Atlas of variation in risk factors and healthcare for vision in England

Quick user guide Maps **1** Type of statistic **2** Geographic **3** Year of data **4** Rate calculated **5 Optimum values** Low indicates Equal sized quintiles The boundaries lower values are preferential (high number of areas presented (e.g. rate, presented per x number of proportion) people indicates higher values are on the map are divided preferential). Local interpretation equally between the 5 maybe required for some indicators. categories with those with the highest values forming the 'Highest' group etc. Map 1a: Experimental statistic: Variation in rate of all vision outpatient attendances by clinical commissioning group (2019/20) For example, in 2020 there were 135 clinical commissioning groups Directly standardised rate per 100,000 population 4 (CCGs), so 27 CCGs are Optimum value: Requires local interpretation in each category. Darker Significance level compared with England areas have the highest Equal-sized quintiles of geographies values. Higher - 99.8% (70) Highest (18,477 - 24,131) Higher - 95% (2) (16,833 - 18,477) **Significance level** (15,790 - 16,833) Not different (7) compared with England (14,391 - 15,790) Lower - 95% (2) The darkest and lightest Lowest (9,821 - 14,391) Lower - 99.8% (54) shading on map shows CCGs whose confidence intervals do not overlap with the England value. London London The second darkest and lightest colours show areas where the England value falls between the CCG's 95% and 99.8% CI. The number in brackets indicates the number of CCGs in each category. 8 © Crown copyright London is presented as a © Crown copyright separate zoomed in map

for clarity.

Chart, box plot and table

Median

14,990

15,825

15,875

16,231

16,177

16,153

16,194

Significant

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6 For each indicator, data is presented visually in a time series of box and whisker plots. The box plots show the distribution of data.

The line inside each box shows the median (the mid-point, so if the 135 CCGs were sorted in order of value, the value halfway between the CCGs in the 67th and 68th position would give the median). The bottom and top of the blue box represents the values which 25% and 75% of the areas fall below. 50% of the areas have a value within this range.

The whiskers mark the values at which 5% and 95% of areas fall below. The median and maximum values are also shown.

The time series allows us to see how the median has changed over time, but also whether the gap between the extreme values has changed.

The table accompanying the box and whisker plots shows whether there has been any statistically significant change in the median, or in the degree of variation over time.

Sections in the chapter

Context - an overview of why the indicator is of public health interest

Magnitude of variation - commentary in relation to the chart, box plot and table

Options for action – suggestions for best practice

Resources – links to useful documents

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CCG rank position

How were the categories calculated?



Box plot

		percentile	(135 CCGs in 2020)
Box & whisker	r plot	Max	135
Whiskers Show the extreme	 Maximum The value of the area with the highest value. 95th percentile 95% of areas have values below this. 	95%	Mid value between values of CCGs in ranks 128 and 129
values in the dataset.	- 75 th percentile 75% of areas have values below this.	75%	Mid value between values of CCGs in ranks 101 and 102
50% of the data values lie between the 25 th	The median is the middle value of an Median (50 th percentile)ordered dataset. Half of the observations are below it and half above	50% - Median	Mid value rank 68
and 75 th percentile. The distance between these is known as the	25 th percentile 25% of areas have values below this.	25%	Mid value between values of CCGs in ranks 34 and 35
inter-quartile range	 ^{5th} percentile 5% of areas have a value below this. Minimum The value of the area with the lowest value. 	5%	Mid value between values of CCGs in ranks 7 and 8
		Min	1

Cataract surgery

Context

A cataract is defined as any opacity in the natural crystalline lens of the eye. It can develop in one or both eyes. The changes to the transparency and refractive index of the lens result in various levels of vision impairment which can affect a person's quality of life and restrict their ability to carry out their daily activities, and to function independently and safely. The single most important risk factor for the development of a cataract is age.¹ The natural changes in lens proteins that occur with age, develop slowly with gradual onset of symptoms such as blurring and glare.

Cataract surgery is the treatment of choice for symptomatic, age-related cataract and prevention of vision impairment.² It is a clinically safe and effective micro-surgical procedure,³ associated with good functional outcomes for both first and second eye surgery.⁴ It remains a high volume NHS activity with surgery predominantly (85%) performed in adults of 65 years of age and over.⁵ Whilst cataract is a major cause of global vision impairment and blindness,⁶ it infrequently causes certifiable sight impairment in the UK.⁷

Surgical activity has steadily increased and is expected to continue to do so as demand continues to rise with the ageing population.⁸ At least a third of all procedures are consistently for second eye surgery.^{3, 9, 10} Periodically there have been restrictions on access to surgery (particularly second eye surgery) as a means to reduce costs to

¹ McCarty CA, Nanjan MB, Taylor HR (2000) Attributable risk estimates for cataract to prioritize medical and public health action. Invest Ophthalmol Vis Sci. 2000 Nov;41(12):3720-5 [Accessed 16 Jun 2021]

² National Institute for Health and Care Excellence (2017) Cataracts in adults: management (NICE guideline [NG77]) [Accessed 16 Jun 2021]

³ National Ophthalomology Database Audit (2020) National Ophthalmology Database (NOD) Audit annual report on cataract surgery September 2020. [Accessed 16 Jun 2021]

 ⁴ Frampton G, Harris P, Cooper K and others (2014) The clinical and cost-effectiveness of second-eye cataract surgery: a systematic review and economic evaluation Health Technol Assess. 2014, 18(68) [Accessed 16 Jun 2021]
 ⁵ NHS Digital (2021) Hospital Admitted Patient Care Activity 2019-20 [Accessed 16 Jun 2021]

⁶ Flaxman SR, Bourne RRA, Resnikoff S and others (2017) Global causes of blindness and distance vision impairment 1990–2020: a systematic review and meta-analysis Lancet Glob Health 2017, 5: e1221–34 [Accessed 16 Jun 2021]

⁷ Bunce C, Wormald R (2008) Causes of blind certifications in England and Wales: April 1999–March 2000 Eye (2008) 22, 905–911 [Accessed 16 Jun 2021]

 ⁸ Royal College of Ophthalmologists (2017) The Way Forward – Cataract Report [Accessed 16 Jun 2021]
 ⁹ Desai P, Reidy A, Minassian DC (1999) Profile of patients presenting for cataract surgery in the UK: national data collection Br J Ophthalmol 1999, 83:893–896 [Accessed 16 Jun 2021]

¹⁰ Day AC, Donachie PHJ, Sparrow JM, Johnston RL (2015) The Royal College of Ophthalmologists' National Ophthalmology Database study of cataract surgery: report 1, visual outcomes and complications Eye (2015) 29, 552–560 [Accessed 16 Jun 2021]

manage health budgetary restrictions.^{11, 12, 13} However NICE Guideline NG77 recognises the need for cataract surgery in both eyes, and its contribution to maintaining population eye health.²

Cataract surgery during the COVID-19 pandemic

Since the onset of the coronavirus (COVID-19) pandemic in March 2020, clinical activity has been prioritised to manage conditions at high risk of losing sight, with all routine care including cataract surgery delayed. Inevitably, as seen in figure 3.1, this resulted in a sharp drop in surgical activity during the first (April to June 2020) and second (December 2020 to February 2021) wave of the pandemic, with concerted efforts to resume activity towards expected levels in the intervening period. Nevertheless, this has resulted in a backlog of unoperated cases together with new cases arising during the pandemic, all of which would benefit from cataract surgery.

¹¹ Coronini-Cronberg S, Lee H, Darzi A, and others (2012) Evaluation of clinical threshold policies for cataract surgery among English commissioners J Health Serv Res Policy 2012,17: 241–247 [Accessed 16 Jun 2021]

 ¹² Burdon M (2019) End the postcode lottery for cataract surgery BMJ 2019, 365:I2293 [Accessed 21 Jun 2021]
 ¹³ Lacobucci G (2019) NHS commissioners are ignoring guidelines by rationing cataract surgery BMJ 2019, 365:I2326

[[]Accessed 21 Jun 2021]

Figure 3.1: Provisional data: Admission to hospital for cataract surgery in people aged 65 years and over for England (January 2018 to February 2021)



Map 3a: Variation in rate of admission to hospital for cataract surgery in people aged 65 years and over by clinical commissioning group (2019/20)

Directly standardised rate per 100,000 population Optimum value: Requires local interpretation



Column chart: Variation in rate of admission to hospital for cataract surgery in people aged 65 years and over by CCG (2019/20)



Box plot time series: Variation in rate of admission to hospital for cataract surgery in people aged 65 years and over by CCG (2013/14 to 2019/20)



	2019/20	2018/19	2017/18	2016/17	2015/16	2014/15	2013/14	Year
No significant change	2,837	3,202	3,691	3,032	2,756	2,961	2,621	Max-Min (Range)
No significant change	827	641	657	763	779	818	692	75th-25th percentile
No significant change	1,882	1,656	1,444	1,768	1,712	1,657	1,566	95th-5th percentile
INCREASING Significant	3,762	3,718	3,539	3,648	3,623	3,531	3,298	Median

Map 3b: Variation in rate of admission to hospital for first cataract surgery in people aged 65 years and over by clinical commissioning group (2019/20)

Directly standardised rate per 100,000 population Optimum value: Requires local interpretation



Column chart: Variation in rate of admission to hospital for first cataract surgery in people aged 65 years and over by CCG (2019/20)



Box plot time series: Variation in rate of admission to hospital for first cataract surgery in people aged 65 years and over by CCG (2013/14 to 2019/20)



	2019/20	2018/19	2017/18	2016/17	2015/16	2014/15	2013/14	Year
No significant change	1,572	1,689	2,107	1,616	1,516	1,607	1,314	Max-Min (Range)
No significant change	412	311	349	347	414	366	344	75th-25th percentile
No significant change	1,025	880	726	849	867	789	731	95th-5th percentile
INCREASING Significant	2,152	2,158	2,038	2,092	2,059	2,070	1,948	Median

Map 3c: Variation in rate of admission to hospital for second cataract surgery within 12 months in people aged 65 years and over by clinical commissioning group (2019/20)

Directly standardised rate per 100,000 population Optimum value: Requires local interpretation



Column chart: Variation in rate of admission to hospital for second cataract surgery within 12 months in people aged 65 years and over by CCG (2019/20)



Box plot time series: Variation in rate of admission to hospital for second cataract surgery within 12 months in people aged 65 years and over by CCG (2013/14 to 2019/20)



	2019/20	2018/19	2017/18	2016/17	2015/16	2014/15	2013/14	Year
No significant change	1,469.1	1,256.0	1,391.6	1,440.0	1,349.2	1,251.0	1,480.8	Max-Min (Range)
No significant change	449.7	331.9	318.2	374.7	458.1	432.8	353.4	75th-25th percentile
No significant change	887.5	795.7	799.0	975.4	910.3	895.8	803.6	95th-5th percentile
No significant change	1,244.6	1,160.7	1,117.6	1,211.7	1,151.0	1,146.0	1,016.7	Median

Magnitude of Variation

Map 3a: Variation in rate of admission to hospital for cataract surgery in people aged 65 years and over by clinical commissioning group

The maps and column chart display the latest period (2019/20), during which clinical commissioning group (CCG) values ranged from 2,462 per 100,000 population to 5,299 per 100,000 population, which is a 2.2-fold difference between CCGs.

The England value for 2019/20 was 3,660 per 100,000 population.

The box plot shows the distribution of CCG values for the period 2013/14 to 2019/20.

The median increased significantly from 3,298 per 100,000 population in 2013/14 to 3,762 per 100,000 population in 2019/20.

During 2019/20, almost 384,000 cataract operations were performed in the NHS in England on people age 65 years and over. Of these over 123,000 (32%) operations were performed on the second eye within 12 months of the first eye operation, with this proportionate level of activity remaining stable for several decades.^{9,10}

The rate of overall cataract surgery increased during the period from 2013/14 to 2019/20 without any change in variation in this activity between CCGs. Most recently much of this 2.2-fold variation is seen to have occurred at the extremes of the distribution of activity, with 73% (98/135) of CCGs having surgical rates significantly different to the national rate at the 99.8% confidence level.

The rising rates for surgery reflect a response to rising demand. The deprivation chart (Index of Multiple Deprivation rank) figure 3.2 shows there to be no strong association with the variation in rate of admission to hospital for cataract surgery at a CCG level, indicating that cataract surgical services meet known demand but should be checked locally as this could be compounded by access to services.

Figure 3.2: Scatterplot of admission to hospital for cataract surgery in people aged 65 years and over by index of multiple deprivation by clinical commissioning group (2019/20)



Other factors influencing variation include differences in the level of need and service uptake in local populations, commissioning priorities, and capacity pressures to deliver services for rising demand. In addition, given the wide dispersion of variation, the relative contribution of these factors influencing first, and second eye surgery also need to be considered and are presented in the following sections.

Map 3b: Variation in rate of admission to hospital for first cataract surgery in people aged 65 years and over by clinical commissioning group

The maps and column chart display the latest period (2019/20), during which CCG values ranged from 1,371 per 100,000 population to 2,943 per 100,000 population, which is a 2.1-fold difference between CCG

The England value for 2019/20 was 2,086 per 100,000 population.

The box plot shows the distribution of CCG values for the period 2013/14 to 2019/20.

The median increased significantly from 1,948 per 100,000 population in 2013/14 to 2,152 per 100,000 population in 2019/20.

Similarly, the rates for first eye cataract surgery performed in persons aged 65 years and over, increased during the period 2013/14 to 2019/20, and were associated with a persistent greater than 2-fold variation. However, there was less dispersion of this variation, and most recently 50% (68/135) of CCGs had rates significantly different to the national rate for first eye cataract surgery at the 99.8% confidence level.

The rising rates for surgery reflect a response to rising demand and recognition of the benefits conferred by surgery on the population at risk. The deprivation chart (Index of Multiple Deprivation rank) figure 3.3 shows there to be no strong association with the variation in rate of admission to hospital for first cataract surgery at a CCG level, indicating that cataract surgical services meet known demand but should be checked locally as this could be compounded by access to services.

Figure 3.3: Scatterplot of admission to hospital for first cataract surgery in people aged 65 years and over by index of multiple deprivation by clinical commissioning group (2019/20)



Variations are also likely to be influenced by factors akin to those operating for all cataract surgery activity: differences in the level of need and service uptake in local populations, commissioning priorities, and capacity pressures to deliver services for rising demand.

Map 3c: Variation in rate of admission to hospital for second cataract surgery within 12 months in people aged 65 years and over by clinical commissioning group

The maps and column chart display the latest period (2019/20), during which CCG values ranged from 584 per 100,000 population to 2,053 per 100,000 population, which is a 3.5-fold difference between CCGs.

The England value for 2019/20 was 1,175 per 100,000 population.

The box plot shows the distribution of CCG values for the period 2013/14 to 2019/20.

Second eye surgery was defined as a cataract procedure being performed on persons aged 65 and over, within 12 months of their first eye operation, which reflects contemporaneous clinical practice. It accounted for about a third of cataract surgical activity in this age group.

There was no demonstrable change in surgical rates for second eye surgery over the period 2013/14 to 2019/20, and no change in the level of variation associated with this activity. This together with the consistency in proportionate activity for second eye surgery suggests that demand generated following first eye surgery may be met but does not necessarily imply that need for second eye surgery is met.

The 3.5-fold variation during the financial year beginning 2019 was associated with considerable dispersion of this variation. Seventy-three per cent (99/135) of CCGs had rates that were significantly different to the national rate for second eye cataract surgery at the 99.8% confidence level, during 2019/20. It is likely that activity for second eye surgery is a key factor driving the wide dispersion for the rates of all cataract surgery.

The deprivation chart (Index of Multiple Deprivation rank) figure 3.4 shows there to be no strong association with variation in the rate of admission to hospital for second cataract surgery within 12 months indicating that services meet known demand but should be checked locally as this could be compounded by access to services.

Figure 3.4: Scatterplot of admission to hospital for second cataract surgery within 12 months in people aged 65 years and over by index of multiple deprivation by clinical commissioning group (2019/20)



Access to second eye surgery has historically been vulnerable to restrictions as a means to manage limited health budgets. Differences in the clinical and commissioning priorities for second eye surgery, imposed thresholds for intervention, and capacity for service provision, may also be influencing the variations in activity.

Options for action

Differences in age structure and deprivation are not driving the variation in activity or potential inequalities in service access or provision.

The common factors likely to be influencing variation in the rates for all, first and second eye cataract surgery include differences in commissioning and clinical priorities, capacity for service provision, levels of need and demand, and service uptake between CCGs. The dispersion of the variation around these rates may be reflecting how these factors are operating and their impact on prevalent demand for first and second eye surgery.

Local review should take account of these factors for first and second eye separately, together with demographic factors such as gender and ethnicity to identify any potential health needs which may influence uptake of available services.

Careful review of all of these factors will be required to manage the backlog of cases and the new demand arising since the onset of the pandemic, in order to prioritise those at greatest need of cataract surgery in the context of other unmet demand for eye health care. This may involve some readjustment of pre-COVID-19 guidance and practice to ensure equitable use of health resources across the eye health care landscape.

Resources

Clinical Council for Eye Health Commissioning (2018) SAFE - Systems and assurance framework for eye-health: Overview [Accessed 15 Apr 2021]

Clinical Council for Eye Health Commissioning (2018) SAFE - Systems and assurance framework for eye-health: SAFE - Cataract [Accessed 15 Apr 2021]

Fight for Sight (2021) A-Z Eye Conditions: Cataract [Accessed 15 Apr 2021]

Moorfields Eye Hospital NHS Foundation Trust (2001) Eye Conditions: Cataract [Accessed 15 Apr 2021]

National Institute for Health and Care Excellence (2017) Cataracts in adults: management (NICE guideline [NG77]) [Accessed 27 Mar 2021]

National Institute for Health and Care Excellence (2015) Clinical Knowledge Summaries: Cataract [Accessed 27 Mar 2021]

NHS (2020) NHS Health A-Z: Age-related cataracts [Accessed 31 Mar 2021]

NHS (2021) NHS Health A-Z: Cataract-Surgery [Accessed 31 Mar 2021]

Royal College of Ophthalmologists (2018) Cataract Commissioning Guide [Accessed 27 Mar 2021]

Royal College of Ophthalmologists (2017) The Way Forward - Cataract Report [Accessed 27 Mar 2021]

Royal College of Ophthalmologists (2017) The Way Forward: Resources [Accessed 15 Apr 2021]

Royal National Institute of Blind People (RNIB) (2019) Eye Conditions: Cataracts [Accessed 15 Apr 2021]

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