flat
- 651 (0.9%) patients were recorded as being unable to cooperate during the operation

8.5 Index of multiple deprivation

The English index of multiple deprivation (IMD) was calculated for 119,685 (96.6%) patients from 70 participating English centres with cataract surgery data recorded on the Medisoft EMR. All but five centres performed cataract surgery on patients in the most deprived national decile of social deprivation (decile 1) and all but three centres performed cataract surgery on patients in the least deprived national decile of social deprivation (decile 10). The median English national decile of social deprivation for patients undergoing cataract surgery varied significantly between centres, confirming that there was variation between the participating centres in the social deprivation of patients undergoing cataract surgery, Figures 5a and 5b. The IMD was not calculable for operations from the other contributing data collection systems or from the contributing Welsh centres where different indices are used.

Figure 5a: Box and whisker plots of the national deciles of social deprivation for patients undergoing cataract surgery during the audit period by participating centre.

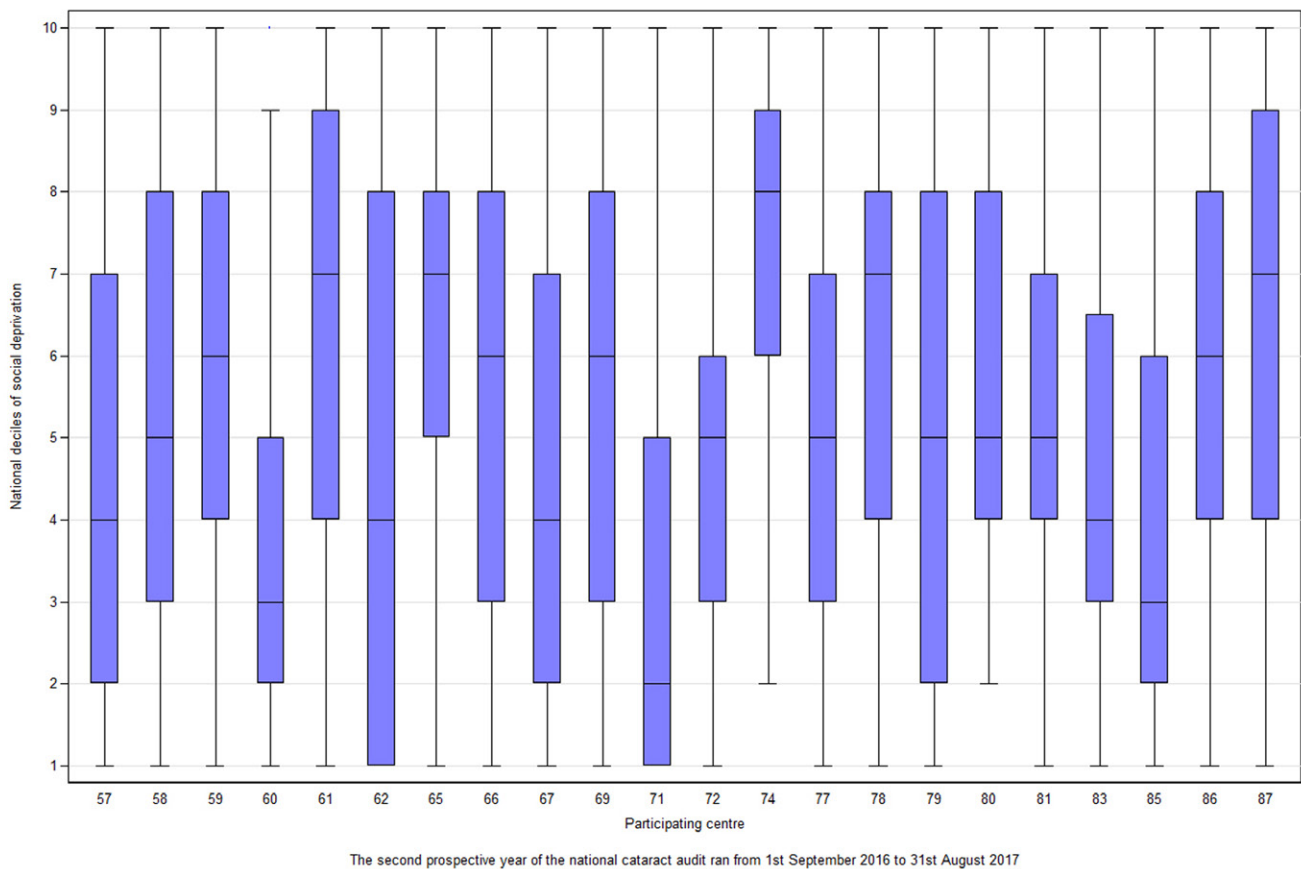
Established centres with data in the first year report



The second prospective year of the national cataract audit ran from 1st September 2016 to 31st August 2017

Figure 5b: Box and whisker plots of the national deciles of social deprivation for patients undergoing cataract surgery during the audit period by participating centre

Recently joining centres without data in the first year report



8.6 Preoperative Visual Acuity (VA)

A preoperative visual acuity was recorded for 158,433 (86.2%) eyes and missing for 25,379 (13.8%) eyes, of which 1,842 (1.0% of operations) had a Pin Hole Visual Acuity (PHVA) measured but no Corrected Distance Visual Acuity (CDVA) or Uncorrected Distance Visual Acuity (UDVA) measurement.

There was wide variation in the percentage of eyes with a preoperative VA by contributing centre, where for 5 (6.0%) centres <50% of eyes had a pre-operative VA, for 61 (73.5%) centres more than 80% of eyes had a pre-operative VA and for 18 (21.7%) centres more than 95% of eyes had a pre-operative VA, Figures 6a and 6b.

For 52 centres with pre-operative data in the first and second prospective audit years, 6 (11.5%) centres had >5% points higher percentage of eyes with a pre-operative VA in year 2 than year 1, 36 (69.2%) centres year 2 percentage of eyes with a pre-operative VA was within $\pm 5\%$ points of their year 1 percentage and 10 (19.2%) centres had >5% points higher percentage of eyes with a pre-operative VA in year 1 than year 2, Figure 7.

The overall percentage of eyes with a pre-operative VA for the 52 centres with data in both audit years was 86.5% in year 1 and 86.3% in year 2. For the 31 recently joining centres, their overall percentage of eyes with a pre-operative VA was 85.8%.

For the 158,433 eyes with a preoperative VA measurement, the measurement was CDVA in 109,658 (69.2%) eyes, UDVA in 46,220 (29.2%) eyes and in 2,555 (1.6%) eyes the CDVA measurement was the same as the UDVA measurement.

The median preoperative VA was 0.50 LogMAR units (range; -0.30 – NPL) (6/19 Snellen Equivalent); where 5,867 (3.7%) eyes were CF, 3,072 (1.9%) eyes were HM, 768 (0.5%) eyes were PL and 42 (<0.1%) eyes were NPL.

The preoperative VA was 0.30 LogMAR units (6/12) or better for 53,318 (33.7%) eyes, 0.60 LogMAR units (6/24) or better for 111,622 (70.5%) eyes and 1.0 LogMAR units (6/60) or better for 141,618 (89.4%) eyes.

The median preoperative VA was 0.50 LogMAR units for each grade of surgeon.

There was variability in the preoperative VA between contributing centres, although for the majority of centres the median preoperative VA was approximately 0.50 LogMAR units, Figures 8a and 8b.

Access to surgery, judged by preoperative VA was uniform regardless of IMD national decile, Figure 9. Preoperative VA is used as a proxy metric for access because where access to surgery is significantly limited the average preoperative VA would be expected to be worse and vice versa.

For 28,576 patients who had both eyes undergo cataract surgery during the audit period and had a preoperative VA measurement for both eyes (excluding simultaneous bilateral surgery), the mean presenting VA was worse for the first treated eye than for the second treated eye (means = 0.59 (6/24) and 0.48 LogMAR (6/18) respectively, $p < 0.001$).

Of the 201 patients who had simultaneous bilateral surgery, 143 (71.1%) had presenting VA data for both eyes where the median difference in the VA between the right and left eyes was 0.00 LogMAR units and the inter quartile range was -0.20 – +0.10 LogMAR units.

Figure 6a: The percentage of eligible cataract operations supplied to the national cataract audit with a valid pre-operative VA by participating centre

Established centres with data in the first year report

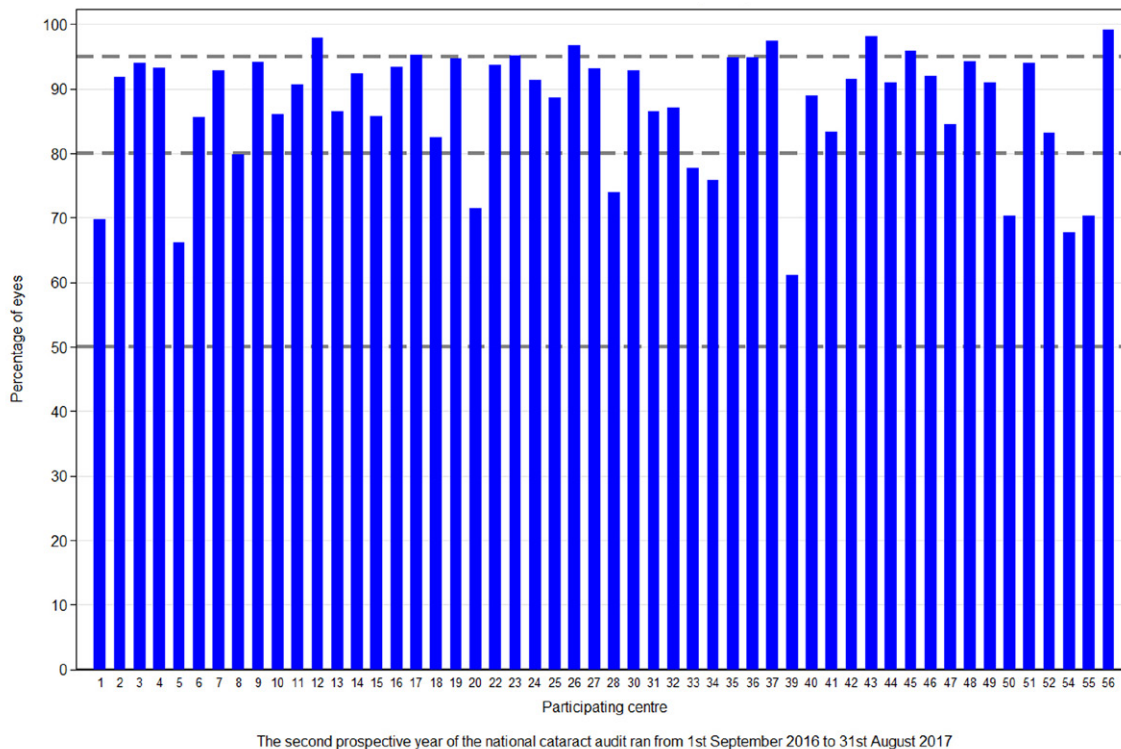


Figure 6b: The percentage of eligible cataract operations supplied to the national cataract audit with a valid pre-operative VA by participating centre

Recently joining centres without data in the first year report

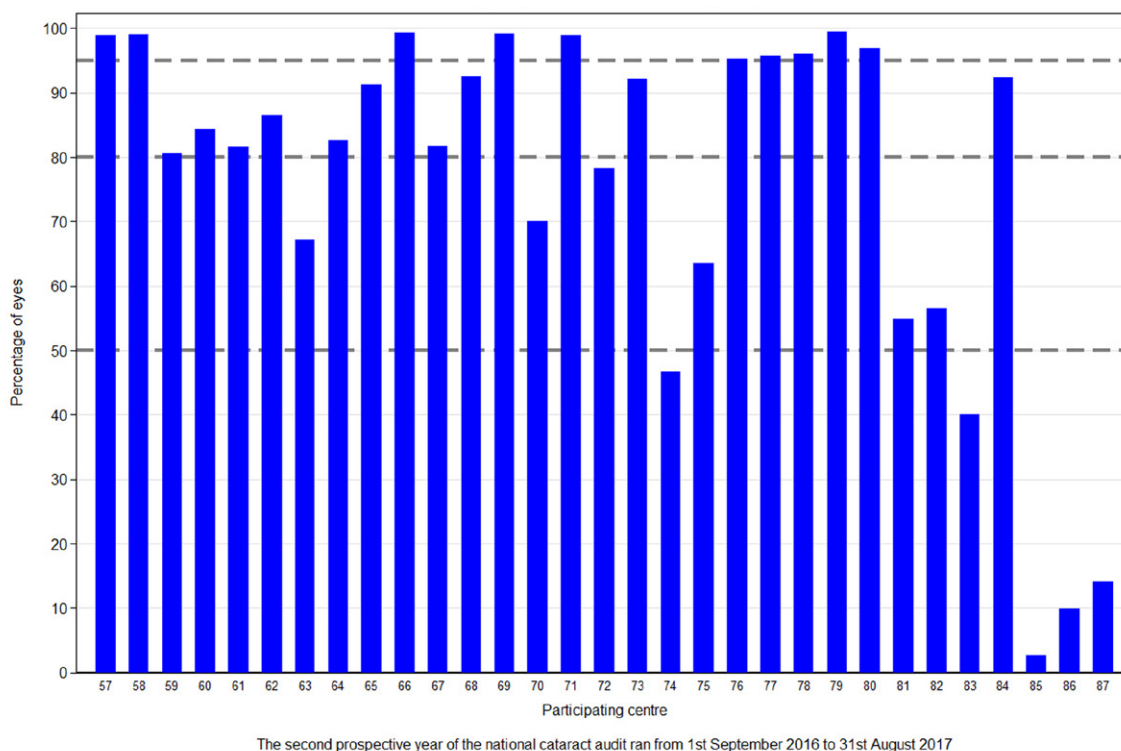


Figure 7: The percentage of cataract operations with a valid pre-operative VA for 52 participating centres with data in both audit years 1 and 2

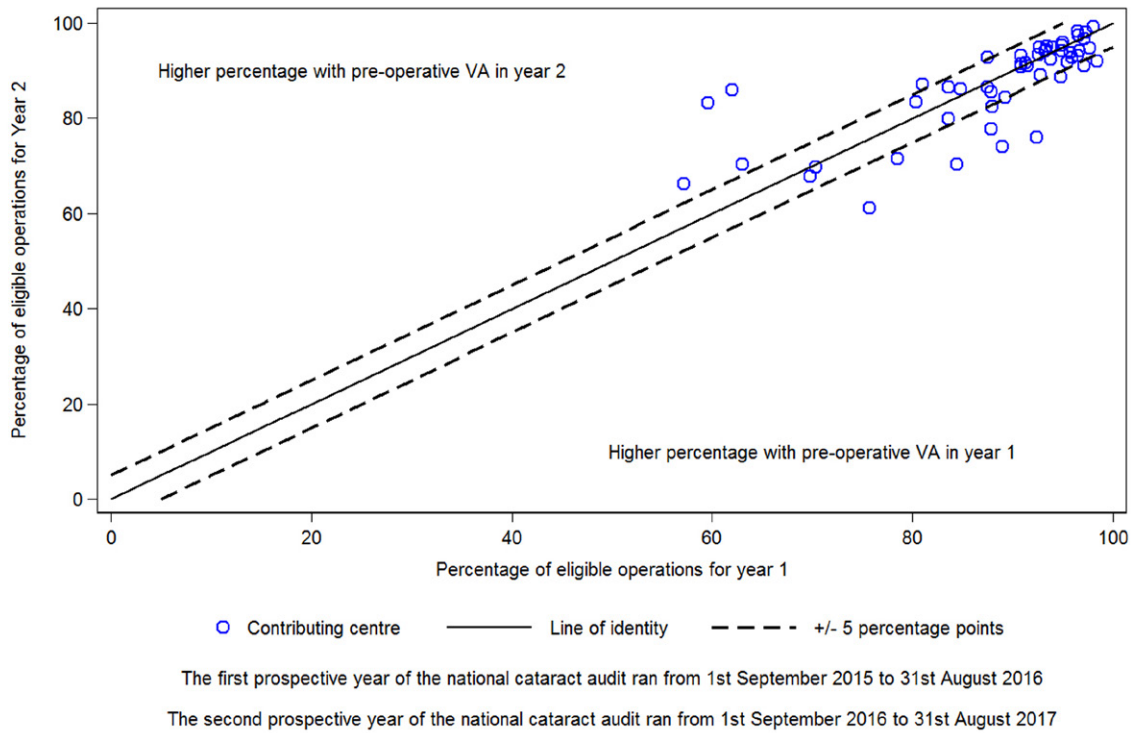


Figure 8a: Pre-operative LogMAR visual acuity for eligible cataract operations supplied to the national cataract audit by participating centre

Established centres with data in the first year report

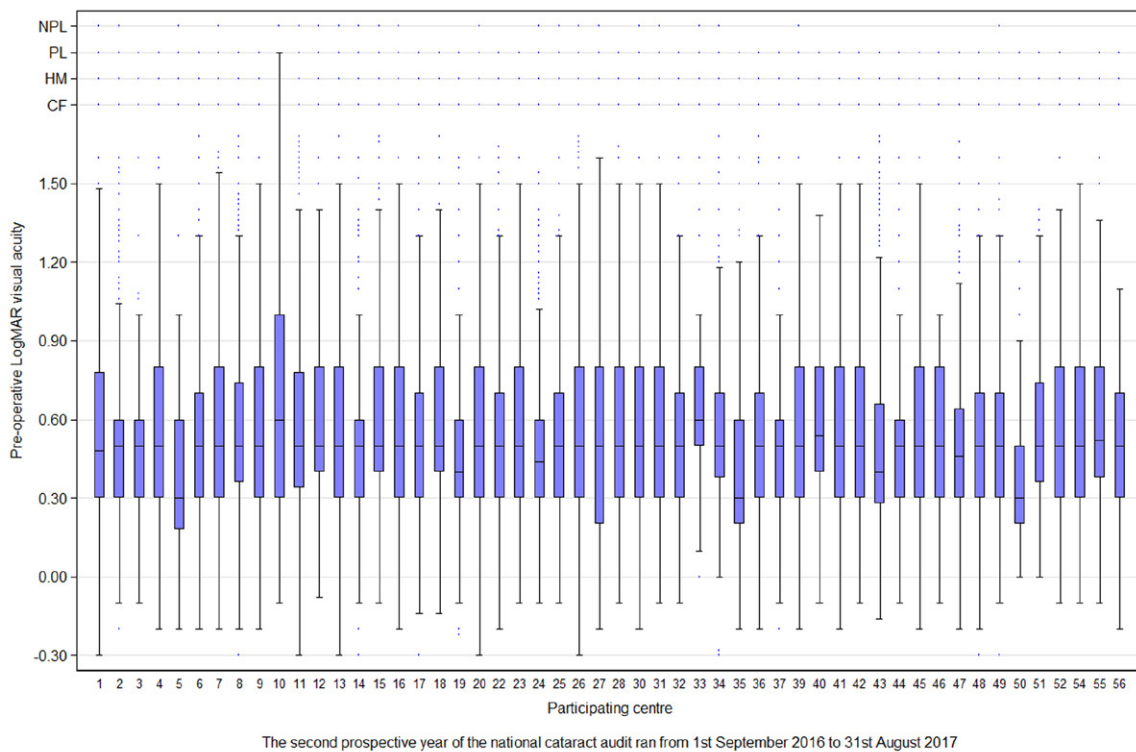


Figure 8b: Pre-operative LogMAR visual acuity for eligible cataract operations supplied to the national cataract audit by participating centre

Recently joining centres without data in the first year report

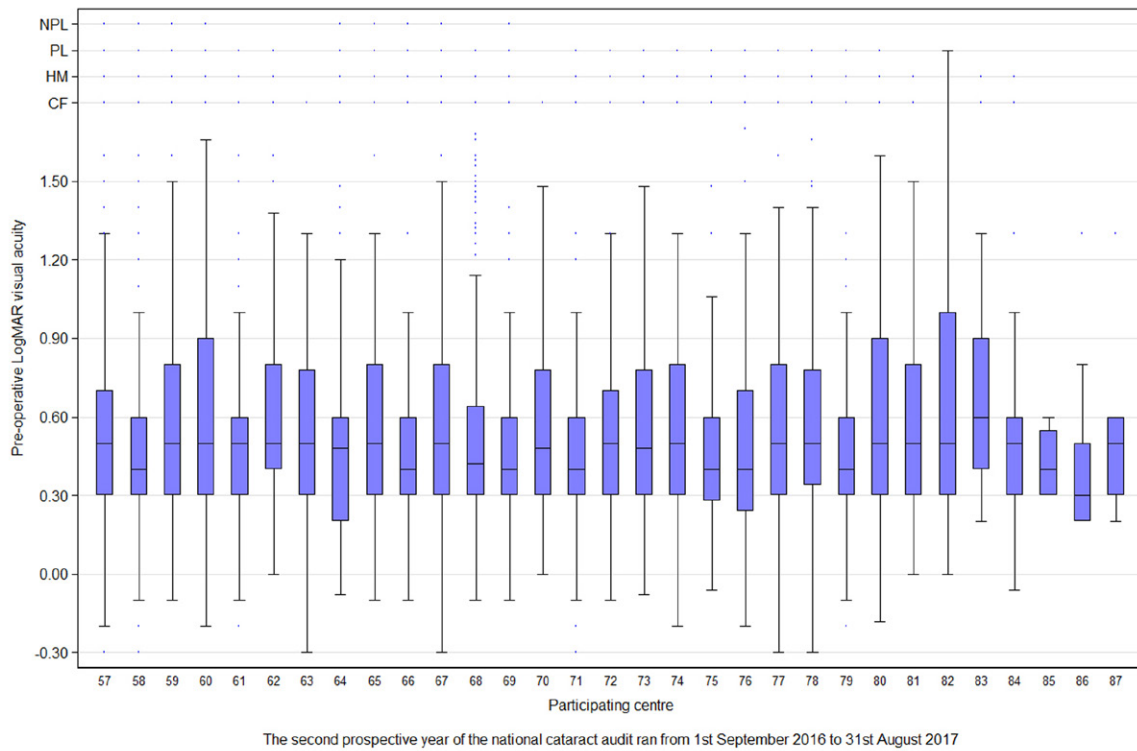
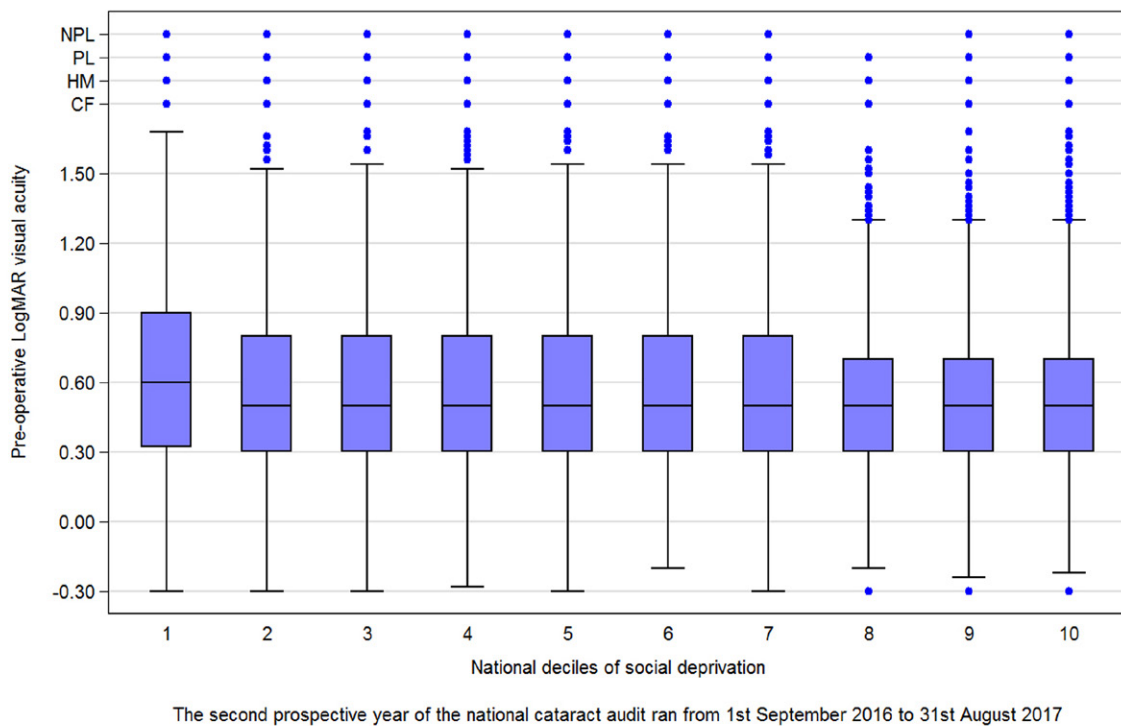


Figure 9: Pre-operative LogMAR VA by national deciles of social deprivation

N = 108,393 patient's from 70 participating centres



8.7 Ocular co-pathology

The presence or absence of ocular co-pathology was recorded for 96.7% of operated eyes and was not recorded for 3.3% of eyes. Assuming that the not recorded ocular co-pathology are 'none', then an ocular co-pathology was present in 74,952 (40.8%) eyes and recorded as absent (or not recorded) for 108,860 (59.2%) eyes.

The percentage of eyes with ocular co-pathology data recorded (any, none or not recorded) varied between centres, where the percentage of eyes reported to have any ocular co-pathology ranged between centres from 6.7% to 59.5%, and 20 (24.1%) centres had >50% of operated eyes with an ocular co-pathology, Figures 10a and 10b.

The most commonly recorded ocular co-pathologies were age related macular degeneration, glaucoma and diabetic retinopathy which were recorded for 10.1%, 8.8% and 5.8% of operations respectively, Figure 11.

A higher proportion of operations were performed by consultant surgeons for each individual ocular co-pathology Figure 12.

For the prospective data collection changes to the recording of ocular co-pathology were implemented, details about the impact of the changes on the ocular co-pathology results can be found in appendix 4.

Figure 10a: The percentage of eligible cataract operations supplied to the national cataract audit with and without ocular co-pathology data by participating centre

Established centres with data in the first year report

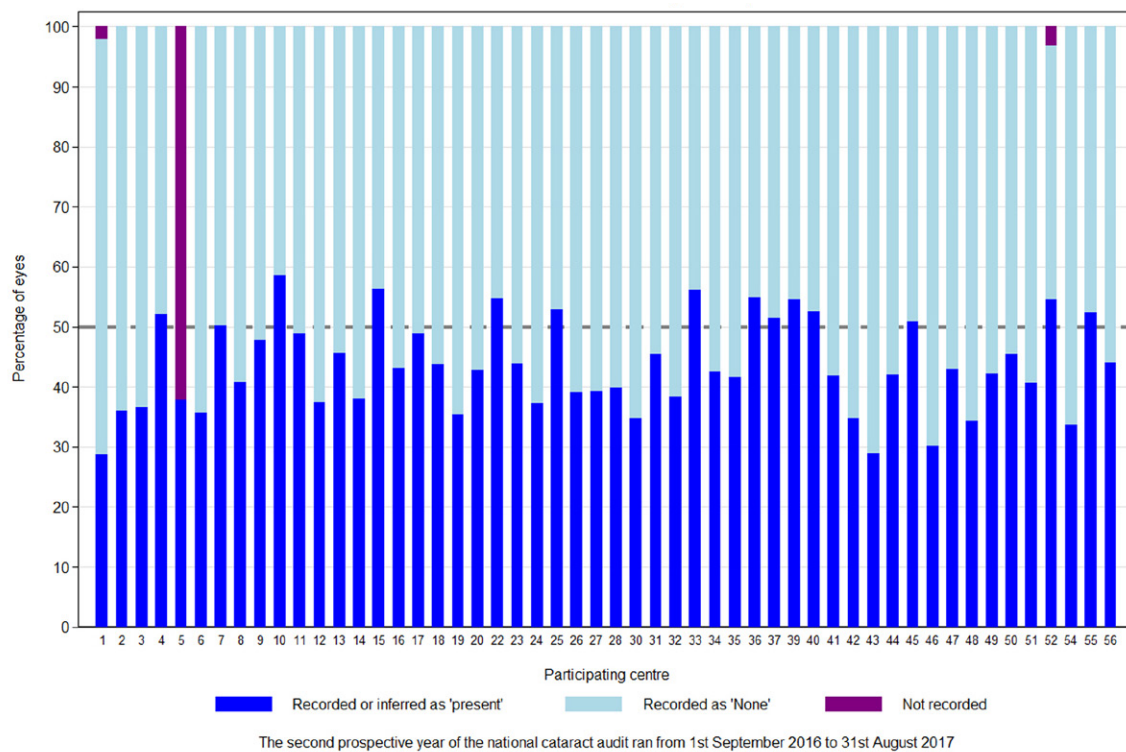


Figure 10b: The percentage of eligible cataract operations supplied to the national cataract audit with and without ocular co-pathology data by participating centre

Recently joining centres without data in the first year report

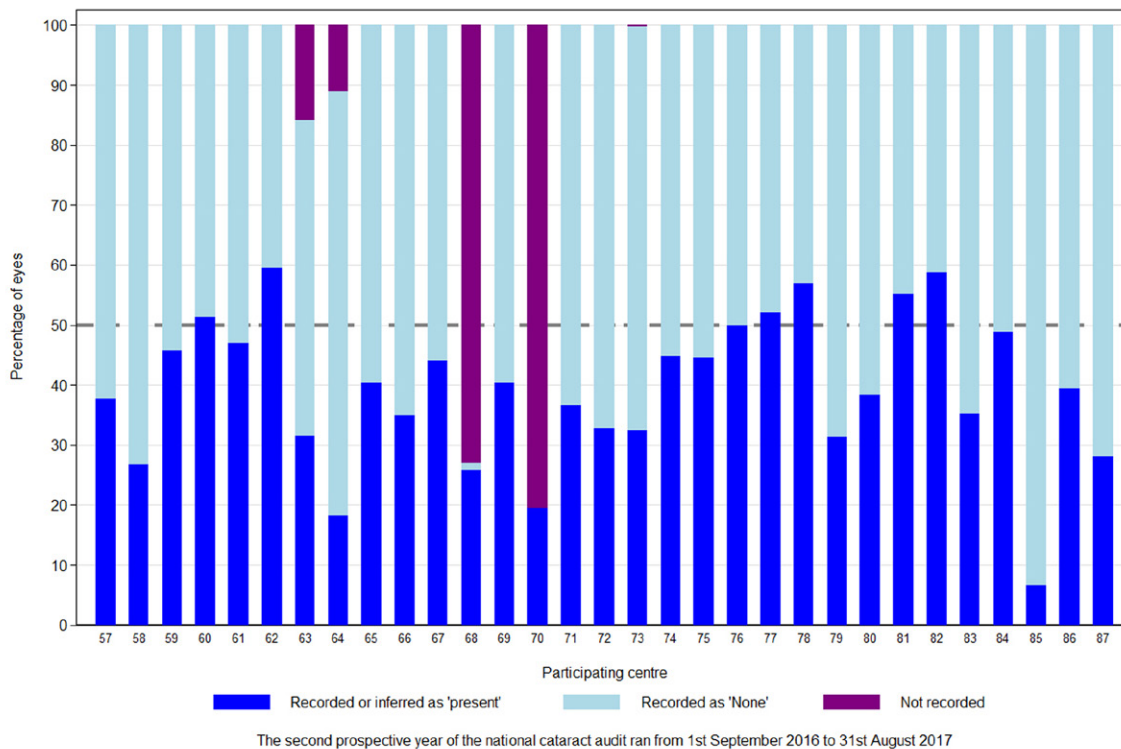


Figure 11: The percentage of eligible cataract operations supplied to the national cataract audit with each individual ocular co-pathology

N = 183,812 operations from 83 participating centres

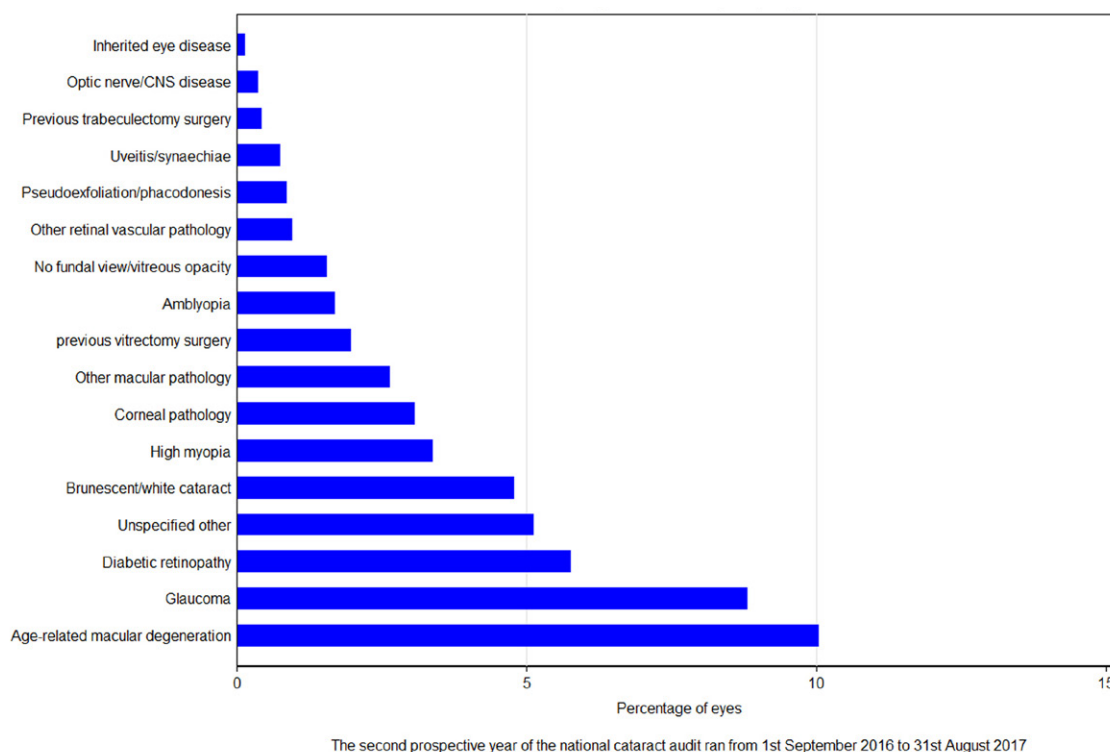
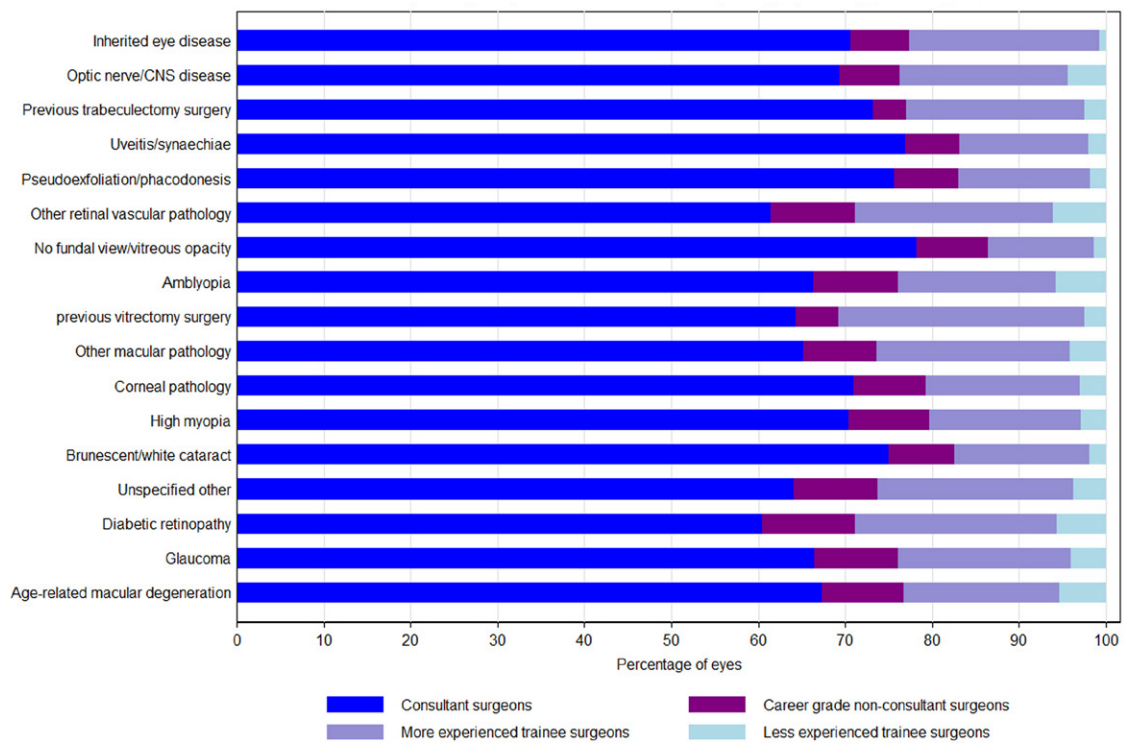


Figure 12: The percentage of cataract operations supplied to the national cataract audit with each individual ocular co-pathology by grade of surgeon



The second prospective year of the national cataract audit ran from 1st September 2016 to 31st August 2017

8.8 Operation characteristics

Phacoemulsification ± IOL was performed in all eligible cataract operations and for 172,869 (94.0%) operations was the only operative procedure performed. Phacoemulsification ± IOL was combined with one other procedure in 9,780 (5.3%) operations, with ≥2 other procedures in 1,163 (0.6%) operations.

The most frequently performed operative procedures that were combined with phacoemulsification ± IOL were anterior vitrectomy and insertion of pupil ring expander, which were performed in 0.8% and 0.6% of operations respectively. A full list of operative procedures combined with phacoemulsification ± IOL can be found in Appendix 5.

8.9 Operative complications

One or more intra-operative complication was recorded for 5,841 (3.2%) operations, with the most frequently recorded being PCR which was reported for 2,551 (1.4%) operations. The ‘any’ intra-operative complication rates were higher for the less experienced grade of surgeons, while the rates for individual intra-operative complications were similar across the grades of surgeon except for PCR and unspecified ‘other’ which were higher for the less experienced grades, Table 2.

Table 2: Recorded Intra-operative complications for cataract operations for the first year of the national audit by grade of surgeon

Intra-operative complications n (column %)	Consultant surgeons (N = 116,979)	Career grade non-consultant surgeons (N = 17,503)	More Experienced trainee surgeons (N = 40,574)	Less experienced trainee surgeons (N = 8,756)	Total (N = 183,812)
Eyes with no complications	113,857 (97.3)	16,964 (96.9)	38,854 (95.8)	8,296 (94.7)	177,971 (96.8)
Eyes with ≥1 complication	3,122 (2.7)	539 (3.1)	1,720 (4.2)	460 (5.3)	5,841 (3.2)
Recorded intra-operative complications*					
Posterior capsular rupture	1,286 (1.1)	270 (1.5)	793 (2.0)	202 (2.3)	2,551 (1.4)
Zonule rupture – no vitreous loss	406 (0.3)	57 (0.3)	212 (0.5)	39 (0.4)	714 (0.4)
Corneal epithelial abrasion	269 (0.2)	31 (0.2)	109 (0.3)	46 (0.5)	455 (0.2)
Torn iris / damage from the phaco	218 (0.2)	40 (0.2)	122 (0.3)	22 (0.3)	402 (0.2)
Lens exchange required / other IOL problems	136 (0.1)	26 (0.1)	60 (0.1)	17 (0.2)	239 (0.1)
Anterior capsular tear	84 (<0.1)	17 (0.1)	107 (0.3)	18 (0.2)	226 (0.1)
Endothelial damage / Descemet's tear	113 (0.1)	16 (<0.1)	51 (0.1)	15 (0.2)	195 (0.1)
Iris prolapse	83 (<0.1)	8 (<0.1)	68 (0.2)	20 (0.2)	179 (0.1)
Corneal oedema	85 (<0.1)	10 (<0.1)	45 (0.1)	26 (0.3)	166 (<0.1)
Iris trauma	78 (<0.1)	12 (<0.1)	44 (0.1)	10 (0.1)	144 (<0.1)
Hyphaema	66 (<0.1)	7 (<0.1)	29 (<0.1)	3 (<0.1)	105 (<0.1)
Phaco burn / wound problems	46 (<0.1)	4 (<0.1)	29 (<0.1)	10 (0.1)	89 (<0.1)
Choroidal / suprachoroidal haemorrhage	26 (<0.1)	3 (<0.1)	11 (<0.1)	1 (<0.1)	41 (<0.1)
Unspecified other**	563 (0.5)	77 (0.4)	227 (0.6)	73 (0.8)	940 (0.5)

*Each operation can have more than one intra-operative complication recorded.

**The unspecified other included one corneal perforation, one wound leak, two vitreous haemorrhages, three decentred IOL and fourteen instances when the operation was cancelled.

8.10 Postoperative complications

Of the 183,812 eligible cataract operations submitted to the audit, 152,663 (83.1%) operations were performed before 30th June 2017 and had the potential for two months follow up. Of these 89,248 (58.5%) operations had no postoperative complication data recorded, 55,341 (36.3%) had 'none' recorded as the postoperative complication and 8,074 (5.3%) had at least one postoperative complication recorded.

The percentage of operations with a postoperative complication record (none or a complication) or no postoperative complication record varied significantly between the participating centres, with nine centres having no records of any specific postoperative complications, Figures 13a and 13b.

The most frequently recorded postoperative complication were postoperative uveitis, corneal oedema / striae and cystoid macular oedema which were the only individual postoperative complications recorded for >1.0% of operations, Figure 14.

Figure 13a: The percentage of eligible cataract operations supplied to the national cataract audit with and without recorded post-operative complication data by participating centre

Established centres with data in the first year report

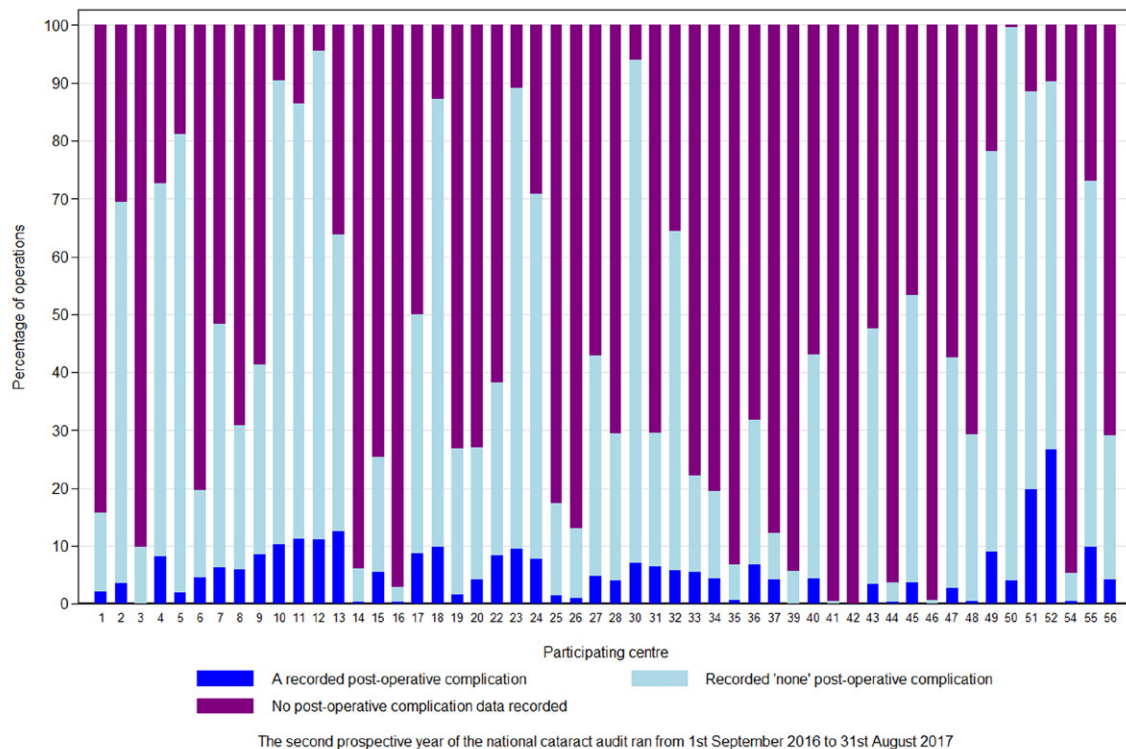


Figure 13b: The percentage of eligible cataract operations supplied to the national cataract audit with and without recorded post-operative complication data by participating centre

Recently joining centres without data in the first year report

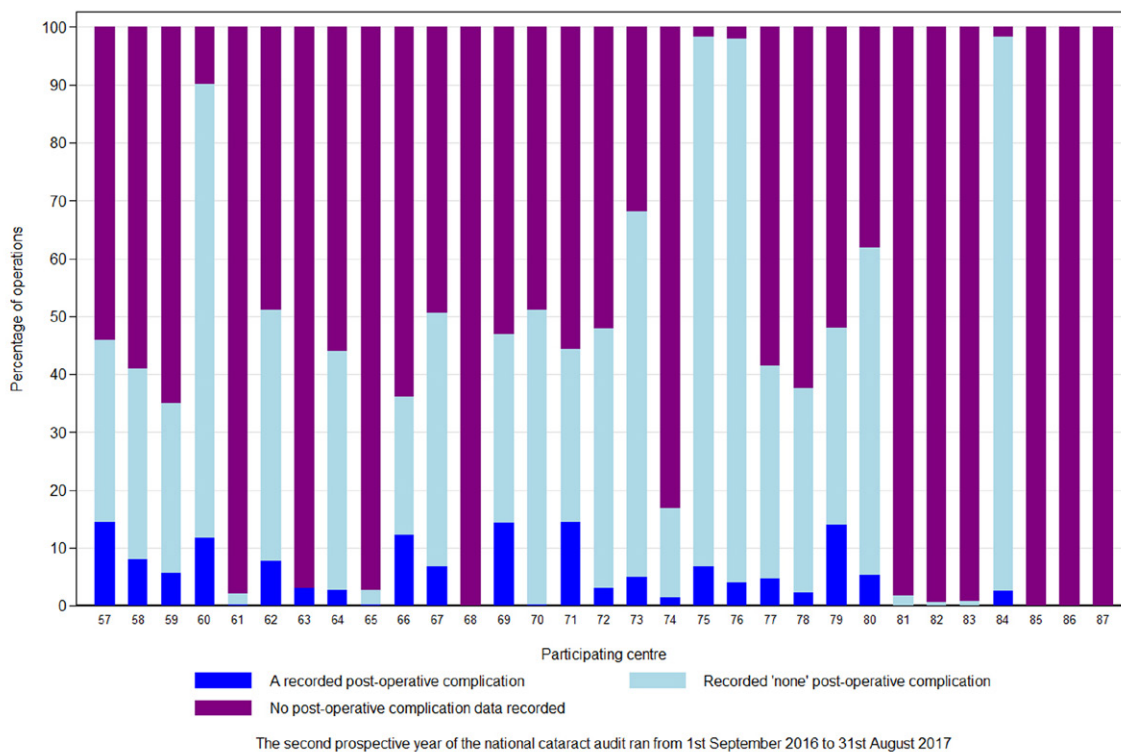
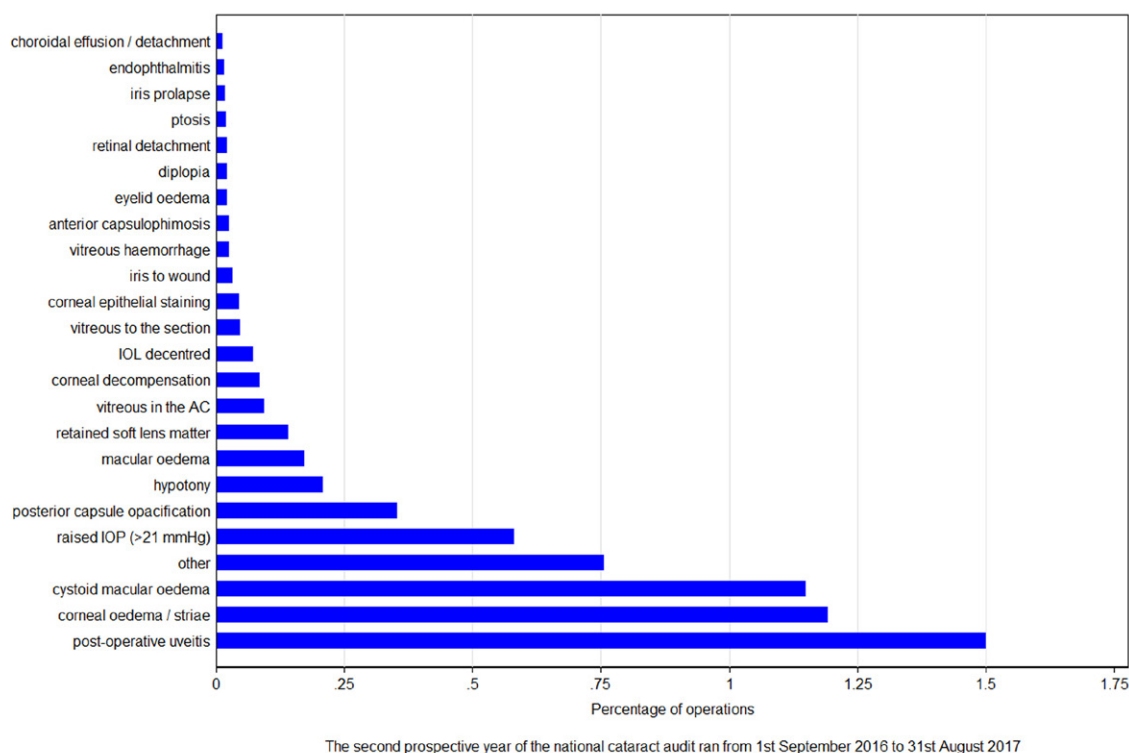


Figure 14: The percentage of eligible cataract operations supplied to the national cataract audit with each individual post-operative complication

N = 152,663 operations from 83 participating centres



8.11 Postoperative visual acuity

Of the 183,812 eligible cataract operations submitted to the audit, 152,663 (83.1%) operations were performed before 30th June 2017 and had the potential for two months follow up. Of these a postoperative visual acuity was recorded for 108,680 (71.2%) eyes and missing for 43,983 (28.8%) eyes. A further 8 operations from 2 centres were excluded from post-operative results as these centres had 2 and 6 operations with post-operative VA data respectively. Eligible for post-operative VA analysis are 108,672 operations from 78 contributing centres.

There was wide variation in the percentage of eyes with postoperative VA by contributing centre, for 18 (23.1%) centres <50% of eyes had a post-operative VA, for 31 (39.7%) centres >80% of eyes had a post-operative VA and for only 1 (1.3%) centre >95% of eyes had a post-operative VA, Figures 15a and 15b. Influencing this result are operations performed in the latter part of the audit period where follow up times may have been too brief for all post op results to be available, and discharge to the community for the post-operative refraction and visual acuity assessments.

For 52 centres with post-operative VA data in the first and second prospective audit years, 19 (36.5%) centres had >5% points higher percentage of eyes with a post-operative VA in year 2 than year 1, 25 (48.1%) centres year 2 percentage of eyes with a post-operative VA was within $\pm 5\%$ points of their year 1 percentage and 8 (15.4%) centres had >5% points higher percentage of eyes with a post-operative VA in year 1 than year 2, Figure 16.

The overall percentage of eyes with a post-operative VA for the 52 centres with data in both audit years was 69.8% in year 1 and 71.2% in year 2. For the recently joining centres, their overall percentage of eyes with a post-operative VA was 71.0%.

For the 108,672 eyes with a postoperative VA measurement, the best measurement was CDVA in 35,988 (33.1%) eyes, UDVA in 32,029 (29.5%) eyes, PHVA in 21,645 (19.9%) eyes; the best measurement was the same for two of the assessment methods for 17,641 (16.2%) eyes and the same for all three methods in 1,369 (1.3%) eyes.

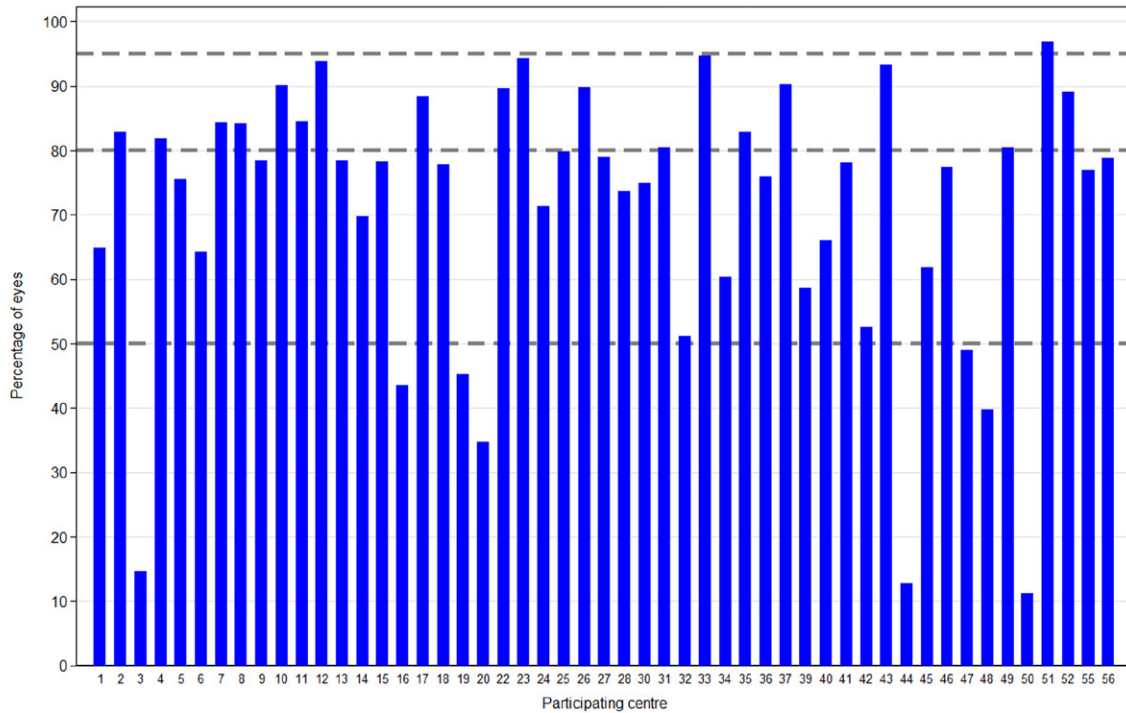
The median postoperative VA was 0.10 LogMAR units (range; -0.30 – NPL) (6/7.5 Snellen equivalent); where 411 (0.4%) eyes were CF, 205 (0.2%) eyes were HM, 57 (<0.1%) eyes were PL and 3 (<0.1%) eyes were NPL.

The postoperative VA was 0.30 LogMAR units (6/12) or better for 96,623 (88.9%) eyes, 0.60 LogMAR units (6/24) or better for 104,329 (96.0%) eyes and 1.0 LogMAR units (6/60) or better for 107,141 (98.6%) eyes (Table 3).

The postoperative VA was fairly stable across participating centres, Figures 17a and 17b.

Figure 15a: The percentage of eligible cataract operations supplied to the national cataract audit with a valid post-operative VA by participating centre

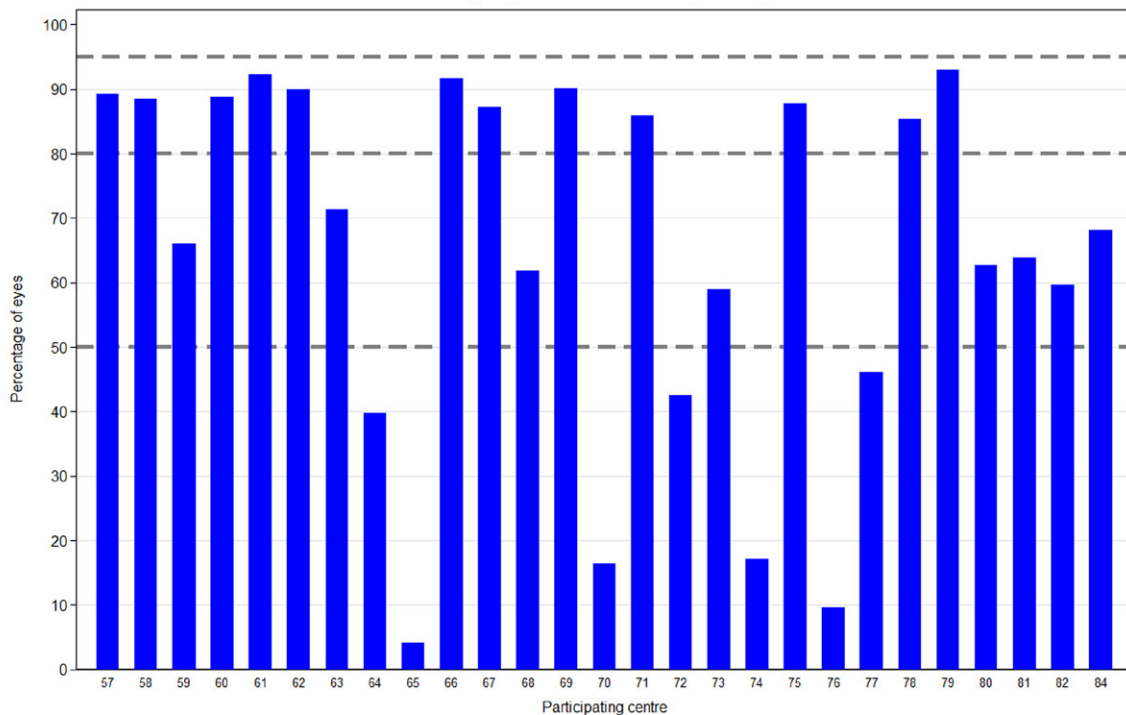
Established centres with data in the first year report



The second prospective year of the national cataract audit ran from 1st September 2016 to 31st August 2017

Figure 15b: The percentage of eligible cataract operations supplied to the national cataract audit with a valid post-operative VA by participating centre

Recently joining centres without data in the first year report



The second prospective year of the national cataract audit ran from 1st September 2016 to 31st August 2017

Figure 16: The percentage of cataract operations with a valid post-operative VA for 52 participating centres with data in both audit years 1 and 2

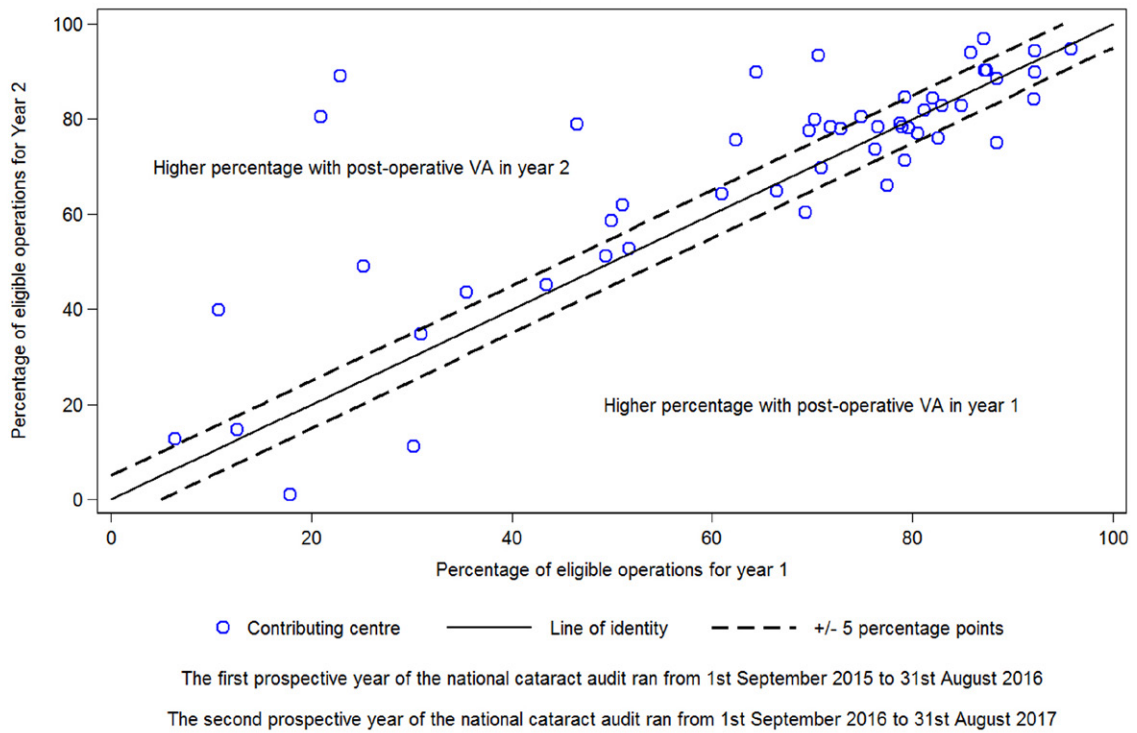


Figure 17a: Post-operative LogMAR visual acuity for eligible cataract operations supplied to the national cataract audit by participating centre

Established centres with data in the first year report

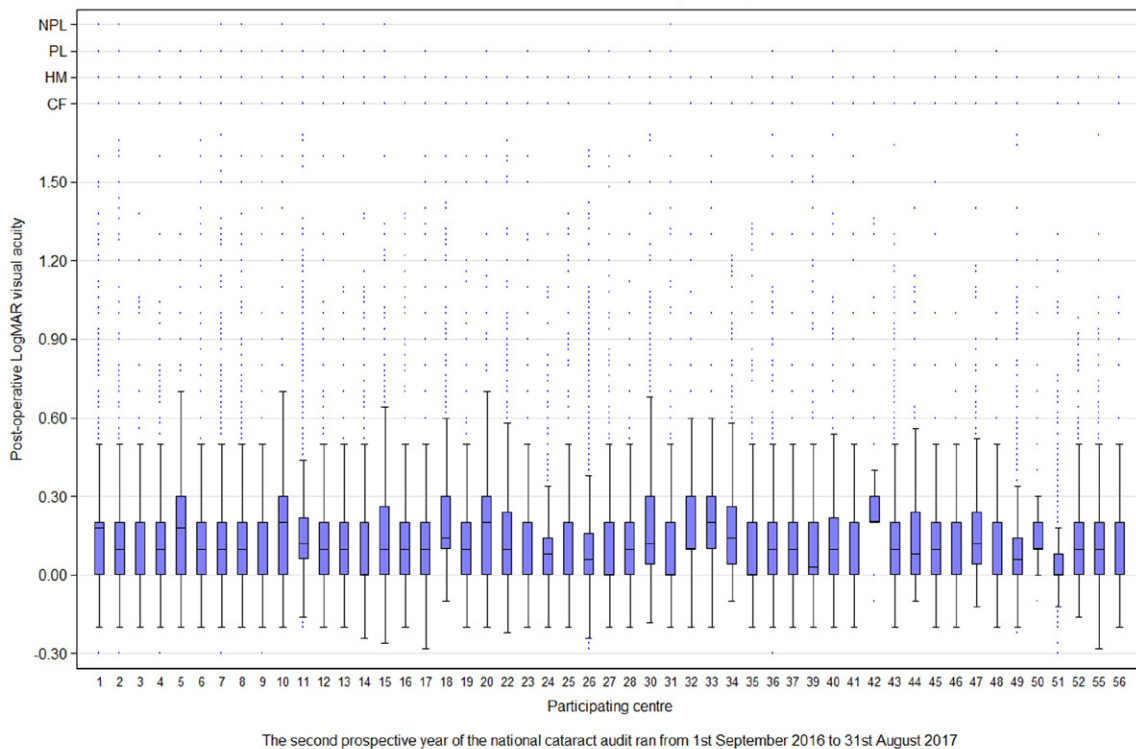
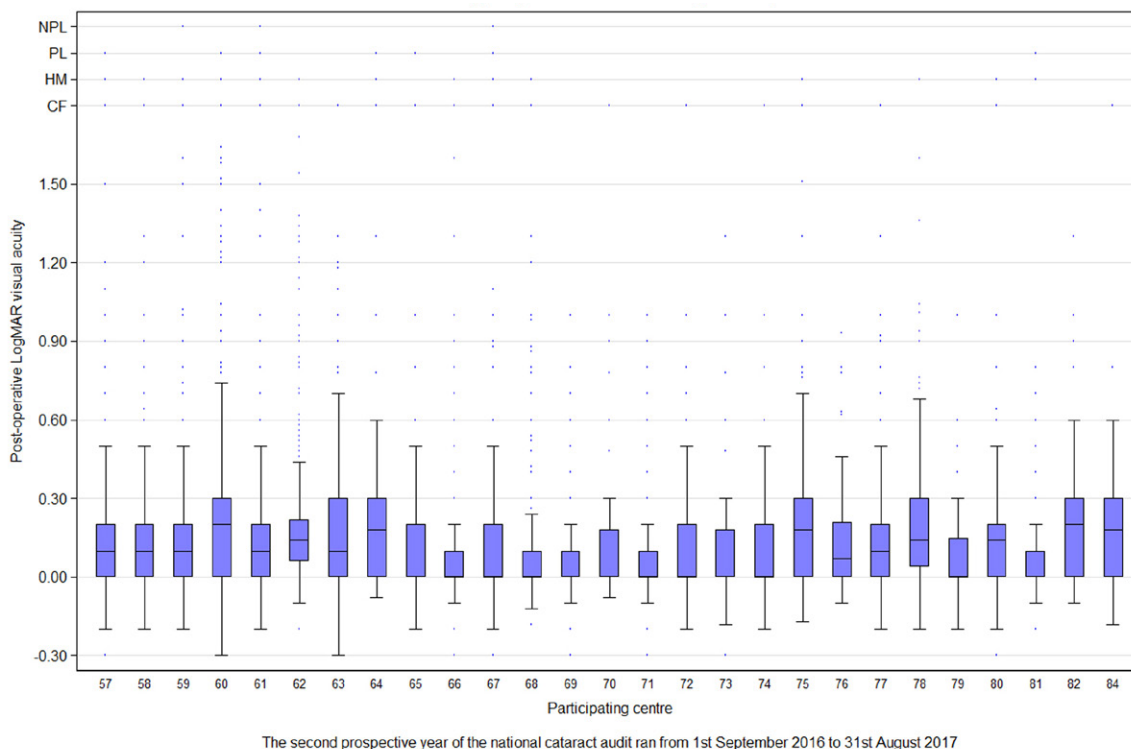


Figure 17b: Post-operative LogMAR visual acuity for eligible cataract operations supplied to the national cataract audit by participating centre

Recently joining centres without data in the first year report



8.12 Change in visual acuity

Of the 152,663 eligible cataract operations submitted to the audit performed before 30th June 2017, 97,381 (63.8%) eyes had both a preoperative VA and a postoperative VA measurement. A further 4 operations from 2 centres are excluded as these centres had only 2 eyes each with both a pre- and post-operative VA. Eligible for change in VA analysis are 97,377 operations from 78 participating centres.

For 52 centres with change in VA data in the first and second prospective audit years, 18 (34.6%) centres had >5% points higher percentage of eyes with change in VA data in year 2 than year 1, 23 (44.2%) centres year 2 percentage of eyes with change in VA data was within $\pm 5\%$ points of their year 1 percentage and 11 (21.2%) centres had >5% points higher percentage of eyes with change in VA data in year 1 than year 2, Figure 18.

The overall percentage of eyes with change in VA data for the 52 centres with data in both audit years was 62.9% in year 1 and 64.1% in year 2. For the recently joining centres, their overall percentage of eyes with change in VA data was 62.7%.

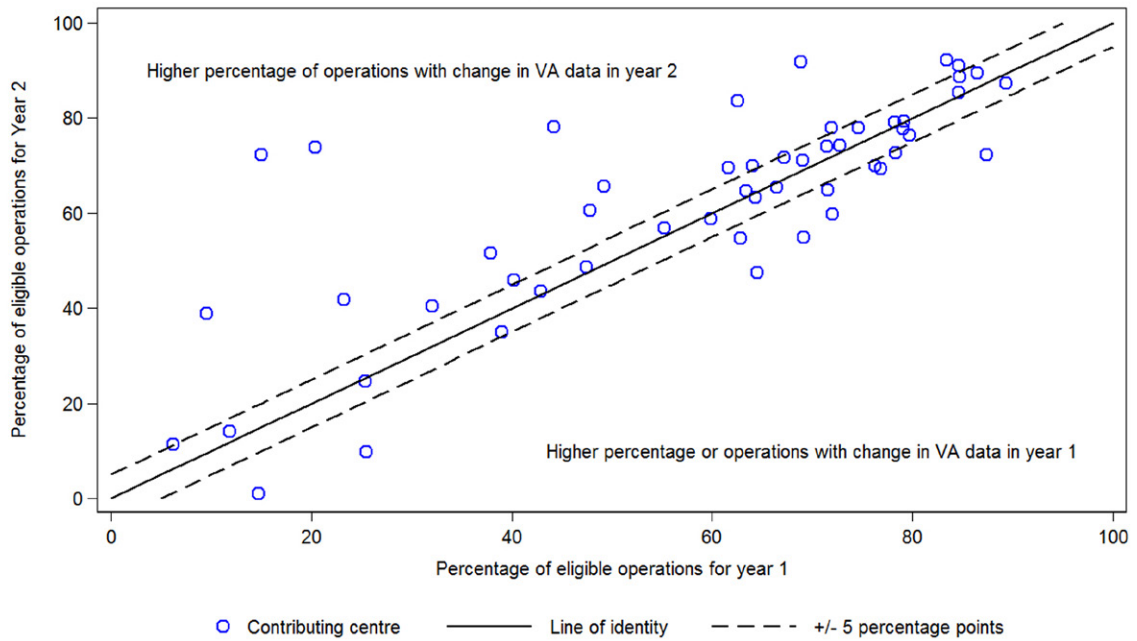
The median change in VA from baseline was a 0.34 LogMAR gain (IQR; 0.20 – 0.60 gain). A loss of >0.10 LogMAR (-1 line) was experienced by 3,158 (3.2%) eyes, a change of ± 0.10 LogMAR (± 1 line) by 9,159 (9.4%) eyes and a gain of >0.10 LogMAR (+1 line) by 85,060 (87.4%) eyes. The change in VA was fairly stable between the participating centres, Figures 19a and 19b.

76% of eyes with a presenting VA of 0.00 LogMAR or better had a postoperative VA of 0.00 LogMAR or better and 96% of eyes with a presenting VA of 0.30 LogMAR or better had a postoperative VA of 0.30 LogMAR or better.

Eyes that had an ocular co-pathology or experienced an intra-operative complication or PCR during surgery had worse postoperative VA than eyes that did not have any of these problems. >89% of eyes without these problems had a postoperative VA of 0.30 LogMAR (6/12 Snellen) or better, Table 3.

The percentage of operations from each participating centre with preoperative VA, postoperative VA and both pre- and postoperative VA data varied between participating centres, Table 4.

Figure 18: The percentage of eligible cataract operations supplied to the national cataract with both a valid pre-operative and post-operative VA measurement for 52 participating centres with data in both audit years 1 and 2

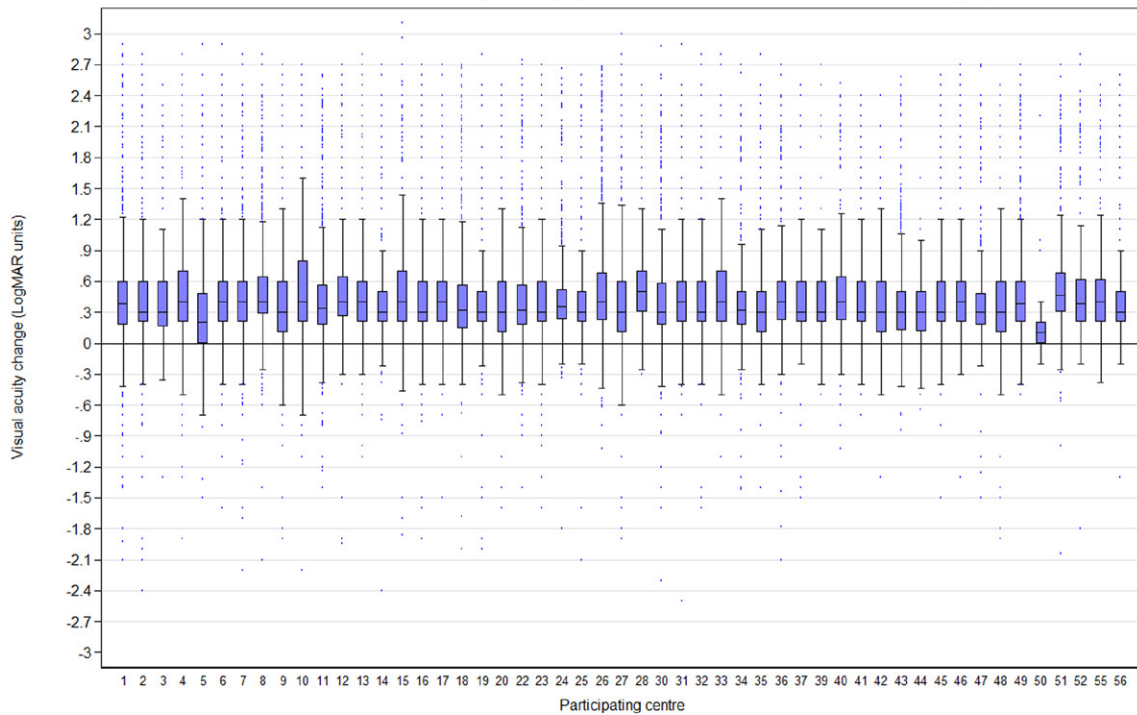


The first prospective year of the national cataract audit ran from 1st September 2015 to 31st August 2016

The second prospective year of the national cataract audit ran from 1st September 2016 to 31st August 2017

Figure 19a: Box and whisker plots of VA change for eligible cataract operations supplied to the national cataract audit by participating centre (Below the horizontal line is VA loss and above the line VA gain)

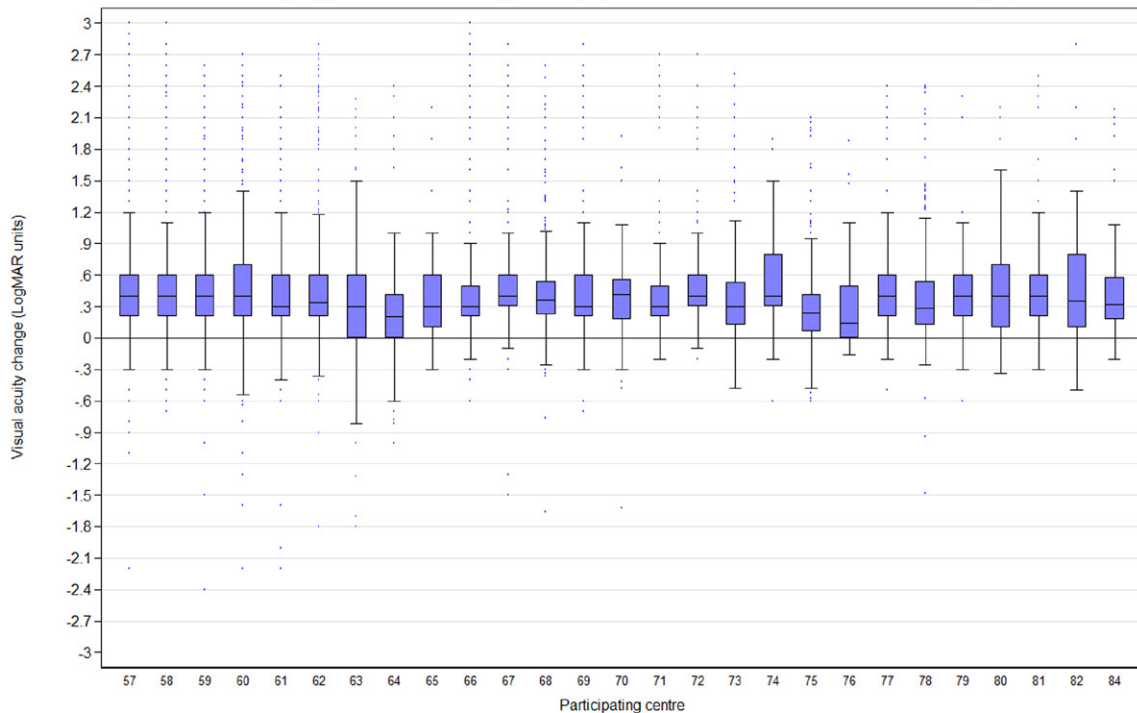
Established centres with data in the year one report



The second prospective year of the national cataract audit ran from 1st September 2016 to 31st August 2017

Figure 19b: Box and whisker plots of VA change for eligible cataract operations supplied to the national cataract audit by participating centre (Below the horizontal line is VA loss and above the line VA gain)

Recently joining centres without data in the year one report



The second prospective year of the national cataract audit ran from 1st September 2016 to 31st August 2017

Table 3: Postoperative VA by preoperative VA, ocular co-pathology and intra-operative complications.

Percentages are row % (Approximate Snellen)	Postoperative LogMAR visual acuity				
	≤0.00 (6/6 or better)	≤0.18 (6/9 or better)	≤0.30 (6/12 or better)	≤0.60 (6/24 or better)	≤1.00 (6/60 or better)
All eyes (N = 97,377)	40.4	62.6	89.2	96.1	98.6
Presenting LogMAR VA (Snellen)					
≤0.00 (N = 2,007)	76.3	87.4	98.3	99.8	100.0
≤0.18 (N = 5,598)	61.1	86.3	97.3	99.6	100.0
≤0.30 (N = 32,399)	50.2	72.4	96.6	99.5	99.9
≤0.60 (N = 68,651)	43.4	66.8	93.9	99.2	99.8
≤1.00 (N = 87,270)	41.8	64.5	91.5	97.9	99.7
Ocular co-pathology					
No (N = 54,320)	47.7	70.7	94.9	98.9	99.7
Yes (N = 43,057)	31.2	52.4	82.0	92.5	97.2
Intra-operative complications					
No (N = 94,563)	40.9	63.1	89.6	96.3	98.7
Yes (N = 2,814)	25.8	45.1	77.1	89.2	95.1
PCR					
No (N = 96,093)	40.7	62.9	89.4	96.2	98.7
Yes (N = 1,284)	23.0	39.0	72.8	86.8	93.6

Table 4: The percentage of eyes with preoperative VA, postoperative VA and change in VA data for participating centres in the audit.

Centre name	Centre number	Number of operations	% with preoperative VA data	Number of operations eligible for postoperative VA results	% with postoperative VA data	% with change in VA data
Moorfields Eye Hospital NHS Foundation Trust	1	18,659	69.8	15,445	64.8	58.7
The Newcastle upon Tyne Hospitals NHS Foundation Trust	2	8,761	91.8	7,378	82.8	76.4
Norfolk and Norwich University Hospitals NHS Foundation Trust	3	4,407	94.1	3,774	14.7	14.0
Leeds Teaching Hospitals NHS Trust	4	4,409	93.2	3,686	81.9	77.6
York Teaching Hospital NHS Foundation Trust	5	4,238	66.2	3,611	75.6	51.5
Oxford University Hospitals NHS Foundation Trust	6	4,229	85.6	3,544	64.3	56.9
University Hospitals Bristol NHS Foundation Trust	7	4,504	92.8	3,635	84.4	79.2
Gloucestershire Hospitals NHS Foundation Trust	8	3,532	79.9	2,998	84.2	69.2
Sheffield Teaching Hospitals NHS Foundation Trust	9	3,417	94.1	2,961	78.4	74.3
Sandwell and West Birmingham Hospitals NHS Trust	10	3,542	86.1	2,889	90.2	78.0
University Hospital Southampton NHS Foundation Trust	11	2,862	90.7	2,444	84.5	77.9
Royal Berkshire NHS Foundation Trust	12	3,132	98.0	2,644	93.9	92.2
Calderdale and Huddersfield NHS Foundation Trust	13	2,600	86.5	2,137	78.4	69.5
Mid Cheshire Hospitals NHS Foundation Trust	14	2,403	92.4	2,004	69.8	65.4

Table 4 continued: The percentage of eyes with preoperative VA, postoperative VA and change in VA data for participating centres in the audit.

Centre name	Centre number	Number of operations	% with preoperative VA data	Number of operations eligible for postoperative VA results	% with postoperative VA data	% with change in VA data
The Mid Yorkshire Hospitals NHS Trust	15	2,295	85.8	1,961	78.2	65.5
Cardiff & Vale University LHB	16	2,625	93.4	2,294	43.5	40.5
Epsom and St Helier University Hospitals NHS Trust	17	2,335	95.3	1,876	88.4	85.3
Barts Health NHS Trust	18	2,656	82.5	2,126	77.8	64.6
Frimley Health NHS Foundation Trust	19	3,021	94.8	2,533	45.2	43.5
Bradford Teaching Hospitals NHS Foundation Trust	20	2,344	71.5	1,974	34.7	24.6
Plymouth Hospitals NHS Trust	22	2,625	93.7	2,224	89.7	83.7
University Hospitals Birmingham NHS Foundation Trust	23	1,819	95.1	1,544	94.4	89.4
Hampshire Hospitals NHS Foundation Trust	24	2,098	91.4	1,752	71.3	64.8
Royal Cornwall Hospitals NHS Trust	25	1,878	88.7	1,506	79.9	71.6
Central Manchester University Hospitals NHS Foundation Trust	26	2,792	96.7	2,263	89.8	87.3
King's College Hospital NHS Foundation Trust	27	4,862	93.2	4,057	79.0	74.0
Shrewsbury and Telford Hospital NHS Trust	28	1,971	73.9	1,536	73.6	54.9
The Hillingdon Hospitals NHS Foundation Trust	30	2,052	92.8	1,785	75.0	69.9
Aintree University Hospital NHS Foundation Trust	31	1,303	86.6	1,143	80.5	69.9
Royal United Hospitals Bath NHS Foundation Trust	32	1,498	87.0	1,181	51.1	46.0
Chesterfield Royal Hospital NHS Foundation Trust	33	1,558	77.7	1,308	94.7	72.2
Mid Essex Hospital Services NHS Trust	34	1,631	75.9	1,387	60.3	47.4
Harrogate and District NHS Foundation Trust	35	1,450	94.8	1,253	82.8	79.0
North West Anglia NHS Foundation Trust	36	2,908	94.9	2,404	76.0	72.7
Northern Devon Healthcare NHS Trust	37	1,283	97.5	1,102	90.3	88.6
Wirral University Teaching Hospital NHS Foundation Trust	39	1,107	61.1	894	58.6	34.9
South Warwickshire NHS Foundation Trust	40	1,408	89.0	1,161	66.1	59.8
Isle of Wight NHS Trust	41	1,293	83.4	1,045	78.2	63.3
St Helens and Knowsley Teaching Hospitals NHS Trust	42	1,472	91.5	1,177	52.7	48.7
Wrightington, Wigan and Leigh NHS Foundation Trust	43	1,381	98.3	1,204	93.3	91.7
Warrington and Halton Hospitals NHS Foundation Trust	44	1,273	91.0	1,126	12.8	11.4
South Tees Hospitals NHS Foundation Trust	45	1,843	95.8	1,546	61.9	60.6
The Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust	46	2,276	92.0	1,918	77.5	71.2
Barking, Havering and Redbridge University Hospitals NHS Trust	47	1,544	84.5	1,379	49.0	41.8
Royal Free London NHS Foundation Trust	48	2,200	94.2	1,934	39.8	38.9
University Hospitals Coventry and Warwickshire NHS Trust	49	2,343	91.0	1,888	80.5	73.7
Barnsley Hospital NHS Foundation Trust	50	564	70.4	545	11.2	9.7
Salisbury NHS Foundation Trust	51	1,279	94.1	1,013	96.9	90.9
London North West University Healthcare NHS Trust	52	546	83.2	475	89.1	72.2

Table 4 continued: The percentage of eyes with preoperative VA, postoperative VA and change in VA data for participating centres in the audit.

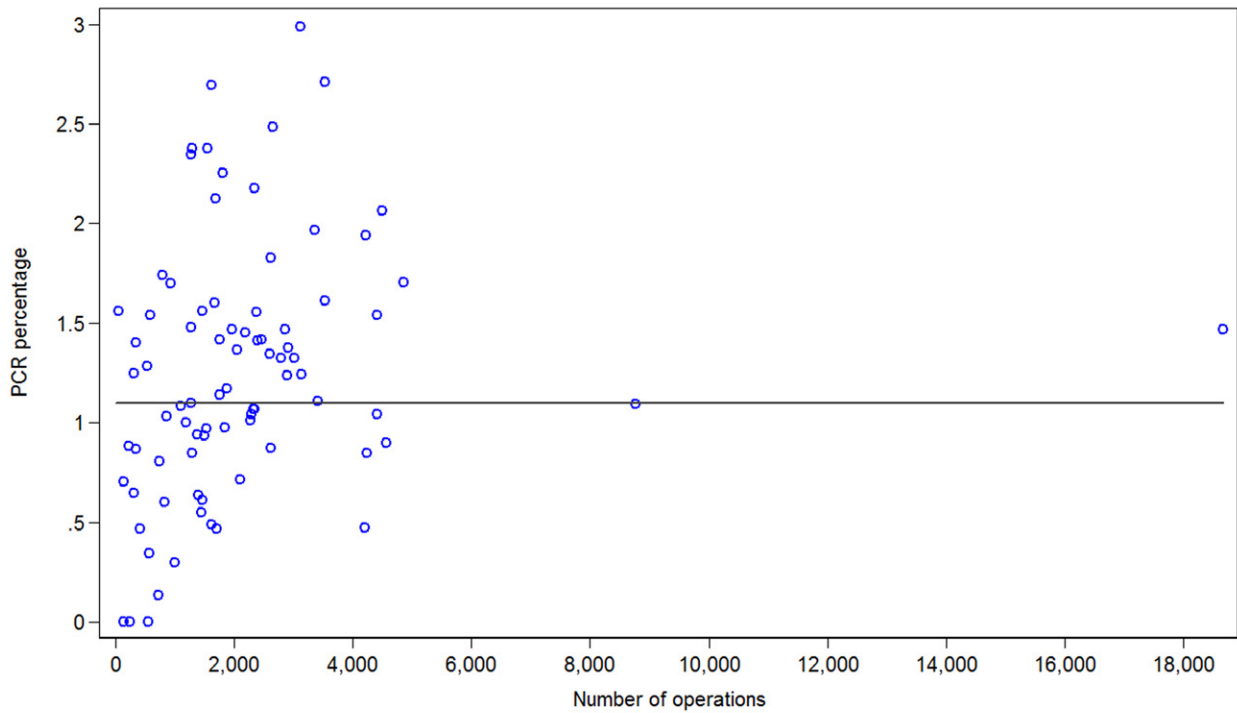
Centre name	Centre number	Number of operations	% with preoperative VA data	Number of operations eligible for postoperative VA results	% with postoperative VA data	% with change in VA data
University Hospitals of Morecambe Bay NHS Foundation Trust	54	226	67.7	226	0.9	0.9
Nottingham University Hospitals NHS Trust	55	1,198	70.4	954	76.9	54.6
Yeovil District Hospital NHS Foundation Trust	56	744	99.2	612	78.9	78.1
SpaMedica (Manchester)	57	4,570	98.9	3,950	89.2	88.4
SpaMedica (Wakefield)	58	4,214	99.0	3,320	88.6	87.9
East Sussex Healthcare NHS Trust	59	3,356	80.7	2,838	66.0	56.6
Imperial College Healthcare NHS Trust	60	3,114	84.3	2,463	88.8	74.9
Portsmouth Hospitals NHS Trust	61	2,905	81.6	2,505	92.2	74.2
Heart of England NHS Foundation Trust	62	2,465	86.5	2,042	89.9	77.4
Cambridge University Hospitals NHS Foundation Trust	63	2,380	67.2	2,111	71.4	46.9
East Kent Hospitals University NHS Foundation Trust	64	1,764	82.6	1,362	39.7	32.5
The Ipswich Hospital NHS Trust	65	1,754	91.3	1,428	4.1	3.9
SpaMedica (Wirral)	66	1,710	99.4	1,383	91.7	91.0
County Durham and Darlington NHS Foundation Trust	67	1,692	81.7	1,399	87.2	71.8
United Lincolnshire Hospitals NHS Trust	68	1,683	92.6	1,455	61.8	57.0
SpaMedica (Newton-le-Willows)	69	1,629	99.2	1,373	90.2	89.6
Northampton General Hospital NHS Trust	70	1,470	70.1	1,193	16.4	9.9
SpaMedica (Liverpool)	71	1,005	98.9	798	86.0	85.1
James Paget University Hospitals NHS Foundation Trust	72	942	78.3	715	42.5	35.4
Bolton NHS Foundation Trust	73	871	92.2	590	59.0	54.9
Kingston Hospital NHS Foundation Trust	74	829	46.7	576	17.2	6.8
Northern Lincolnshire and Goole NHS Foundation Trust	75	803	63.5	803	87.8	56.7
The Rotherham NHS Foundation Trust	76	734	95.4	710	9.6	9.4
Torbay and South Devon NHS Foundation Trust	77	585	95.7	364	46.2	44.2
Great Western Hospitals NHS Foundation Trust	78	576	96.0	388	85.3	84.0
SpaMedica (Bolton)	79	425	99.5	129	93.0	92.2
The Princess Alexandra Hospital NHS Trust	80	357	96.9	228	62.7	61.4
Wye Valley NHS Trust	81	346	54.9	282	63.8	41.5
Cwm Taf University LHB	82	320	56.6	139	59.7	21.6
Sherwood Forest Hospitals NHS Foundation Trust	83	309	40.1	254	2.4	0.8
Royal Surrey County Hospital NHS Foundation Trust	84	252	92.5	230	68.3	64.8

8.13 Case complexity adjusted PCR results

Unadjusted for case complexity PCR rates for the 83 participating centres are shown on Figure 20 and an adjusted for case complexity graph in Figure 21. None of the participating centres were outliers in the second year of the audit. Details of the unadjusted and adjusted for case complexity PCR results for the 83 participating centres can be found in Table 5, along with a case complexity index which is the overall predicted probability of PCR for all the cases reported for each centre.

Figure 20: Unadjusted for case complexity PCR funnel plot for participating centres.

N = 183,812 operations from 83 participating centres

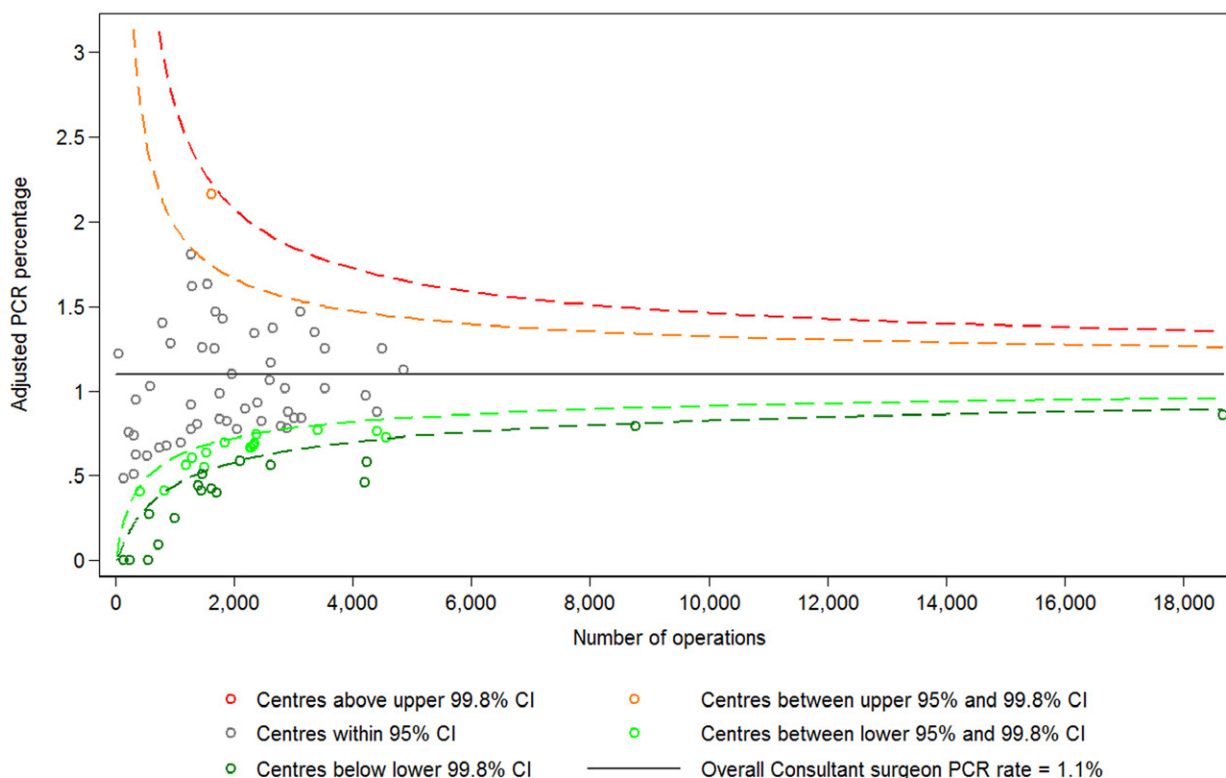


○ Participating centres unadjusted PCR rate — Overall Consultant surgeon PCR rate = 1.1%

The second prospective year of the national cataract audit ran from 1st September 2016 to 31st August 2017

Figure 21: Adjusted for case complexity PCR funnel plot for participating centres.

N = 183,812 operations from 83 participating centres



The second prospective year of the national cataract audit ran from 1st September 2016 to 31st August 2017; CI = Confidence Interval

Table 5: Posterior capsular rupture and VA Loss results for participating centres in the audit.

Centre name	Centre number	Posterior Capsular rupture Overall Consultant surgeon PCR rate = 1.1%				Visual Acuity loss Overall Consultant surgeon VA Loss rate = 0.9%			
		Number of operations	Unadjusted PCR rate (%)	Case complexity index (%)	Adjusted PCR rate (%)	Number of operations	Unadjusted VA Loss rate (%)	Case complexity index (%)	Adjusted VA Loss rate (%)
Moorfields Eye Hospital NHS Foundation Trust	1	18,659	1.47	1.87	0.86				
The Newcastle upon Tyne Hospitals NHS Foundation Trust	2	8,761	1.10	1.53	0.79	5,636	0.75	0.77	0.87
Norfolk and Norwich University Hospitals NHS Foundation Trust	3	4,407	1.04	1.50	0.76				
Leeds Teaching Hospitals NHS Trust	4	4,409	1.54	1.93	0.88	2,862	1.05	0.98	0.96
York Teaching Hospital NHS Foundation Trust	5	4,238	0.85	1.61	0.58				
Oxford University Hospitals NHS Foundation Trust	6	4,229	1.94	2.20	0.97				
University Hospitals Bristol NHS Foundation Trust	7	4,504	2.06	1.81	1.25	2,879	1.08	0.98	0.99
Gloucestershire Hospitals NHS Foundation Trust	8	3,532	1.61	1.75	1.01	2,076	0.48	0.88	0.49

The case complexity index is an estimate of the overall predicted probability of the adverse event based on the reported case complexity.

Table 5 continued: Posterior capsular rupture and VA Loss results for participating centres in the audit.

		Posterior Capsular rupture Overall Consultant surgeon PCR rate = 1.1%				Visual Acuity loss Overall Consultant surgeon VA Loss rate = 0.9%			
Centre name	Centre number	Number of operations	Unadjusted PCR rate (%)	Case complexity index (%)	Adjusted PCR rate (%)	Number of operations	Unadjusted VA Loss rate (%)	Case complexity index (%)	Adjusted VA Loss rate (%)
Sheffield Teaching Hospitals NHS Foundation Trust	9	3,417	1.11	1.60	0.77	2,199	1.27	0.93	1.24
Sandwell and West Birmingham Hospitals NHS Trust	10	3,542	2.71	2.38	1.25	2,254	1.02	0.91	1.01
University Hospital Southampton NHS Foundation Trust	11	2,862	1.47	1.59	1.02	1,905	0.79	0.97	0.73
Royal Berkshire NHS Foundation Trust	12	3,132	1.25	1.63	0.84	2,439	0.29	0.73	0.35
Calderdale and Huddersfield NHS Foundation Trust	13	2,600	1.35	1.39	1.06	1,485	0.94	0.91	0.93
Mid Cheshire Hospitals NHS Foundation Trust	14	2,403	1.41	1.68	0.93	1,311	0.69	0.85	0.73
The Mid Yorkshire Hospitals NHS Trust	15	2,295	1.05	1.73	0.66	1,285	0.78	1.10	0.64
Cardiff & Vale University LHB	16	2,625	1.83	1.72	1.17				
Epsom and St Helier University Hospitals NHS Trust	17	2,335	1.07	1.74	0.68	1,601	0.50	0.91	0.50
Barts Health NHS Trust	18	2,656	2.48	1.99	1.38	1,374	0.58	0.74	0.71
Frimley Health NHS Foundation Trust	19	3,021	1.32	1.73	0.84				
Bradford Teaching Hospitals NHS Foundation Trust	20	2,344	2.18	1.78	1.34				
Plymouth Hospitals NHS Trust	22	2,625	0.88	1.72	0.56	1,861	0.81	1.03	0.70
University Hospitals Birmingham NHS Foundation Trust	23	1,819	2.25	1.74	1.43	1,381	1.01	0.87	1.05
Hampshire Hospitals NHS Foundation Trust	24	2,098	0.71	1.34	0.59	1,136	0.26	0.77	0.31
Royal Cornwall Hospitals NHS Trust	25	1,878	1.17	1.56	0.83	1,079	0.65	0.95	0.62
Central Manchester University Hospitals NHS Foundation Trust	26	2,792	1.33	1.84	0.79	1,976	0.91	0.79	1.04
King's College Hospital NHS Foundation Trust	27	4,862	1.71	1.67	1.13	3,004	0.90	1.00	0.81
Shrewsbury and Telford Hospital NHS Trust	28	1,971	1.47	1.47	1.10				
The Hillingdon Hospitals NHS Foundation Trust	30	2,052	1.36	1.93	0.78	1,248	1.68	0.76	1.98
Aintree University Hospital NHS Foundation Trust	31	1,303	2.38	1.61	1.62	799	0.75	0.97	0.70
Royal United Hospitals Bath NHS Foundation Trust	32	1,498	0.93	1.86	0.55				
Chesterfield Royal Hospital NHS Foundation Trust	33	1,558	2.37	1.60	1.63	944	0.53	0.85	0.56

The case complexity index is an estimate of the overall predicted probability of the adverse event based on the reported case complexity.

Table 5 continued: Posterior capsular rupture and VA Loss results for participating centres in the audit.

		Posterior Capsular rupture Overall Consultant surgeon PCR rate = 1.1%				Visual Acuity loss Overall Consultant surgeon VA Loss rate = 0.9%			
Centre name	Centre number	Number of operations	Unadjusted PCR rate (%)	Case complexity index (%)	Adjusted PCR rate (%)	Number of operations	Unadjusted VA Loss rate (%)	Case complexity index (%)	Adjusted VA Loss rate (%)
Mid Essex Hospital Services NHS Trust	34	1,631	2.70	1.37	2.16				
Harrogate and District NHS Foundation Trust	35	1,450	0.55	1.46	0.42	990	1.41	0.98	1.30
North West Anglia NHS Foundation Trust	36	2,908	1.38	1.73	0.88	1,748	0.80	1.01	0.72
Northern Devon Healthcare NHS Trust	37	1,283	1.48	1.78	0.92	976	0.51	1.00	0.46
Wirral University Teaching Hospital NHS Foundation Trust	39	1,107	1.08	1.71	0.70				
South Warwickshire NHS Foundation Trust	40	1,408	0.64	1.59	0.44				
Isle of Wight NHS Trust	41	1,293	0.85	1.55	0.60	661	0.61	0.75	0.73
St Helens and Knowsley Teaching Hospitals NHS Trust	42	1,472	1.56	1.37	1.26				
Wrightington, Wigan and Leigh NHS Foundation Trust	43	1,381	0.94	1.29	0.80	1,104	0.45	0.78	0.52
Warrington and Halton Hospitals NHS Foundation Trust	44	1,273	1.10	1.56	0.77				
South Tees Hospitals NHS Foundation Trust	45	1,843	0.98	1.54	0.70	937	0.85	0.82	0.93
The Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust	46	2,276	1.01	1.66	0.67	1,365	0.29	0.67	0.39
Barking, Havering and Redbridge University Hospitals NHS Trust	47	1,544	0.97	1.67	0.64				
Royal Free London NHS Foundation Trust	48	2,200	1.45	1.79	0.89				
University Hospitals Coventry and Warwickshire NHS Trust	49	2,343	1.07	1.71	0.69	1,392	0.50	0.82	0.55
Barnsley Hospital NHS Foundation Trust	50	564	0.00	1.39	0.00				
Salisbury NHS Foundation Trust	51	1,279	2.35	1.43	1.81	921	0.43	0.77	0.51
London North West University Healthcare NHS Trust	52	546	1.28	2.29	0.62	343	0.29	0.85	0.31
University Hospitals of Morecambe Bay NHS Foundation Trust	54	226	0.88	1.28	0.76				
Nottingham University Hospitals NHS Trust	55	1,198	1.00	1.95	0.57				
Yeovil District Hospital NHS Foundation Trust	56	744	0.81	1.33	0.67	478	0.21	0.83	0.23
SpaMedica (Manchester)	57	4,570	0.90	1.36	0.72	3,490	0.32	0.72	0.39
SpaMedica (Wakefield)	58	4,214	0.47	1.14	0.46	2,918	0.24	0.68	0.32

The case complexity index is an estimate of the overall predicted probability of the adverse event based on the reported case complexity.

Table 5 continued: Posterior capsular rupture and VA Loss results for participating centres in the audit.

		Posterior Capsular rupture Overall Consultant surgeon PCR rate = 1.1%				Visual Acuity loss Overall Consultant surgeon VA Loss rate = 0.9%			
Centre name	Centre number	Number of operations	Unadjusted PCR rate (%)	Case complexity index (%)	Adjusted PCR rate (%)	Number of operations	Unadjusted VA Loss rate (%)	Case complexity index (%)	Adjusted VA Loss rate (%)
East Sussex Healthcare NHS Trust	59	3,356	1.97	1.61	1.35				
Imperial College Healthcare NHS Trust	60	3,114	2.99	2.24	1.47	1,846	1.41	0.98	1.30
Portsmouth Hospitals NHS Trust	61	2,905	1.24	1.75	0.78	1,859	0.70	0.86	0.73
Heart of England NHS Foundation Trust	62	2,465	1.42	1.90	0.82	1,580	0.70	0.95	0.66
Cambridge University Hospitals NHS Foundation Trust	63	2,380	1.55	2.29	0.75				
East Kent Hospitals University NHS Foundation Trust	64	1,764	1.42	1.58	0.99				
The Ipswich Hospital NHS Trust	65	1,754	1.14	1.51	0.83				
SpaMedica (Wirral)	66	1,710	0.47	1.29	0.40	1,259	0.16	0.73	0.19
County Durham and Darlington NHS Foundation Trust	67	1,692	2.13	1.59	1.47	1,004	0.80	0.86	0.83
United Lincolnshire Hospitals NHS Trust	68	1,683	1.60	1.41	1.25				
SpaMedica (Newton-le-Willows)	69	1,629	0.49	1.27	0.42	1,230	0.24	0.74	0.29
Northampton General Hospital NHS Trust	70	1,470	0.61	1.33	0.51				
SpaMedica (Liverpool)	71	1,005	0.30	1.33	0.25	679	0.00	0.68	0.00
James Paget University Hospitals NHS Foundation Trust	72	942	1.70	1.46	1.28				
Bolton NHS Foundation Trust	73	871	1.03	1.68	0.68				
Kingston Hospital NHS Foundation Trust	74	829	0.60	1.61	0.41				
Northern Lincolnshire and Goole NHS Foundation Trust	75	803	1.74	1.37	1.40				
The Rotherham NHS Foundation Trust	76	734	0.14	1.59	0.09				
Torbay and South Devon NHS Foundation Trust	77	585	1.54	1.65	1.03				
Great Western Hospitals NHS Foundation Trust	78	576	0.35	1.40	0.27	326	0.92	1.34	0.62
SpaMedica (Bolton)	79	425	0.47	1.27	0.41	119	1.68	0.75	2.01
The Princess Alexandra Hospital NHS Trust	80	357	1.40	1.62	0.95	140	0.71	0.84	0.76
Wye Valley NHS Trust	81	346	0.87	1.52	0.63				
Cwm Taf University LHB	82	320	1.25	1.86	0.74				
Sherwood Forest Hospitals NHS Foundation Trust	83	309	0.65	1.39	0.51				

The case complexity index is an estimate of the overall predicted probability of the adverse event based on the reported case complexity.

Table 5 continued: Posterior capsular rupture and VA Loss results for participating centres in the audit.

		Posterior Capsular rupture Overall Consultant surgeon PCR rate = 1.1%				Visual Acuity loss Overall Consultant surgeon VA Loss rate = 0.9%			
Centre name	Centre number	Number of operations	Unadjusted PCR rate (%)	Case complexity index (%)	Adjusted PCR rate (%)	Number of operations	Unadjusted VA Loss rate (%)	Case complexity index (%)	Adjusted VA Loss rate (%)
Royal Surrey County Hospital NHS Foundation Trust	84	252	0.00	1.42	0.00	149	0.00	0.81	0.00
East Lancashire Hospitals NHS Trust	85	150	0.00	1.37	0.00				
Southport and Ormskirk Hospital NHS Trust	86	142	0.70	1.59	0.49				
Stockport NHS Foundation Trust	87	64	1.56	1.41	1.22				

The case complexity index is an estimate of the overall predicted probability of the adverse event based on the reported case complexity.

8.14 Case complexity adjusted visual loss results

Of the 183,812 eligible operations supplied to the audit, 152,663 operations were performed up to 30th June 2017 and had the potential for two months follow up. Of these, 70,248 (46.0%) operations from 46 centres were performed in centres where a preoperative and postoperative VA was recorded for at least 40% of the operations.

An unadjusted for case complexity funnel plot of VA Loss is shown in Figure 22 and an adjusted for case complexity funnel plot in Figure 23 for the 47 centres with VA Loss data. Details of the unadjusted and adjusted for case complexity VA Loss results for the 46 participating centres can be found in Table 5, along with a case complexity index which is the overall predicted probability of VA Loss for all the cases reported for each centre. Centres with <40% completeness for both preoperative and postoperative data have not been reported as the estimates would be too unreliable.

The percentage rate used for VA loss has been lowered from 1.5% to 0.9% to better reflect the VA loss rate for consultant and career grade surgeons whose results are published in the public domain. The actual observed VA loss rate for the year 2 VA loss sample was 0.7% which is slightly lower than the percentage rate used. This is not an unexpected result as there is variation in the number of operations and the number/experience of surgeons between centres, some centres will have fewer surgeons than others and if these surgeons are very experienced this will contrast with a teaching hospital that is likely to have more operations performed by relatively less experienced surgeons. Another influence is the variation in the recording of follow up data which is necessary for visual loss estimation.

It should also be noted that the samples used for the VA Loss results are smaller than those used for the PCR results due to missing presenting (pre-) and/or postoperative VA measurements. Any improvements in the number of operations with a recorded presenting and postoperative VA would increase the sample for future re-fitting of the Visual Loss model, this in turn would decrease parameter estimation errors due to the increased sample size.

Figure 22: Unadjusted for case complexity Visual Loss funnel plot for participating centres
N = 70,248 operations from 46 participating centres

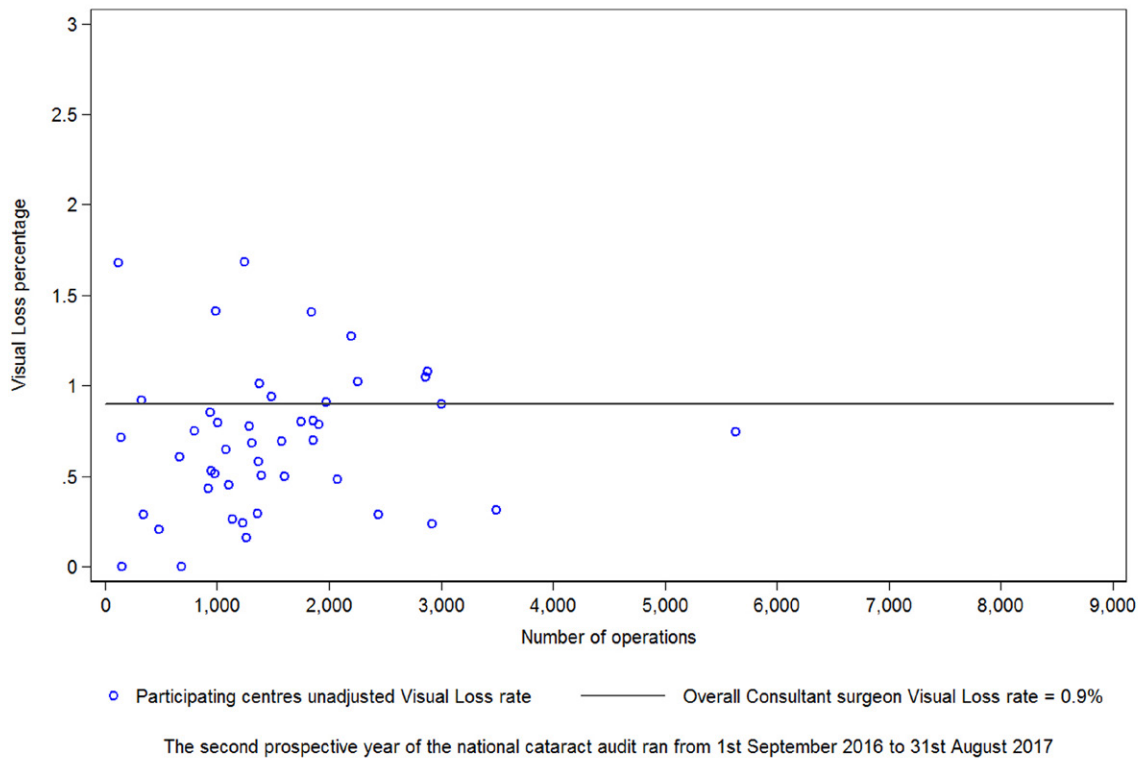
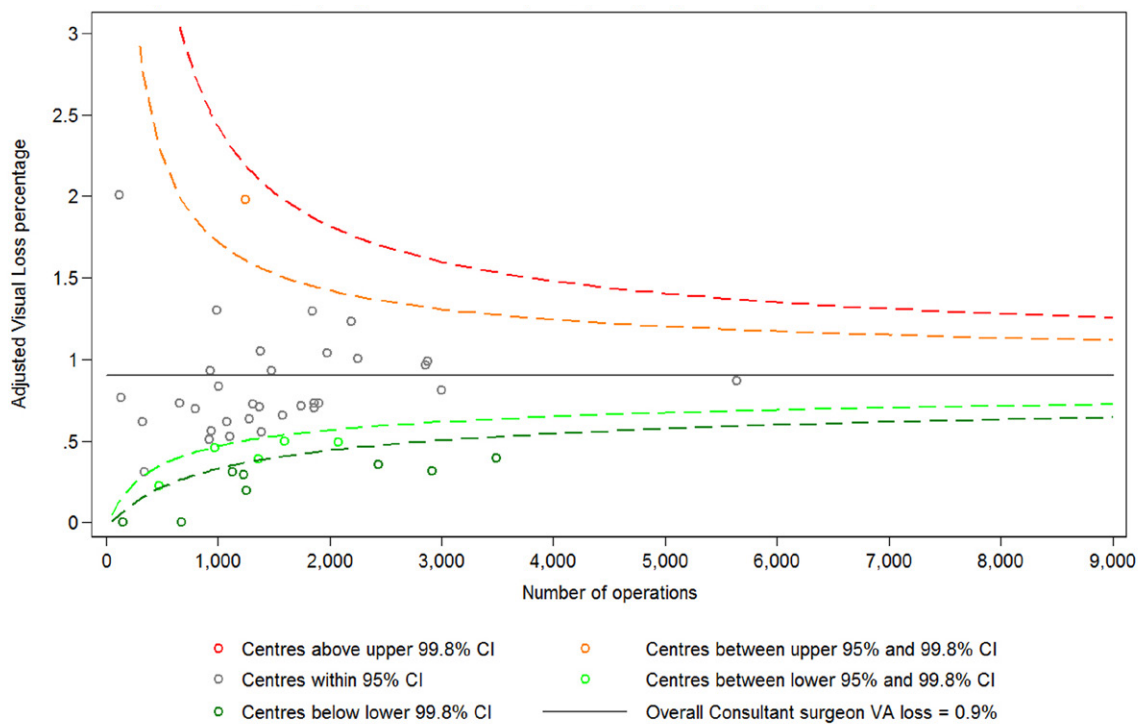


Figure 23: Adjusted for case complexity Visual Loss funnel plot for participating centres
N = 70,248 operations from 46 participating centres



The second prospective year of the national cataract audit ran from 1st September 2016 to 31st August 2017; CI = Confidence Interval

9. Summary of Key Points

This third annual report from the National Ophthalmology Database Cataract Audit is the second to report prospectively collected data for a one-year period.

- Good progress has been made in terms of expanding the number of centres from 34 in the first annual report to 56 in the first prospective audit year report to 77 NHS trusts and one independent sector provider (6 sites) in this report. Looking ahead 111 of 122 traditional NHS cataract providers and two independent sector providers have indicated that they wish to participate in the future cycles of the audit.
- Established markers of surgical quality – PCR and VA Loss – are used as metrics for risk adjusted outcomes. PCR is the most frequent intra-operative complication and is associated with postoperative loss of vision. VA Loss is intended to capture all eyes where outcome has been adverse whether or not associated with PCR.
- This is the second cataract audit report to include the reporting of named centre results for all submitted operations with results for named consultant surgeons shortly to be published as part of the Consultants Outcomes Programme (COP). For the 83 centres included in this report outcomes have been found to be within the standard HQIP expectation, i.e. risk adjusted outcomes within 3SD of the consultant average.
- Data completeness of reported surgery is excellent (100%) for PCR though less so for VA, particularly for postoperative VA, an area where many centres could do better, some centres in particular having poor VA data returns following surgery.
- Quality improvement drivers in this audit take the form of risk adjusted results for surgical complications and vision loss from before to after surgery. These key measures are risk adjusted to acknowledge case complexity and provide credit to surgeons and centres undertaking complex work. Without conscious completion of risk indicator data surgeons and centres run the risk of not being given credit for the complexity of the work undertaken, an important message for participants to take on board both when planning surgery and when recoding their patient notes.
- The audit tools provided allow for real time tracking of adverse surgical events which facilitates local monitoring of complications by centres and surgeons. In the event of an adverse signal becoming apparent, timely corrective action would avoid unnecessary harm to patients and avoid centres or surgeons being identified as outliers in national audit reports going forward.

It is encouraging to note that since 2010 when this work feeding back cataract surgical results to centres and surgeons began, there has been a 30% overall reduction in PCR complications which equates to approximately 2,500 less surgical complications annually. These figures represent reductions in morbidity and cost and bear witness to the quality improvements which have been achieved. In the forthcoming period of the audit coverage will be extended to include all traditional NHS centres, and more of the ‘independent sector treatment centres’. All providers of NHS funded care are accountable to the public for the quality of services they provide. It is encouraging that the first independent sector treatment centre has joined and is included in the current report, with one further such centre having expressed interest in joining going forward. Further outcomes are being considered in order to provide a broader, more balanced and more easily interpreted assessment of NHS service quality in cataract care.

10. Glossary

Abbreviation	Description
≥	Greater than or equal to
≤	Less than or equal to
CDVA	Corrected distance visual acuity
CF	The ability to count fingers
CI	Confidence Interval
COP	Clinical Outcomes Publication
EMR	Electronic Medical Record
HM	The ability to distinguish hand movements
HQIP	Healthcare Quality Improvement Partnership
HSCIC	Health and Social Care Information Centre
IMD	Index of multiple deprivation is the measure of relative deprivation for small areas in England
IOL	Intra-ocular lens is an artificial lens generally inserted into the capsule of the lens after cataract removal
IQR	Inter Quartile Range
ISTC	Independent Sector Treatment Centre
OCCI	Opposite Clear Corneal Incision
NCAPOP	National Clinical Audit and Patient Outcomes Programme
NICOR	National Institute for Cardiovascular Outcomes Research
NHS	National Health Service
NOD	National Ophthalmology Database
NPL	No perception of light
NWIS	National Wales Information Service
PAS	Patient Administration System keeps track of all patients' admissions and appointments.
PCR	Posterior capsule rupture is a break in the posterior capsule of the lens, usually as a complication of cataract surgery. It may allow vitreous to move forward into the anterior chamber of the eye.
PHVA	Pin hole visual acuity - The pinhole is an eye shield with several small holes which allow light rays to reach the retina without the interference of optical problems of the eye. It is used to test visual acuity.
PL	Perception light
RCOphth	The Royal College of Ophthalmologists

10. Glossary continued

Abbreviation	Description
S251 exemption	Approval for exemption from section 251 of the NHS Health and Social Care Act 2006 which allows for certain uses of patient identifiable data such as linkage of data from more than one data source e.g. a national audit and NHS Digital
SES	Socio-economic status is the social standing or class of an individual or group. It is often measured as a combination of education, income and occupation
UDVA	Uncorrected distance visual acuity
UK	United Kingdom
VA	Visual acuity is the sharpness of vision, measured by the ability to distinguish letters or numbers at a given distance according to a fixed standard. We have reported VA using the LogMAR scale (base 10 Log of the reciprocal of the visual angle). A normal LogMAR VA is 0.0 and the number increases as vision gets worse. LogMAR=0.3 would be at the boundary for driving a car and 1.0 would be at the level of registrable severe sight impairment. A postoperative VA of 0.3 or better is often used as a measure of a favourable outcome from surgery.
WHO	World Health Organisation
Yes/No	Yes or No

11. Graphs and Tables

Interpreting the Graphs

Among the results there are four types of graphs. The labelling of centres is a ranking of the total number of operations contributed by each centre, and calculated for the number of operations eligible in the first year the centre has sufficient operations for reporting. Centres 1 – 56 are the centres that were included in the first audit year report, where centre 1 had the most operations and centre 56 the fewest. Centres 57 - 87 are the centres first appearing in the second audit year report, where centre 57 had the most operations and centre 87 the fewest. Some centre numbers have become redundant due to mergers of NHS Trusts or one NHS Trust taking over the ophthalmology service in another NHS Trust.

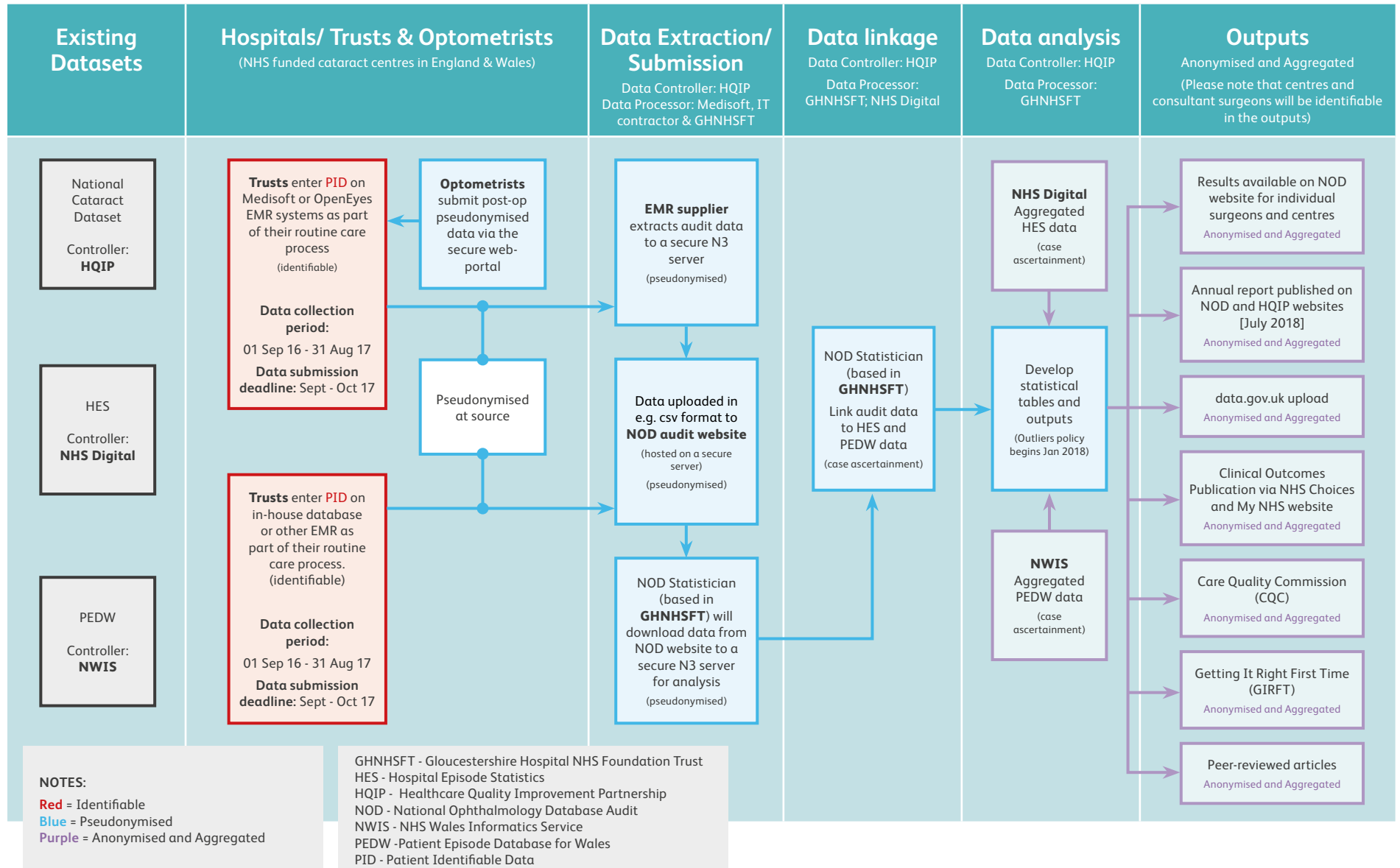
- Bar charts – the horizontal axis consists of the categorical element, usually contributing centre. When bar charts are sub-divided by another category, the vertical height of each bar indicates the quantity of interest for that bar chart as read from the vertical axis. Some bar charts have horizontal dashed reference lines at specific points on the y-axis, these relate to cut-off points used in the reporting of results, for example 50%. Figure 2 is an example of a bar chart.
- Box and Whisker plots – the spread for the variable of interest is shown for each of the contributing centres. 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. Figure 5 is an example of a Box and Whisker plot.
- Funnel plots – The spread of dots on these look like a funnel going from left to right. Each dot represents a result for a centre as read off the vertical axis (proportion or rate). The funnel effect results from increasing statistical precision as the numbers get higher going along the horizontal axis. Some of the plots have lines on them showing what is expected. A result above the top line (three standard deviations) would be deemed unacceptably high. Figure 21 is an example of a Funnel plot.
- Year 1 vs year 2 graphs – these graphs display the estimate from audit years 1 and 2 for the centres with data in both audit years. The diagonal line (line of identity) and for percentage estimate graphs, the $\pm 5\%$ dashed lines can be used to ascertain if the estimate is higher or lower for an audit year, for example, above the upper 5% dashed line indicates the estimate is more than 5% higher in year 2, within the dashed lines indicates the year 1 and year 2 estimates are within 5% of each other, and below the lower dashed line indicates the estimate was more than 5% higher in year 1. Figure 1 is an example of a Year 1 vs year 2 graph.

12. References

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Appendix 1: Governance Structure

National Ophthalmology Database (NOD) Audit Project Data Flow



Appendix 2: National Ophthalmology Database Audit Project Steering Group Membership

Name	Designation
Andrew Frost	Cataract Representative The Royal College of Ophthalmologists
Anthony King	Cataract Representative The Royal College of Ophthalmologists
Beth Barnes	Head of the Professional Support Department The Royal College of Ophthalmologists
Catherine Dennison	Senior Manager of Research and Policy Royal National Institute of Blind People
Chris Rogers	Independent Statistician The University of Bristol
David Parkins	Practicing Optometrist The College of Optometrists
David Yorston	Cataract Representative The Royal College of Ophthalmologists
Janet Bax	Patient Representative The Patients Association
John Bax	Patient Representative The Patients Association
John Sparrow	Chairman Clinical Lead for RCOphth National Ophthalmology Database Audit
Kathy Evans	Chief Executive The Royal College of Ophthalmologists
Martin McKibbin	Cataract Representative The Royal College of Ophthalmologists
Matt Broom	Lay Group Representative The Royal College of Ophthalmologists and Vision UK
Melanie Hingorani	Cataract Representative The Royal College of Ophthalmologists
Raghu Ram	Wales Representative The Royal College of Ophthalmologists
Sasha Hewitt	Associate Director of Quality and Development Healthcare Quality Improvement Partnership (HQIP)
Tasneem Hoosain	Project Manager Healthcare Quality Improvement Partnership (HQIP)
Wendy Newsom	Practicing Optometrist The College of Optometrists

Appendix 3: Case Definitions

Eligible Cataract Surgery Criteria

- Operation performed between 1st September 2016 – 31st August 2017.
- Operation performed in an NHS hospital in England or Wales.
- Operation performed in adults (aged 18 or above).
- Operation included a phacoemulsification procedure.
- Operative data includes a surgeon identifier and valid surgeon grade.
- Operation included a “cataract” indication for surgery (see the NOD audit website for details).
- Operation without any of the ineligible indications for surgery (see NOD audit website for details).
- Operation did not include certain operative procedures (see the NOD audit website for details).
- Operations that included a pars plana vitrectomy with no vitreoretinal indication for surgery and no other vitreoretinal procedures except for sponge and scissor vitrectomy or automated anterior vitrectomy.
- Operation not for a traumatic injury.
- A minimum of 50 eligible cataract operations for each participated centre.

PCR - Posterior Capsule Rupture or Vitreous Prolapse or both

PCR was deemed to have occurred if any of the following intra-operative complications are recorded during surgery; Zonule rupture – vitreous loss, PC rupture ± vitreous loss, Vitreous to the section at end of surgery, Vitreous loss, Nuclear/ epinuclear fragment into vitreous, intra-ocular lens (IOL) into the vitreous, lens fragments into vitreous, or if any of the following occurred.

- The operation includes any of ‘Sponge and scissors vitrectomy’, ‘Secondary IOL’, ‘Automated anterior vitrectomy’ or ‘Scleral fixed IOL’.
- The operative procedure includes ‘Fragmatome lensectomy ± IOL’ with a previous or concurrent phacoemulsification procedure.
- The operative procedure includes ‘Removal of retained lens fragments’ combined with a pars plana vitrectomy.
- If either of ‘vitreous to the section’ or ‘vitreous in the anterior chamber’ were recorded within eight weeks of cataract surgery, this includes the day of cataract surgery in the time frame.
- If there is a record of a dropped nucleus operation with 90 days of cataract surgery, this includes the day of cataract surgery in the time frame.

Appendix 3 continued: Case Definitions

Visual Acuity (VA)

Visual acuity measurements were extracted from the EMR on the LogMAR scale and numeric substitutions of 2.10, 2.40, 2.70 and 3.00 were used for the ability to count fingers (CF), the ability to distinguish hand movements (HM), perception of light (PL) and no perception of light (NPL) respectively.

Preoperative VA was defined as the better of corrected distance visual acuity (CDVA) and the uncorrected distance visual acuity (UDVA) recorded within a 4 month 'time window' prior to surgery. Where there are multiple occasions of measurement the VA measurement closest to the date of surgery is used and measurements recorded on the same day as cataract surgery are considered as preoperative measurements.

Postoperative VA was defined as the best measurement of CDVA or UDVA or pinhole visual acuity (PHVA) within the 'time window' of between 14 days and four months of cataract surgery (inclusive).

Postoperative VA results were restricted to operations performed up to 30th June 2017 to allow for at least two months potential follow up. A further restriction was applied to the VA Loss results where only centres and surgeons with <40% missing pre and postoperative VA data were included.

Visual loss was defined as

- For eyes with a pre-operative VA of <1.00 LogMAR, a loss of ≥ 0.30 LogMAR (doubling or worse of the visual angle) between the preoperative and postoperative VA measurements.
- For eyes with a pre-operative VA of ≥ 1.00 LogMAR and <CF, VA loss is designated if the post-operative VA is HM, PL or NPL.
- For eyes with a pre-operative VA of CF, VA loss is designated if the post-operative VA is PL or NPL.
- For eyes with a pre-operative VA of HM, VA loss is designated if the post-operative VA is NPL.
- For eyes with a pre-operative VA of PL or NPL no VA loss is considered.

Appendix 3 continued: Case Definitions

LogMAR VA is a continuous scale which allows arithmetic operations and parametric statistical methods to be employed in the analysis. Conversion between LogMAR and approximate Snellen scores, and their interpretations, are as follows:

Approximate Snellen to LogMAR Conversion		
LogMAR	Snellen	VA Interpretation
-0.1	6/5	Excellent
0.0	6/6	Very Good
0.2	6/9	Good
0.3	6/12	Reasonably Good
0.5	6/18	Moderate
0.6	6/24	Moderate Sight Impairment
0.8	6/36	Sight Impairment
0.9	6/48	Sight Impairment
1.0	6/60	UK Severe Sight Impairment
1.1	5/60	UK Severe Sight Impairment
1.2	4/60	UK Severe Sight Impairment
1.3	3/60	WHO Severe Sight Impairment
2.1	Count Fingers (CF)	WHO Severe Sight Impairment
2.4	Hand Movements (HM)	WHO Severe Sight Impairment
2.7	Perception of Light (PL)	WHO Severe Sight Impairment
3.0	No Perception of Light (NPL)	WHO Severe Sight Impairment

WHO is World Health Organisation

Appendix 4: Percentage of eyes with VA data at different time intervals

Centre name	Centre number	Pre-operative VA					Post-operative VA				
		N	6 months %	5 months %	4 months %*	3 months %	N	3 months %	4 months %*	5 months %	6 months %
Moorfields Eye Hospital NHS Foundation Trust	1	18,659	71.9	71.2	69.8	66.3	15,445	63.4	64.8	65.6	66.1
The Newcastle upon Tyne Hospitals NHS Foundation Trust	2	8,761	96.1	94.5	91.8	83.3	7,378	81.3	82.8	83.4	84.0
Norfolk and Norwich University Hospitals NHS Foundation Trust	3	4,407	96.0	95.3	94.1	91.5	3,774	14.1	14.7	15.1	15.3
Leeds Teaching Hospitals NHS Trust	4	4,409	98.6	97.8	93.2	75.5	3,686	80.5	81.9	83.0	83.5
York Teaching Hospital NHS Foundation Trust	5	4,238	84.0	78.9	66.2	53.3	3,611	73.6	75.6	76.1	76.7
Oxford University Hospitals NHS Foundation Trust	6	4,229	89.4	88.1	85.6	80.8	3,544	61.6	64.3	65.8	66.6
University Hospitals Bristol NHS Foundation Trust	7	4,504	98.4	97.3	92.8	72.8	3,635	80.3	84.4	85.3	85.6
Gloucestershire Hospitals NHS Foundation Trust	8	3,532	92.8	89.1	79.9	59.0	2,998	83.2	84.2	84.9	85.2
Sheffield Teaching Hospitals NHS Foundation Trust	9	3,417	97.3	96.3	94.1	90.8	2,961	75.8	78.4	79.6	80.1
Sandwell and West Birmingham Hospitals NHS Trust	10	3,542	92.6	90.3	86.1	78.7	2,889	88.8	90.2	90.8	91.2
University Hospital Southampton NHS Foundation Trust	11	2,862	94.8	93.7	90.7	84.3	2,444	82.5	84.5	85.5	86.2
Royal Berkshire NHS Foundation Trust	12	3,132	99.0	98.7	98.0	96.6	2,644	93.4	93.9	94.0	94.1
Calderdale and Huddersfield NHS Foundation Trust	13	2,600	95.3	92.1	86.5	78.1	2,137	76.0	78.4	79.4	80.1
Mid Cheshire Hospitals NHS Foundation Trust	14	2,403	93.8	93.4	92.4	90.9	2,004	67.8	69.8	70.8	71.1
The Mid Yorkshire Hospitals NHS Trust	15	2,295	96.9	91.9	85.8	75.4	1,961	76.8	78.2	79.1	79.5
Cardiff & Vale University LHB	16	2,625	94.4	94.0	93.4	93.0	2,294	42.3	43.5	44.2	44.8
Epsom and St Helier University Hospitals NHS Trust	17	2,335	98.2	97.6	95.3	81.2	1,876	88.0	88.4	88.8	89.1
Barts Health NHS Trust	18	2,656	86.9	85.4	82.5	78.2	2,126	74.5	77.8	79.8	80.7
Frimley Health NHS Foundation Trust	19	3,021	96.5	95.8	94.8	93.1	2,533	40.0	45.2	48.6	50.3
Bradford Teaching Hospitals NHS Foundation Trust	20	2,344	84.6	79.4	71.5	59.7	1,974	31.4	34.7	37.3	38.4
Plymouth Hospitals NHS Trust	22	2,625	99.2	97.3	93.7	87.9	2,224	85.8	89.7	91.5	92.3
University Hospitals Birmingham NHS Foundation Trust	23	1,819	97.8	97.1	95.1	90.4	1,544	93.4	94.4	94.6	95.1
Hampshire Hospitals NHS Foundation Trust	24	2,098	96.8	95.1	91.4	84.0	1,752	70.2	71.3	71.9	72.0
Royal Cornwall Hospitals NHS Trust	25	1,878	97.6	94.8	88.7	80.2	1,506	78.4	79.9	80.9	81.8

Appendix 4 continued: Percentage of eyes with VA data at different time intervals

Centre name	Centre number	Pre-operative VA					Post-operative VA				
		N	6 months %	5 months %	4 months %*	3 months %	N	3 months %	4 months %*	5 months %	6 months %
Central Manchester University Hospitals NHS Foundation Trust	26	2,792	97.6	97.2	96.7	95.5	2,263	87.5	89.8	90.2	90.5
King's College Hospital NHS Foundation Trust	27	4,862	96.3	94.9	93.2	89.8	4,057	78.1	79.0	79.6	79.8
Shrewsbury and Telford Hospital NHS Trust	28	1,971	87.3	82.3	73.9	62.0	1,536	72.1	73.6	74.5	75.1
The Hillingdon Hospitals NHS Foundation Trust	30	2,052	98.6	96.3	92.8	85.9	1,785	71.6	75.0	77.4	78.7
Aintree University Hospital NHS Foundation Trust	31	1,303	90.6	89.0	86.6	82.0	1,143	78.7	80.5	81.5	82.2
Royal United Hospitals Bath NHS Foundation Trust	32	1,498	90.3	88.9	87.0	84.5	1,181	47.0	51.1	53.5	54.9
Chesterfield Royal Hospital NHS Foundation Trust	33	1,558	93.0	88.8	77.7	61.7	1,308	94.3	94.7	94.9	94.9
Mid Essex Hospital Services NHS Trust	34	1,631	79.3	78.5	75.9	71.9	1,387	58.5	60.3	61.6	62.5
Harrogate and District NHS Foundation Trust	35	1,450	97.9	96.8	94.8	89.8	1,253	82.6	82.8	84.0	84.5
North West Anglia NHS Foundation Trust	36	2,908	97.2	96.4	94.9	92.1	2,404	73.8	76.0	77.2	77.9
Northern Devon Healthcare NHS Trust	37	1,283	99.4	99.0	97.5	94.1	1,102	89.4	90.3	90.8	91.0
Wirral University Teaching Hospital NHS Foundation Trust	39	1,107	71.5	66.8	61.1	54.8	894	57.3	58.6	60.0	60.7
South Warwickshire NHS Foundation Trust	40	1,408	98.7	96.0	89.0	78.4	1,161	54.8	66.1	71.7	73.8
Isle of Wight NHS Trust	41	1,293	87.6	86.0	83.4	82.2	1,045	78.0	78.2	78.6	79.6
St Helens and Knowsley Teaching Hospitals NHS Trust	42	1,472	96.6	94.8	91.5	87.2	1,177	48.2	52.7	56.2	57.7
Wrightington, Wigan and Leigh NHS Foundation Trust	43	1,381	99.2	99.1	98.3	97.5	1,204	92.8	93.3	93.6	93.9
Warrington and Halton Hospitals NHS Foundation Trust	44	1,273	94.5	93.2	91.0	86.5	1,126	11.5	12.8	14.9	18.0
South Tees Hospitals NHS Foundation Trust	45	1,843	98.5	97.6	95.8	91.7	1,546	58.7	61.9	64.3	65.0
The Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust	46	2,276	97.9	96.1	92.0	85.2	1,918	74.8	77.5	79.3	80.0
Barking, Havering and Redbridge University Hospitals NHS Trust	47	1,544	85.6	85.0	84.5	83.0	1,379	46.7	49.0	50.6	51.3
Royal Free London NHS Foundation Trust	48	2,200	95.8	95.4	94.2	92.0	1,934	37.8	39.8	40.0	40.3
University Hospitals Coventry and Warwickshire NHS Trust	49	2,343	92.4	91.8	91.0	89.6	1,888	78.8	80.5	82.2	83.5
Barnsley Hospital NHS Foundation Trust	50	564	78.0	75.5	70.4	62.8	545	8.3	11.2	12.1	12.5

Appendix 4 continued: Percentage of eyes with VA data at different time intervals

Centre name	Centre number	Pre-operative VA					Post-operative VA				
		N	6 months %	5 months %	4 months %*	3 months %	N	3 months %	4 months %*	5 months %	6 months %
Salisbury NHS Foundation Trust	51	1,279	98.4	96.9	94.1	86.6	1,013	96.5	96.9	97.1	97.1
London North West University Healthcare NHS Trust	52	546	85.0	84.4	83.2	74.5	475	84.2	89.1	89.5	89.7
University Hospitals of Morecambe Bay NHS Foundation Trust	54	226	89.4	83.2	67.7	57.1	226	0.4	0.9	0.9	0.9
Nottingham University Hospitals NHS Trust	55	1,198	90.1	84.7	70.4	49.7	954	75.6	76.9	78.2	78.7
Yeovil District Hospital NHS Foundation Trust	56	744	99.3	99.2	99.2	98.7	612	77.0	78.9	80.6	82.4
SpaMedica (Manchester)	57	4,570	100.0	99.6	98.9	97.8	3,950	88.6	89.2	89.6	89.7
SpaMedica (Wakefield)	58	4,214	99.9	99.7	99.0	97.9	3,320	87.8	88.6	88.9	89.1
East Sussex Healthcare NHS Trust	59	3,356	90.6	87.3	80.7	70.2	2,838	62.2	66.0	70.0	75.0
Imperial College Healthcare NHS Trust	60	3,114	94.1	89.5	83.2	73.3	2,463	85.9	87.9	88.7	89.6
Portsmouth Hospitals NHS Trust	61	2,905	93.3	90.2	81.6	70.3	2,505	92.1	92.2	92.3	92.5
Heart of England NHS Foundation Trust	62	2,465	98.0	97.0	86.5	79.3	2,042	82.2	90.0	94.0	94.9
Cambridge University Hospitals NHS Foundation Trust	63	2,380	73.7	70.8	67.2	62.3	2,111	67.4	71.4	74.0	76.1
East Kent Hospitals University NHS Foundation Trust	64	1,764	88.1	86.4	82.6	76.6	1,362	38.5	39.7	40.7	41.1
The Ipswich Hospital NHS Trust	65	1,754	91.7	91.6	91.3	90.1	1,428	3.5	4.1	5.7	8.3
SpaMedica (Wirral)	66	1,710	99.9	99.8	99.4	98.1	1,383	91.0	91.7	91.8	91.9
County Durham and Darlington NHS Foundation Trust	67	1,692	96.0	92.4	81.7	62.2	1,399	84.5	87.2	89.8	90.8
United Lincolnshire Hospitals NHS Trust	68	1,683	93.8	93.3	92.6	91.5	1,455	61.1	61.8	62.3	62.5
SpaMedica (Newton-le-Willows)	69	1,629	100.0	99.8	99.2	97.9	1,373	89.5	90.2	90.4	90.6
Northampton General Hospital NHS Trust	70	1,470	71.4	71.2	70.1	67.7	1,193	15.9	16.4	16.6	16.8
SpaMedica (Liverpool)	71	1,005	100.0	100.0	98.9	97.1	798	84.6	86.0	86.6	86.6
James Paget University Hospitals NHS Foundation Trust	72	942	86.6	83.0	78.3	70.4	715	41.5	42.5	42.9	44.1
Bolton NHS Foundation Trust	73	871	93.7	93.3	92.2	90.8	590	58.1	59.0	59.7	60.3
Kingston Hospital NHS Foundation Trust	74	829	52.6	50.9	46.7	41.4	576	16.7	17.2	18.4	18.6
Northern Lincolnshire and Goole NHS Foundation Trust	75	803	77.6	71.1	63.5	55.5	803	87.2	87.8	88.2	88.5
The Rotherham NHS Foundation Trust	76	734	97.0	96.7	95.4	92.8	710	9.6	9.6	9.6	9.7
Torbay and South Devon NHS Foundation Trust	77	585	97.3	96.9	95.7	94.4	364	42.0	46.2	48.4	48.6

Appendix 4 continued: Percentage of eyes with VA data at different time intervals

Centre name	Centre number	Pre-operative VA					Post-operative VA				
		N	6 months %	5 months %	4 months %*	3 months %	N	3 months %	4 months %*	5 months %	6 months %
Great Western Hospitals NHS Foundation Trust	78	576	99.0	98.1	96.0	92.2	388	84.0	85.3	86.3	86.9
SpaMedica (Bolton)	79	425	100.0	99.8	99.5	98.8	129	93.0	93.0	93.0	93.0
The Princess Alexandra Hospital NHS Trust	80	357	98.9	97.8	96.9	95.0	228	57.9	63.2	65.8	70.6
Wye Valley NHS Trust	81	346	61.6	60.7	54.9	44.2	282	63.1	63.8	64.2	64.2
Cwm Taf University LHB	82	320	57.2	57.2	56.6	55.3	139	55.4	59.7	61.9	64.0
Sherwood Forest Hospitals NHS Foundation Trust	83	309	42.1	41.4	40.1	37.2	254	1.6	2.4	3.5	3.5
Royal Surrey County Hospital NHS Foundation Trust	84	252	98.8	97.2	92.5	84.1	230	67.0	68.7	71.7	72.6
East Lancashire Hospitals NHS Trust	85	150	2.7	2.7	2.7	0.0	150	0.0	0.0	0.0	0.0
Southport and Ormskirk Hospital NHS Trust	86	142	9.9	9.9	9.9	9.2	22	0.0	0.0	0.0	0.0
Stockport NHS Foundation Trust	87	64	14.1	14.1	14.1	14.1	7	0.0	0.0	0.0	0.0
Overall (All centres combined)	N/A	183,812	91.2	89.6	86.2	79.8	152,663	69.2	71.2	72.3	73.0

Appendix 5: Ocular co-pathology changes

For the prospective data collection changes to the recording of ocular co-pathology were implemented. The intention is that in the future when sufficient operations have the individual components recorded separately this information could be investigated in the risk adjustment models.

The new options were as follows;

- AMD could be specified as either 'dry AMD' or 'wet AMD'
- No fundal view / vitreous opacities could be recorded separately as either 'no fundal view' or 'vitreous opacities'
- Psuedoexfoliation / phacodeneses could be recorded separately as either 'psuedoexfoliation' or 'phacodeneses'
- Uveitis / synechia could be recorded separately as either 'uveitis' or 'synechia'
- When either 'macular hole' or 'epiretinal membrane peel' were recorded it was possible to record if with or without a prior pars plana vitrectomy (PPV)

For the full results in this report these co-pathologies are not tabulated separately, but for interest overall figures for certain splits are summarised below.

- Of the 18,484 operations recorded in eyes with AMD, 8,400 (45.4%) were recorded as 'dry' AMD, 2,566 (13.9%) as 'wet' AMD and 7,518 (40.5%) as AMD without the specification of 'dry' or 'wet'.
- Of the 2,869 operations recorded in eyes with no fundal view / vitreous opacities, 2,351 (81.9%) were recorded as 'no fundal view', 82 (2.9%) as 'vitreous opacities' and 436 (15.2%) as combined.
- Of the 1,587 operations recorded in eyes with psuedoexfoliation / phacodeneses, 979 (61.7%) were recorded as 'psuedoexfoliation', 191 (12.0%) as 'phacodeneses' and 417 (26.3%) as combined.
- Of the 1,367 operations recorded in eyes with uveitis / synechia, 1,237 (90.5%) were recorded as 'uveitis', 4 (0.3%) as 'synechia' and 126 (9.2%) as combined.
- Of the 790 operations recorded in eyes with macular hole, 310 (39.2%) were recorded with a previous PPV and of the 2,246 operations recorded in eyes with epiretinal membrane peel, 179 (8.0%) were recorded with a previous PPV.

Appendix 6: Operative procedures combined with phacoemulsification ± IOL

Operative procedure	Frequency
Automated anterior vitrectomy	1,393
Insertion of pupil ring expander	1,080
Limbal relaxing incisions / Opposite clear corneal incisions	875
Insertion of Iris hooks	872
Intravitreal injection	856
Capsular tension ring	603
Capsulectomy	533
Intraoperative phenylephrine	473
Stretching of the Iris	264
Synaechiolysis	258
Injection of bleb (antimetabolite)	236
Pars plana vitrectomy	123
I/C Miochol	93
Sphincterotomy	80
Injection into anterior chamber	41
Incision of Cornea	35
Removal of retained lens fragments	31
Insertion of Cypass implant	24
Section of Cornea	24
Washout of anterior chamber	24
Fragmatone lensectomy	17
Suture of cornea	17
IOL removal	15
IOL exchange	13
Sub-conjunctival injection	13
Implantation of intravitreal device	11
Secondary IOL	11
Peripheral iridectomy	10
Examination under anaesthesia	7
Removal Cornea sutures	7
Orbital floor injection	6
Anterior chamber paracentesis	5
Broad iridectomy	5
Perfect capsule	3
Diathermy	2
Insertion of punctal plug	2
Corneal epithelial debridement	1
Incision of conjunctiva	1
Lacrimal punctoplasty	1
Scleral-fixed IOL	1

Appendix 7: Eligible cataract surgical centres in England and Wales

Category	Organisation name	Data collection system
Established centres, first included in the Year 1 report	Aintree University Hospital NHS Foundation Trust	Medisoft
	Barking, Havering and Redbridge University Hospitals NHS Trust	Medisoft
	Barnsley Hospital NHS Foundation Trust	In-house
	Barts Health NHS Trust	Medisoft
	Bedford Hospital NHS Trust – Moorfields**	Medisoft
	Blackpool Teaching Hospitals NHS Foundation Trust****	Medisoft
	Bradford Teaching Hospitals NHS Foundation Trust*	Medisoft
	Calderdale and Huddersfield NHS Foundation Trust	Medisoft
	Cardiff and Vale University Health Board	Medisoft
	Central Manchester University Hospitals NHS Foundation Trust	Medisoft
	Chesterfield Royal Hospital NHS Foundation Trust	Medisoft
	Croydon Health Services NHS Trust – Moorfields**	Medisoft
	Epsom and St Helier University Hospitals NHS Trust	Medisoft
	Frimley Health NHS Foundation Trust	Medisoft
	Gloucestershire Hospitals NHS Foundation Trust	Medisoft
	Hampshire Hospitals NHS Foundation Trust	Medisoft
	Harrogate and District NHS Foundation Trust	Medisoft
	Isle of Wight NHS Trust	Medisoft
	King's College Hospital NHS Foundation Trust	Medisoft
	Leeds Teaching Hospitals NHS Trust	Medisoft
	London North West University Healthcare NHS Trust	In-house
	Mid Cheshire Hospitals NHS Foundation Trust	Medisoft
	Mid Essex Hospital Services NHS Trust	Medisoft
	Mid Yorkshire Hospitals NHS Trust	Medisoft
	Moorfields Eye Hospital NHS Foundation Trust	OpenEyes
	Norfolk and Norwich University Hospitals NHS Foundation Trust	Medisoft
	Northern Devon Healthcare NHS Trust	Medisoft
	North West Anglia NHS Foundation Trust***	Medisoft
	Nottingham University Hospitals NHS Trust	Medisoft
	Oxford University Hospitals NHS Trust	Medisoft
	Plymouth Hospitals NHS Trust	Medisoft
	Royal Berkshire NHS Foundation Trust	Medisoft
Royal Cornwall Hospitals NHS Trust	Medisoft	
Royal Free London NHS Foundation Trust	Medisoft	

Appendix 7 continued: Eligible cataract surgical centres in England and Wales

Category	Organisation name	Data collection system
Established centres, first included in the Year 1 report	Royal United Hospital Bath NHS Trust	Medisoft
	Salisbury NHS Foundation Trust	Medisoft
	Sandwell and West Birmingham Hospitals NHS Trust	Medisoft
	Sheffield Teaching Hospitals NHS Foundation Trust	Medisoft
	Shrewsbury and Telford Hospital NHS Trust	Medisoft
	South Tees Hospitals NHS Foundation Trust	Medisoft
	South Warwickshire NHS Foundation Trust	Medisoft
	St Helens and Knowsley Hospitals NHS Trust	Medisoft
	The Hillingdon Hospitals NHS Foundation Trust	Medisoft
	The Newcastle Upon Tyne Hospitals NHS Foundation Trust	Medisoft
	The Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust	Medisoft
	University Hospital Southampton NHS Foundation Trust	Medisoft
	University Hospitals Birmingham NHS Foundation Trust	Medisoft
	University Hospitals Bristol NHS Foundation Trust	Medisoft
	University Hospitals Coventry and Warwickshire NHS Trust	Medisoft
	University Hospitals of Morecambe Bay NHS Foundation Trust	Medisoft
	Warrington and Halton Hospitals NHS Foundation Trust	Medisoft
	Wirral University Teaching Hospital NHS Foundation Trust	Medisoft
	Wrightington, Wigan and Leigh NHS Foundation Trust	Medisoft
Yeovil District Hospital NHS Foundation Trust	Medisoft	
York Teaching Hospital NHS Foundation Trust	In-house	
Recently joining centres, first included in the year 2 report	Bolton NHS Foundation Trust	OpenEyes
	Cambridge University Hospitals NHS Foundation Trust	EPIC
	County Durham and Darlington NHS Foundation Trust	Medisoft
	Cwm Taf University Health Board	Medisoft
	East Kent Hospitals University NHS Foundation Trust	OpenEyes
	East Lancashire Hospitals NHS Trust	Medisoft
	East Sussex Healthcare NHS Trust****	Medisoft
	Great Western Hospitals NHS Foundation Trust	Medisoft
	Heart of England NHS Foundation Trust	Medisoft
	Imperial College Healthcare NHS Trust	Medisoft
	James Paget University Hospitals NHS Foundation Trust	Medisoft

Appendix 7 continued: Eligible cataract surgical centres in England and Wales

Category	Organisation name	Data collection system
Recently joining centres, first included in the year 2 report	Kingston Hospital NHS Trust	Medisoft
	Northampton General Hospital NHS Trust	In-house
	Northern Lincolnshire and Goole Hospitals NHS Foundation Trust	In-house
	Portsmouth Hospitals NHS Trust	Medisoft
	Royal Surrey County Hospital NHS Foundation Trust	In-house
	Sherwood Forest Hospitals NHS Foundation Trust	Medisoft
	Southport and Ormskirk Hospital NHS Trust	Medisoft
	SpaMedica – Bolton	Medisoft
	SpaMedica – Liverpool	Medisoft
	SpaMedica – Manchester	Medisoft
	SpaMedica – Newton-le-willows	Medisoft
	SpaMedica – Wakefield	Medisoft
	SpaMedica - Wirral	Medisoft
	Stockport NHS Foundation Trust	Medisoft
	The Ipswich Hospital NHS Trust	Medisoft
	The Princess Alexandra Hospital NHS Trust	Medisoft
	The Rotherham NHS Foundation Trust	In-house
	Torbay and South Devon NHS Foundation Trust	Medisoft
	United Lincolnshire Hospitals NHS Trust	In-house
Wye Valley NHS Trust	Medisoft	
Submitted data, but for <50 eligible cases	Royal Liverpool and Broadgreen University Hospitals NHS Trust	Medisoft
	Surrey and Sussex Healthcare NHS Trust	Medisoft
	Taunton and Somerset NHS Foundation Trust	Medisoft
	The Royal Wolverhampton NHS Trust	Medisoft
Signed up to participate in the audit, but yet to submit data	Abertawe Bro Morgannwg University Health Board	OpenEyes
	Ashford and St Peter's Hospitals NHS Foundation Trust	TBC
	Brighton and Sussex University Hospitals NHS Trust	Medisoft
	Buckinghamshire Healthcare NHS Trust	Medisoft
	Burton Hospitals NHS Foundation Trust	Medisoft
	City Hospitals Sunderland NHS Foundation Trust	TBC
	Colchester Hospital University NHS Foundation Trust	Medisoft
	Dorset County Hospital NHS Foundation Trust	TBC
East Cheshire NHS Trust	TBC	

Appendix 7 continued: Eligible cataract surgical centres in England and Wales

Category	Organisation name	Data collection system
Signed up to participate in the audit, but yet to submit data	George Eliot Hospital NHS Trust	Medisoft
	Guy's and St Thomas' NHS Foundation Trust	TBC
	Hull and East Yorkshire Hospitals NHS Trust	TBC
	Hywel Dda University Health Board	Medisoft
	Kettering General Hospital NHS Foundation Trust	TBC
	Luton and Dunstable Hospital NHS Foundation Trust	TBC
	Maidstone and Tunbridge Wells NHS Trust	TBC
	Milton Keynes Hospital NHS Foundation Trust	TBC
	North Cumbria University Hospitals NHS Trust	Medisoft
	North Middlesex University Hospital NHS Trust	Medisoft
	Pennine Acute Hospitals NHS Trust	TBC
	Powys Teaching Health Board	TBC
	Queen Victoria Hospital NHS Foundation Trust	TBC
	Royal Devon and Exeter NHS Foundation Trust	TBC
	Southend University Hospital NHS Foundation Trust	TBC
	The Dudley Group NHS Foundation Trust	TBC
	The Queen Elizabeth Hospital King's Lynn NHS Foundation Trust	TBC
	University Hospitals of Leicester NHS Trust	TBC
	University Hospitals of North Midlands NHS Trust	TBC
West Hertfordshire Hospitals NHS Trust	TBC	
Yet to sign up or declined participation	Aneurin Bevan University Health Board	
	Betsi Cadwaladr University Health Board	
	Chelsea and Westminster Hospital NHS Foundation Trust	
	Countess of Chester Hospital NHS Foundation Trust	
	Derby Teaching Hospitals NHS Foundation Trust	
	Doncaster and Bassetlaw Hospitals NHS Foundation Trust	
	East and North Hertfordshire NHS Trust	
	Lancashire Teaching Hospitals NHS Foundation Trust	
	West Suffolk NHS Foundation Trust	
	Worcestershire Acute Hospitals NHS Trust	
	Western Sussex Hospitals NHS Trust	

*Includes patients from Airedale NHS Foundation Trust.

**Data combined with Moorfields Eye Hospital NHS Foundation Trust.

***This is a new NHS Trust formed from a merger of two participating NHS Trusts that both had data in the year 1 prospective report, these NHS Trusts were Peterborough and Stamford Hospitals NHS Foundation Trust and Hinchingbrooke Health Care NHS Trust.

****This centre had sufficient eligible cases for inclusion in the year 1 report, but did not submit ≥ 50 eligible operations for year 2.

*****This centre participated in the year 1 prospective audit, but due to a data extraction problem the data from this centre could not be included in the year 1 report.

TBC – To be confirmed

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