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Intraocular lens selection in US cataract surgery: a prospective survey informing an expert-derived clinical decision tool

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ABSTRACT

Background: Advanced-technology intraocular lenses (IOLs) can provide greater spectacle independence compared with single-focus (monofocal) IOLs, without significantly compromising visual quality. However, usage rates are variable and lower than those of single-focus lenses.

Research, design, and methods: This prospective survey study investigated practice patterns and perspectives on IOL selection among a representative sample of US cataract surgeons ('surgeons'; $N = 127$) and in those with recognized expertise in advanced-technology IOLs ('experts'; $N = 7$). Using survey findings, an expert panel identified knowledge/confidence gaps.

Results: Optical biometry was considered essential by 87.4% of surgeons and 100% of experts. Confidence in IOL selection was high (78.8% vs 100%), while 53.5% vs 100% offered advanced-technology IOLs to all qualifying patients. Confidence in post-operative management of advanced-technology IOLs was lower among surgeons (42.5%) than experts (100%). Experts reported a 30% lower threshold for treating astigmatism with toric IOLs than surgeons (0.71 D vs 1.01 D) and showed more consistent decision-making patterns driven by patient factors.

Conclusions: Findings indicated variability in IOL-selection confidence and decision-making patterns, pre-operative assessment rigor, and comfort with postoperative management, highlighting opportunities for targeted education and standardization. An IOL selection decision-making tool was outlined to support IOL-selection standardization based on objective clinical criteria and subjective patient factors.

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Astigmatism; advanced-technology IOL; cataract surgery; intraocular lenses; intraocular lens selection; outcomes; presbyopia-correcting IOLs

1. Introduction

Refractive-cataract surgery or lens-based surgery is the most common surgical procedure performed in the U.S.A. [1]. As cataract is the leading cause of preventable blindness and the second leading cause of moderate-to-severe visual impairment globally [2,3], cataract surgery is associated with substantial benefits. The restoration of vision through cataract surgery has been shown in large datasets to reduce the risk of falls and injury [4,5] and reduce cognitive impairment and depression in older adults [6,7]. Additionally, untreated vision loss is a modifiable risk factor for dementia, and cataract surgery has been shown to lower the risk of dementia by 25% to 30% through improved visual function [8–10]. Improvements in surgical techniques and technologies allowed for improved refractive outcomes and a reduction in complication rates. Patient expectations have moved beyond restoring visual clarity, with many patients now having higher expectations for visual quality [11]. For most cataract patients, the implantation of a conventional single-focus (monofocal) intraocular lens (IOL) restores clarity of vision at one focal

point; however, these lenses do not provide astigmatism correction, and therefore, many patients with residual astigmatism may require spectacles for distance, intermediate, and/or near vision. Furthermore, distance-targeted single-focus IOLs do not provide spectacle independence at near and intermediate distances, which are often required for common daily tasks [12].

Advancements in IOL technology provide an opportunity to address additional patient needs, preferences, and expectations. Advanced-technology IOLs are broadly considered to be any IOL providing vision correction beyond one focal point (simultaneous-vision IOLs). Comprehension of clinical outcomes associated with different IOL technologies has improved through grouping lenses that yield similar outcomes into a functional classification [13]. These classifications have recently been recognized by global consensus [14]. The classification is directly based on the range of depth of field (DOFi) [15], although its categories have also demonstrated indirect estimates of other endpoints, such as binocular uncorrected visual acuity and spectacle

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independence [16]. The classifications include Full-DOFi IOLs (Steep, Smooth, or Continuous) and Partial-DOFi IOLs (Narrowed, Enhanced, or Extended) [14]. Astigmatism correcting toric IOLs are also available in each of these classifications. Although early models of many simultaneous-vision IOLs provided increased spectacle independence, this often came with a reduction in visual quality, with decreased contrast sensitivity and an increased occurrence of dysphotopsias, such as glare, halo, spider webbing, and starbursting [12]. However, newer models have demonstrated fewer visual symptoms, better contrast sensitivity, and higher patient satisfaction [17–19]. Thus, these advancements have made it possible for patients with the appropriate ocular characteristics to achieve spectacle independence at most distances without significantly compromising visual quality [19].

Despite the availability of advanced-technology IOLs, the rate of implantation is lower than that of conventional single-focus lenses, with usage rates varying substantially between practice type and by patient characteristics [20,21]. Therefore, it would be valuable to understand cataract surgeons' perspectives on advanced-technology IOLs, and their current approach to IOL selection. This study aimed to investigate practice patterns and perspectives on IOL use, surgeon preferences, and decision-making among US cataract surgeons, including the use of advanced-technology IOLs. Using the results from the survey, we then aimed to identify and address knowledge and confidence gaps in US cataract surgery practice, and address these gaps with educational initiatives based on best practices and aligned with common clinical workflows and constraints.

2. Methods

2.1. Study design

This prospective, non-randomized study comprised a digital survey investigating IOL usage patterns, preferences, and decision-making among two cohorts of US cataract surgeons. The first cohort was a representative sample of US cataract surgeons, and the second included surgeons with recognized expertise in advanced-technology IOLs. A 2-hour in-person workshop, facilitated by the clinical research organization, was then held with the advanced-technology IOL expert cohort. The experts reviewed the survey results, and based on the findings, identified knowledge and confidence gaps in US cataract surgery practice. From these findings, the experts proposed educational initiatives to address these gaps, aligned with their best practices and common clinical workflows and constraints. Recommendations reaching $\geq 80\%$ agreement were deemed to have reached consensus. The surveys were completed between March 5 and 12 March 2025, followed by the workshop on 17 October 2025. Informed consent was obtained from all survey participants. This study was provided with an exemption from Western Institution Review Board and Copernicus Group, given its survey-based nature and the absence of sensitive or identifying private data.

2.2. Study population

Participants were identified from the American Society of Cataract and Refractive Surgery (ASCRS) national database of cataract surgeons using quota sampling, ensuring broad geographic representation throughout the U.S.A. Active cataract surgeons meeting the following criteria were targeted for inclusion in the US cataract surgeon cohort: ≥ 5 years of clinical practice experience, based in private or hospital-based practice in the U.S.A., with a minimum surgical volume of 500 cataract surgeries annually. Surgeons based in academic medical centers were not eligible for inclusion in this cohort. For the second cohort—the advanced-technology IOL expert cohort—surgeons were screened from the same database, supplemented by anterior-segment society leadership rosters and authorship records. Surgeons were eligible for the second cohort if they met all previous inclusion criteria and had recognized experience with advanced-technology IOLs. Surgeons from academic medical centers were also eligible to participate in this cohort.

2.3. Survey procedures

The survey was conducted anonymously via the Qualtrics digital platform [22]. The survey collected data on cataract surgery practices, IOL selection, and patient management, using direct multiple-choice questions, ranking questions, and Likert scales. No IOL brands or models were cited within the survey. Within the survey, advanced-technology IOLs were defined as any IOL providing simultaneous vision with a partial or full range of field, or astigmatism-correcting toric IOLs. The original survey instrument was issued before the release of the global consensus statement on the functional classification of IOL types; as a result, the IOL terminology used in the original survey instrument does not match that used in the Results, which were updated retrospectively to align with the consensus classification.

2.4. Statistical analysis

Survey responses were analyzed using descriptive statistics, including frequency distributions, rankings, mean impact scores (for barriers to advanced-technology IOL use), and pattern and trend identification. No inferential statistics, modeling, or extrapolation were performed. Outcomes were segmented by cohort. Differences between cohorts were not powered for statistical comparison. The target sample size of 130 surgeons was not statistically powered but a reflection of feasibility and alignment with prior survey-based studies in this space, and with the aim of capturing a sufficiently broad and representative range across US cataract surgeons to ensure robustness of the decision pathways.

3. Results

3.1. Survey results

A flow diagram summarizing participant identification, screening, and inclusion is provided in Supplementary Figure S1.

Table 1. Study population demographics.

Characteristic	US cataract surgeon cohort (N = 127)	Advanced-technology IOL expert cohort (N = 7)
Region, n (%)		
Pacific	11 (8.7)	0 (0)
Mountain	8 (6.3)	0 (0)
West North Central	12 (9.4)	0 (0)
West South Central	19 (15.0)	1 (14.3)
East North Central	15 (11.8)	1 (14.3)
East South Central	7 (5.5)	0 (0)
South Atlantic	27 (21.3)	4 (57.1)
Middle Atlantic	24 (18.9)	1 (14.3)
New England	4 (3.1)	0 (0)
Years performing cataract surgery, n (%)		
5–10 years	52 (40.9)	0 (0)
11–15 years	36 (28.3)	0 (0)
16–20 years	14 (11.0)	2 (28.6)
>20 years	25 (19.7)	5 (71.4)
Practice type		
Private practice (self-owned)	88 (69.3)	3 (42.9)
Private practice (private equity owned)	24 (18.9)	3 (42.9)
Hospital-based practice	15 (11.8)	0 (0)
Academic medical center ^a	0 (0)	1 (14.3)
Cataract surgery annual volume		
500–999	97 (76.4)	3 (42.9)
≥1000	30 (23.6)	4 (57.1)
Significant clinical experience in addition to cataract surgery		
Dry eye	111 (87.4)	6 (85.7)
Glaucoma	105 (82.7)	4 (57.1)
Corneal and external eye diseases	94 (74.0)	6 (85.7)
Refractive errors	87 (68.5)	7 (100)
Other injuries and trauma	67 (52.8)	3 (42.9)
Keratoconus	54 (42.5)	5 (71.4)

^aAcademic medical centers were excluded from the US cataract surgeon cohort.
Abbreviations: IOL, intraocular lens.

A total of 134 unique, verified, complete survey responses were received and included in the analysis; 127 in the US cataract surgeon cohort and 7 in the advanced-technology IOL expert cohort. Respondents represented 39 US states, with California, Texas, Florida, and New York having the highest representation. The study population demographics are summarized in [Table 1](#).

[Table 2](#) summarizes the preoperative assessments typically performed for cataract surgery in both cohorts. In the US cataract surgeon cohort, 87/127 (68.5%) respondents viewed pre-surgical ocular surface optimization as ‘extremely important’ or ‘very important’; 31/127 (24.4%) viewed it as moderately important, and 9/127 (7.1%) as slightly important. In the advanced-technology IOL expert cohort, 5/7 (71.4%) viewed pre-surgical ocular surface optimization as ‘extremely

important’ or ‘very important,’ with 1/7 (14.3%) viewing it as ‘moderately important,’ and 1/7 (14.3%) as ‘slightly’ important.

In the US cataract surgeon cohort (N = 127), the minimum amount of corneal astigmatism treated with an IOL at the time of cataract surgery was reported to be 1.00 D in 38.6%, 0.75 D in 24.4%, and 0.5 D in 11.0% of respondents. The remaining 26.1% of respondents reported a value of 1.25 D–2.00 D. In the advanced technology IOL expert cohort (N = 7), the minimum amount of corneal astigmatism treated with an IOL at the time of cataract surgery was reported to be 0.75 D in 85.7%, and 0.5 D in 14.3% of respondents. In both cohorts, it was reported that vision with simultaneous-vision IOLs is more impacted by astigmatism than single-focus lenses. In the US cataract surgeon cohort, 21.3%, 37.0%, and 30.7% of respondents reported

Table 2. Essential preoperative testing for cataract surgery.

Assessment	US cataract surgeon cohort (N = 127)	Advanced-technology IOL expert cohort (N = 7)
Optical biometry	111 (87.4)	7 (100)
Topography	110 (86.6)	6 (85.7)
Macular OCT	109 (85.8)	6 (85.7)
Tear film analysis ^a	48 (37.8)	4 (57.1)
Tomography	36 (28.4)	6 (85.7)
Pupilometry	34 (26.8)	3 (42.9)
Aberrometry	28 (22.1)	4 (57.1)
Tear osmolarity testing	80 (6.3)	2 (28.6)

^aTear film analysis included tear breakup time, staining, and Schirmer testing.
Abbreviations: IOL, intraocular lens; OCT, optical coherence tomography.

that 0.5 D, 0.75 D, and 1.00 D, respectively, was the minimum uncorrected corneal astigmatism that impacts quality of vision with a single-focus IOL. In contrast, 48.8%, 29.9%, and 13.4% of respondents reported that 0.5 D, 0.75 D, and 1.00 D, respectively, was the minimum uncorrected corneal astigmatism that impacts quality of vision with a simultaneous-vision IOL. Similarly, in the advanced technology IOL expert cohort, 57.1% and 42.9% of respondents reported that 0.5 D and 0.75 D, respectively, was the minimum uncorrected corneal astigmatism that impacts quality of vision with a single-focus IOL, and 42.9%, 28.6%, and 28.6% of respondents reported that 0.25 D, 0.5 D, and 0.75 D, respectively, was the minimum uncorrected corneal astigmatism that impacts quality of vision with a simultaneous-vision IOL. Toric IOLs were used to treat corneal astigmatism by all respondents in the advanced-technology IOL cohort (100%) and 122/127 (96.1%) in the US cataract surgeon cohort. Other approaches included limbal relaxing incisions (6/7 [85.7%] and 65/127 [51.2%]), on-axis incisions (4/7 [57.1%] and 48/127 [37.8%]), and astigmatic keratotomy (2/7 [28.6%] and 28/127 [22.0%]).

In the US cataract surgeon cohort, 25/127 (19.7%), 75/127 (59.1%), 25/127 (19.7%), and 2/127 (1.6%) respondents reported being 'extremely confident,' 'very confident,' 'moderately confident,' or 'slightly confident' with IOL selection, respectively. In the advanced-technology IOL expert cohort, all respondents (100%) reported being 'extremely confident' or 'very confident' with IOL selection.

Figure 1 summarizes the IOL utilization by lens type among the two cohorts, and Figure 2 summarizes the characteristics most strongly influencing surgeon decisions by lens type and patient characteristics. In healthy eyes, Full-DOFi IOLs were the preferred approach for all respondents in the advanced-technology IOL cohort (7/7; 100%) and 48/127 (37.8%) respondents in the US cataract surgeon cohort. For patients with irregular astigmatism, the preferred approach for providing presbyopia correction was a Partial-DOFi Extended IOL (small aperture) in the advanced-technology IOL expert cohort (7/7; 100%) and a single-focus IOL with spectacles in the US cataract surgeon cohort (51/127; 40.2%). In patients with a history of corneal refractive surgery, the preferred approach in both cohorts was bilateral Partial-DOFi Enhanced IOL (light adjustable) (4/7 [57.1%] and 45/127 [35.4%] in the advanced-technology IOL expert and US cataract surgeon cohorts, respectively). In patients with controlled ocular surface disease, the preferred approach in the advanced-technology IOL cohort was bilateral Full-DOFi IOLs (6/7; 85.7%). In the US cataract surgeon cohort, responses showed high variability (Figure 2(b)). In patients with retinal disease, both cohorts preferred single-focus lenses. The US cataract surgeon cohort most commonly preferred single-focus lenses with spectacles (90/127; 70.9%); the advanced-technology IOL expert cohort most commonly preferred monovision with a single-focus IOL (3/7; 42.9%). In patients with controlled glaucoma, neither cohort showed a consistent preference for approach to presbyopia correction (Figure 2(b)), with 42/127 (33.1%) preferring single-focus IOLs with spectacles in the US cataract surgeon

cohort, and 2/7 (28.6%) preferring bilateral Full-DOFi IOLs in the advanced-technology IOL cohort.

Both cohorts felt the biggest barrier to advanced-technology IOL use was cost. On a scale of 1–5, with 1 being 'not a barrier' and 5 being a 'critical barrier,' the mean reported score for 'IOL cost' was 4.0 in the US cataract surgeon cohort ($N=127$) and 3.4 in the advanced-technology IOL expert ($N=7$) cohort. The US cataract surgeon cohort rated all remaining factors as ~1 point higher than the advanced-technology IOL expert cohort: 3.7 vs 2.3 for 'managing unhappy patients,' 3.2 vs 2.0 for 'chair time with patients,' 3.1 vs 1.6 for 'selecting the right patients,' 2.8 vs 1.9 for 'effective patient education,' 2.5 vs 1.6 for 'confidence in IOL technology,' and 2.0 vs 1.1 for 'diagnostic technology.' 'Other' reported barriers received a mean reported score of 2.0 in the US cataract surgeon cohort and 3.0 in the advanced-technology IOL expert cohort; the barriers specified by the respondents included patient expectations, side effect profile, insurance, and patient ocular comorbidities. The number of respondents reporting being 'extremely' or 'very' confident managing residual refractive error and complications with advanced-technology IOLs was 7/7 (100%) in the advanced-technology IOL expert cohort (100%; $N=7$) and 54/127 (42.5%) in the US cataract surgeon cohort. The number of respondents who reported offering advanced-technology IOLs to all qualifying patients as standard practice was 7/7 (100%) in the advanced-technology IOL expert cohort and 68/127 (53.5%) in the US cataract surgeon cohort. In the advanced-technology IOL expert cohort, 5/7 (71.4%) respondents reported that 50%–74% of patients proceed with an advanced-technology IOL when offered, with 2/7 (28.6%) reporting 25%–49% of patients. In the US cataract surgeon cohort, 41/127 (32.3%), 64/127 (50.4%), 21/127 (16.5%), and 1/127 (0.8%) reported that <25%, 25%–49%, 50%–74%, and ≥75% patients, respectively, proceed with an advanced-technology IOL when offered.

3.2. Identification of knowledge and confidence gaps and proposed educational initiatives

The advanced-technology IOL expert cohort convened to review the results of the survey, identify knowledge and confidence gaps in US cataract surgery practice, and gain consensus on educational initiatives to address these gaps. Experts agreed that the findings indicated variability in confidence, decision-making, and practice patterns related to preoperative assessment, IOL selection, and patient management, and that targeted education in the following key areas may support more consistent outcomes and increased appropriate use of advanced-technology IOLs: comprehensive preoperative assessment; IOL selection based on objective clinical criteria and subjective patient factors; postoperative management of residual refractive error and complications; and improving patient satisfaction with advanced-technology IOLs. Based on these conclusions, experts outlined a proposed IOL-selection decision framework (Figure 3). It outlines the key preoperative assessments that can be conducted, and uses objective clinical criteria and subjective patient factors to match patients to the most appropriate IOL type to meet their needs, balancing eye health, astigmatism, and patient

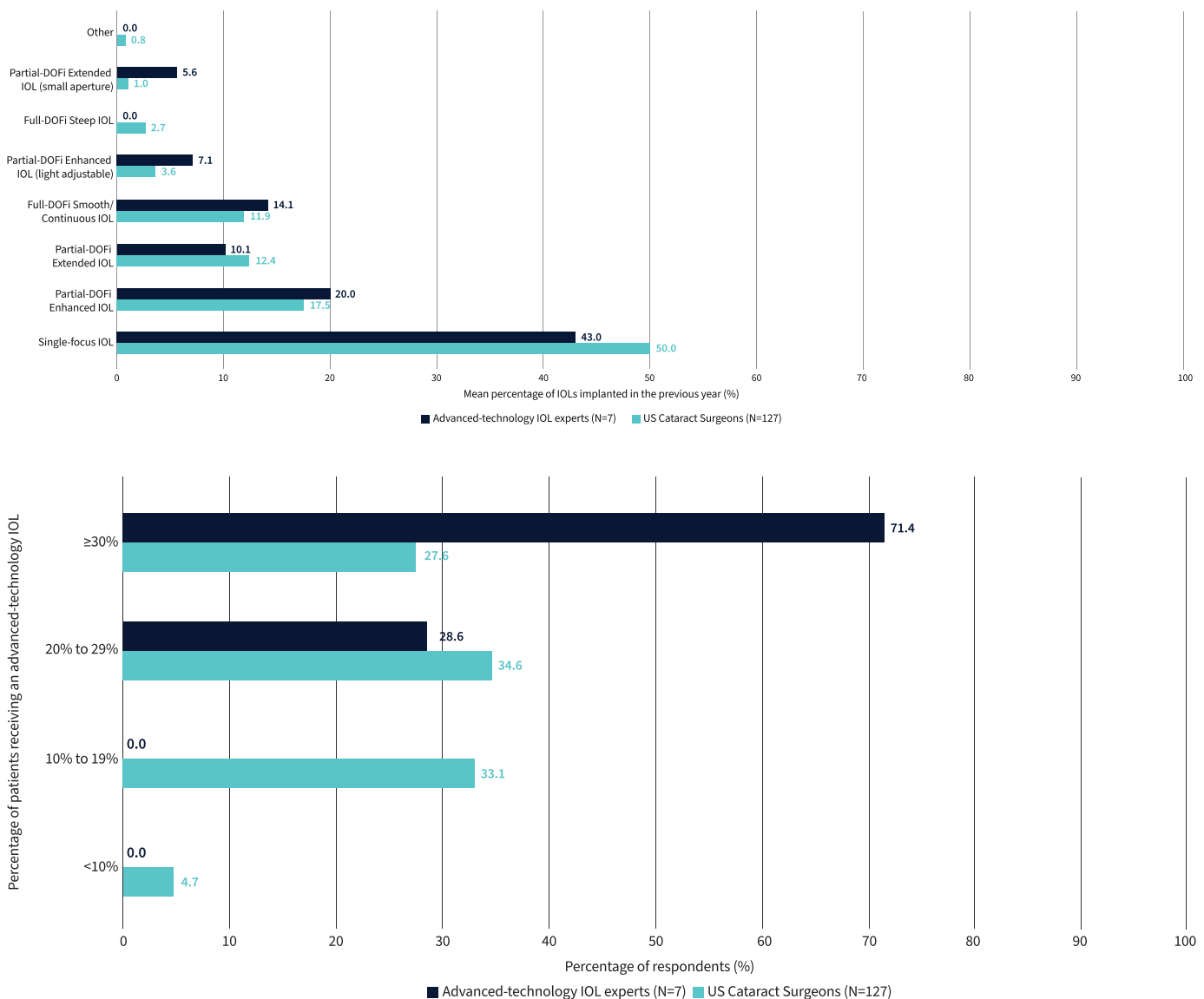


Figure 1. IOL utilization patterns.

1a. IOL utilization by lens type.

Each category includes toric and non-toric models.

1b. Percentage of patients receiving an advanced-technology IOL.

Advanced technology IOLs include toric and non-toric, adjustable and presbyopia-correcting models.

Abbreviations: DOFi, range of the depth of field; IOL, intraocular lens.

preferences and lifestyle factors. The experts agreed that to use this tool optimally, surgeons must be proficient in effective patient communication. This includes setting patient expectations, outlining the attributes of various advanced-technology IOLs, and effectively elucidating patient preferences, goals, lifestyle needs, hobbies, and risk tolerance. It was also recognized that, in addition to informed IOL selection, postoperative patient care and management are key to ensuring optimal outcomes and patient satisfaction. This includes identifying any underlying causes for dissatisfaction (eg, dry eye disease, other ocular surface diseases [dry eye masqueraders], posterior capsular opacification, dysphotopsias, time to achieve neuroadaptation, vitreous floaters, residual refractive error, and unmanaged expectations) and

addressing these factors in a timely and effective manner, with the ability to perform refractive enhancements.

4. Discussion

This study investigated practice patterns and perspectives on IOL selection among a representative sample of US cataract surgeons, and in those with recognized expertise in advanced-technology IOLs. The surveyed cohort represented an experienced population of US cataract surgeons with ≥5 years of clinical practice experience and a high surgical volume (≥500 cases per year), reflecting established, real-world practice environments. However, the findings indicated notable variability in confidence, decision-making,

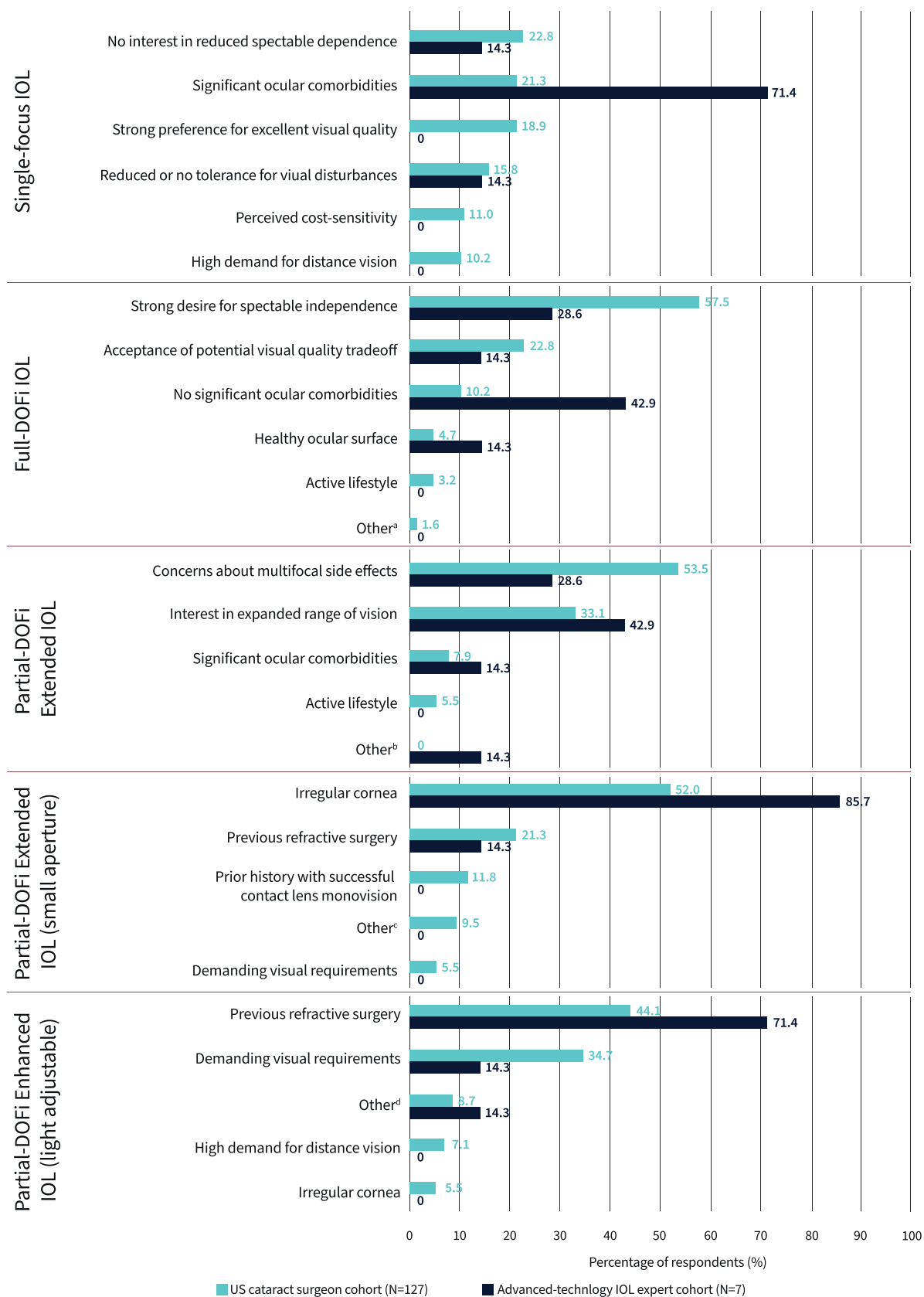


Figure 2. Characteristics most strongly influencing surgeon decisions by lens (a) type and (b) patient characteristics.

2(a). Other responses: ^a'I don't recommend them' ($n = 1$), 'I don't recommend them due to glare/scattering' ($n = 1$); ^bOther responses: 'I do not utilize EDOF lenses' ($n = 1$); 'Other responses: 'I do not use/recommend' ($n = 12$); ^cOther responses: 'specific visual goals' ($n = 1$); 'I do not use/recommend' ($n = 10$).

2(b). Other response: ^a'mini-monovision with enhanced monofocals' ($n = 1$), and 'multifocal/EDOF' ($n = 1$); ^bOther response: 'monovision with enhanced monofocal' ($n = 1$), 'monofocal IOL with possible scleral contact lens after cataract surgery' ($n = 1$), 'LASIK after bilateral trifocal' ($n = 1$), 'monofocal with contact lens after surgery' ($n = 1$), 'do not recommend' ($n = 1$); 'Non specified'; ^cOther response: 'mini-monovision with enhanced monofocals' ($n = 1$); ^dOther response: 'bilateral trifocals if glaucoma is preperimetric' ($n = 1$), 'don't see patients with glaucoma' ($n = 1$); 'Other response: 'in the future I hope to offer light adjustable lenses for this' ($n = 1$).

Abbreviations: DOFi, range of the depth of field; EDOF, extended depth of focus; IOL, intraocular lens; LASIK, laser-assisted in situ keratomileusis.

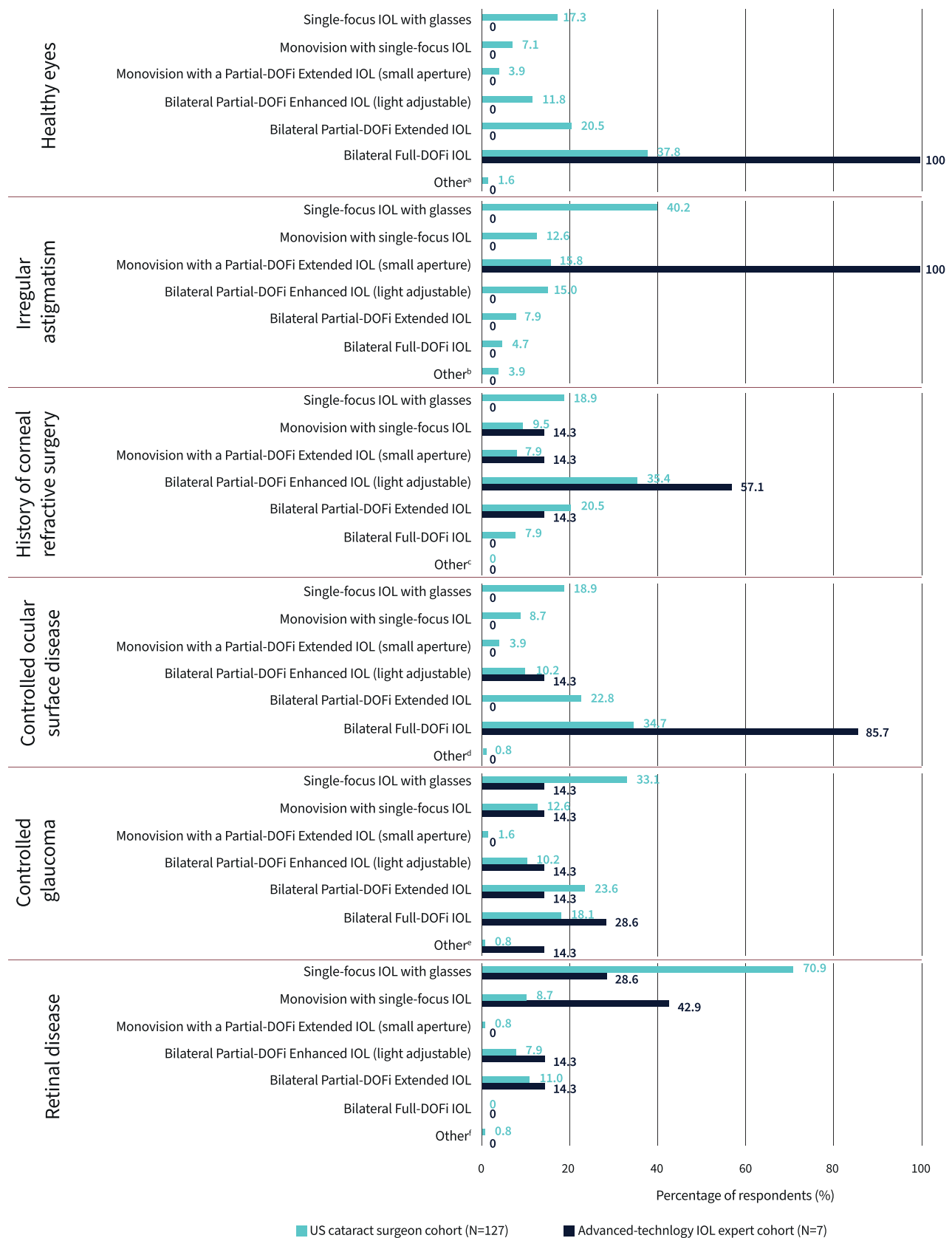


Figure 2. Continued.

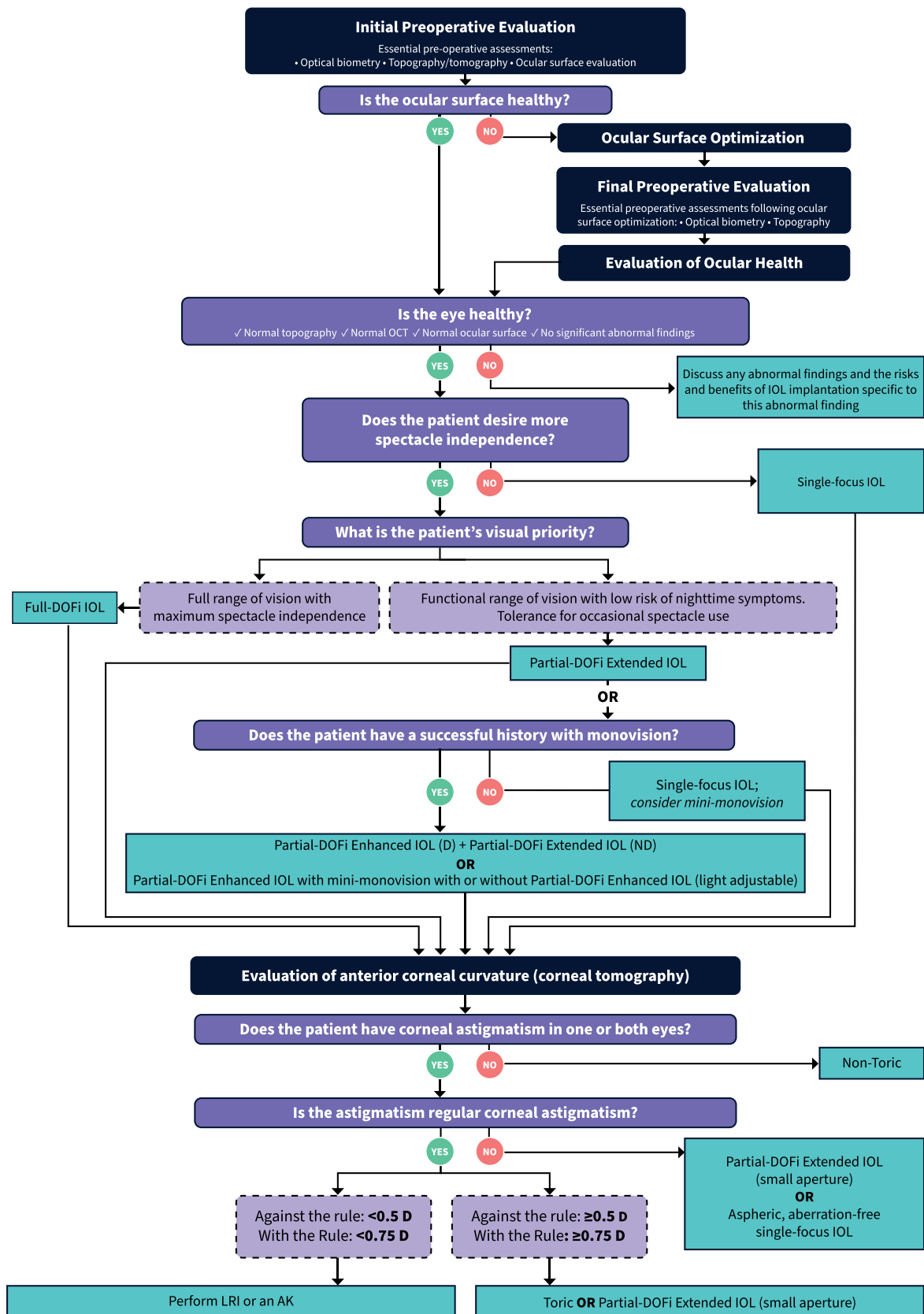


Figure 3. Proposed IOL selection framework.

Abbreviations: AK, astigmatic keratotomy; D, dominant eye; DOFi, range of the depth of field; IOL, intraocular lens; ND, non-dominant eye; OCT, optical coherence tomography.

and practice patterns regarding preoperative assessment, IOL selection, and patient management.

In terms of preoperative assessment, although most surgeons reported routine use of core diagnostic modalities, such as optical biometry, the cohort of surgeons with expertise in advanced-technology IOLs demonstrated a more comprehensive preoperative diagnostic approach than the representative sample of US cataract surgeons. Most notably, 100% of the advanced-technology IOL expert cohort considered optical biometry essential, compared with 87.4% of the US cataract surgeon cohort. Additionally, most surgeons in the expert cohort (85.7%) considered both topography and tomography as essential, whereas in the US cataract surgeon cohort, although 86.6% viewed topography as essential, only 28.4% viewed tomography as essential. This difference may indicate a key knowledge gap regarding the importance of tomography in preoperative assessment, which has been shown to enable the identification of retinal pathologies that cannot be detected by biomicroscopic fundus examination, provide a more objective evaluation of visual prognosis, and inform surgical strategy [23]. Both cohorts shared a similar perspective on the importance of pre-surgical ocular surface optimization, with approximately two-thirds rating it as extremely or very important; however, a meaningful proportion of surgeons (~30%) rated it as only moderately or slightly important. Preexisting ocular surface disease, which is highly prevalent in patients presenting for cataract surgery (~80%) [24,25], has been shown to reduce the accuracy of pre-surgical measurements, exacerbate postoperative dry eye symptoms, and impact surgical outcomes and patient satisfaction [25,26]. Therefore, the inconsistent preoperative rigor regarding ocular surface optimization observed in this study indicates a potential unmet educational need that may impact postoperative outcomes and patient satisfaction [27].

Heterogeneity was also observed in the thresholds for treating corneal astigmatism in routine practice. The advanced-technology IOL expert cohort reported a lower threshold for treating astigmatism with toric IOLs than the US cataract surgeon cohort. Given that astigmatism as low as 0.5 D has been shown to reduce objective visual quality and patient satisfaction [28], this finding may indicate an important knowledge gap. Educational initiatives to address this should also emphasize the importance of accurately aligning the toric IOL axis with the true corneal steep meridian to reduce refractive error [29], which can be challenging in low astigmatism eyes. The advanced-technology IOL expert cohort also reported utilizing a wider range of surgical strategies for astigmatism management than the US cataract surgeon cohort, including toric IOLs, limbal relaxing incisions, on-axis incisions, and astigmatic keratotomy. For patients with irregular astigmatism, the preferred approach for providing presbyopia correction for all surgeons in the expert cohort was monovision with a Partial-DOFi Extended IOL, in line with published case reports [30–32]; in contrast, only 16% of the US cataract surgeon cohort reported this as their preferred approach, which may highlight a knowledge gap regarding the availability and effectiveness of this option.

While many surgeons reported high confidence in IOL selection, ~20% of the US cataract surgeon cohort reported

only moderate or slight confidence. This was also reflected in the variation among the cohort in decision-making patterns driven by specific patient factors. The advanced-technology IOL expert cohort reported greater confidence in IOL selection, demonstrated more consistent decision-making patterns, and were more likely to offer presbyopia-correcting IOLs to all qualifying patients than the US cataract surgeon cohort. The advanced-technology IOL expert cohort also had greater confidence managing refractive errors and complications post-IOL implantation compared with the US cataract surgeon cohort, with over half of the responders in the US cataract surgeon cohort reporting limited confidence in this area.

The benefits of cataract surgery are well-documented, with studies showing a significant decrease in fall rates and increased confidence in mobility after lens implantation [4,5]. However, a requirement for multifocal spectacles and monovision after cataract surgery may be associated with an increased risk of falls [33]. Advanced-technology IOLs can reduce the need for multifocals or reading glasses post-cataract surgery and can provide enhanced contrast sensitivity, helping patients navigate various environments [17–19]. However, advanced-technology IOLs account for only 20% of all IOLs implanted globally, with usage rates varying substantially by practice type and patient characteristics [20,21]. Initiatives to increase the appropriate use of advanced-technology IOLs would therefore be valuable.

Based on the survey findings, the panel of advanced-technology IOL experts deduced that targeted education in the following areas may support more consistent outcomes and increase appropriate use of advanced-technology IOLs: comprehensive preoperative assessment; IOL selection based on objective clinical criteria and subjective patient factors; postoperative management of refractive error and complications; and improving patient satisfaction with advanced-technology IOLs. To address some of these educational needs, the expert panel outlined a proposed decision-making framework. This decision-tree aims to support the standardization of preoperative assessments and IOL selection based on objective clinical criteria and subjective patient factors (Figure 3). This proposed framework is not intended to be exhaustive; surgeons should integrate emerging IOL platforms and individualized clinical judgment when alternative strategies are clinically appropriate, for example topography-guided corneal procedures or staged corneal rehabilitation for irregular astigmatism, and IOLs with negative or aberration-neutral spherical aberration profiles in selected post-refractive eyes with elevated positive corneal spherical aberration.

The survey study design has several inherent limitations, including the reliance on self-reported data and surgical volumes, conferring a susceptibility to recall bias, and the potential for voluntary participation bias. A strength of the study is the geographical distribution of respondents across 39 US states, reducing the influence of regional bias. However, the restrictions on survey participants, including the exclusion of academic practitioners and those performing fewer than 500 cataract surgeries annually, may limit the generalizability of the findings. In addition, the two-stage selection process—particularly the use of additional expertise criteria for the advanced-technology IOL expert cohort—may introduce selection bias, and surgeons who declined participation may differ systematically from those who responded. Finally, given the

disparity in sample sizes between the US cataract surgeon cohort ($N = 127$) and the advanced-technology IOL expert cohort ($N = 7$), the cohorts were not intended for statistical comparison but rather for qualitative insights into potential differences in perspectives and practices.

5. Conclusions

This study identified variation in diagnostic rigor, management of ocular surface disease, confidence in IOL selection, and comfort in postoperative management in a representative sample of US cataract surgeons. With only 20% of all IOLs chosen for implantation globally being advanced-technology IOLs, data such as this study help outline differences in choice patterns between surgeons [21]. Structured educational initiatives and decision-support frameworks targeting the key areas identified may support more consistent outcomes and increase appropriate use of advanced-technology IOLs. The proposed IOL selection decision-making framework developed by the expert working group, and outlined here, could become an important clinical companion that supports cataract surgeons in their decision-making, overcoming hesitancy around IOL selection. Further initiatives focused on effective patient communication and postoperative patient care and management are recommended to ensure this tool is utilized effectively.

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Declaration of interest

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References

1. Grzybowski A. Recent developments in cataract surgery. *Ann Transl Med.* 2020;8(22):1540. doi: [10.21037/atm-2020-rcs-16](https://doi.org/10.21037/atm-2020-rcs-16)
2. Flaxman SR, Bourne RRA, Resnikoff S, et al. Global causes of blindness and distance vision impairment 1990–2020: a systematic review and meta-analysis. *Lancet Glob Health.* 2017;5(12):e1221–e1234. doi: [10.1016/S2214-109X\(17\)30393-5](https://doi.org/10.1016/S2214-109X(17)30393-5)
3. Steinmetz JD, Bourne RRA, Briant PS, et al. Causes of blindness and vision impairment in 2020 and trends over 30 years, and prevalence of avoidable blindness in relation to VISION 2020: the right to Sight: an analysis for the global burden of disease study. *The Lancet Global Health.* 2021;9(2):e144–e160. doi: [10.1016/S2214-109X\(20\)30489-7](https://doi.org/10.1016/S2214-109X(20)30489-7)
4. Huang C, Channa R, Zhang AY. Cataract surgery decreases risk of falls in elderly patients with comorbid age-related macular degeneration. *Clin Exp Ophthalmol.* 2024;52(8):888–890. doi: [10.1111/ceo.14435](https://doi.org/10.1111/ceo.14435)
5. Brannan S, Dewar C, Sen J, et al. A prospective study of the rate of falls before and after cataract surgery. *Br J Ophthalmol.* 2003;87(5):560–562. doi: [10.1136/bjo.87.5.560](https://doi.org/10.1136/bjo.87.5.560)
6. Ishii K, Kabata T, Oshika T. The impact of cataract surgery on cognitive impairment and depressive mental status in elderly patients. *Am J Ophthalmol.* 2008;146(3):404–409. doi: [10.1016/j.ajo.2008.05.014](https://doi.org/10.1016/j.ajo.2008.05.014)
7. Pellegriani M, Bernabei F, Schiavi C, et al. Impact of cataract surgery on depression and cognitive function: systematic review and meta-analysis. *Clin Exp Ophthalmol.* 2020;48(5):593–601. doi: [10.1111/ceo.13754](https://doi.org/10.1111/ceo.13754)
8. Lee C, Shin E, Kim M, et al. The effect of cataract surgery on the risk of dementia: a nationwide cohort study. *J Clin Med.* 2023;12(20):6441. doi: [10.3390/jcm12206441](https://doi.org/10.3390/jcm12206441)
9. Lee CS, Gibbons LE, Lee AY, et al. Association between cataract extraction and development of dementia. *JAMA Intern Med.* 2022;182(2):134–141. doi: [10.1001/jamainternmed.2021.6990](https://doi.org/10.1001/jamainternmed.2021.6990)
10. Kao SK, Yueh MP, Yeh HJ, et al. Impact of mental health comorbidities on the effect of cataract surgery on dementia risk: a real-world retrospective cohort study. *Br J Ophthalmol.* 2025;109(9):990–996. doi: [10.1136/bjo-2025-327134](https://doi.org/10.1136/bjo-2025-327134)
11. Zvorničanin J, Zvorničanin E. Premium intraocular lenses: The past, present and future. *J Curr Ophthalmol.* 2018;30(4):287–296. doi: [10.1016/j.joco.2018.04.003](https://doi.org/10.1016/j.joco.2018.04.003)

12. Wang SY, Stem MS, Oren G, et al. Patient-centered and visual quality outcomes of premium cataract surgery: a systematic review. *Eur J Ophthalmol*. 2017;27(4):387–401. doi: 10.5301/ejo.5000978
13. Fernández J, Ribeiro F, Rocha-de-Lossada C, et al. Functional classification of intraocular lenses based on defocus curves: a scoping review and cluster analysis. *J Refract Surg*. 2024;40(2):e108–e116. doi: 10.3928/1081597X-20231212-01
14. Fernández J, Koch DD, Barrett GD, et al. Global consensus on the evidence-based functional classification of simultaneous vision IOLs. *J Cataract Refract Surg*. 2026;52(3):219–222. doi: 10.1097/j.jcrs.0000000000001880
15. Riaz KM, Wendelstein JA, Koch DD. Depth of field or depth of focus? *J Cataract Refract Surg*. 2024;50(12):1291–1292. doi: 10.1097/j.jcrs.0000000000001548
16. Fernández J, Ribeiro F, Dick HB, et al. Navigating the lens Labyrinth: a practical approach to intraocular lens classification and selection. *Ophthalmol Ther*. 2025;14(9):2313–2322. doi: 10.1007/s40123-025-01212-0
17. Pedrotti E, Bruni E, Bonacci E, et al. Comparative analysis of the clinical outcomes with a monofocal and an Extended range of vision intraocular lens. *J Refract Surg*. 2016;32(7):436–442. doi: 10.3928/1081597X-20160428-06
18. Kim JS, Jung JW, Lee JM, et al. Clinical outcomes following implantation of diffractive multifocal intraocular lenses with varying add powers. *Am J Ophthalmol*. 2015;160(4):702–9.e1. doi: 10.1016/j.ajo.2015.07.021
19. Muzychuk A, Harasymowycz P. Efficacy and safety evaluation of a new full visual range vs monofocal intraocular lens in patients with cataract: randomized, controlled Canadian clinical trial. *J Cataract Refract Surg*. 2025;51(10):867–875. doi: 10.1097/j.jcrs.0000000000001714
20. Huang CY, Pu C, Hou CH. Premium intraocular lens adoption: insights from a national health insurance analysis. *J Formos Med Assoc*. 2025;124(8):706–711. doi: 10.1016/j.jfma.2024.07.027
21. Market Scope. IOL market report: global analysis for 2024 to 2030. 2025. Available from: <https://www.market-scope.com/pages/reports/497/2025-iol-market-report-global-analysis-for-2024-to-2030-march-2025025>
22. QualtricsXM. QualtricsXM. [cited 2026 May 21]. Available from: <https://www.qualtrics.com/2026>
23. Icoz M, Gurturk Icoz SG. Importance of optical coherence tomography before cataract surgery. *BMC Ophthalmol*. 2024;24(1):339. doi: 10.1186/s12886-024-03622-3
24. Gupta PK, Drinkwater OJ, VanDusen KW, et al. Prevalence of ocular surface dysfunction in patients presenting for cataract surgery evaluation. *J Cataract Refract Surg*. 2018;44(9):1090–1096. doi: 10.1016/j.jcrs.2018.06.026
25. Trattler WB, Majmudar PA, Donnenfeld ED, et al. The prospective Health assessment of cataract patients' ocular surface (PHACO) study: the effect of dry eye. *Clin Ophthalmol*. 2017;11:1423–1430. doi: 10.2147/OPTH.S120159
26. Donaldson K, Parkhurst G, Saenz B, et al. Call to action: treating dry eye disease and setting the foundation for successful surgery. *J Cataract Refract Surg*. 2022;48(5):623–629. doi: 10.1097/j.jcrs.0000000000000844
27. Gomes JAP, Azar DT, Baudouin C, et al. TFOS DEWS II iatrogenic report. *Ocul Surf*. 2017;15(3):511–538. doi: 10.1016/j.jtos.2017.05.004
28. Ye LY, Li SF, Zuo JJ, et al. Effect of low-degree astigmatism on the objective visual quality. *Int J Ophthalmol*. 2024;17(6):1086–1093. doi: 10.18240/ijo.2024.06.14
29. Song F, Xie J, Peng Y, et al. Aligning the axis of toric intraocular lens with the corneal Steep Meridian by setting SIA at 0 diopter: a prospective randomized controlled trial. *Clin Ophthalmol*. 2026;20:1–11. doi: 10.2147/OPTH.S566499
30. Vukich J, Modi S, Fisher BL, et al. Clinical comparison of a small-aperture intraocular lens versus a monofocal control. *J Refract Surg*. 2024;40(11):e824–e835. doi: 10.3928/1081597X-20240731-02
31. Vukich J, Thompson V, Yeu E, et al. Evaluating the small aperture intraocular lens: depth of focus and the role of refraction and preoperative corneal astigmatism in visual performance. *J Cataract Refract Surg*. 2024;50(11):1165–1172. doi: 10.1097/j.jcrs.0000000000001524
32. Schultz T, Dick HB. Small-aperture intraocular lens implantation in a patient with an irregular cornea. *J Refract Surg*. 2016;32(10):706–708. doi: 10.3928/1081597X-20160721-01
33. Chang DH. Multifocal spectacle and monovision treatment of presbyopia and Falls in the elderly. *J Refract Surg*. 2021;37(S1):S12–s16. doi: 10.3928/1081597X-20210408-02