# Cataract standard set for outcome measures: An Italian tertiary referral centre experience

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## Abstract

**Purpose:** Implementation of the International Consortium for Health Outcomes Measurements (ICHOM) standard for cataract surgery into clinical practice at an Italian tertiary referral centre.

**Methods:** Prospective, observational, descriptive study consisting of the registry and analysis of cataract surgeries performed during a 6-month enrolment period at the University Eye Clinic of Trieste, Trieste, Italy. Outcomes were recorded and analysed according to the ICHOM Cataract Standard Set version 2.0.1. Records included clinician-reported outcome measures (CROMs) – visual outcome and complications – and patient-reported outcome measures (PROMs) – self-assessed vision with the Catquest-9SF questionnaire. Correlations between PROMs and CROMs were evaluated. A multiple linear regression was used for predicting the change in PROMs with surgery.

**Results:** A total of 218 eyes (of 218 patients) were analysed. Postoperative corrected distance visual acuity (CDVA) was $\geq$0.3 in 89.0% (194/218) of eyes. There was a statistically significant improvement of the post-operative Catquest-9SF global average score. ($p < 0.001$). The change in the Catquest-9SF score significantly correlated with the change in Item 2 score (related to intermediate vision) ($r = 0.634$, $p < 0.001$). A predictive model of the change in the Catquest-9SF score was found ($p < 0.001$, $R^2$: 0.527) based on preoperative Catquest-9SF total score, presence or not of macular degeneration, presence or not of intraoperative complications, age >75 years old, and preoperative CDVA.

**Conclusions:** Cataract surgery improves the functional vision, with some factors limiting the outcomes such as comorbidities. Self-perceived improvement in intermediate vision significantly influenced the improvement in self-assessed vision.

## Keywords

Lens/cataract, pre-op medical testing, practice management, socioeconomics and education in medicine/ophthalmology, clinical tests, phacoemulsification, postoperative anterior segment problems

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## Introduction

Cataract surgery is one of the most frequently performed elective surgical procedures in many countries and its demand is expected to grow due to globally increased life expectancy and population ageing.[1] With the increase in the number of cataract surgeries, different registries on quality of cataract care have been established worldwide, highlighting the need of a global measurement standard to compare results of different settings.[2] In 2012 the International Consortium for Health Outcomes Measurement (ICHOM) formed a working group to develop a global standard set of outcomes for cataract surgery.[3] ICHOM is a non-profit organization involved in the definition and adoption of global standard sets of outcome measures for different medical conditions worldwide. ICHOM aims at reducing

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variations between healthcare providers while improving the quality of standard care.[4] Within individual facilities, the adoption of objective methods for measurements makes it possible to identify pitfalls and strengths of patient care and ultimately to achieve improvements in the outcomes most relevant for the patients.[3–5] Moreover, internationally-adopted metrics allow providers to compare and to learn from one another.[4]

ICHOM standard sets do not only include traditional clinician-reported outcomes measures (CROMs), but also patient-reported outcome measures (PROMs).[3] CROMs that are frequently utilized in clinical research do not consider the patients' personal experience and perception of the potential improvement or worsening of their state of health.[6]

The ICHOM standard for cataract surgery recommends to track postoperative visual acuity, refractive error, patient-reported visual function and major surgical complications.[3,7] The patient-reported visual function (PROM) is evaluated, according to this standard, using a Rasch-analysed, short, and highly responsive patient questionnaire, the Catquest-9SF, that allows to measure the activity limitations in daily life caused by cataract.[8] The aims of the current study were to implement the ICHOM standard for the measurement of cataract surgery outcomes into clinical practice and to analyse the results for the optimization of cataract patients' care at a tertiary referral ophthalmological centre in North-Eastern Italy.

## Methods

### *Patients*

This prospective observational descriptive study consisted of the registry and analysis of the clinical outcomes of cataract surgeries performed between November 1st, 2018 and May 31st, 2019 at the University Eye Clinic of Trieste. The ICHOM Standard Set version 2.0.1 for cataract surgery was used to define the inclusion and exclusion criteria, the clinical protocol to follow and the PROMs and CROMs that should be evaluated.[7] The inclusion criteria were as follow: patients of 18 years or older at the time of surgical treatment indication, diagnosis of operable cataract, and ability to participate in all aspects of the study, including completion of PROMs. Only one eye for each patient enrolled was included in the analysis, independently from the side of the eye in study (right or left). For those patients undergoing consecutive bilateral cataract extraction during the study period only the first operated eye in order of time was included in the analysis. Furthermore, according to the ICHOM standard, the following exclusion criteria were defined: cataract surgery for other reasons than disturbed vision (e.g. transparent crystalline lens extraction for presbyopia correction), combined surgical procedures such as cataract extraction and corneal transplant surgeries, and cognitive functions disabling the patient to complete a questionnaire. All patients were informed about the nature of the study before their participation. Only patients who signed written informed consent were included. The study adhered to the tenets of the Declaration of Helsinki and was approved by the Hospital Institutional Review Board.

*Preoperative and postoperative examinations.* All patients underwent complete preoperative and postoperative assessments including visual acuity and intraocular pressure measurement and slit lamp exam for anterior and posterior segment evaluation. During the pre-operative examination swept-source biometry was performed for IOL calculations using the IOLMaster700 (Carl Zeiss, Meditec AG, Jena, Germany). For each eye in study monocular uncorrected and corrected distance visual acuities were consecutively recorded. Visual acuity was measured at each visit using a mixed decimals and tumbling 'E' eye chart at 10 foot (≃3 m) distance and the values were expressed as the logarithm of the minimal angle of resolution (logMAR). A questionnaire to assess cataract surgery impact on patients' quality of life (the Catquest-9SF questionnaire) was also administered before cataract extraction and then during a post-operative examination performed within 3 months from the surgery. This validated questionnaire, contains nine items and it allows the clinician to characterize the cataract-related activity limitations in daily life, being the most responsive to cataract surgery among 16 commonly used Rasch-scaled cataract surgery questionnaires.[8,9]

*Surgical procedure.* Patients considered eligible during the pre-operative visit were scheduled for the surgery (generally performed within 30 days) and they were operated by the attending surgeon assigned to the operatory room according to the department shift. At our department the routine approach for cataract extraction is standard phacoemulsification through a 2.2 mm clear corneal incision followed by IOL implantation in the capsular bag (unless complicated cases).

### *Outcome measures*

Following the guidelines established by the ICHOM standard for cataract surgery, the following variables were evaluated and recorded: postoperative uncorrected (UDVA) and corrected distance visual acuity (CDVA) in the operated eye, postoperative absolute refractive error, patient-reported visual function using the validated questionnaire Catquest-9SF in Italian, and intraoperative and postoperative complications including endophthalmitis, return to operative theatre, persistent corneal oedema and others.[7,8,10] Postoperative data were obtained within the first 3 months after the surgery. CROMs included visual acuity and refraction data. Whereas the Rasch calibrated

scores for the different items of the Catquest-9SF questionnaire as well as the total Catquest-9SF score were considered as PROMs.

Besides PROMs and CROMs, the ICHOM standard considers the inclusion of case-mix variables.[7] Following this recommendation, the following case-mix variables were recorded and considered for the analysis of the outcomes: demographic factors including age and gender, variables characterizing the baseline visual status (preoperative visual acuity and target refractive error), ocular comorbidities including glaucoma, macular degeneration, diabetic eye disease and amblyopia or others, previous eye surgeries including previous cataract surgery on fellow eye, corneal refractive surgery and vitrectomy, and other factors such as the type of cataract (dense brown or white), and presence of corneal opacities, pseudoexfoliation or pupil problems.[7] In order to systematically record all data, we updated our medical record form to comply with ICHOM standard set.

### *Statistical analysis*

A commercially available software package was used for conducting the statistical analyses (SPSS for Mac, Version 20.0; IBM Corporation, Armonk, NY, USA). Standard descriptive statistics was used to characterize continuous variables: number of patients (n), arithmetic mean, standard deviation (SD), minimum, median, maximum, lower quartile (Q1), upper quartile (Q3) and interquartile range (IQR). Absolute and relative frequencies (counts and percentages) were calculated to characterize the categorical variables evaluated in the study. Correlation analyses were conducted calculating the Spearman's Rho non-parametric correlation coefficients. The paired Student *t*-test was used to assess the significance of differences in CROMs and PROMs measured preoperatively and postoperatively.

Regarding inferential analyses, multiple linear regression was used for modelling the quantitative outcomes. The variables involved in the model developed were selected according to a step-by-step procedure, considering meanings of $<0.05$ to enter or $<0.10$ to remain in the model. The variance inflation factor (VIF) and the condition index were calculated to assess the level of multicollinearity. High values of the condition index associated with an explanatory variable would indicate the presence of multicollinearity or quasi-collinearity associated with that variable. In that case, this variable was eliminated as an explanatory risk factor since its presence would have made the model unstable. The percentage of outcome explained by the variables of the model was quantified by the adjusted R squared. All the variables included in the final model were statistically significant. The relative importance of the factors included in the final model was established by the semi-partial correlation. All statistical tests were performed with a level of significance of $\alpha = 0.05$.

## Results

### *Sample description*

This study enrolled 218 eyes of 218 patients undergoing cataract surgery with monofocal intraocular lens (IOL) implantation. Patients' mean age was 74.0 years old (Standard deviation, SD: 9.2; range: 28–93 years). Gender distribution in the sample was as follows: 78 males (35.8%) and 140 females (64.2%). A total of 57.8% (126/218) of operated eyes were left. In all cases, the surgical procedure used was phacoemulsification which was performed in most of the cases by an independent surgeon (95.9%, 209/218). Previous cataract surgery in the fellow eye had been performed in 66 patients (30.3%).

### *Analysis of main outcome measures*

Tables 1 and 2 summarize the main outcome measures, including CROMs and PROMs, and case-mix variables obtained in the sample evaluated. A significant improvement was found in UDVA and CDVA of the operated eye with surgery ($p < 0.001$). Postoperative CDVA was 0.3 and 0.0 logMAR or better in 89.0% (194/218) and 53.2% (116/218) of eyes enrolled in the study, respectively (Figure 1). Mean change in logMAR CDVA with surgery was −0.32 (SD: 0.36, range: −2.00 to 0.78).

Table 3 shows a summary of preoperative and postoperative Rasch calibrated scoring obtained with the Catquest-9SF questionnaire in the sample evaluated. As shown, a statistically significant change was observed in the Rasch calibrated score obtained for each item of the questionnaire ($p < 0.001$) as well as for the global average score ($p < 0.001$). The greater magnitude of change was observed for the Rasch calibrated scores of Item 2 (−3.05) and 8 (−2.45). According to overall score of the Catquest-9SF questionnaire, a total of 88.1% (192/218) of patients referred an improvement of the visual function with surgery, whereas 3.7% (8/218) and 1.4% (3/218) of patients reported that it remained stable or worsened, respectively.

### *Relationship between PROMs and CROMs*

The change in logMAR CDVA with surgery was found to be significantly correlated with the following variables: postoperative Rasch calibrated score of Item 2 of the Catquest-9SF questionnaire ($r = 0.174$, $p = 0.013$), change with surgery in the Rasch calibrated score of Catquest-9SF Item 2 ($r = 0.285$, $p < 0.001$), and change with surgery in Rasch calibrated total scoring of Catquest-9SF ($r = 0.296$,

**Table 1.** Summary of the main outcome measures obtained in the sample evaluated defined according to the ICHOM cataract standard.

| Main outcome measures | Mean value (SD), range | Percentages |
|---|---|---|
| Postoperative logMAR UDVA[a] | 0.28 (0.33) surgical eye, 0.00–1.70<br>0.60 (0.51) fellow eye, 0.00–2.00 | – |
| Postoperative logMAR CDVA[a] | 0.12 (0.20) surgical eye, 0.00–1.30<br>0.22 (0.32) fellow eye, 0.00–2.00 | – |
| Postoperative absolute SE (D)[a] | 0.34 (0.40) surgical eye, 0.00–3.00 | – |
| Postoperative complications | – | Endophthalmitis 0% (0/218)<br>Return to operating theater within 3 months 0.5% (1/218)<br>Persistent corneal edema 0.5% (1/218)<br>Others 0.9% (2/218) |
| Intraoperative complications | – | Capsular breach 1.8% (4/218)<br>Zonular dehiscence 0.5% (1/218)<br>Vitreous prolapse 0.9% (2/218)<br>Others 1.8% (4/218) |
| Rasch calibrated data | −0.87 (1.50) | |
| Catquest-9SF | −3.94 to 3.52 | |
| Preoperative score[b] | −2.83 (1.16) | |
| Postoperative score[b] | −4.01 to 2.38 | |

CDVA: corrected distance visual acuity; D: diopters; ICHOM: international consortium for health outcomes measurements; SD: standard deviation; SE: spherical equivalent; UDVA: uncorrected distance visual acuity.
[a]CROMs, clinician-reported outcome measures
[b]PROMs, patient-reported outcome measures

**Table 2.** Summary of the case-mix variables obtained in the sample evaluated as defined according to the ICHOM cataract standard.

| Case-mix variables | Mean value (SD), range | Percentages |
|---|---|---|
| Preoperative logMAR UDVA | 0.90 (0.55) surgical eye, 0.10–2.00<br>0.60 (0.52) fellow eye, 0.00–2.00 | |
| Preoperative logMAR CDVA | 0.43 (0.41) surgical eye, 0.10–2.00<br>0.21 (0.31) fellow eye, 0.00–2.00 | |
| Ocular comorbidities | | Glaucoma 19.7% (43/218)<br>Macular degeneration 5.0% (11/218)<br>Diabetic retinopathy and/or diabetic macular oedema 2.3% (5/218)<br>Amblyopia 5.5% (12/218)<br>Others 11.9% (26/218) |
| Prior ophthalmic interventions | | Previous cataract surgery on fellow eye 30.3% (66/218)<br>Previous corneal refractive surgery on operative eye 0.9% (2/218)<br>Previous vitrectomy on operative eye 0.5% (1/218)<br>Others 6.9% (15/218) |
| Technical factors | | White or dense brown cataract 3.7% (8/218)<br>Corneal opacities 1.8% (4/218)<br>Pseudoexfoliation 13.3% (29/218)<br>Pupillary problems 3.2% (7/218) |

CDVA: corrected distance visual acuity; ICHOM: international consortium for health outcomes measurements; SD: standard deviation; UDVA: uncorrected distance visual acuity.

$p < 0.001$). Likewise, the change with surgery in the Rasch calibrated total Catquest-9SF score was found to be significantly correlated with postoperative logMAR CDVA ($r = 0.216$, $p = 0.002$), postoperative Rasch calibrated score of Catquest-9SF Item 2 ($r = 0.282$, $p < 0.001$), change with surgery in Item 2 score of Catquest-9SF ($r = 0.634$, $p < 0.001$), and postoperative Rasch calibrated total Catquest-9SF score ($r = 0.153$, $p = 0.029$).

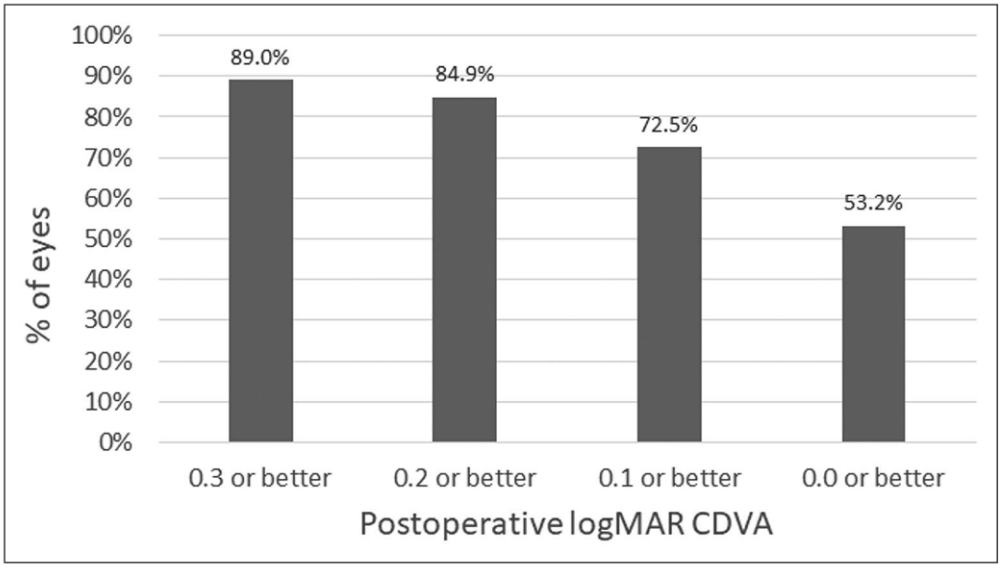


**Figure 1.** Distribution of postoperative corrected distance visual acuity in the sample evaluated. (CDVA, corrected distance visual acuity).

**Table 3.** Summary of preoperative and postoperative Rasch calibrated scoring obtained with the Catquest-9SF questionnaire in the sample evaluated.

| | PREOP | POSTOP | Mean change, *p*-value |
|---|---|---|---|
| | Mean value (SD), median | Mean value (SD), median | |
| Item 1: Do you have difficulty with reading text in the newspaper because of your vision? | −0.81 (1.77), −1.26 | −3.17 (1.34), −3.98 | −2.36*, <0.001 |
| Item 2: Do you have difficulty with recognizing faces of people you meet because of your vision? | 1.79 (1.62), 2.67 | −1.26 (1.57), −2.53 | −3.05*, <0.001 |
| Item 3: Do you have difficulty with seeing prices of goods when shopping because of your vision? | −1.12 (1.79), −1.46 | −2.93 (1.55), −4.18 | −1.81*, <0.001 |
| Item 4: Do you have difficulty with seeing to walk on uneven ground because of your vision? | −1.48 (1.99), −0.91 | −3.10 (1.19), −3.63 | −1.62*, <0.001 |
| Item 5: Do you have difficulty with seeing to do needlework and handicraft because of your vision? | −1.06 (1.87), −1.72 | −2.71 (1.71), −1.72 | −1.65*, <0.001 |
| Item 6: Do you have difficulty with reading text on television because of your vision? | −2.14 (1.93), −3.77 | −3.37 (1.03), −3.77 | −1.23*, <0.001 |
| Item 7: Do you have difficulty with seeing to carry out a preferred hobby because of your vision? | 0.11 (1.98), −0.65 | −1.86 (1.72), −3.37 | −1.97*, <0.001 |
| Item 8: Do you experience that your present vision gives you difficulties in any way in your daily life? | −0.47 (2.73), −1.31 | −2.92 (2.15), −4.59 | −2.45*, <0.001 |
| Item 9: Are you satisfied or dissatisfied with your present vision? | −2.61 (2.36), −2.51 | −4.13 (1.45), −4.95 | −1.52*, <0.001 |
| Overall score | −0.87 (1.50), −0.94 | −2.83 (1.16), −3.06 | −1.96*, <0.001 |

*Statistically significant.

### *Prediction of change in PROMs with surgery*

A statistically significant ($p < 0.001$) predictive model of the change in Rasch calibrated Catquest-9SF score achieved with cataract surgery from the following clinical data was developed (Table 4): preoperative Rasch calibrated Catquest-9SF total score, presence or not of macular degeneration, presence or not of intraoperative complications, age over 75 years old, and preoperative CDVA. The adjusted $R^2$ value associated to this predictive model was 0.527 (Durbin-Watson: 1.747). No multicollinearity was present in these models, with VIF and condition index values within an acceptable range.

## Discussion

Real-world evidence data from public and private health care systems have allowed the identification of the most

**Table 4.** Predictive factors of the change in Rasch calibrated total score of the Catquest-9SF questionnaire achieved with cataract surgery in the analysed sample obtained by means of multiple linear regression analysis.

| Variable | Non-standardized B coefficient | Statistical significance | Partial correlation |
|---|---|---|---|
| Preoperative Rasch calibrated Catquest-9SF total score | −0.632 | <0.001* | −0.701 |
| Macular degeneration | 1.414 | <0.001* | 0.345 |
| Presence or not of intraoperative complications | 1.079 | 0.001* | 0.234 |
| Age over 75 years old | 0.323 | 0.007* | 0.189 |
| Preoperative logMAR CDVA | 0.388 | 0.016* | 0.170 |
| Constant | −2.966 | <0.001* | – |

CDVA: corrected distance visual acuity.
*Statistically significant.

frequent complications as well as the visual outcomes trends for cataract surgery.[2,11] Compared with randomized controlled trials, that generally involve selected populations, real-word evidence and clinical registries provide more generalizable results. However, some concerns have been reported about data quality including selection bias (voluntary participation), transcription errors and the lack of independent audits.[2] For the management of large data sets from different samples of patients and different settings it would be advisable to use standard instruments for outcomes measurement, for example, ICHOM standard set for cataract surgery.[3,7] This is especially useful to compare different data sets, to extract conclusions of global application, to evaluate how physicians are doing compared to their peers worldwide and to share learnings to improve cataract surgery care.[4] In the current study, the ICHOM standard for cataract surgery outcomes measurement was implemented in our routine clinical practice at an Italian tertiary referral ophthalmological centre. Visual outcomes, complications and the relationship between PROMs and CROMs were collected, analysed and critically reviewed.

As expected according to large registries of cataract surgery outcomes, significant improvements in UDVA and CDVA were observed.[12–16] This result confirms the effective distance visual restoration provided by cataract extraction followed by a monofocal IOL implantation. In particular, a mean change in CDVA of -0.32 logMAR was observed in the analysed sample, which represents a gain of around three lines of logMAR visual acuity. Furthermore, 89.0% and 53.2% of eyes enrolled in the study achieved a postoperative CDVA of 0.3 and 0.0 logMAR or better, respectively. Another study evaluating the outcomes of 368.256 cataract surgery procedures from 15 European countries reported that a postoperative CDVA of 0.3 logMAR or better was achieved by 94.3% of cases, whereas 61.3% of eyes achieved a value of 0.0 logMAR or better.[15] This same study also concluded that ocular comorbidity was one of the strongest influences on the final visual outcome.[15] Mönestam and Lundqvist[17] demonstrated that patients undergoing cataract surgery with signs of macular degeneration had a longitudinally worse visual outcome than patients without ocular comorbidities. Likewise, patients with a diagnosis of glaucoma have been shown to be more likely to have a refractive surprise and/or worse visual outcome after phacoemulsification cataract surgery.[18]

In our study we found different ocular comorbidities that might have significantly affected the visual outcomes, including glaucoma (19.7%), macular degeneration (5.0%) and diabetic retinopathy and/or diabetic macular oedema (2.3%).[12] A higher percentage of amblyopes (5.5%) was observed in our sample compared to the reported prevalence for this condition.[19]

For the evaluation of PROMs, we employed the Catquest-9SF questionnaire. This questionnaire has been compared to other 15 Rasch-scaled cataract surgery outcomes questionnaires including the Cataract Symptom Scale, different versions of the National Eye Institute Visual Function Questionnaire, the Cataract TyPE Specification and the Visual Function Index. The Catquest-9SF has shown to be effective for visual functioning measurements in cataract surgery with the largest effect size (a statistic for questionnaire Responsiveness). Moreover, the Catquest-9SF, compared to other available instruments, showed higher simplicity containing only nine items.[8–10] In the sample evaluated in the current study, a significant improvement of PROMs was observed. A mean change of −1.96 was found for the Rasch calibrated Catquest 9SF general score. This confirms that cataract surgery is associated with marked improvements in vision-related activity limitation and satisfaction with vision. This result is consistent with the outcomes reported by other authors in previous studies.[20–24] Besides the significant change in the general Catquest-9SF score, a statistically significant improvement was observed for the Rasch calibrated score obtained in each question. Specifically, the higher change in magnitude was observed for the scores corresponding to items 1 (difficulty with reading text in the newspaper), 2 (difficulty with recognizing faces of people you meet) and 8 (difficulties in any way in your daily life due to vision). It is curious how most of the patients perceived an improvement in tasks associated to near and intermediate vision

despite being implanted with a monofocal IOL. This is consistent with the effective and significant reduction of driving-related difficulties after cataract surgery reported in previous studies.[25] Aspects such as patient motivation and an adequate preoperative explanation of the procedure, giving real expectancies about the post-operative outcomes, might be factors remarkably contributing to this self-assessed near and intermediate visual improvement. Further studies with larger samples will be necessary to systematically address the peculiar issue of postoperative self-assessed changes in near and intermediate vision outcomes. Furthermore, comorbidities have been demonstrated to be among the reasons for poor PROMs after cataract surgery, but in our series the impact of comorbidities on PROMs seemed limited. Indeed, according to the overall score of the Catquest-9SF questionnaire, 88.1% of patients of the current sample referred an improvement of the visual function with surgery.[26,27] In a prospective study evaluating the cataract surgery outcomes in 343 patients, Chaudhary et al.[22] reported that functional vision improved in 83.7% of the cases, with similar levels of comorbidities (glaucoma 15.1%, maculopathy 3.6% and diabetic retinopathy 1.8%) compared to our series.

The change in CDVA with surgery in the analysed sample was found to be correlated with changes with surgery in the Rasch calibrated score of Catquest-9SF Item 2 and in Rasch calibrated total scoring of Catquest-9SF. Although these correlations reached statistical significance, they were weak suggesting that no direct relationship was present between PROMs and CROMs after cataract surgery. Limited but statistically significant correlations were also reported in previous studies between visual acuity and self-assessed level of vision evaluated by the Catquest-9SF questionnaire.[20,22,26,28] In the current sample, a predictive linear regression of the change achieved with cataract surgery in the self-assessed level of vision was found involving the preoperative value of the Rasch calibrated Catquest-9SF total score, the presence or not of macular degeneration, the presence or not of intraoperative complications, age over 75 years old, and the preoperative level of CDVA. Specifically, a higher improvement in self-assessed level of vision was expected in eyes of younger patients, with worse baseline CDVA, poorer preoperative self-assessed level of vision, and without macular degeneration and surgery-related complications. These factors should be considered when providing real expectancies to patients about the surgery. Age is another relevant factor to consider when predicting self-assessed vision after cataract surgery as it has been demonstrated that slightly poorer self-assessed visual outcomes are noted in older patients (especially 90 years or older), in particular in patients with co-existing ocular comorbidities which are highly prevalent.[13]

One of the potentially relevant factors leading to the high values of postoperative self-assessed level of vision in the sample evaluated could be the low incidence of intraoperative and postoperative complications. It should be considered that the presence of complications has been associated with poorer visual outcome and worse self-assessed visual function after cataract surgery.[26,27,29] In the current study, capsular breach occurred in 1.8% of cases, zonular dehiscence in 0.5%, persistent corneal oedema in 0.5% and vitreous prolapse in 0.9%, with still lower incidences for other types of intraoperative complications in spite of the relevant presence of comorbidities in the sample evaluated. These complications rates are comparable to those described in other studies reporting the outcomes of large sample of patients, but also lower than those reported in other large database studies of cataract surgery.[30,31] The low incidence of complications in the sample evaluated might be the consequence of the interaction between several factors, including surgeon's experience, efficient control of the operating theatre and adequate postoperative follow-up and care.

Finally, it should be remarked that a moderate and statistically significant correlation was found between the change with surgery in the Rasch calibrated total Catquest-9SF score and the change in Item 2 score of Catquest-9SF ($r=0.634$), which is related to the self-assessment of the vision-related difficulty to perform an activity in intermediate vision. This confirms the great relevance of intermediate visual restoration in cataract surgery to obtain a satisfactory visual outcome. Recently, the relevance of intermediate vision in cataract surgery outcomes has been remarked by the European Society of Cataract and Refractive Surgery (ESCRS) Functional Vision Working Group, stating that intermediate vision should be always evaluated in cataract surgery and considered as a critical parameter for patients' postoperative satisfaction.[32]

In conclusion, cataract surgery is an efficient procedure for the improvement of functional vision, with some factors limiting the outcomes such as comorbidities and intraoperative and postoperative complications. In the sample evaluated several factors, such as an adequate preoperative counselling of patients to provide real expectations and a good control of the surgical procedure, might have played a critical role for the self-assessed visual outcomes obtained. Specifically, a higher improvement was observed in those eyes undergoing cataract surgery of younger patients with worse baseline CDVA and self-assessed level of vision preoperatively, and without macular degeneration and surgery-related complications. The relationship between PROMs and CROMs is multifactorial and complex, but the improvement in self-assessed vision after cataract surgery was found to be significantly influenced by the self-perceived improvement in intermediate vision. The implementation of ICHOM standard set in our clinical practice allowed us to critically review the patient journey at our Facility, to optimize our medical record template according to the standard set and to plan further steps to improve patients' outcomes.

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