



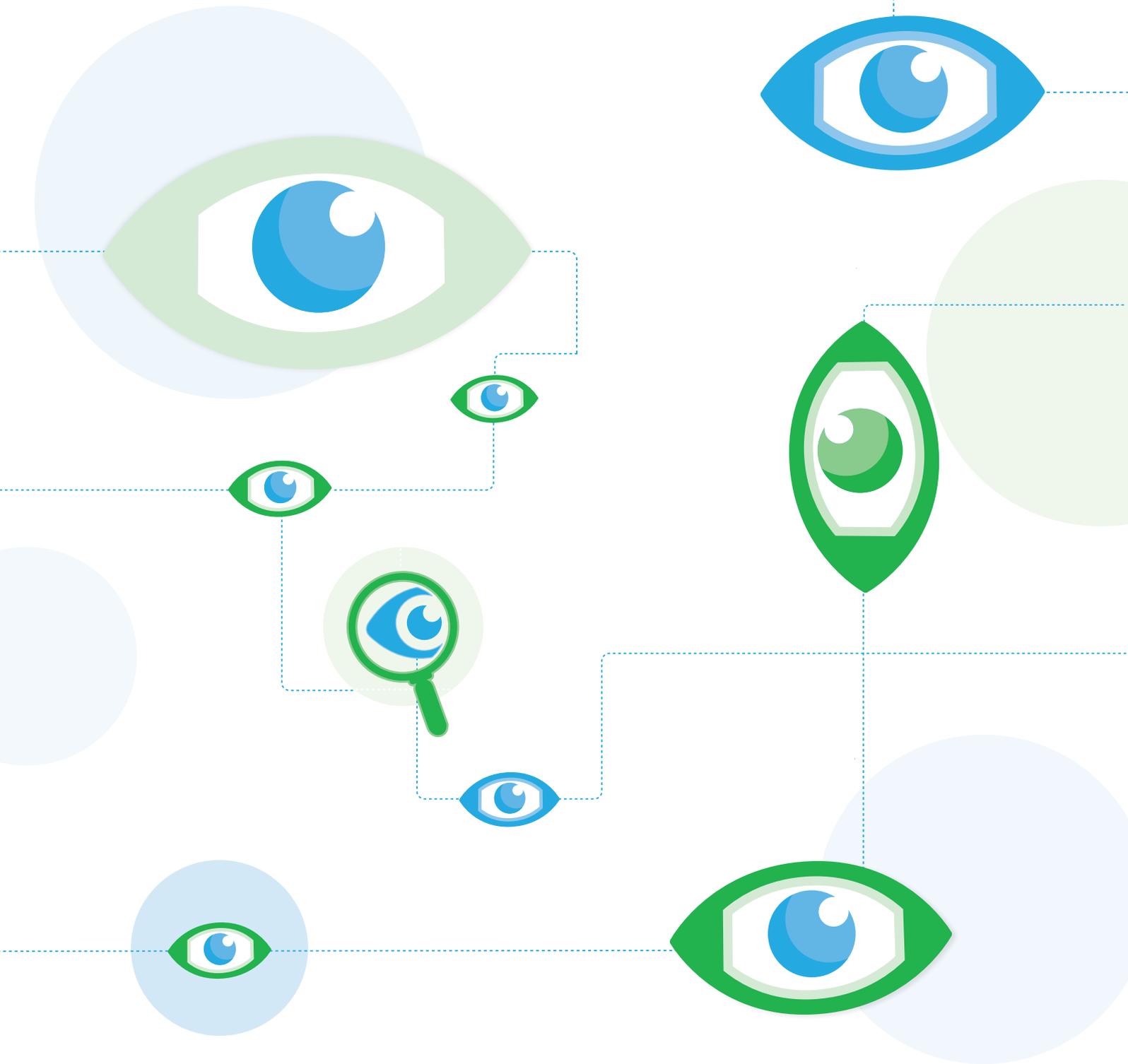
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# Annual Report 2019



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**ESCRS**  
EUREQUO

## Annual Report 2019

based on data from the European Registry  
of Quality Outcomes for Cataract and Refractive Surgery

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[www.eurequo.org](http://www.eurequo.org)

## What is the purpose of a Registry?

In health care, most countries have well-developed and functioning systems to monitor economic and human resource activities. Corresponding systems have not been developed for working with patients, although this is the actual core and the aim of provider organizations. The traditional patient record systems have not facilitated the compilation and analysis of data needed for quality improvement. Although increasingly more records are electronic, they essentially continue to be note pads that individual caregivers use for memory support in treating individual patients.

Quality registries have been developed to fill the gap left by the lack of primary monitoring systems. The quality registries collect information on individual patient's problems, interventions, and outcomes of interventions in a way that allows the data to be compiled for all patients and analysed anonymously at the unit level. The data from registers is invaluable as the conclusions are evidence based with external validity and is not based on the results from a small clinical trial or a case series. In summary, the quality registries are created and ran by professionals within areas where a need for specific information not covered by textbooks or scientific literature has been identified.

## EUREQUO Success and Future

The ESCRS believes that a continuing audit of surgical outcomes is necessary to ensure the best care for patients, by making comprehensive data available for comparison of visual outcomes.

EUREQUO is one of the largest international IT projects in ophthalmology, connecting surgeons all over the world and building a network to facilitate the exchange of expertise.

The EUREQUO Steering Committee is constantly working to update the platform with new parameters to reflect the development of new surgical techniques and trends in the field. The committee is also committed to analysing the aggregate data of the database and developing new scientific papers and has released 13 publications to date. This work will continue.

## The EUREQUO Platform

The European Registry of Quality Outcomes for Cataract and Refractive Surgery (EUREQUO) provides a platform to audit surgical results and encourages surgeons to adjust their techniques and improve their outcomes. The EUREQUO platform contains important clinical parameters but also patient-reported outcome measures for both cataract and refractive surgery. One important use of the database is benchmarking.

Two national registries (from Sweden and the Netherlands) transfer their data to the EUREQUO database. In 2018 this transfer of data from Sweden was temporarily stopped because of the General Data Protection Regulation (GDPR). This has now been solved and the transfer of data is ongoing. On 31st December 2019 more than 3 million cataract surgeries and almost 140,000 refractive surgeries belongs to the EUREQUO database.

EUREQUO is funded by the ESCRS, with initial support from the EU. The platform has been launched globally, and all ESCRS members can access it free of charge.

## EUREQUO Benefits and Benchmarking

- By collecting data, surgeons will be able to monitor their own results over time, and anonymously compare their results with other colleagues, clinics and countries.
- EUREQUO is a convenient web-based registry. Cataract, refractive and patient-reported outcomes are all in one platform.
- EUREQUO provides a unique opportunity to monitor and compare results.
- Collecting data will support surgeons to make an audit report – a new functionality.
- EUREQUO is linked to patient-reported outcomes.
- EUREQUO allows clinical improvement using patient-reported and clinical data.

Only anonymous data are stored within EUREQUO, and only clinical data without any patient ID data are mandatory within the EUREQUO datasets.

For more information visit the EUREQUO website at: [www.eurequo.org](http://www.eurequo.org)

# Cataract Surgery

## Development of the Database

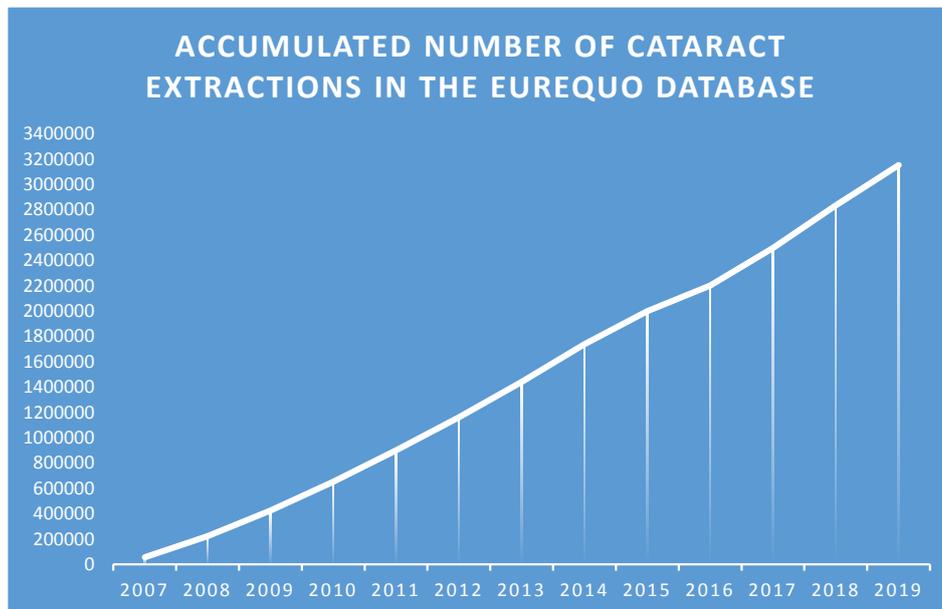
Data presented here is based on the database standing at 15th October 2020. The number of cataract extractions reported to the EUREQUO database is shown in [Table 1](#).

**Table 1.**

**Number of annually reported cataract operations and the accumulated number of cases in the database.**

Year	Number of reported cataract extractions	Accumulated number of cataract extractions in the database
2007	57,552	57,552
2008	165,647	223,199
2009	201,355	424,544
2010	227,283	651,837
2011	249,474	901,311
2012	260,525	1,161,836
2013	280,090	1,441,926
2014	297,564	1,739,490
2015	259,662	1,999,152
2016	203,955	2,203,107
2017	296,787	2,499,894
2018	324,367	2,824,261
2019	328,579	3,152,840

The growth of the database is shown graphically in [Figure 1](#).

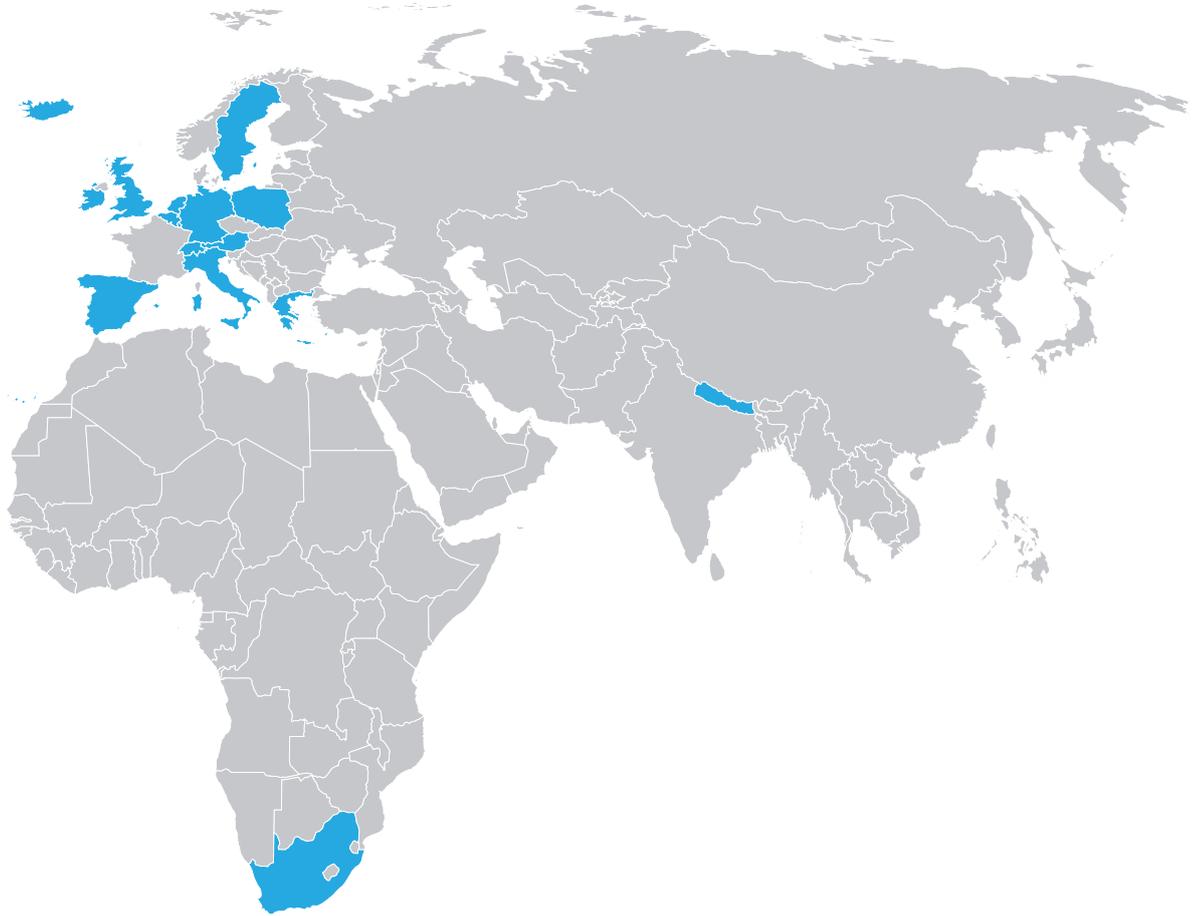


**Figure 1.**

**Number of accumulated cataract operations in the EUREQUO database over time. One million cases were achieved in 2011, two million cases in 2016 and three million cases in 2019.**

Since launch the number of participating countries has varied between 14 and 16. In 2019 clinics from 15 countries entered data to the EUREQUO database, 13 from the EU and 2 from outside the EU.

## Contributing Countries



- Austria
- Belgium
- Germany
- Greece
- Iceland
- Ireland
- Italy
- Luxembourg
- Nepal
- Netherlands
- Poland
- South Africa
- Sweden
- Switzerland
- United Kingdom

## Trends in outcomes over time

Visual outcome, postoperative corrected distance visual acuity, LogMAR. Cases with follow up data.

Year	N	Mean	SD
2008	64,751	0.088	0.23
2009	100,302	0.081	0.23
2010	110,037	0.080	0.23
2011	114,036	0.076	0.23
2012	122,024	0.069	0.22
2013	118,625	0.062	0.20
2014	142,591	0.069	0.24
2015	140,220	0.059	0.23
2016	91,725	0.041	0.16
2017	148,680	0.057	0.26
2018	174,766	0.040	0.17
2019	171,930	0.038	0.19

Refractive outcome, biometry prediction error (spherical equivalent). Cases with follow up data.

Year	N	Absolute mean	SD	within $\pm 0.5D$
2008	63,568	0.478	0.54	67.3%
2009	100,628	0.457	0.52	69.0%
2010	111,091	0.443	0.49	70.2%
2011	114,414	0.433	0.48	71.2%
2012	122,367	0.419	0.52	72.3%
2013	118,889	0.416	0.47	72.4%
2014	142,575	0.435	0.55	72.3%
2015	140,201	0.415	0.48	73.2%
2016	91,934	0.412	0.48	73.5%
2017	148,939	0.403	0.46	73.7%
2018	175,503	0.399	0.46	74.0%
2019	172,298	0.392	0.46	74.0%

Any surgical complication

Year	N	Number	% of all surgeries
2007	85,711	2768	3.2
2008	137,543	3402	2.5
2009	201,287	4593	2.3
2010	226,471	4973	2.2
2011	244,639	6005	2.5
2012	256,855	4908	1.9
2013	261,100	4354	1.7
2014	293,554	7103	2.4
2015	254,838	3323	1.3
2016	197,391	2447	1.2
2017	296,787	3445	1.2
2018	195,581	2843	1.5
2019	172,311	2030	1.2

The trends show an improvement for visual outcome, refractive outcome and a reduced number of surgical complications.

# Data for 2019

## Preoperative and surgical data

The number of cataract extractions reported into the database for 2019 was 328,579. The mean age of the operated patients was 73.4 years and 56.7% were females and 43.3% males.

## Preoperative visual acuity

The preoperative corrected distance visual acuity (CDVA) in surgery eye was 0.1 (6/60) or worse in 9.3% of all cases. In 41.4% of the cases the preoperative CDVA was worse than 0.5 (6/12). This means that in 58.6% the visual acuity was 0.5 (6/12) or better.

## Ocular co-morbidity

In 27.9% there was an ocular co-morbidity in the surgery eye. Such co-morbidities were Glaucoma (6.2%), Macular Degeneration (10.2%), Diabetic Retinopathy (2.5%), and Amblyopia (1.8% [131,015 missing cases]).

## Surgical difficulty

In 9.8% the surgeon reported a surgical difficulty. Such a difficulty could be: Previous corneal refractive surgery (0.3%), White/Brown cataract with need of capsular staining (2.3%), Small pupil with need for mechanical dilatation (2.8%), Corneal opacities (1.5% [131,015 missing cases]), Previous vitrectomy (0.84%) and other surgical difficulty (4.6% [131,015 missing cases]).

## Surgical experience

This new parameter was introduced in 2017. It was reported in 2019 for 16,076 surgeries, and 121 (0.8%) of these surgeries were performed by a trainee.

## Type of operation

A phacoemulsification with implantation of a posterior chamber intraocular lens (IOL) was the most frequent type of surgery (97.4%). In 5603 (1.7%) cases a planned extracapsular cataract extraction was performed. A femtosecond laser-assisted cataract extraction was reported in 350 (0.2%) cases [131,015 missing cases]. In 796 (0.2%) cases an "another" type of operation was performed. In 1458 cases (0.5%) a phacoemulsification with implantation of a posterior IOL combined with another surgical procedure (e.g. vitrectomy or corneal transplantation) were reported.

## Type of IOL material

The dominating type of IOL material was an acrylic hydrophobic IOL, 86.6% received such an IOL. An acrylic hydrophilic IOL was implanted in 10.8%. In 324 cases (0.1%) no IOL was implanted and the eye was left aphakic.

## Additional refractive quality IOL

Additional refractive quality IOL was reported for 131,980 cataract extractions. In 1750 (1.3%) cases a multifocal IOL was implanted and in 2084 (1.6%) a toric IOL and in 141 (0.1%) a multifocal-toric IOL was implanted. In 13 cases an extended depth of focus (EDF) lens was implanted.

## Surgical complications

In 1836 (0.57%) cases a posterior capsule rupture with or without vitreous loss occurred. For trainees this complication occurred in 4.6%. Other surgical complications were [missing data; 131,015]: Dropped nucleus in 90 (0.05%) cases, Iris damage in 336 (0.2%) cases, and "Other sight-threatening complication" in 953 (0.5%) cases.

## Follow up data (data from clinics committed to report outcome data)

Complete follow up data was reported for 171,930 cataract extractions. The average time from date of surgery to date of follow up was 31.2 (SD 28) days. The mean age of follow-up patients was 73.2 years and 56.2% were females.

## Visual outcome

A final CDVA of 1.0 (6/6) or better was achieved by 78.4% (95% Confidence Interval [CI]: 78.2-78.6) of all reported cases. A CDVA of 0.5 (6/12) or better was achieved by 96.0% (95%CI: 95.9-96.1) of all cases.

## Refractive outcome

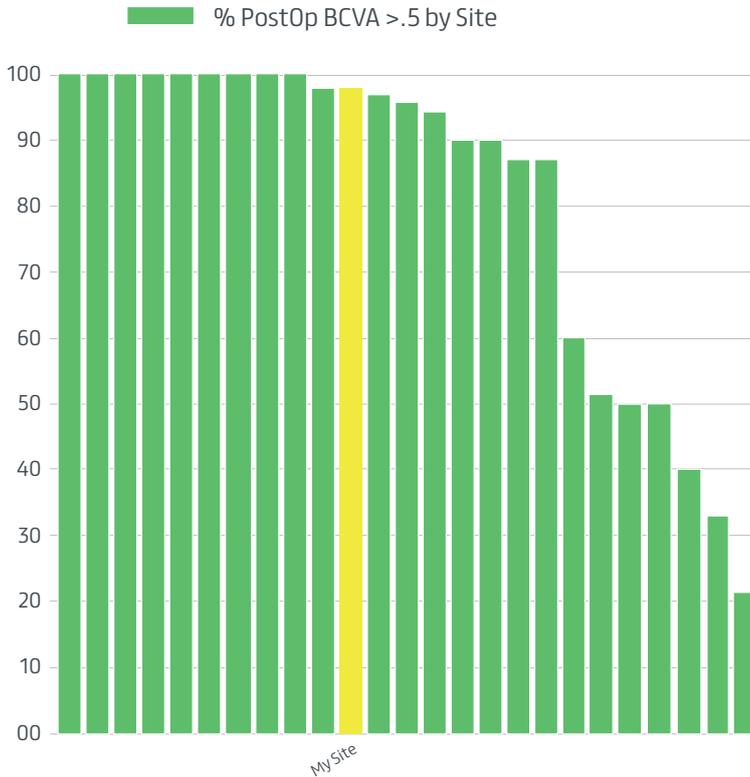
The average spherical equivalent error was -0.04D (SD 0.60). The absolute mean spherical equivalent error was 0.39D (SD 0.46). Within  $\pm 0.5D$  biometry prediction error (spherical equivalent) was 74.4% (95% CI: 74.2-74.6), and within  $\pm 1.0D$  94.3% (95% CI: 94.2-94.4).

## Postoperative complications

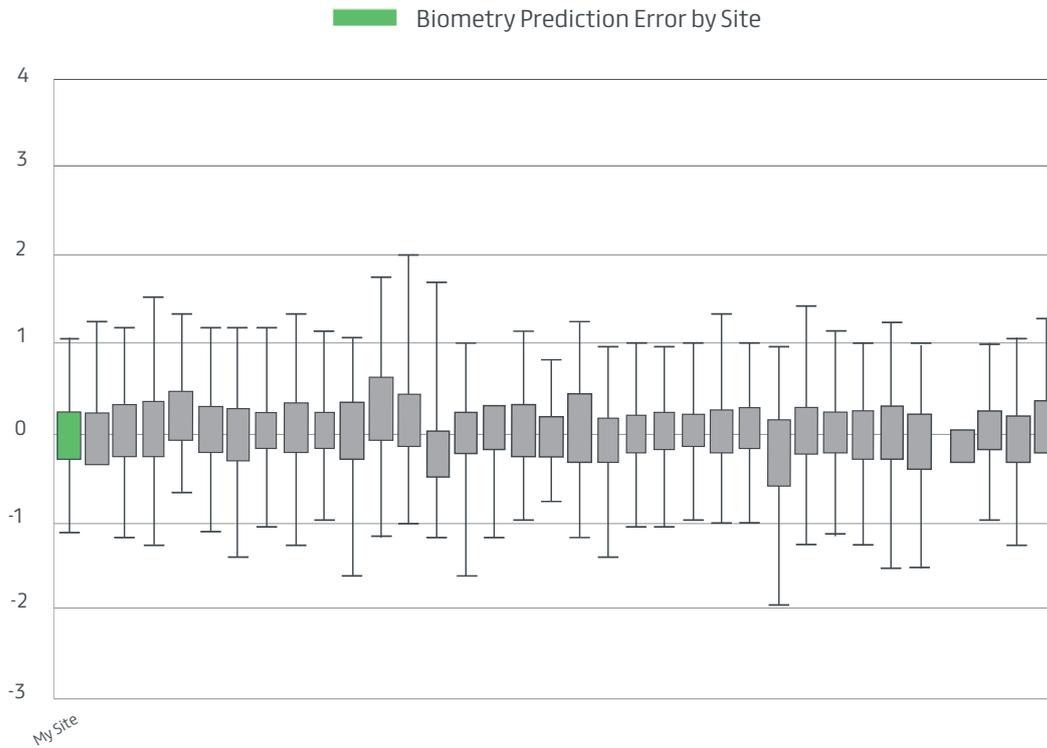
In 98.8% of the cases no postoperative complication was reported during the follow up time. In 668 (0.39%) cases there was a persistent corneal edema and in 35 (0.02%) cases uncontrolled elevated intraocular pressure. Twenty-three cases (0.013%) of endophthalmitis were reported. This number does not include cases that occurred later than the follow up date.

# Benchmarking diagrams

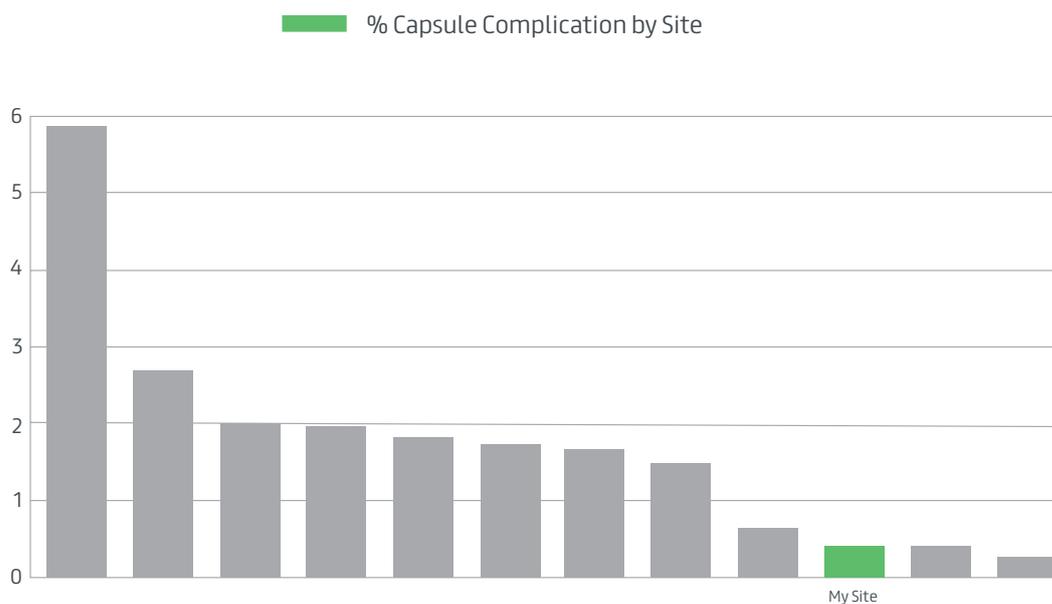
1. Visual outcome, percentage of cases with CDVA 0.5 (6/12) or better. Each bar represents one clinic. Green bar = requesting unit. Only a part of the clinics is shown.



**3. Boxplot diagram with biometry prediction error, correct sign. Every box represents a unit. Green bar = requesting unit. Only a part of the clinics is shown.**



**4. Reported capsule complications in per cent (posterior capsular break with or without vitreous loss) during surgery. Every bar represents a unit. Green bar = requesting unit. Only a part of the clinics is shown.**



## 5. Refractive Surgery

### Development of the database

The number of refractive surgeries reported to the EUREQUO database is shown in [Table 2](#).

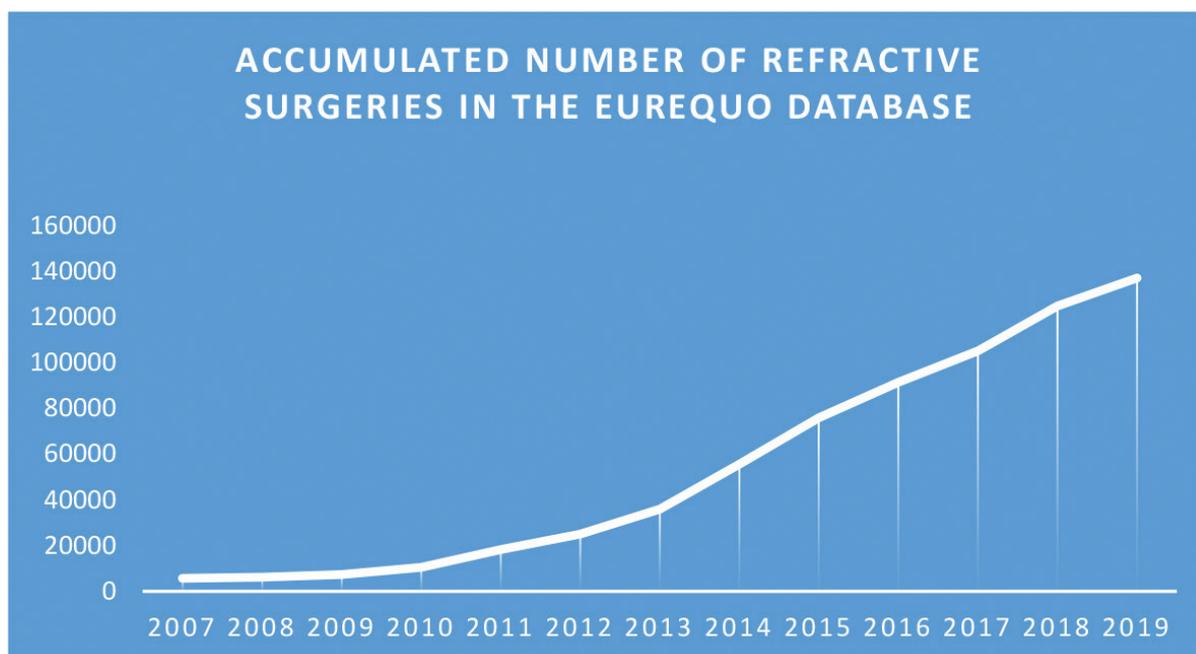
**Table 2.** Number of annually reported refractive surgeries and the accumulated number of cases in the database. The database inherited historical cases from the Refractive Outcomes Information System collected until the end of 2007.

Year	Number of reported refractive surgeries	Accumulated number of refractive surgeries in the database
Inherited cases until the end of 2007	5773	5773
2008	492	6265
2009	1081	7346
2010	3100	10,446
2011	7766	18,212
2012	6837	25,049
2013	10,926	35,975
2014	19,711	55,686
2015	20,279	75,965
2016	15,470	91,435
2017	13,758	105,193
2018	19,679	124,872
2019	12,192	137,064

The growth of the database is shown graphically in [Figure 2](#).

### Figure 2.

Number of accumulated refractive surgeries in the EUREQUO database over time. 50,000 cases were reached in 2014 and 100,000 in 2017.



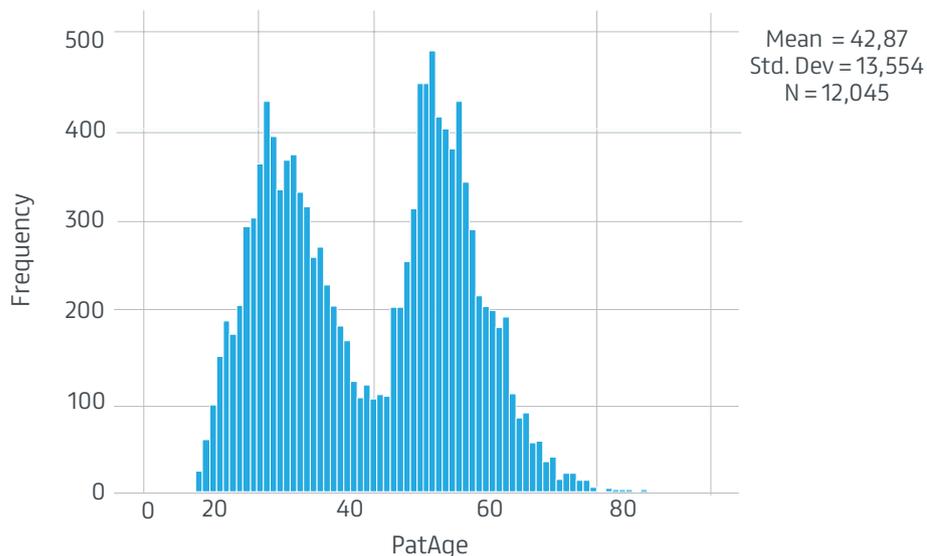
## Data for 2019

Data from 8 countries has been entered into the database in 2019. The number of refractive surgeries entered into the database for 2019 was 12,192.

### Preoperative data

The mean age of the patients was 42.9 (SD 13.5) years and 48.6% were females and 51.4% were males.

The age distribution reflects laser surgery in younger age and RLE in middle-aged persons (Figure 3).

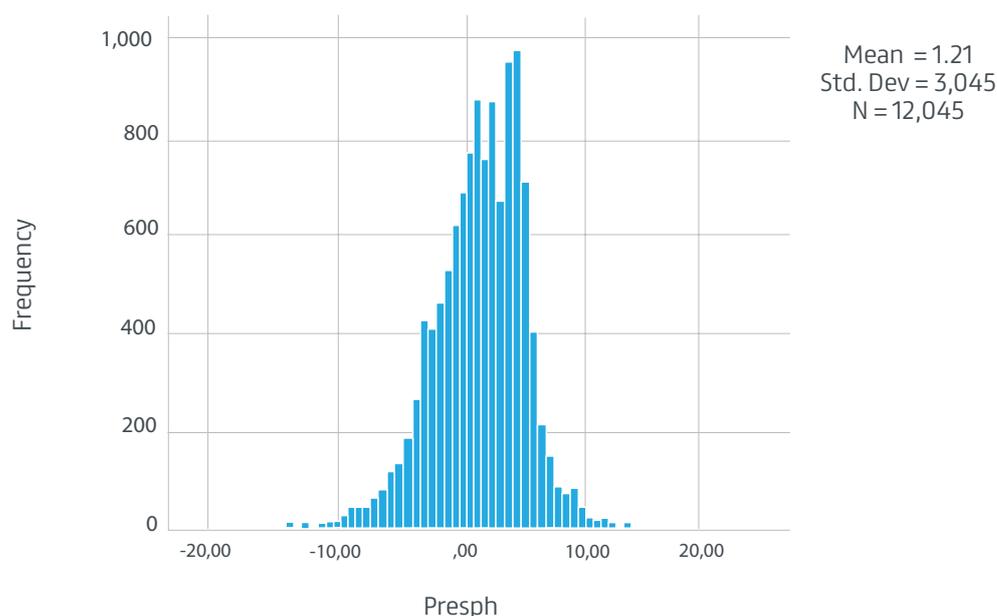


**Figure 3.**

**Histogram showing the age distribution.**

The mean preoperative corrected distance visual acuity (CDVA) in the eye to be operated on was -0.0043 (SD 0.062) LogMAR and the median value 0.0 LogMAR. The mean preoperative spherical refraction was -1.21 (SD 3.05) and the mean spherical equivalent was -1.61 (SD 3.07). A preoperative myopia of -3.0D or more existed in 26.6% of the eyes and a hyperopia of 2.0D or more in 12.2% of the eyes. A myopic spherical equivalent existed in 65.5% of the eyes, 1.0% were emmetropic and 34.5% had a hyperopic spherical equivalent before surgery.

The distribution of preoperative spherical refraction is shown in Figure 4.



**Figure 4.**

**Distribution of preoperative spherical refraction.**

# Type of surgery

Most of surgeries were primary (99.2%). Only a small fraction were enhancements (0.6%) or additional (0.2%) surgery.

## Surgery method

LASIK was performed in 4138 eyes, 134 by blade and 4004 by femtosecond laser. LASEK was performed in 920 eyes and PRK in 732 eyes. Another 49 unspecified laser surgeries were reported.

Altogether 50 incisions were reported.

Refractive lens exchange (RLE) dominated the type of refractive surgeries during 2019 in the database, 5544 eyes were reported. Among the specified RLE surgeries 4685 were trifocal IOLs with (1402) or without (3283) a toric IOL as well. A monofocal IOL was implanted in 397 cases with (173) or without (224) a toric IOL.

A phakic IOL in posterior chamber was implanted in 717 eyes and a phakic IOL in the anterior chamber was implanted in 48 eyes.

## Surgical complications

Very few surgical complications were reported. A corneal flap complication occurred in 11 eyes out of 4004 femtosecond LASIK procedures. Another cornea-related complication occurred in 25 cases distributed in RLE: 10, Femtosecond lasik:13, and Lasek:2. In single eyes of RLE a posterior capsular tear occurred (2 eyes) and iris trauma (2 eyes).

## Visual and refractive outcomes

Follow up visit and examination occurred on average 94.7 (SD 26.9) days after surgery.

In 65.8% of the eyes a final uncorrected distance visual acuity of 1.0 (6/6) or better was achieved and in 89.2% the same final distance visual acuity was achieved with best correction.

A final refraction within  $\pm 0.5D$  was achieved in 89.3% of the eyes.

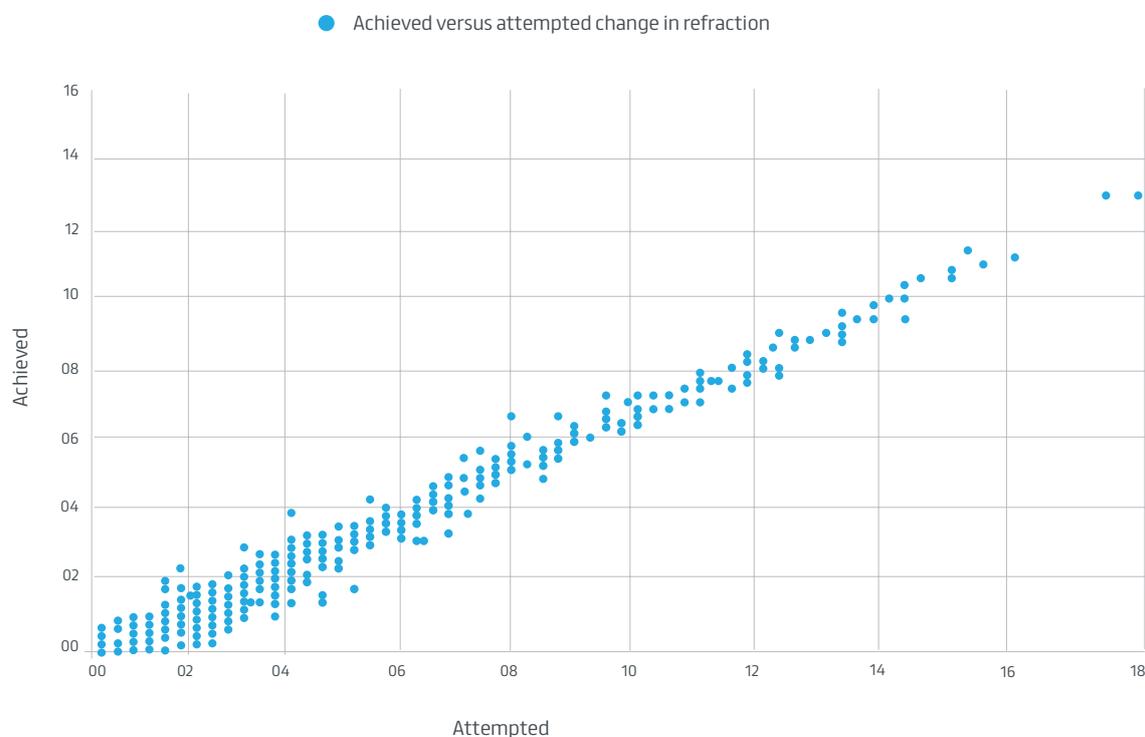
## Postoperative complications

In altogether 35 eyes a postoperative complication was reported. Nine eyes with significant haze, and 6 eyes with an optical error ( $>2.0D$  of error) were reported.

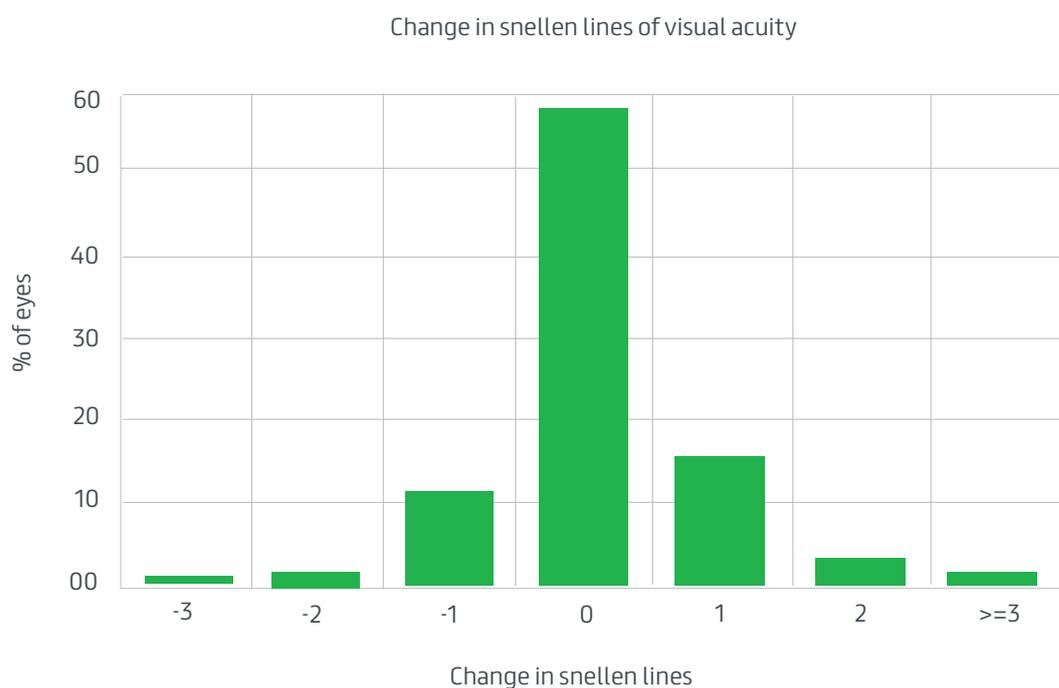
# Benchmarking Diagrams from the refractive surgery output report

## The Graphs are from a Group of Reporting Units

**Graph 1.**  
Attempted versus achieved refraction



**Graph 2.**  
Change in Snellen lines, surgery eye.



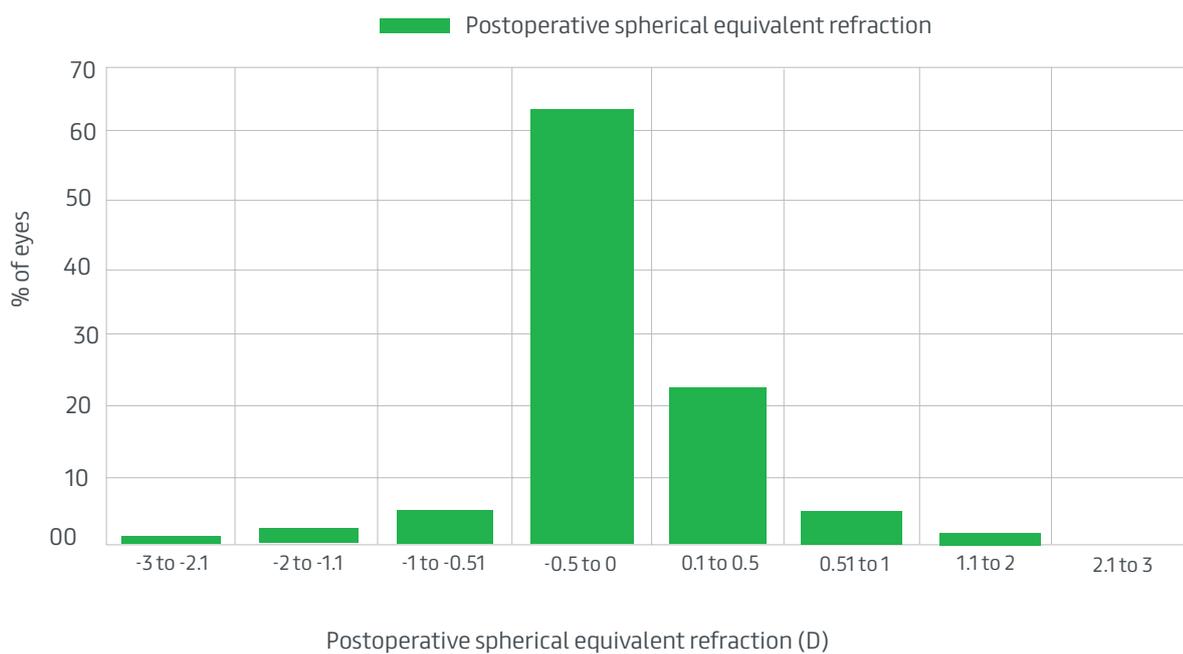
### Graph 3.

Preoperative spectacle corrected VA and postoperative uncorrected VA.



### Graph 4.

Postoperative spherical equivalent



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