




A novel method to evaluate quality of care from the perspective of cataract patients

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Abstract

Purpose To evaluate quality of care from patient's perspective following cataract surgery using a novel questionnaire and to assess validity of the survey in context with the identification of lacks in quality of care.

Methods Assessment of quality of care in 150 patients (150 eyes) who underwent cataract surgery in an Austrian clinical setting based on a novel "Quality of Care from Patient's perspective following Cataract Surgery" (QCPCS)-questionnaire including 10 subjective, 10 objective and 7 general health care criteria. Quality of care was graded according to importance (range: 1 = not important to 4 = extremely important) and frequency of occurrence (range: 1 = never to 4 = often, 0 = not applicable). Quality-impact indices (QI-respective grading by patient/4) were assessed.

Results Mean performance score was 3.84 (SD = 0.42, range: 1–4). Mean QI was 0.89 for subjective, 0.90 for objective and 0.96 for general health care criteria ($p = 0.29$). All-over skewness and coefficient of variation were -2.65 and 5.85 respectively. Internal consistency was high (Cronbach's $\alpha = 0.75$) confirming causal taxonomy of disease-specific and generic items.

Conclusion A valid new method to reliably and holistically evaluate patient's satisfaction related to cataract surgery including a broad range of patient needs is presented, suitable to assess potential lacks in quality of health care in daily ophthalmological clinical practice.

Introduction

The opacification of the lens by cataract that blocks or scatters light is most commonly caused by ageing of its proteins subsequently leading to a reduction of vision in 23% of individuals aged 65–74 years, increasing with age [1]. If left untreated the condition ultimately leads to severe visual impairment. Extracting the natural lens can restore vision by replacing it with an inert lens implant [2]. Demand for surgery consistently increases as cataract is age-related and surgery substantially improves patient's quality of life.

Hence, due to long waiting lists a change towards day-case surgery using local anaesthesia has occurred within the last decade. Besides higher cost effectiveness, this outpatient setting demonstrated to be as effective and safe compared to inpatient surgery [1]. This development demands excellent quality of care for affected patients, making the evaluation of patient satisfaction a prerequisite.

Currently patient satisfaction is considered to be a key outcome measure for health services and is essential for sustaining relationships between health care providers and patients [1, 3, 4]. It is further of major importance with respect to quality assurance (QA) and the expected outcome of care [5]. A valid evaluation of the quality of ophthalmic services from the patient's perspective should consider all components that contribute to the quality of health care including objective (i.e. related to treatment) and subjective outcome criteria (patient satisfaction) [5, 6].

However, this recognised utility has numerous inherent assumptions about the nature and significance of expressions of satisfaction. It has been suggested that the assessment of patient satisfaction depends on the measurement

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method applied and that unreliability of measurement may be a substantial problem when measuring satisfaction. Former research further showed that factors like age or education influence acquiescence of respondents substantially [7–9].

Considering these formerly reported questionnaire-associated limitations it was the aim of the current study to assess quality of health care from the perspective of patients who underwent cataract surgery in an Austrian clinical setting using a novel patient-based survey that includes objective, subjective and general health care criteria that are relevant for thorough QA evaluation.

Materials and methods

This prospective single centre cross-sectional study included 150 consecutive patients (150 eyes) of the Department of Ophthalmology, Hietzing Hospital Vienna, Austria, who underwent cataract surgery. Patients were asked about their perception of satisfaction directly after surgery. Cataract surgery obeyed a regular operating procedure with the use of topical anaesthesia and phacoemulsification followed by a standardised extracapsular cataract extraction (ECCE) technique and an intraocular lens implant (IOL) that was placed inside the lens capsule.

Eligible patients were aged 40–90 years and scheduled to undergo phacoemulsification with foldable IOL implantation under topical anaesthesia with clear self-sealing corneal incisions. One eye (first eye surgery or other eye pseudophakic) was eligible for surgery. Inclusion criteria were presence of cortical, nuclear or subcapsular cataract, traumatic cataract, pseudoexfoliation syndrome (PES) and cataract formation due to prior intraocular surgery. Main non-inclusion criteria were combined procedures, iatrogenic or congenital cataract, corneal, endothelial, epithelial, stromal, residual or progressive corneal disease as well as infection or inflammation within the previous three months.

Six patients (4%) also received one or more intravitreal treatments with anti-vascular endothelial growth factor (anti-VEGF) on the same day or several days prior to cataract surgery. Intravitreal treatment used comprised bevacicimab (Avastin®), ranibizumab (Lucentis®), or aflibercept (Eylea®). Intravitreal injections were performed using 30 Gauge needles following topical application of oxybuprocaine and betadine solution.

Cataract surgery and anti-VEGF therapy were both applied during the same procedure if indicated.

Signed informed consent was obtained from each patient and the character of the study was explained in detail preceding patient inclusion. The study protocol was approved by the local ethics committee and adhered to the ethical tenets of the Declaration of Helsinki. All patients included

in the present study were mentally able to reflect the complexity of the questionnaire.

The questionnaire

The present study used a novel questionnaire to evaluate patient satisfaction related to cataract surgery [“Quality of Care from Patient’s perspective following Cataract Surgery” (QCPCS)] that was developed by the Department of Ophthalmology, Hietzing Hospital Vienna, Austria. Relevant grading criteria included were defined according to patient interviews (patients formulated the relevant criteria), clinical experience by ophthalmologists and previous findings in literature [3–22] that report about validity of questionnaires that measure the quality of care from the perspective of patients.

Subjective and objective QA criteria asked participants to indicate what they considered to be most important to the quality of their care and to rate the importance of 27 aspects of their overall care. A particular quality of care was graded according to importance (scale range: 1–4, range: 1 = not important to 4 = extremely important) and frequency of occurrence (range: 1 = never to 4 = often, 0 = not applicable).

General quality of care aspects comprised quality of conversation with the Doctor (including informed consent), quality of conversation with nursing staff, friendliness at the counter, quality of preparation for surgery, quality of transportation to operating room, quality of surgical procedure and quality of care following surgery. The degree of education ranging from lowest (1 = elementary school) to highest (6 = university degree) was evaluated for each patient and subsequently correlated to grading results.

Statistics

Scores were calculated using mean values and standard deviation (SD). Scores were analysed by linear transformation of standardised values (Z scores) to values between 0 (“not important”) and 4 (“very important”) [9–11]. Further, skewness scores were computed as a measure of symmetry of distribution. The individual performance and importance scores (iP) on different quality of care aspects (j = full possible rating score) were used to calculate quality impact indices (QI), using the formula $QI = iP/j$, applied in a similar fashion previously [6, 9, 10]. Theoretically a quality impact score could range between 0 (least possible quality of care: patients report that improvement is needed) to 1 (best possible quality of care). Factor analysis was carried out for representation of the internal structure by calculating Cronbach’s α . A level of ≥ 0.70 was considered as an acceptable value. Appropriateness of the factor analytic model was verified using Bartlett’s test of sphericity

and *F*-test (referring to the equality of variances of the differences between measurements). The Spearman-Brown formula was used to measure test reliability.

In case of more than 10% of missing importance score values these were excluded from assessment. For comparison analysis of grading criteria between patients the paired *T* test was used. For comparison evaluation between age groups, groups of educational level and assessment of differences between subjective, objective and general criteria related to quality of care scores, the Mann–Whitney *U* test was performed. Analysis of variance (ANOVA) was accomplished in order to analyse differences among group means.

Spearman correlation coefficients were calculated to correlate results with level of education, age and gender.

Excel 2014, MedCalc (version 13.3.3.0) and Past Project (version 3.06) were used to perform statistical analyses. Statistical significance level was defined as $p < 0.05$.

Results

Ninety-six patients were female, 54 were male. Mean age of patients was 73 (SD = 11, range: 20–95) years. Total number of completed questionnaires returned was 143 (response rate = 95.3%). Thirty-three patients (23.1%) already had cataract surgery on the other eye, 7 eyes (7.3%) also received treatment with anti-VEGF.

Table 1 summarises results related to subjective, objective and general quality of health care criteria of the “Quality of Care from Patient’s perspective following Cataract Surgery” (QCPCS)-questionnaire.

Mean (SD) of the importance scores was similar when comparing subjective, objective and general quality of health care criteria: 3.8 (0.45), 3.6 (0.55) and 3.84 (0.42) for subjective, objective and general criteria respectively (ANOVA, $p = 0.29$, Figs 1 and 2).

Summarised, mean performance score of all grading criteria was 3.84 (SD = 0.42, range: 1–4, QI = 0.96). Mean QI was 0.89, 0.90 and 0.96 for subjective, objective and general quality of health care criteria respectively. Overall, trust in Doctors and nursing staff reached highest QI (0.96), disinfection of hands following contact to patients was rated least important (QI = 0.32).

Lower skewness results were found for general quality of health care criteria (−0.45) compared to subjective (level of importance: −1.44, frequency of occurrence: −2.79) or objective (level of importance: −2.81, frequency of occurrence: −1.99) quality of health care criteria.

Overall, internal consistency was high [(Cronbach’s $\alpha = 0.75$), subjective criteria: Cronbach’s $\alpha = 0.62$; objective criteria: Cronbach’s $\alpha = 0.60$]. Bartlett’s test of sphericity ($\chi^2 = 521.5$) and *F* test ($p < 0.01$) showed appropriateness

of the factor analytic model that revealed legitimacy of the procedure [95% confidence interval (CI) for the mean (subjective criteria): 3.78–3.82; CI (objective criteria): 3.57–3.63]. Spearman-Brown prophecy was 0.6 that demonstrated good reliability of the QCPCS.

Regarding level of education most respondents (19%) had completed traineeship as their highest level of education (most important ratings were given for an appropriate amount of time for informed consent, least important ratings for staff disinfecting hands following contact to other patients), while 0.6% had completed college/university (most important ratings: treatment adheres to gold standard, least important ratings were identical to patients who completed traineeship as highest degree of education).

In this study most participants were aged between 71 and 80 (46.6%) years followed by 81–90 (22%) and 61–70 year old patients (20%). In all, 11.3% of individuals were aged between 51 and 60 years and 0.1% of patients were between 20 and 30 years old. Though statistically insignificant, there was a trend of a correlation between patients aged between 60–70 years and the quality of care criterion “treatment adheres to gold standard” ($r = 0.7$).

Differences between patients who had cataract surgery alone and patients who had cataract surgery in addition to intravitreal treatment with anti-VEGF differed statistically significantly when comparing subjective and objective grading results (QI of patients who underwent cataract surgery alone = 0.90, QI of patients who had cataract surgery in addition to anti-VEGF therapy = 0.88, $p < 0.01$).

Discussion

Clinical quality evaluation has recently become increasingly important, not least as expectations of treated patients have increased considerably [3, 22]. Recent research showed that the most influencing factors for global patient’s satisfaction are facilities in the hospital, atmosphere and the staff’s level of kindness. The significance of structured and standardised processes related to quality of care resulting in patient satisfaction following cataract surgery has further been shown [13]. Fitzpatrick and others [14] presented a study that indicated that patients have variable concerns associated with their disease and that these interests need to be considered more directly when explaining reasons for different responses related to medical consultations [23]. A valid assessment of the quality of ophthalmic services from the perspective of patients should incorporate all components that contribute to the quality of services [objective outcome criteria (functional tests), subjective outcome criteria (patient satisfaction), and criteria that are related to the way the services are provided (structure and process of care)] [5, 6, 15].

Table 1 Summary of quality of care ratings of patients who underwent cataract surgery based on the “Quality of Care from Patient’s perspective following Cataract Surgery” (QCPCS)-questionnaire

Subjective criteria	Level of importance for patients				Frequency of occurrence			
	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.
Treatment takes place in silent and pleasant atmosphere	3.81	0.39	3.00	4.00	3.93	0.32	2.00	4.00
Appropriate amount of time for informed consent is provided	3.79	0.45	3.00	4.00	3.96	0.21	3.00	4.00
Friendly personnel	3.85	0.37	3.00	4.00	3.99	0.14	3.00	4.00
Clean and tidy work station	3.73	0.49	2.00	4.00	3.94	0.31	2.00	4.00
Consultation of medical professional is possible whenever needed	3.66	0.51	2.00	4.00	3.91	0.50	1.00	4.00
Getting to know the surgeon personally prior to surgery	3.59	0.69	1.00	4.00	3.92	0.47	1.00	4.00
Care taking is sustained by personnel throughout entire stay	3.35	0.85	1.00	4.00	3.50	1.03	1.00	4.00
Staff is open for my questions	3.74	0.44	3.00	4.00	3.98	0.16	3.00	4.00
I fully trust Doctors and nursing staff	3.85	0.36	3.00	4.00	3.97	0.20	3.00	4.00
Staff is sensitive concerning my fears and concerns	3.65	0.48	3.00	4.00	3.86	0.61	1.00	4.00
Mean	3.70	0.50			3.90	0.40		
SD	0.15	0.15			0.14	0.27		
Min	3.35	0.36			3.50	0.14		
Max	3.85	0.85			3.99	1.03		
Variance	0.02	0.02			0.02	0.07		
Skewness	-1.44	1.57			-2.79	1.51		
Coeff. var.	4.10	30.58			3.69	69.21		
<i>Objective criteria</i>								
My name is identified repeatedly prior to surgery	3.52	0.66	1.00	4.00	3.91	0.48	1.00	4.00
Staff disinfects hands following contact to patients	1.29	1.34	1.00	4.00	3.01	0.32	1.00	4.00
Treatment adheres to gold standard	3.89	0.32	3.00	4.00	3.93	0.49	1.00	4.00
My identity and data are verified again prior to surgery using a safety-checklist	3.65	0.56	2.00	4.00	3.75	0.82	1.00	4.00
Treatment follows standard operating procedures	3.67	0.59	1.00	4.00	3.93	0.44	1.00	4.00
My medical record is registered and saved electronically on the computer	3.25	0.86	1.00	4.00	3.41	1.13	1.00	4.00
I get along well on the ward and do not have to be afraid to fall down	3.65	0.59	2.00	4.00	3.93	0.36	2.00	4.00
I am asked for possible allergies	3.63	0.63	1.00	4.00	3.97	0.36	1.00	4.00
Side of intervention is marked	3.86	0.39	2.00	4.00	3.98	0.16	3.00	4.00
Examination tools are clean hygienic	3.90	0.31	3.00	4.00	3.89	0.59	1.00	4.00
Mean	3.43	0.63			3.77	0.52		
SD	0.78	0.30			0.32	0.28		
Min	1.29	0.31			3.01	0.16		
Max	3.90	1.34			3.98	1.13		
Variance	0.60	0.09			0.10	0.08		
Skewness	-2.81	1.55			-1.99	1.29		
Coeff. var.	22.61	48.33			8.36	53.83		

Table 1 (continued)

Subjective criteria	Level of importance for patients				Frequency of occurrence			
	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.
<i>Summary of results regarding ratings of subjective and objective criteria</i>								
3.57	0.56			3.83	0.46			
SD	0.56	0.24			0.25	0.28		
Min	1.29	0.31			3.01	0.14		
Max	3.90	1.34			3.99	1.13		
Variance	0.32	0.06			0.06	0.08		
Skewness	-3.83	1.92			-2.49	1.19		
Coeff. var.	15.74	42.90			6.44	60.45		
<i>General quality of health care criteria</i>								
Quality of conversation with the Doctor (including informed consent)					3.94	0.25	3.00	4.00
Quality conversation with nursing staff					3.80	0.50	2.00	4.00
Friendliness at the counter					3.72	0.54	2.00	4.00
Quality of preparation for surgery					3.89	0.32	3.00	4.00
Quality of transportation to operating room					3.73	0.50	2.00	4.00
Quality of surgery					3.95	0.22	3.00	4.00
Quality of care following surgery					3.91	0.35	2.00	4.00
Mean					3.84	0.38		
SD					0.09	0.13		
Min					3.72	0.22		
Max					3.95	0.54		
Variance					0.01	0.02		
Skewness					-0.45	0.02		
Coeff. var.					2.53	33.94		
<i>Overall results summarising subjective, objective and general quality of health care criteria</i>								
Mean					3.84	0.42		
SD					0.22	0.24		
Min					3.01	0.14		
Max					3.99	1.13		
Variance					0.05	0.06		
Skewness					-2.65	1.59		
Coeff. var.					5.85	57.70		

Min. minimum value, *Max.* maximum value, *Coeff.var.* Coefficient of variation

Subjective criteria: (range: 1 = not important, 4 = extremely important)

Objective criteria: (range: 1 = never, 4 = often, 0 = not applicable)

Mean values and standard deviation (SD) are represented for each quality of care-related criterion.

Results in grey boxes represent mean values

Our study showed high patient satisfaction following cataract surgery using the “Quality of Care from Patient’s perspective following Cataract Surgery” (QCPCS)-questionnaire that demonstrated to be a valid and detailed survey to assess patient satisfaction, not least as it considers a wide range of aspects related to subjective, objective and general

health care criteria. We showed that the survey presented here reveals good overall internal consistency indicating reliability when used in clinical practice. The insignificant differences in high satisfaction levels between groups (subjective, objective and general) confirm good quality of care in an Austrian ophthalmological clinical setting.

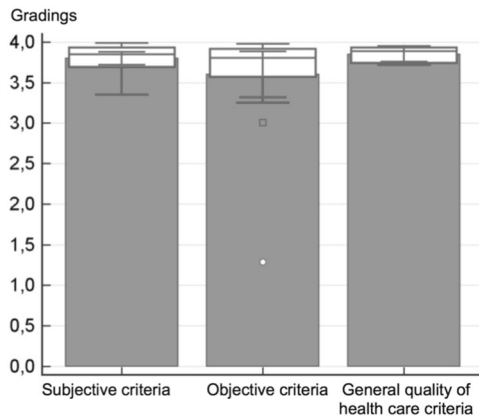


Fig. 1 Box plot diagram comparing subjective, objective and general quality of health care criteria in patients following cataract surgery using the “Quality of Care from Patient’s perspective following Cataract Surgery” (QCPCS)-questionnaire. No statistically significant differences between grading groups were found. The 95% confidence intervals (CI) are represented by turquoise vertical lines. The white dot shows an outlier. Orange bars illustrate mean values. Results of all patients are summarised

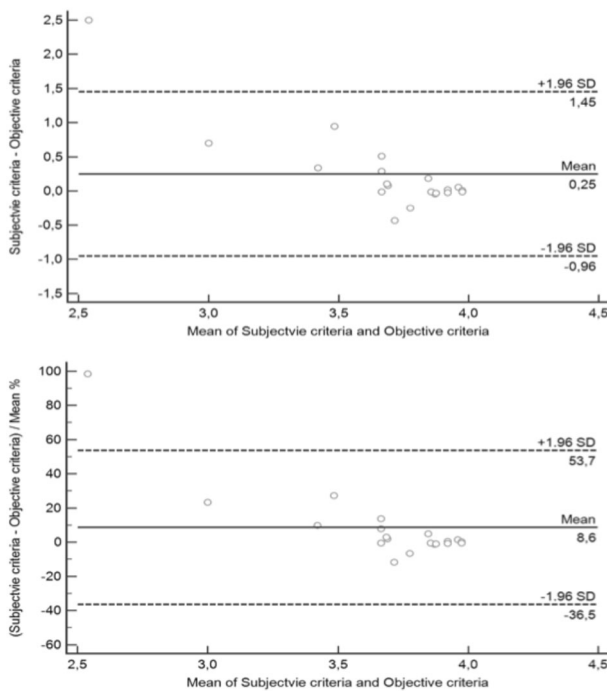


Fig. 2 Bland–Altman plot (top: absolute values, bottom: %) of agreement comparing subjective and objective grading criteria of the “Quality of Care from Patient’s perspective following Cataract Surgery” (QCPCS)-questionnaire. The mean of the test and retest scores is plotted on the x axis and the differences between the two scores on the y axis. The horizontal interrupted lines represent the limits of agreement [within 2 standard deviations (SD) from the mean]. Mean values are plotted for layout reasons

Significance of our results seems evident as considerable concern regarding quality of care and patient safety has evolved in response to a profound alteration of health care

systems in recent years [16], particularly due to financial reasons. Novel structural and compensation approaches created inducements potentially affecting quality of care. Despite the fact that certain systems apparently contribute to quality improvement, apprehensions about potentially negative consequences have induced a movement to ensure that quality will not be killed to control costs [1]. Bearing in mind this global development advancement towards methods that are appropriate to evaluate patient satisfaction seem indispensable, not least in order to identify risks in the health care system.

However, comprehension regarding risks entirely differs from the patient’s point of view as compared to the perception of professional service providers. Characteristic risk indicators related to quality of care e.g. physically-related, friendliness of employees, aspects related to light and colour, social inequality [17] only in part apply to the understanding of patients. Additionally, emotional aspects associated with quality- and risk-related aspects have a determinate influence on decisions about sustained care in the identical department or recommendation to an alternative clinic [18].

The significance of assessing quality of care to increase patient safety in a clinical setting has been shown earlier by Kasatpibal et al. [19] and others [20]. The application of a checklist developed by the World Health Organization (WHO) to avoid interventional mistakes has reduced surgical-related complication rates (mortality) by 50% [19]. Furthermore, software developed to accomplish decision support is effective in predicting adverse drug effects [21], highly relevant when considering medical services.

In addition, studies related to quality of health care in the United States [16] revealed that some patients receive more care than needed and that others receive less than desirable. It has been indicated that 70% of patients received recommended acute care, 50% of patients received recommended preventive care; 60% recommended chronic care; 30% contraindicated acute care and 20% contraindicated chronic care [16].

Moreover, previous research showed that quality of medical care substantially varies and that clinicians are increasingly interested in relevant quality-related results [8].

When evaluating the effectiveness of cataract surgery the significance of the patient’s viewpoint has been recognised [23], though, only few related studies were yet conducted [12, 23]. Although a questionnaire evaluating patient satisfaction following cataract surgery has formerly been presented [23], the survey used in our study seems more suitable for broad clinical use compared to Nijkamp et al. [23], who focused on generic and cataract specific indicators only, sparing the integral evaluation of subjective, objective and general health care criteria, providing a more holistic quality-related assessment. Lindfield et al. [24]

recently provided a concept to improve the quality of cataract surgery, however, that study [24] focused on performance improvement rather than on quality of care criteria that are related to patient needs as performed in our study. Not least, the QCPCS presented here considers factors like age or education, making it robust for general use, as it has been shown previously that these features significantly influence acquiescence of respondents [7, 25].

Although no statistically significant correlation between age groups and quality of care criteria was shown in our study, the trend of a correlation between patients between 61–70 years of age and “treatment adheres to gold standard” indicates the need of identifying quality of care features that are particularly relevant for certain age groups.

This study also showed that completion of the QCPCS-survey is suitable for patients in terms of time consumption (~5–10 minutes/questionnaire).

The reason for the lower QI of patients who had cataract surgery alone and patients who underwent cataract surgery in addition to treatment with anti-VEGF in our study remains to be assessed (QI = 90, vs. 0.88, $p < 0.01$). One reason for the verified difference may most likely be related to the fact that an additional surgical procedure (treatment with anti-VEGF) increases the stress level of affected patients, resulting in less good QI results, or the fact that an additional retinal disease (in addition to cataract formation) was diagnosed in affected patients. The aspect of comparing multiple- to single-surgical procedures remains to be evaluated in future studies. Though, these results further confirm the validity of the QCPCS-questionnaire, considering the identification of fields of medical care to be focused on even more carefully.

Although this study attempts to assess quality of care criteria that are broadly accepted by patients, certain objective criteria (1, 2, 8 and 9 in the table) are mandatory for a time-out procedure in a clinical setting and essential for performing surgery and were therefore also evaluated in the present study, reaching high level of importance scores. This substantiates the significance and need for mentioned quality of care criteria.

Results of the current study and mentioned findings discussed more than justify a broad patient-based evaluation of quality of care in a diversified and in-depth fashion related to cataract surgery, which would allow more conclusive assessment of the status of the nation’s health care and would enable us to rule out areas in need of improvement. According to the results of our study, the authors believe that the QCPCS-questionnaire is a suitable tool to fulfil this requirement.

Study limitations are the relatively low patient numbers, lack of reproducibility data and the single-centre

character of the investigation. Although quality of care in patients with and without retinal diseases who received cataract surgery and anti-VEGF mediators was assessed, retinal diseases requiring anti-VEGF were not further differentiated, which may be considered as a limitation of the study. Further, waiting time would have been a characteristic to be considered, which was not specifically measured in the current manuscript, however will be considered in future investigations. Moreover, further subjective and objective criteria that could be included in the survey might be useful in order to make the results of our study even more coherent. Moreover, the eligibility of the QCPCS questionnaire presented here to uncover deficiencies regarding quality of care has to be substantiated further in a larger patient cohort as well as in an outpatient care setting and should be compared to other methods that refer to quality of care assessment, which will be subject of future investigations. Further, the evaluation of our results using item response theory methods (i.e. Rasch) as used previously by others [26, 27] would have been favourable in context with the present study. Furthermore, conducting less strict cataract-related exclusion criteria may be effective in terms of evaluating patient satisfaction in more complicated cases of cataract.

To conclude the present study showed that the novel QCPCS-questionnaire is a valid and reliable method to evaluate quality of health care related to cataract surgery from the patient’s point of view and incorporates a broad spectrum of comprehensive criteria to consistently assess patient’s satisfaction, potentially useful for a broad use in daily ophthalmological clinical practice.

Summary

What was known before

- Quality of Care in cataract surgery must maintain high Standards and it is decisive to objectively evaluate quality of care in this field
- Only limited research has been achieved in recent years regarding this aspect

What this study adds

- The manuscript evaluates quality of care from patient’s perspective following cataract surgery using a novel questionnaire considering patient needs and assesses the validity of the survey in context with the identification of lacks in quality of care.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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