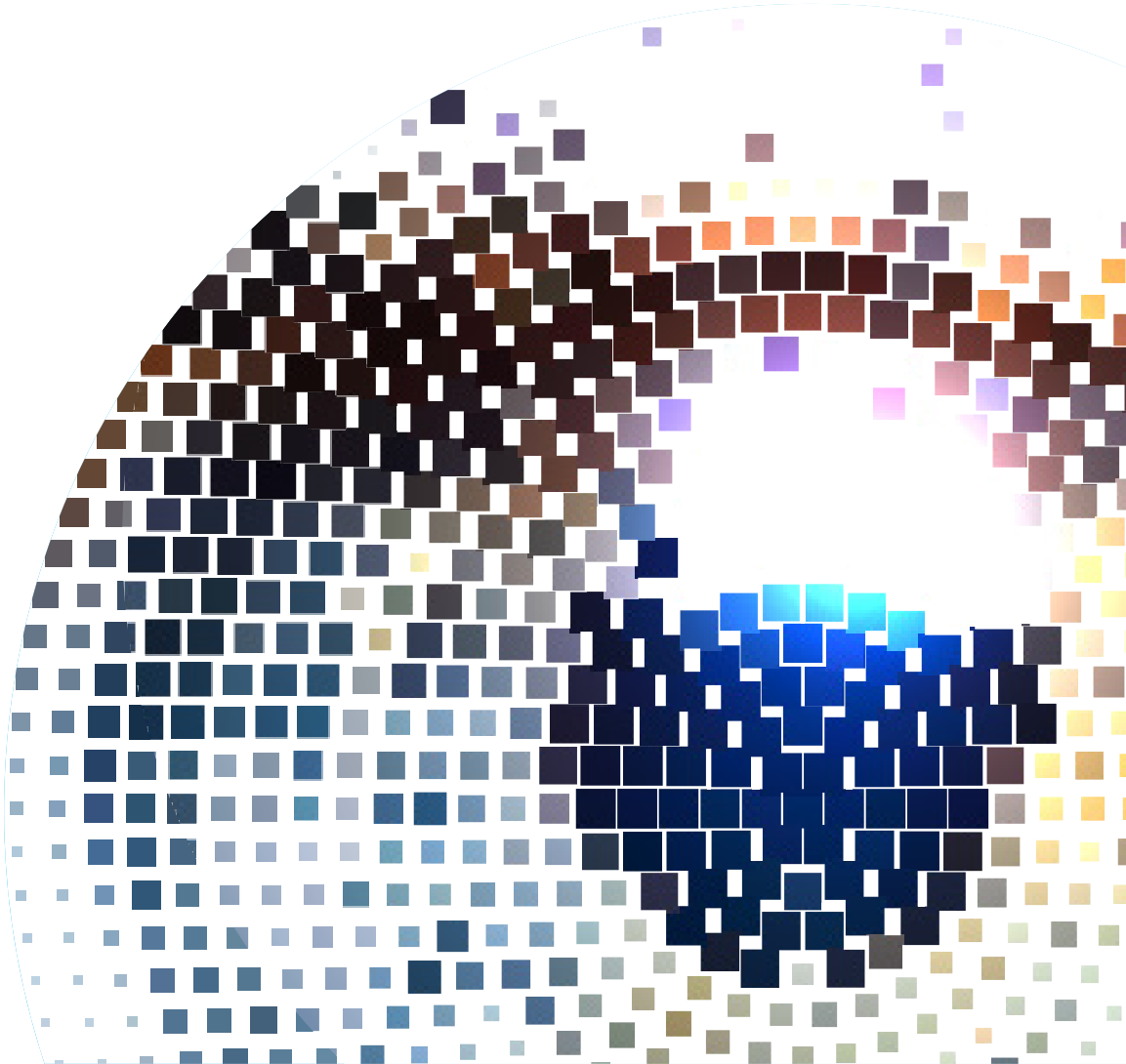
ESCRS EUREQUO

ESCRS REGISTRIES

Annual Report 2022

ANNUAL REPORT 2022 BASED ON DATA
FROM THE EUROPEAN REGISTRY
OF QUALITY OUTCOMES
FOR CATARACT AND REFRACTIVE SURGERY



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ESCRS

Annual Report 2022 Based on Data from the European Registry of Quality Outcomes for Cataract and Refractive Surgery

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Introduction

In 2007, the ESCRS and 11 national societies received a European Union grant to develop a registry (EUREQUO) for cataract and refractive surgery with a goal to improve the outcomes of European Cataract and Refractive Surgery.

Fifteen years later, one registry has grown to three with the addition of the European Cornea and Cell Transplantation Registry (ECCTR) and the European Registry of Childhood Cataract (EuReCCA), the latter having commenced in 2022.

Together, these registries contain data for more than 4 million surgeries and represent one of the richest ophthalmology datasets in Europe.

In 2022, the Registries Steering Group worked to integrate additional sources of data, focusing on country-level registries, as well as surgical data from individual clinics. Data are collected and aggregated from national registries sharing common data models such as in Sweden, the Netherlands, and France, or centrally from individual sites committed to quality improvement enrolled in the registries.

The ESCRS Steering Group has put three task forces in place to support the future development of the registries while focusing on best practices, patient-reported outcome measures (PROMs), and collaboration with industry in these data aggregation projects, respectively. With the input of international experts from the three task forces, we will be better able to conduct registry studies with value-based health care at the forefront.

In addition to the update on the cataract and refractive outcomes collected over the past 12 months, we consider the importance of collecting clinical *and* patient reported outcomes, and its impact on the future of patient care in ophthalmology. On this topic, we have invited Dr. Neo Tapela, Chief Scientific Officer of ICHOM (International Consortium for Outcome Measures in Health), to share her thoughts on the role of registries in value-based healthcare.

In addition, we have invited Prof. Dr. Joaquim Murta, chair of the Department of Ophthalmology, Coimbra, Portugal, to share with us the history of the Health Cluster Portugal Value-Based Health Care Registry, the most recently added registry to EUREQUO.

EUREQUO is one of the largest international IT projects in ophthalmology, connecting surgeons all over the world, providing a network to facilitate the exchange of information. We are energized by what the future holds for the ESCRS Registries.

Anders Behndig and Mor Dickman
On behalf of the ESCRS Registries Steering Group

To learn more, or to become a registered clinic, please visit : https://registries.escrs.org/

1. New Registries Task Forces Established

In the coming years, the ESCRS aims to expand data collection across Europe and improve the use of the data gathered thus far to create standardized outcome data sets. This will help the transfer of data to the registries and support registry-based research. To foster this ambition and support its activities, the ESCRS Registries Group established an International Advisory Task Force, a PROMs Task Force, and an Industry Task Force.

1. The Global Advisory Task Force

This task force brings together a wide range of international experts in ophthalmology that bring diverse perspectives and knowledge to the registries. The task force seeks to expand the reach of the registries beyond existing stakeholders by leveraging its broad network and establishing international partnerships and collaborations. Finally, the task force aims to promote transparency and accountability in the registry process by incorporating patient voices, ensuring the registries reflect the experiences and needs of patients.
The members include:

Flora Lum, MD
VICE PRESIDENT OF QUALITY AND DATA SCIENCE OF THE AMERICAN ACADEMY OF OPHTHALMOLOGY

Sunny Virmani
GROUP PRODUCT MANAGER, HEALTH AI AT GOOGLE

Neo Tapela, MD
CHIEF SCIENTIFIC OFFICER AT ICHOM

Cara Antoine, PhD
EXECUTIVE VICE PRESIDENT, CHIEF TECHNOLOGY AND PORTFOLIO INNOVATION OFFICER AT CAPGEMINI

Doug Koch, MD
PROFESSOR AND ALLEN, MOSBACHER, AND LAW CHAIR IN OPHTHALMOLOGY AT BAYLOR UNIV/ASCRS

Adi Abulafia, MD
CHAIRMAN AT THE ISRAELI SOCIETY OF CATARACT SURGERY

Kerry Goetzke, MS, PhDc
DEPUTY DIRECTOR, NEI OFFICE OF DATA SCIENCE AND HEALTH INFORMATICS

2. The PROMs Task Force

was established to bring regulatory and industry professionals, patient advocates, clinicians, and researchers together to address the gap in capturing patient reported outcomes within European healthcare systems. The group aims to develop and validate tools that can effectively capture specific variables of patient experiences and outcomes. It also seeks to incorporate existing and new PROMs into the healthcare system, enabling patients to collect their outcomes data and have autonomy in utilizing it meaningfully.

The members of this task force are :

Jos Kleijnen, MD, PhD
CONSULTANT TO TASK FORCE. PROFESSOR OF SYSTEMATIC REVIEWS IN HEALTH CARE, MAASTRICHT UNIVERSITY

Konrad Pesudovs, PhD
OUTCOMES RESEARCHER UNIV OF NEW SOUTH WALES

Ekkehard Fabian, MD
OPHTHALMOLOGIST/ TECHNOLOGIST, AUGENCENTRUM ROSHEIM

Mats Lundstrom, MD, PhD
EUREQUO CO-FOUNDER

Tanja Stamm, PhD
HEAD, CENTER FOR MEDICAL DATA SCIENCE MED. UNIV. WIEN

James Wolffsohn, OD, PhD
PROFESSOR OF OPTOMETRY/ PROMS DEVELOPER, ASTON UNIVERSITY

Isabella Baur, MD
YO REP/FELLOW HEIDELBERG UNIVERSITY

3. The Industry Task Force

was formed in order to foster collaboration and dialogue between regulators, companies, and patient advocates, recognizing the enthusiasm within the industry to join forces and embrace opportunities through increased digitalization. Industry's involvement in collecting outcome data for regulatory-mandated real-world data collection, coupled with their ongoing development of digital tools for data collection and analysis, renders them highly valuable for facilitating future registry studies. The group's objective is to streamline the process by standardizing data sets, conducting postmarketing surveillance, and ensuring follow-up, utilizing PROMs.

The members of this task force are :

Kristina Dziekan, MsC
COMMERCIAL LEADER AND ADVISORY IN MARKET ACCESS, ESG STRATEGY AND VALUE BASED HEALTHCARE CHAIR CONSULTANT (EX-ALCON)

Luc Bonnefoy
SENIOR VICE PRESIDENT, BAUSCH+LOMB SURGICAL

Syed Rashid
DIRECTOR OF MARKET ACCESS & SALES TRAINING (EMEA), SURGICAL J&J VISION

Stanley Windsor, PhD
DIGITAL INNOVATION MANAGER, RAYNER

Werner Schafer
HEAD OF DIGITAL PORTFOLIO MANAGEMENT & STRATEGY, CARL ZEISS MEDITEC

Yossi Sammy, MD, MBA
VP, HEAD, MEDICAL AFFAIRS INTERNATIONAL, ALCON

2. The Importance of Value-Based Healthcare

The International Consortium for Health Outcomes Measurement (ICHOM), established in 2012, aims to redefine healthcare success based on patient-reported outcomes. Our focus is on value-based healthcare, ensuring that collected data truly reflects what matters to patients and standardizing outcome measurements.

The current evaluation of healthcare has neglected essential aspects of the patient. The emphasis is currently on objective measurements such as clinical outcome measures, imaging, and diagnostic tests. While these tests have their merits, they don't guarantee improved quality of life or improved quality of visual outcomes. Measuring outcomes that matter most to patients enables a cycle of continuous improvement of patient outcomes and experiences, which ultimately enables reform across ophthalmology providers and industry.

Standardizing data collection and international collaboration allow healthcare organizations to understand patients' needs and experiences globally. This approach facilitates quality improvement, benchmarking, identification of best practices, and addressing disparities for positive change. Our goal is to bring these aspects to the forefront, benefiting patients and society as a whole.

ICHOM sets evidence-based standards for patient-reported and clinician-reported outcomes. Our multidisciplinary and international approach ensures reliable and validated instruments and questionnaires.

The ESCRS Registries, focusing on patient-reported outcomes, contribute to a pan-European effort to assess the effectiveness of healthcare systems from the patients' perspective. This valuable analysis informs improvements, identifies best practices, and empowers patients and advocacy groups in ophthalmic surgical care. ICHOM is enthusiastic about collaborating with initiatives like EUREQUO, reaffirming our dedication to improving healthcare outcomes by prioritizing patients' perspectives and experiences.

-Dr. Neo Tapela, Chief Scientific Officer at ICHOM

3. Why Registries Form a Critical Component of Clinical Outcomes Reporting

Quality registries were created to fill the gap between EMRs and data generated by clinical research projects and randomized clinical trials (RCTs). Quality registries collect specific information on individual patient's functions, symptoms, interventions and outcomes of interventions in a way that allows the data to be compiled for all patients and analysed anonymously at a congregated level. Compiled data generated by registries may not hold the data standard of an RCT, but registry data, being unselected, can be relevant to "real life" in a way that RCT data cannot.

Quality registries are invaluable given that they are evidence based with external validity and consist of large, geographically widespread data sets. For example, enabling the ongoing audit of surgical outcomes and gathering of surgical data is necessary to ensure the best care for patients, by making comprehensive data available for comparison of outcomes and developments over time.

There are numerous examples of ways in which registry data can be used for facilitating and improving health care quality. Registry data can be used to test scientific hypotheses, for example in planning large-scale RCTs, to monitor the use of equipment and surgical methods over time. This aids Health Technology Assessment (HTA) procedures in defining state-of-the-art care with implementation of new methods and replacement of old outdated regimens, planning education of new surgeons, finding rare outcomes and complications, and easily gathering data from specific patient groups - even for extremely rare conditions - for subgroup analysis.

4. The New ESCRS Registries:

ECCTR
European Cornea and Cell Transplantation Registry

ESCRS EURECCA

As part of its focus on cataract, refractive and corneal disease, the ESCRS has established two new registries in recent years. The European Cornea and Cell Transplantation Registry (ECCTR) is an EU web-based registry in the field of cornea, which asseses the safety, quality, and efficacy of corneal transplantation.

With more than 30,000 corneal transplants performed in Europe on an annual basis, the aim of ECCTR is to build a common assessment, methodology, and network for academics, health professionals, and authorities.

In 2022, EuReCCA was established to capture data on pediatric cataract surgery, an underserved and understudied area.

From 2023, the ESCRS Registries Group will report on outcomes from the three registries providing a richer source of data to European ophthalmologists.

5. The EUREQUO Registry

The European Registry of Quality Outcomes for Cataract and Refractive Surgery (EUREQUO) provides a platform to audit cataract and refractive surgical results and encourages surgeons to adjust their techniques and improve their outcomes.
The database platform on which EUREQUO is built is updated on an ongoing basis to assess the latest developments in modern European cataract surgery and to reflect the development of new surgical techniques and trends in the field.

The EUREQUO platform collects important clinical parameters, with the future goal to include patient-reported outcome measures for both cataract and refractive surgery. The ESCRS Registries are committed to analysing the aggregated data and publishing the findings for the benefit of patients, health care providers, ESCRS members and the scientific community.

6. EUREQUO Benefits and Benchmarking

- EUREQUO is a convenient web-based registry where cataract and refractive data and PROMs are collected over time and stored in a large database
- The data are available and easily retrievable so surgeons can monitor their results over time and compare them anonymously with other surgeons and clinics across the EU
- With a database of over 4 million records, trends in surgical outcomes are tracked over time
- Only clinical data without any patient ID data are stored within EUREQUO, maintaining pseudo-anonymity

7. Welcoming the Portugal Cataract Registry to EUREQUO

The inclusion of patients from the Portugal Cataract Registry into the EUREQUO database was a significant milestone for the ESCRS. Portugal's cataract surgery VBHC model is an excellent reference for other European countries. Professor Dr. Joaquim Murta played a crucial role in the development of the Portugal Cataract Registry, which now contributes data to EUREQUO.

Portugal's registry began as a sub-cluster within the Health Cluster Portugal Project six years ago. Funding from the ophthalmic industry allowed the inclusion of 12 hospitals, both public and private, and the development of an IT interface to transfer information. Patient inclusion started in 2018.
The registry published its first report in 2020 and another during the COVID-19 pandemic in 2021. Recognition came in the form of a nomination as a global innovation hub by the World Economic Forum. Currently, approximately 30,000 surgeries and 23,500 patients are included in the registry, following ISO standards. Annual reports have been published, and two peer-reviewed papers are being prepared.

A benchmark analysis was conducted among clinics, fostering a learning collaborative environment within the registries. Analysis of the registry data revealed an interesting finding: while clinicians rated outcomes as excellent for 10% of patients, the same patients did not report good outcomes.
This highlights the importance of considering patient-reported outcomes for true quality of care. PROM surveys will enable the analysis of the cost-benefit ratio for different treatments, such as multifocal and EDOF IOLs. These findings support the argument for value-based healthcare, advocating for a shift from a volume-based model to one focused on value.

-Prof. Dr. Joaquim Murta

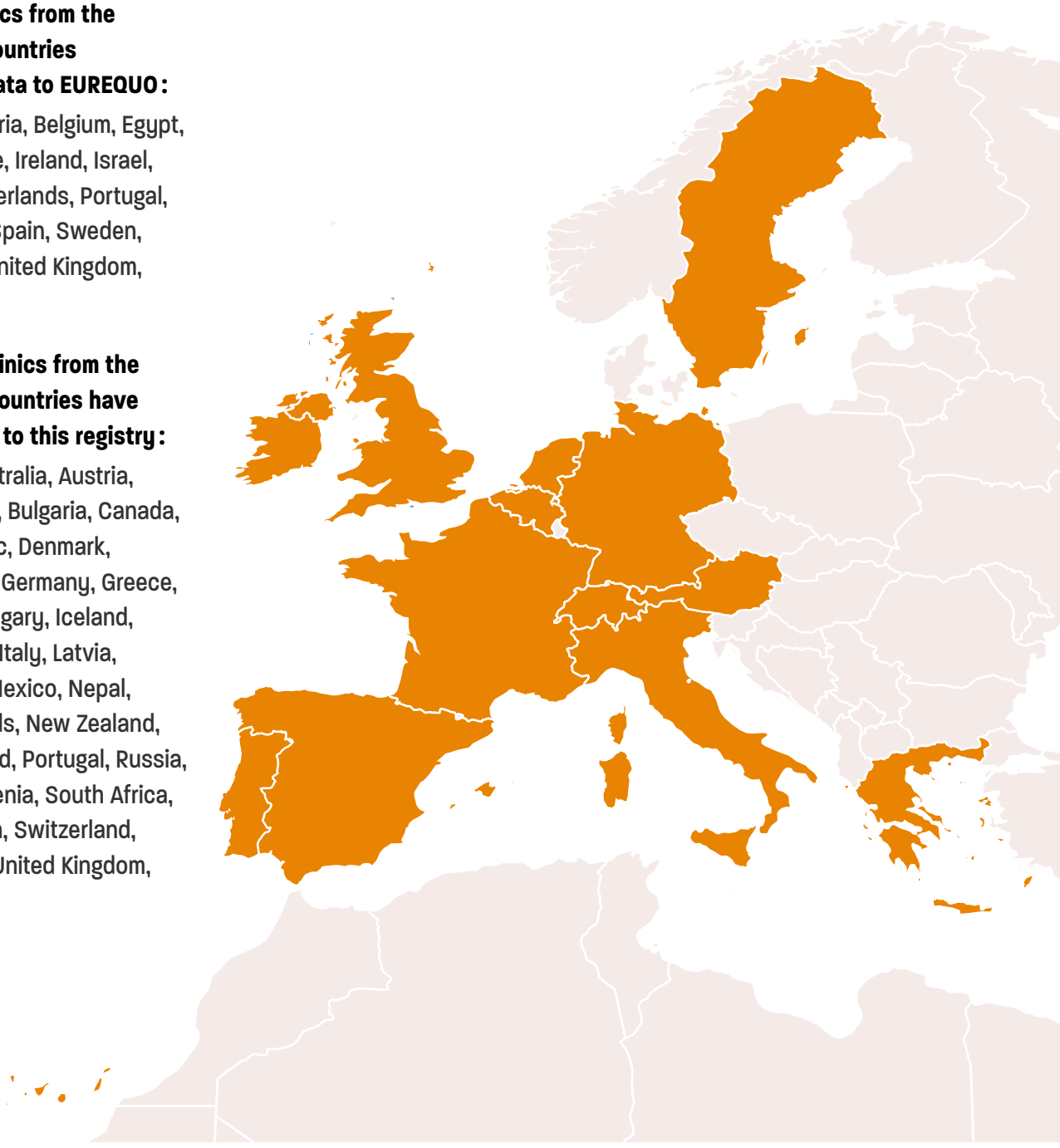
8. Contributing countries

For 2022, clinics from the following 17 countries contributed data to EUREQUO:

Australia, Austria, Belgium, Egypt, France, Greece, Ireland, Israel, Italy, the Netherlands, Portugal, South Africa, Spain, Sweden, Switzerland, United Kingdom, United States

Since 2007, clinics from the following 39 countries have provided data to this registry:

Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Czech Republic, Denmark, Egypt, France, Germany, Greece, Honduras, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Luxembourg, Mexico, Nepal, the Netherlands, New Zealand, Norway, Poland, Portugal, Russia, Slovakia, Slovenia, South Africa, Spain, Sweden, Switzerland, Syria, Turkey, United Kingdom, United States



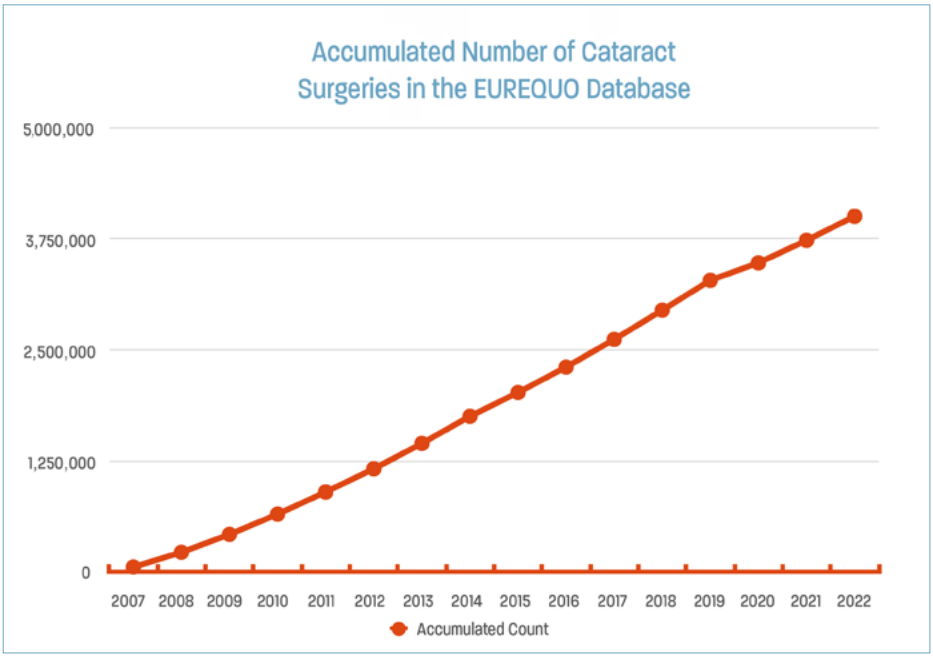
9. Cataract Surgery

Development of the Database

Table 1. *Number of annually reported cataract operations for 2022 and accumulated number of cases reported to the EUREQUO database since 2007.*

YEAR	NUMBER OF REPORTED CATARACT EXTRACTIONS	ACCUMULATED NUMBER OF CATARACT EXTRACTIONS IN THE DATABASE
2007	57,554	57,554
2008	165,649	223,203
2009	201,356	424,559
2010	227,178	651,737
2011	249,456	901,193
2012	260,804	1,161,997
2013	285,327	1,447,324
2014	305,558	1,752,882
2015	266,815	2,019,697
2016	286,322	2,306,019
2017	310,945	2,616,964
2018	328,636	2,945,600
2019	336,413	3,282,013
2020	196,014	3,478,027
2021	252,751	3,730,778
2022	271,347	4,002,125

Figure 1. *Number of accumulated cataract operations in the EUREQUO database over time. The first million cases were reached in 2011, two million cases in 2016, three million cases in 2019, and four million cases in 2022.*



Cataract Data

Pre-operative and surgical data
The number of cataract extractions reported into the database for 2022 was 271,347. The amount of cataract surgeries with post-op data recorded into the database for 2022 was 113,861. Of those reported, 56.69% were female and 43.30% were male.

Pre-operative visual acuity
The pre-operative corrected distance visual acuity (CDVA) in surgical eye was 0.1 (6/60) or worse in 2.14% of all cases and worse than 0.5 (6/12) in 51.67%. This means that in 48.33%, the visual acuity was 0.5 (6/12) or better.

Ocular co-morbidity
In 24.4% of all cataract surgeries reported, there was an ocular co-morbidity in the surgical eye. Of these co-morbidities, 21.57% had Glaucoma, 39.76% had Macular Degeneration, 7.83% had Diabetic Retinopathy, and 3.07% had Amblyopia.

Surgical difficulty
In 7.8% of the total reported cataract surgeries, the surgeon reported a surgical difficulty. Of these difficulties, 2.71% had previous corneal refractive surgery, 24.94% had a White/Brown cataract with need of capsular staining, 5.01% had Pseudoexfoliation Syndrome, 26.06% had a need for mechanical pupil dilatation, 7.41% had corneal opacities, 3.40% had a previous vitrectomy and 30.47% had “other” surgical difficulty.

Type of operation
Phacoemulsification with implantation of a posterior chamber intraocular lens (IOL) was the most frequent type of surgery with 268,490 (98.95%) cases. A femtosecond laser-assisted cataract extraction was reported in only 355 (0.13%) cases. Less than 1% (0.91%) of cases had an “other” type of operation performed.

Type of IOL material
The dominating type of IOL material was hydrophobic acrylic , 92.04% received such an IOL. A hydrophilic acrylic IOL was implanted in 5.22%. In 4,862 (1.79%) cases no IOL was implanted, and the eye was left aphakic (missing data in 42 cases).

Additional refractive quality IOL
Additional refractive quality IOL was reported in 10,604 (3.9%) cataract extractions in 2022. Of these reported, 4,666 (44%) were toric, 3,954 (37.29%) were extended depth of focus (EDoF), 1,608 (15.16%) were multifocal IOLs, and 362 (3.41%) were multifocal-toric.

Intra-operative Surgical complications (% of total cataract extractions)
There were 4,108 surgical complications reported in 2022 : 1,214 (0.45%) cases with posterior capsule rupture, 154 (0.06%) cases with anterior capsule tear, 10 (0.004%) cases with vitreous loss, 27 (0.01%) cases with dropped nucleus, 150 (0.06%) cases with iris damage, 4 (0.001%) cases with laser performance complication, and 2,549 (0.94%) cases with “other” complications.

Type of Biometry performed
There were 3,553 cases that reported type of biometry. Optical coherence was the predominating type of biometry used in 38,374 (98.62%) cases. Ultrasound contact was used in less than 1.3% of cases.

Keratometry
There were 662 cases that reported type of keratometry. Of those, 85.65% used optical biometry, and 12.84% used automated keratometry. 0.60% used Scheimpflug tomography, and 0.91% used topography.

Follow-up Data (data from clinics committed to report outcome data)

Complete follow-up data was reported for 113,861 cataract extractions.

Visual outcome

The mean decimal pre-op BCVA for 2022 was 0.458 (Snellen between 6/12 and 6/15), with a standard deviation of 0.233. The mean decimal post-op BCVA for 2022 was 0.947 (Snellen between 6/6 and 6/7.5), with a standard deviation of 0.287.

A final BCVA of 1.0 (6/6) or better was achieved by 67.78% of all reported cases. A BCVA of 0.5 (6/12) or better was achieved in 92.81% of all cases. 90.43% of cases had a change in BCVA from pre- to post-op of 2 or more lines, and 52.51% of cases had a change in BCVA greater than 5 lines.

Table 2. *Mean pre- and post-operative best corrected distance visual acuity for 2022, decimal notation. N equals number of cases with follow up data.*

YEAR	N PRE	MEAN PRE	SD	N POST	MEAN POST	SD
2008	165,213	0.402	0.218	76,196	0.879	0.246
2009	200,823	0.418	0.222	100,650	0.890	0.245
2010	226,499	0.424	0.224	110,521	0.893	0.244
2011	248,769	0.429	0.223	115,826	0.898	0.238
2012	260,099	0.442	0.224	124,543	0.908	0.236
2013	284,594	0.451	0.224	132,578	0.915	0.234
2014	304,682	0.460	0.225	148,733	0.919	0.235
2015	262,613	0.489	0.217	146,511	0.936	0.232
2016	281,262	0.492	0.220	159,845	0.941	0.233
2017	304,551	0.481	0.232	167,559	0.937	0.247
2018	326,421	0.492	0.240	184,897	0.958	0.247
2019	334,383	0.497	0.241	192,094	0.970	0.251
2020	195,195	0.473	0.244	69,680	0.952	0.284
2021	251,661	0.456	0.238	108,855	0.942	0.289
2022	270,457	0.458	0.233	113,499	0.947	0.287

Biometry Prediction Error

The mean absolute biometry prediction error (the absolute value of the difference between target refraction and post-op spherical equivalent) for 2022 was 0.39 D. There were 113,108 cases that reported target and post-op spherical equivalent.

Of those, 84,323 (74.55%) cases were within 0.50 D of target and 107,309 (94.87%) cases were within 1.00 D of target sphere.

Table 3. *Refractive outcome: mean biometry prediction error (spherical equivalent in diopters) and standard deviation. N equals number of cases with follow up data. Percentage of cases with biometry prediction error within 1 D and percentage of cases within 0.50D.*

YEAR	N	MEAN	SD	%, <=1.0	%, <=.5
2008	74,822	0.481299	0.544495	88.15%	65.83%
2009	100,630	0.457155	0.521461	91.36%	68.97%
2010	110,505	0.443863	0.489959	91.78%	70.10%
2011	115,792	0.43325	0.485086	92.59%	71.14%
2012	124,575	0.418638	0.46481	93.11%	72.34%
2013	132,633	0.436565	0.544102	92.63%	71.74%
2014	148,863	0.433793	0.551731	92.66%	72.37%
2015	146,648	0.41501	0.493194	93.41%	73.10%
2016	159,727	0.416267	0.49672	93.38%	73.12%
2017	167,578	0.408934	0.515401	93.54%	73.42%
2018	184,965	0.399353	0.470454	93.54%	74.01%
2019	192,118	0.395533	0.475434	94.14%	74.29%
2020	69,664	0.413859	0.442523	94.00%	72.45%
2021	108,629	0.400967	0.420364	94.54%	73.72%
2022	113,124	0.392837	0.421448	94.86%	74.54%

Post-operative complications (% of total post ops)

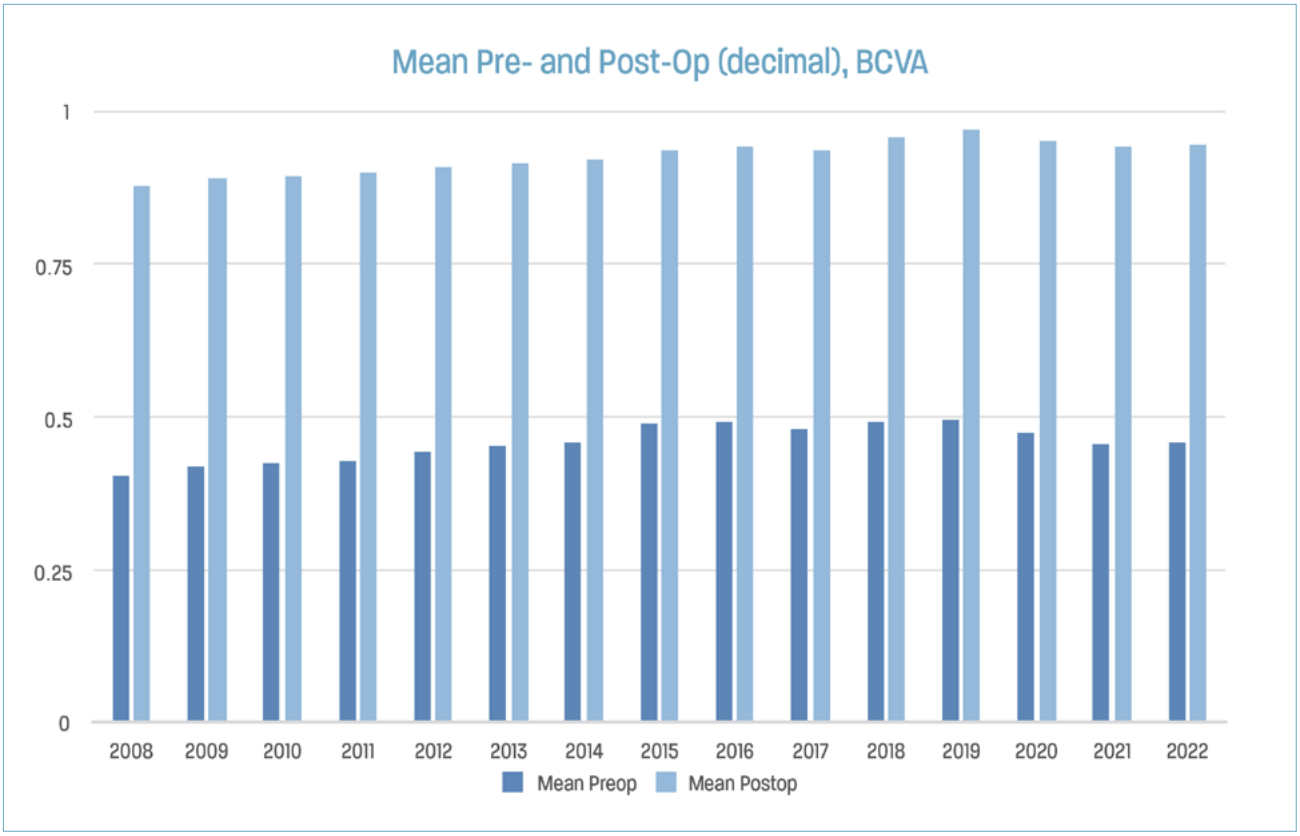
Of the total 111,883 cases, 98% reported no post-operative complication. Of the 1710 cases of reported complications, 529 (0.47%) had clinically significant macular oedema (CME), 110 (0.10%) had persistent corneal edema, 23 (0.02%) had uncontrolled elevated intraocular pressure, 29 (0.02%) underwent IOL explantation, and 14 (0.01%) had endophthalmitis. "Other" complications occurred in 0.88%.

Table 4. *Number and percentage of postoperative complications per year.*

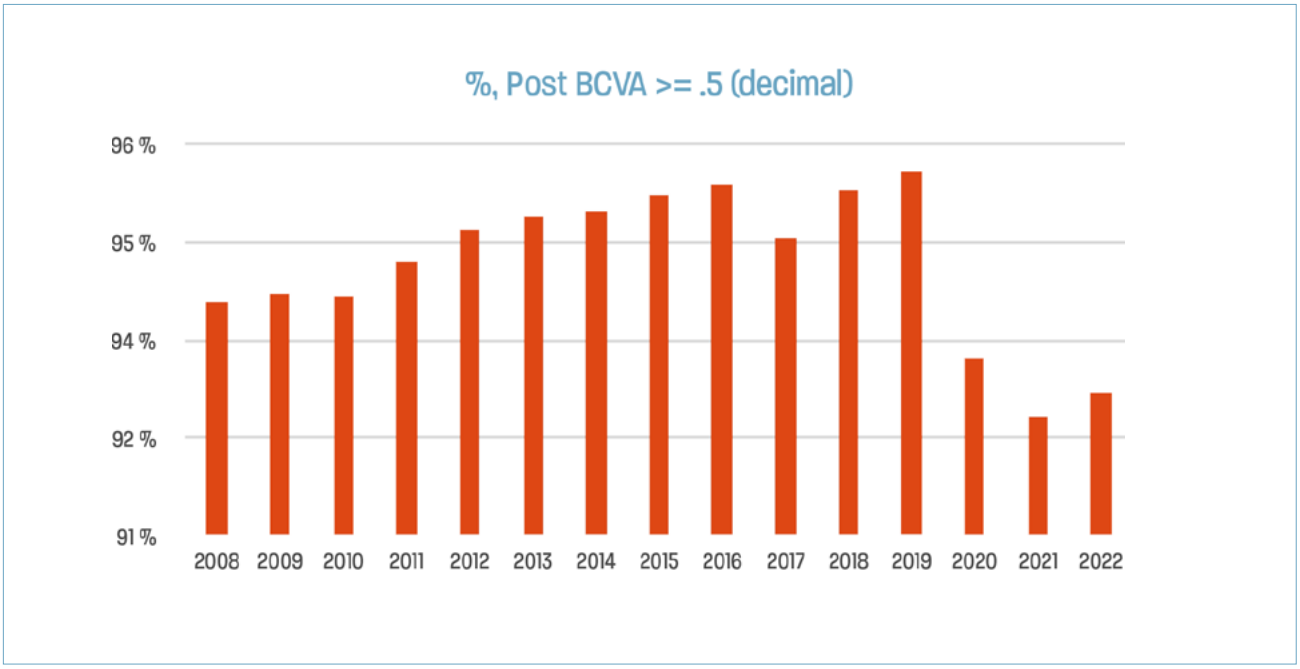
YEAR	N, SURGERIES	# COMPLICATIONS	%
2008	165,649	4,107	2.48%
2009	201,356	4,597	2.28%
2010	227,178	4,990	2.20%
2011	249,456	6,147	2.46%
2012	260,804	5,043	1.93%
2013	285,327	6,560	2.30%
2014	305,558	7,406	2.42%
2015	266,813	3,648	1.37%
2016	286,312	3,745	1.31%
2017	310,942	3,733	1.20%
2018	328,634	3,652	1.11%
2019	336,413	3,411	1.01%
2020	196,011	1,604	0.82%
2021	252,759	2,144	0.85%
2022	271,387	2,069	0.76%

Benchmarking Diagrams

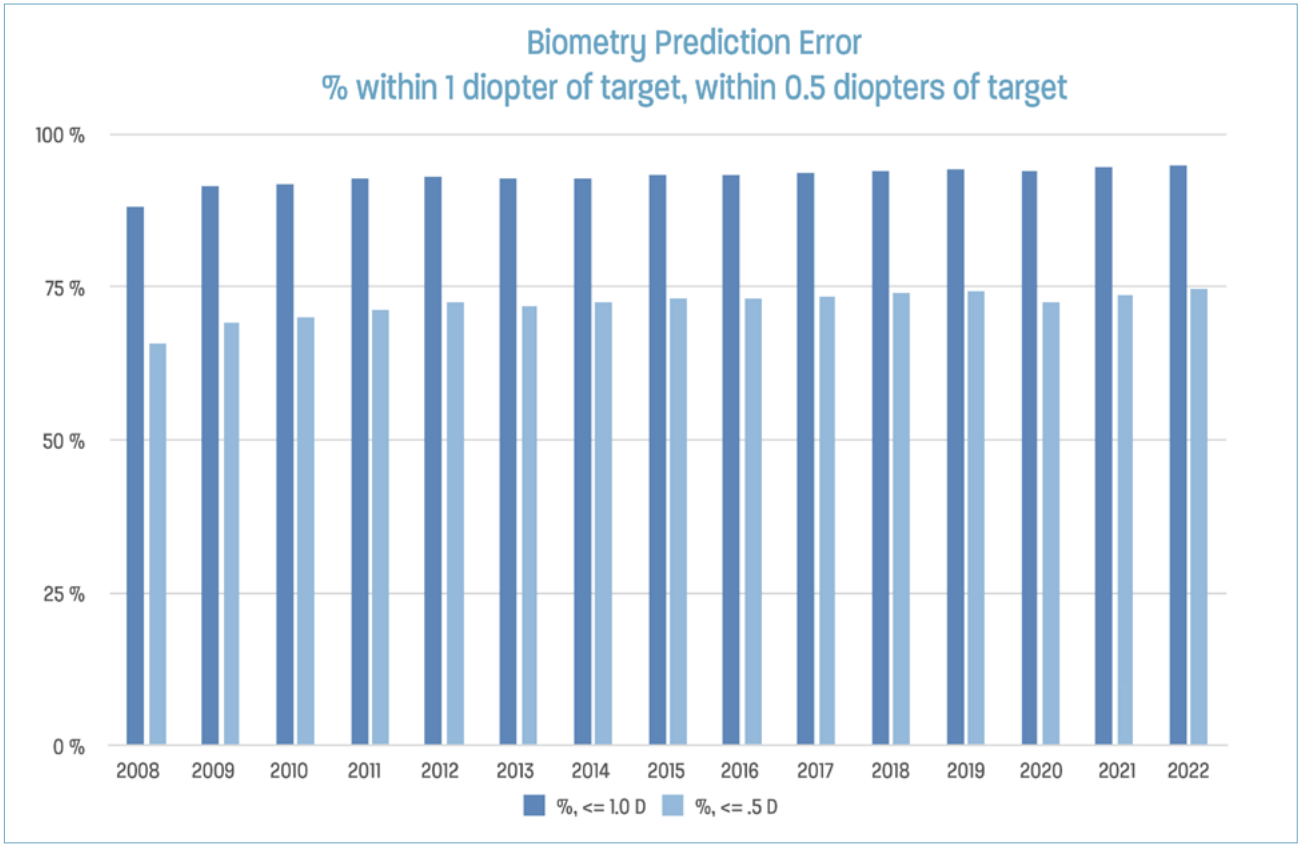
Graph 1. *Mean pre- vs. post-operative best corrected decimal VA per year from 2008 to 2022 (Decimal VA of 1= 6/6). See exact data and standard deviations in Table 1 above.*



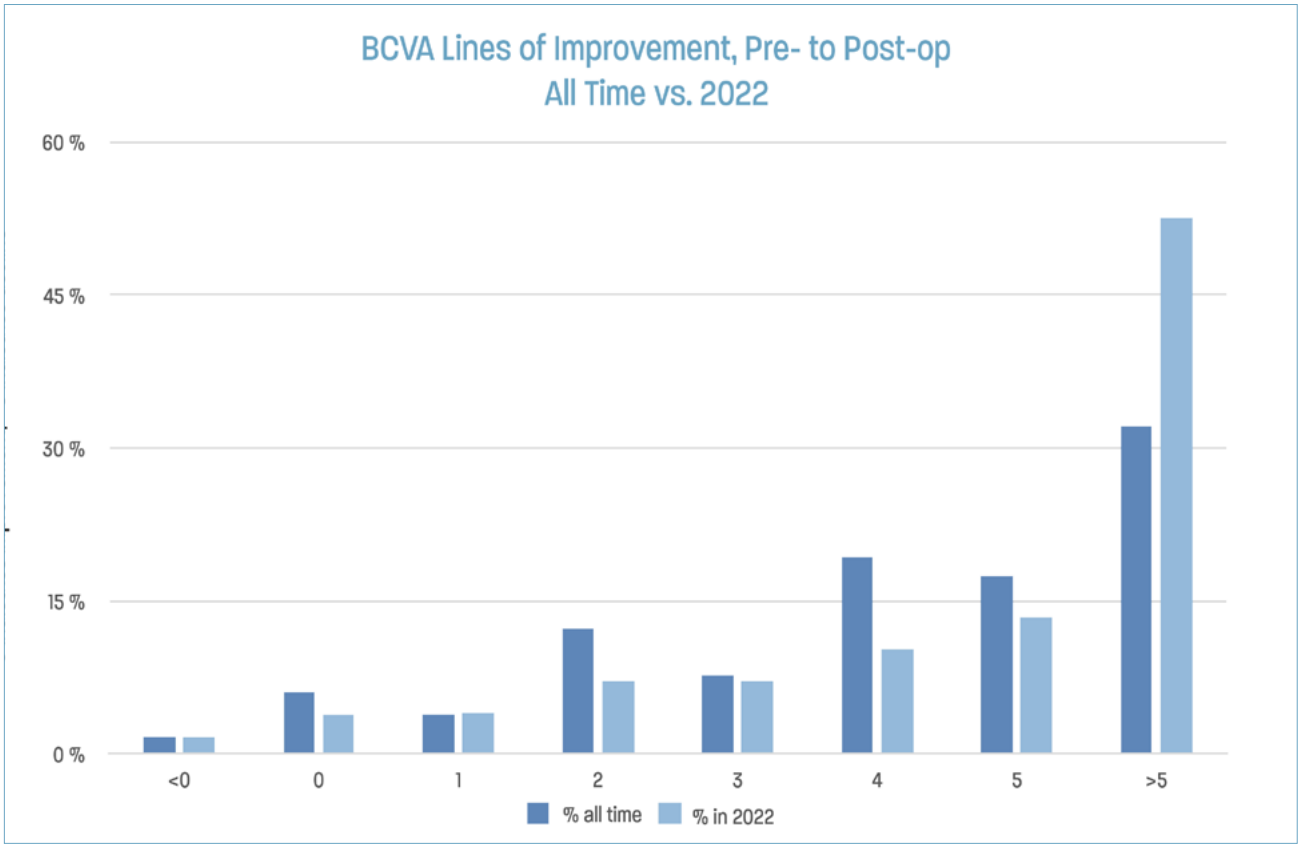
Graph 2. *Visual outcome, percent of patients with BCVA >= 0.5 (6/12), decimal from 2007 to 2022.*



Graph 3. *Biometry Prediction Error. Percentage of cases within 1D and 0.50D for each year.*



Graph 4. *Best corrected visual acuity lines of improvement after cataract surgery, all time vs 2022. Less than 0 indicates decline in vision, 0 indicates no improvement, and greater than 0 indicates improvement in vision after surgery.*



10. Refractive Surgery

Development of the Database

Table 5. *Number of annually reported refractive surgeries for 2022 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. A possible reason for the low amount of data reported is that one large provider were unable to register data due to a change in their EMR system, but this is being resolved and should be reflected in 2023 annual report.*

YEAR	NUMBER OF REPORTED REFRACTIVE SURGERIES	ACCUMULATED NUMBER OF REFRACTIVE SURGERIES IN THE DATABASE
INHERITED CASES, 2007 AND BEFORE	5,996	5,996
2008	789	6,785
2009	1,555	8,340
2010	4,940	13,280
2011	13,154	26,434
2012	11,871	38,305
2013	16,734	55,039
2014	26,129	81,168
2015	27,158	108,326
2016	26,781	135,107
2017	20,250	155,357
2018	23,888	179,245
2019	21,550	200,795
2020	13,077	213,872
2021	2,414	216,286
2022	2,135	218,421

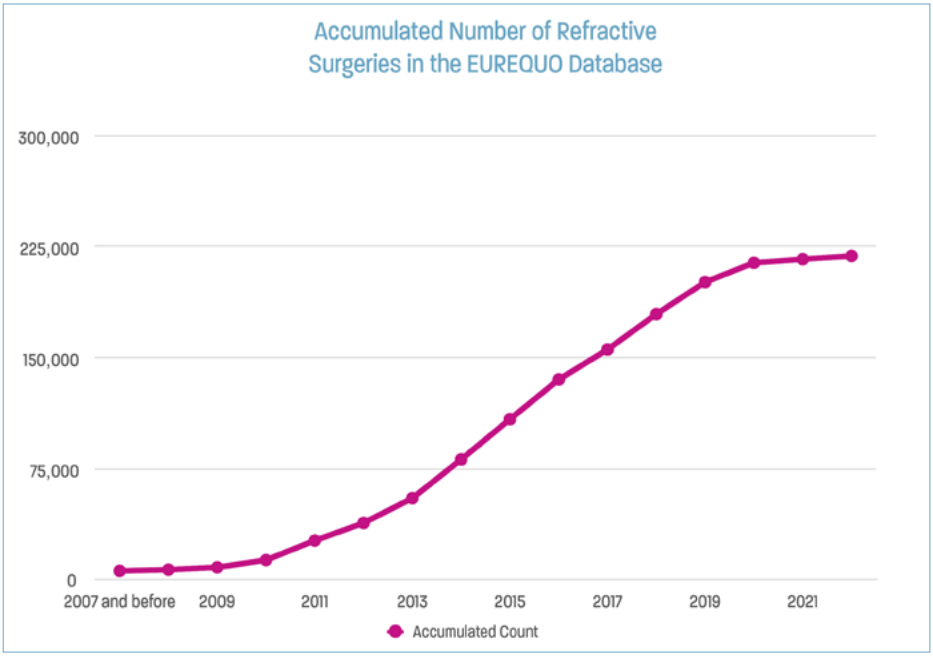


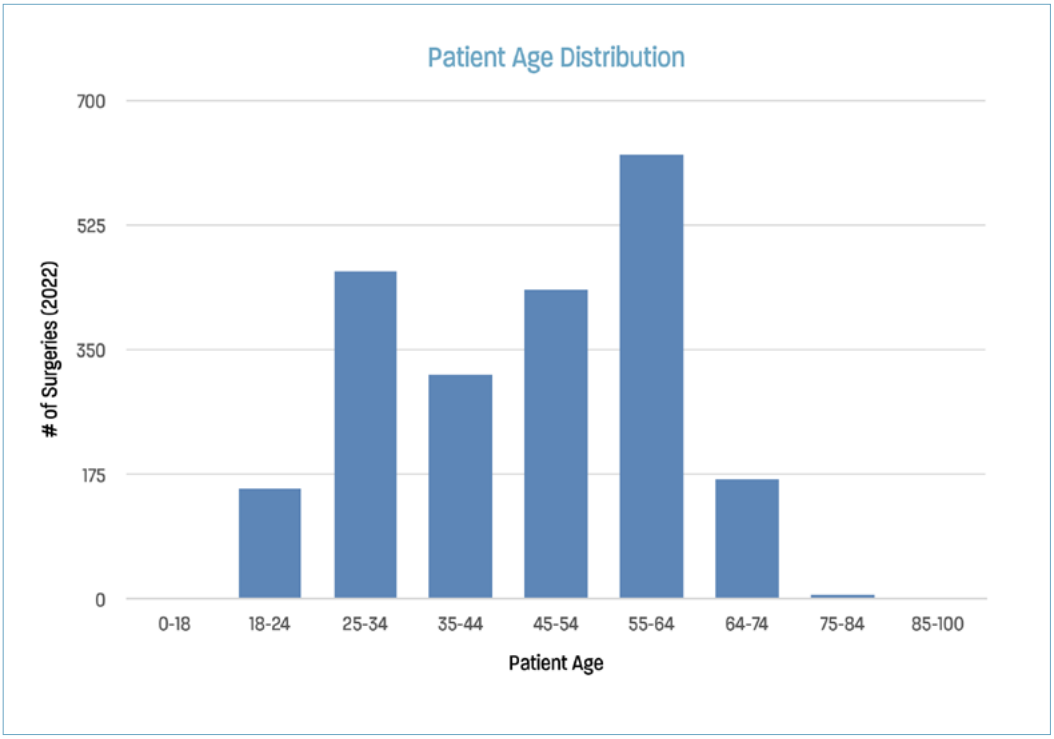
Figure 2. *Number of accumulated refractive surgeries in the EUREQUO database over time. The number of refractive surgeries entered for 2022 was 2,135.*

Refractive Data

Pre-operative data

The mean age of the patients was 47 (SD 14.22) years. The age distribution reflects laser surgery in younger age and RLE in middle-aged persons (Figure 3).

Figure 3. *Histogram showing the age distribution of refractive surgery patients for 2022.*

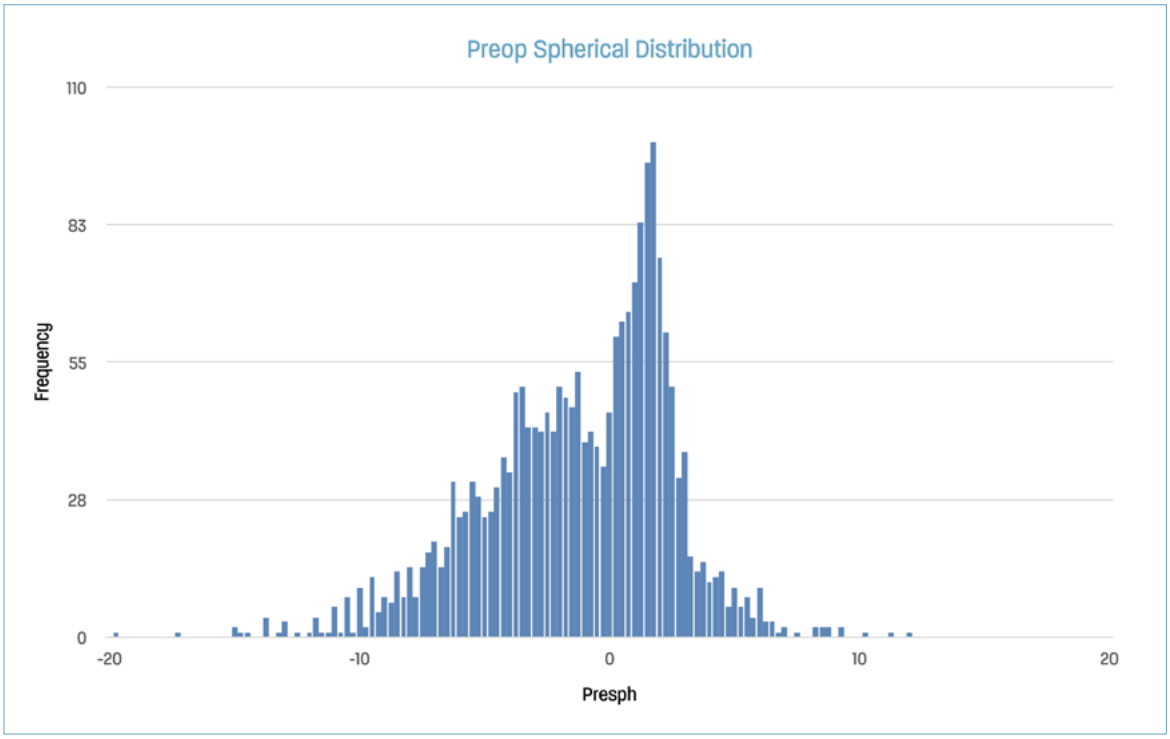


Pre-operative visual acuity

The mean pre-operative best-corrected distance visual acuity (BCVA) in the operated eye had a mean logMAR value of -0.033 (SD 0.076) and a median logMAR value of 0.0 (Snellen value of 6/6). Pre-operatively, 58.55% of the operated eyes had a myopic spherical equivalent, 1.41% were emmetropic, and 40.05% had a hyperopic spherical equivalent. In 31.71% of the eyes, there was a pre-operative myopic refraction of -3.0 D or more. In 18.78% of the eyes, there was a pre-operative hyperopic refraction of +2.0 D or more.

For myopic pre-op laser refractive surgeries, the mean pre-op spherical refraction was -3.28D. For hyperopic pre-op laser refractive surgeries, the mean pre-op spherical refraction was 1.47D. For myopic pre-op RLE surgeries, the mean pre-op spherical refraction was -3.69D. For hyperopic pre-op RLE surgeries, the mean pre-op spherical refraction was 1.84D.

Figure 4. *Histogram showing distribution of pre-operative spherical refraction.*



Type of surgery

Of the total 2,135 cases of refractive surgeries reported for 2022, 847 were laser refractive surgery. LASIK was performed in 187 eyes: 2 by blade and 185 by femtosecond laser. LASEK was performed in 349 eyes and PRK in 308 eyes. "Other" laser surgeries constituted 3 cases.

The majority of refractive surgeries entered into the database for 2022 were primary (97.38%). Only a small fraction were enhancements (1.73%) or additional surgery (0.89%).

There were 1,712 cases of refractive lens exchange (RLE) reported in 2022, dominating the type of refractive surgery reported for 2022. Among the specified RLE surgeries, 394 were trifocal IOLs (171 toric and 223 non-toric), 204 were monofocal IOLs (75 toric and 129 non-toric), and 123 were EDOF IOLs, and 991 non-specified.

A phakic IOL in posterior chamber was implanted in 208 eyes and a phakic IOL in the anterior chamber was implanted in 28 eyes.

Surgical complications

Nearly 100% of refractive surgeries had no complication. Of the total 2,135 refractive surgery cases, there were only 2 reported cases of corneal complication: 1 corneal flap complication from femto-LASIK and 1 implant related. For intraocular complications from RLE, there were 2 cases of posterior capsular rupture, 1 case of iris trauma, and 1 case of "other".

Follow-up Data

Visual and refractive outcomes

Follow up visit and examination occurred on average 89 (SD 64) days after surgery (median 87 days). In 71.18% of the eyes a final uncorrected distance visual acuity of 1.0 (6/6) or better was achieved and in 89.73% the same final distance visual acuity was achieved with best correction.

Post-operatively, 69.33% of patients were within plano to -0.50D, and 18.13% were within +0.1D to +0.50D. A final spherical refraction within 0.5D was achieved in 88.12% of the eyes.

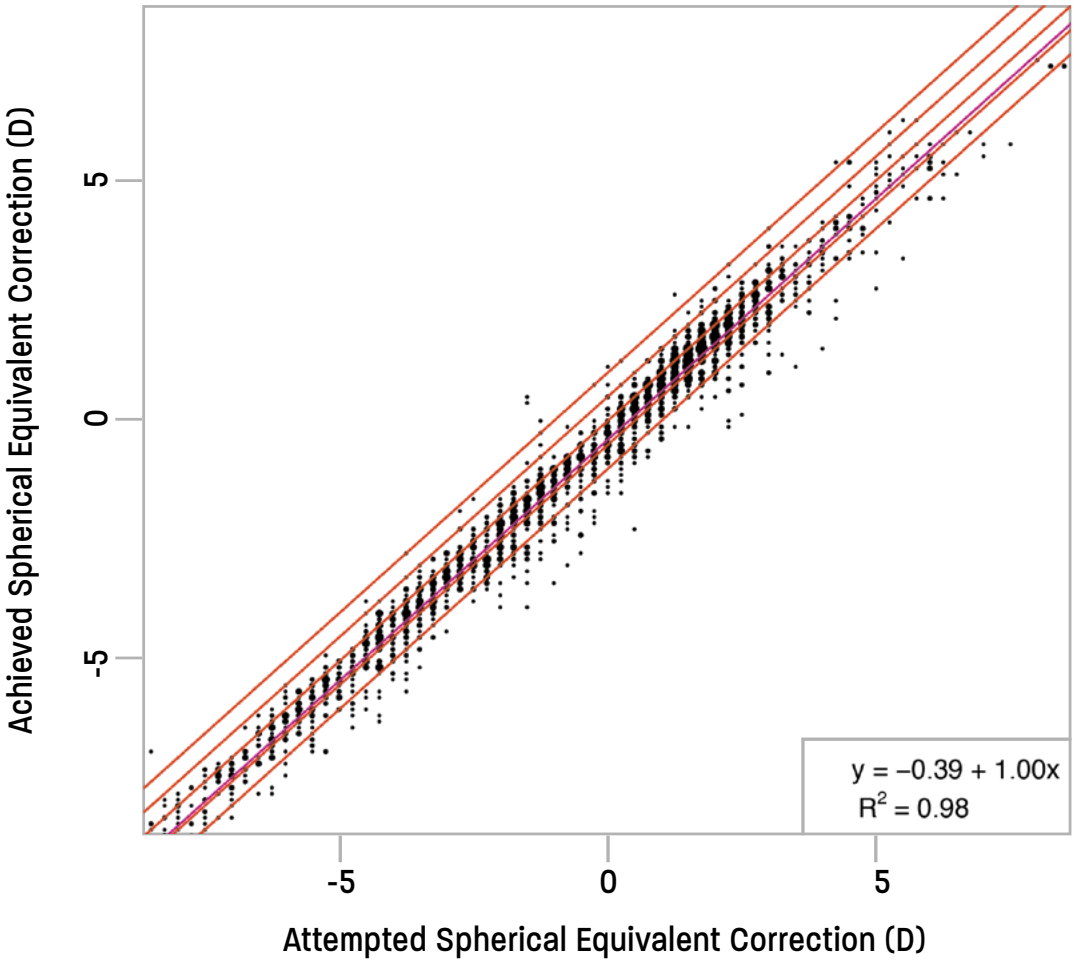
Post-operative complications

Out of 2,113 surgeries with reported follow up, 97% reported no complication post-operatively. Relating to the laser refractive procedures, there were 0 cases of DLK, 4 cases of corneal haze from PRK, and 0 cases of ectasia. From RLE, there were 9 cases of elevated IOP, 6 cases of optic error, 1 case of corneal oedema, 1 case of PCO, 5 cases of retinal complications, and 1 case of "other".

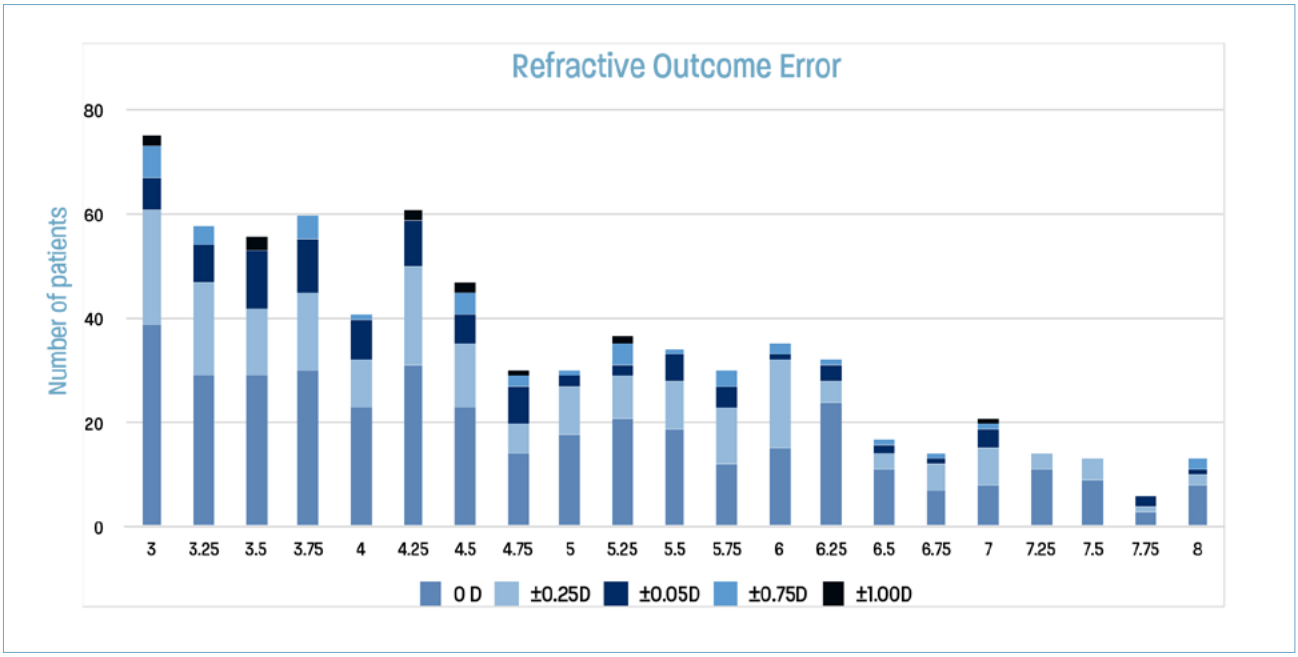
In 71.18% of the eyes a final uncorrected distance visual acuity of 1.0 (6/6) or better was achieved and in 89.73% the same final distance visual acuity was achieved with best correction.

Benchmarking Diagrams

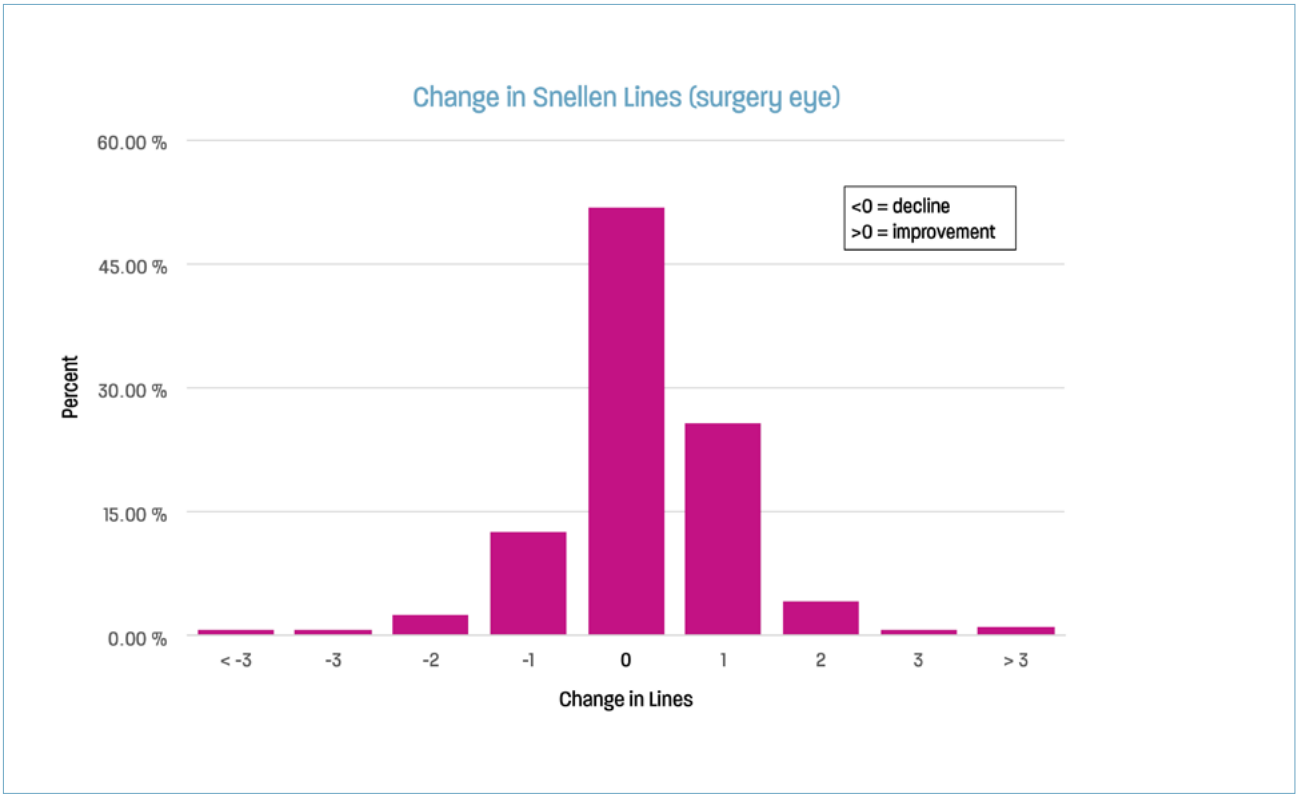
Graph 5. *Attempted vs. Achieved refraction (magnitude in diopters). "Attempted" is the absolute value of the difference between pre-op sphere and pre-op target refraction sphere. "Achieved" is the absolute value of the difference between pre-op sphere and post-op sphere.*



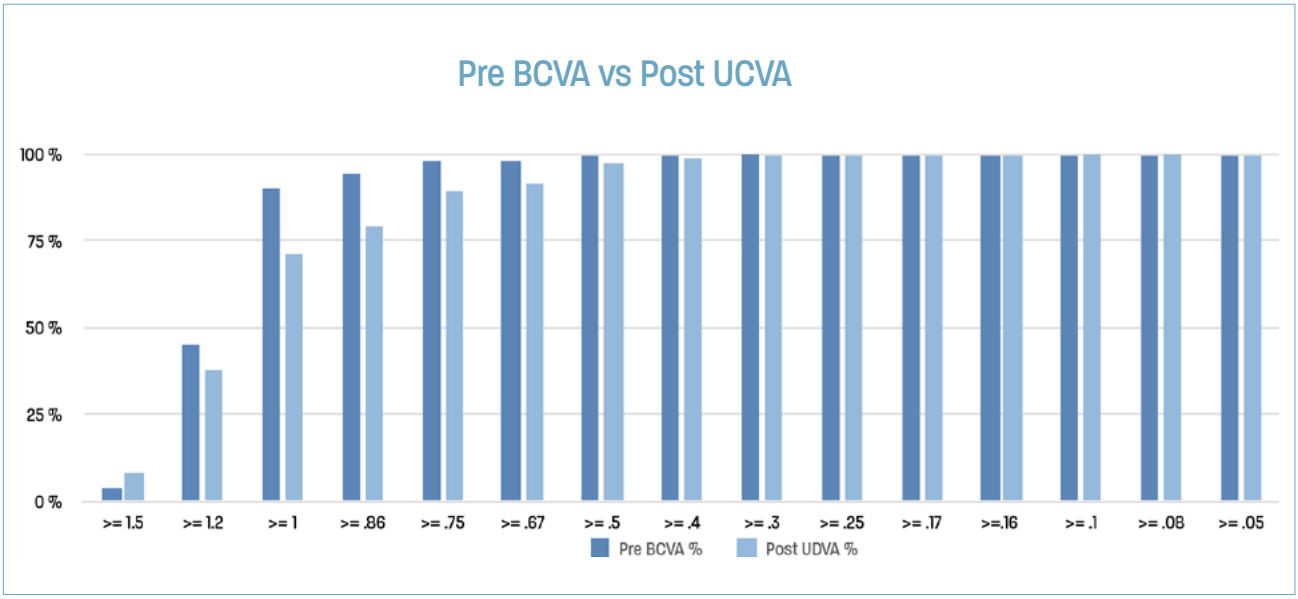
Graph 6. *Refractive outcome error for treatments of magnitude 3 diopters to 8 diopters. For each refractive error attempted, the number of people who attained 100% correction (0 D error) and the number of people with +/- 0.25D, +/- 0.50D, +/- 0.75, and +/-1D from target.*



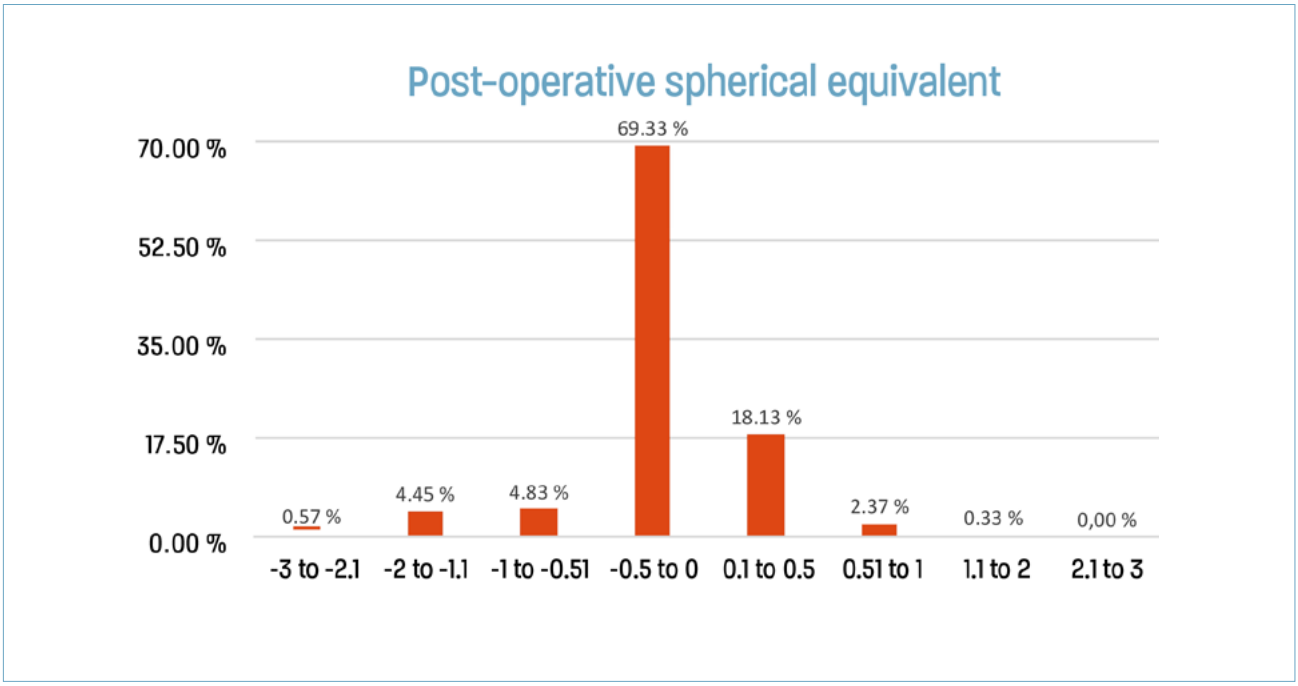
Graph 7. *Change in Snellen lines of visual acuity from pre-operative (best-corrected VA) to post-operative refractive surgery (uncorrected VA). 0 indicates no improvement, >1 indicated improvement in vision, and <0 indicates decline.*



Graph 8. *Percentage of Pre-operative spectacle corrected VA and post-operative uncorrected VA, decimal VA (1=6/6). Pre-operative uncorrected VA data currently not collected.*



Graph 9. *Post-operative refractive outcome, percentage of cases within specified spherical equivalent.*



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