

## Customized Clinical Practice Guidelines for Management of Adult Cataract in Iran

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### Abstract

**Purpose:** To customize clinical practice guidelines (CPGs) for cataract management in the Iranian population.

**Methods:** First, four CPGs (American Academy of Ophthalmology 2006 and 2011, Royal College of Ophthalmologists 2010, and Canadian Ophthalmological Society 2008) were selected from a number of available CPGs in the literature for cataract management. All recommendations of these guidelines, together with their references, were studied. Each recommendation was summarized in 4 tables. The first table

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showed the recommendation itself in clinical question components format along with its level of evidence. The second table contained structured abstracts of supporting articles related to the clinical question with their levels of evidence. The third table included the customized recommendation of the internal group respecting its clinical advantage, cost, and complications. In the fourth table, the internal group their recommendations from 1 to 9 based on the customizing capability of the recommendation (applicability, acceptability, external validity). Finally, customized recommendations were sent one month prior to a consensus session to faculty members of all universities across the country asking for their comments on recommendations.

**Results:** The agreed recommendations were accepted as conclusive while those with no agreement were discussed at the consensus session. Finally, all customized recommendations were codified as 80 recommendations along with their sources and levels of evidence for the Iranian population.

**Conclusion:** Customization of CPGs for management of adult cataract for the Iranian population seems to be useful for standardization of referral, diagnosis and treatment of patients.

**Keywords:** Adult; Cataract; Iran; Practice Guideline

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## INTRODUCTION

Cataract is the progressive deterioration of optical qualities of the crystalline lens.<sup>[1,2]</sup> The most common form is age-related cataract which affects a high percentage of people over the age of 50 years.<sup>[2]</sup> Cataract has been reported to be the cause of 47.8% of all cases of blindness worldwide and are a serious health issue particularly in developing countries.<sup>[3]</sup> In Iran, cataract is are highly prevalent, and based on two studies performed on Tehran citizens over 40 years, a prevalence of 12% to 19.1% has been reported.<sup>[4,5]</sup> Another study from Varamin district has reported cataract as the cause of blindness in 31.7% of cases and severe visual acuity impairment in 47.5% of cases.<sup>[6]</sup> Currently, the only option for visual rehabilitation in human subjects with cataract is surgical removal of the lens,<sup>[7]</sup> which is one of the most successful surgical treatments.<sup>[2]</sup> This surgery has vastly changed during the past 20 years,<sup>[8]</sup> and with advances in microscopic surgery and intraocular lens (IOL) manufacturing, the quality of vision after surgery has dramatically improved, leading to more cases of surgical treatment being performed.<sup>[9]</sup>

National clinical practice guidelines (CPGs) include clinical recommendations based on systematically verified evidence. These guidelines are developed to evaluate the effectiveness, safety, and efficiency of inventions considering domestic factors and justly distributed health care. These guidelines have an impact on decision-making by both clinicians and health care authorities.<sup>[10,11]</sup>

The present guideline for management of cataract in adult patients has been customized in order to comply with guidelines of the Fifth National Development Program of the Islamic Republic of Iran, particularly section D of the 32<sup>nd</sup> amendment calling for customizing national CPGs for the healthcare system and providing fair access to continuous and qualified health care as

one of the main goals of the health care system. We also stressed adhering to the 75<sup>th</sup> strategic goal of the Iranian Ministry of Health and Medical Education regarding use of national medical guidelines and establishment of evidence-based practices. This guideline was customized in the Ophthalmic Knowledge Management Unit (KMU) at Shahid Beheshti University of Medical Sciences in 2011 to fulfill requirements by the Iranian Ministry of Health and Medical Education.<sup>[12,13]</sup>

Iranian cataract management guidelines contain 80 clinical recommendations with the aim of standardizing and customizing different aspects of cataract management in adults including etiology, progression, indication for intervention, diagnosis, treatment, and pre-and post-surgical care.

## METHODS

A group including general ophthalmologists as well as cornea, vitreoretinal and strabismus subspecialists, masters of optometry and biostatistics, expert searcher, head of the Office for healthcare standards, Deputy of Curative Affairs, Iran Ministry of Health and Medical Education representative participated in this effort.

### Search for Related Guidelines and Screen Extracted Guidelines

First, medical data resources including National Guideline Clearinghouse, Guidelines International Network, National Institute for Clinical Excellence, Scottish Intercollegiate Guidelines Network, National Health and Medical Research Council, and New Zealand Guidelines Group were searched to find national guidelines related to our subject. All guidelines were evaluated based on their quality characteristics such as structural soundness, availability of the full guideline, and being up-to-date. In the next step, guidelines which fulfilled all of the above-mentioned

requirements were scored by using AGREE instrument. This evaluation instrument included 23 questions covering different aspects of the guideline, and the guidelines were given a score of 0 to 100. Finally, based on their scores, the guidelines from the American Academy of Ophthalmology (2006 and 2011),<sup>[2,14]</sup> the Royal College of Ophthalmologists,<sup>[9]</sup> and the Canadian Ophthalmological Society<sup>[1]</sup> with total scores of 85, 81, 80, and 75, respectively, were selected as reference guidelines.

### The Process of Evaluating the Selected Clinical Guidelines

We first designed the questions based on the selected CPGs, then categorized them according to their precedence in the treatment process of cataract [Table 1].

#### Evaluating the content of referenced guidelines

The recommendations of the selected guidelines which have addressed each question were included in Table 2. Those recommendations which had similar populations or interventions were placed in the same table. To fill this table, we first recorded four parts of questions which included the patient population or the disease (P), intervention or exposure (I), comparison (C), and finally, outcome (O), and then entered the main related recommendation. We also entered technical

breakthroughs if suggested by reliable scientific organizations or countries as new recommendations.

Organizing the recommendations in tables helped us recognize different aspects of the final guideline. This method also optimized the search for related evidence.

#### Analysis of the evidence supporting each recommendation

Abstracts of all supporting evidence for each recommendation were extracted. We also searched the Coherence Library, Trip Database (Evidence-based synopses), Bandolier, and PubMed (Clinical queries section) databases from 2007 to 2012 for the clinical questions related to each suggested recommendation. These databases are known as reliable sources for information with highest levels of evidence based on systematic review, meta-analysis, and clinical trial studies. All these abstracts were criticised by our team, and their related details were entered in Table 3. If there was any ambiguity in the abstract, the full text was studied.

The level of evidences have been determined based on Tables 4 and 5. If there was more than one recommendation for a clinical question and those recommendations did not have the same level of evidence, the recommendation with a higher level of evidence was selected.

#### Analysis of the clinical advantage of recommendations

After completing the supporting evidence and choosing the recommendation with the highest level of evidence, the related recommendation was entered in Table 6. Next, the internal group evaluated the recommendation in terms of its benefits, side effects, and treatment cost.

The benefit of an intervention is different from its outcome. It includes the ability to manage the treatment at lower levels of the health care system, at specialty and subspecialty levels, decrease admission rate and duration, decreased the need for surgical treatment, increase patient satisfaction, allow faster recovery, reduce the need for post-treatment visits, and minimize patient pain and suffering.

We also categorized side effects based on their nature and severity as well as the effectiveness based on the supporting evidences.

**Table 1. Algorithm of the clinical practice guidelines**

Cataract management
Nonsurgical (risk factors for cataract progression)
Surgical
Preoperative
Indication (VA, other conditions)
Assessment (eye, laboratory, intraocular lens)
Risk factors for cataract operation
Intraoperative
Anesthesia, operational stages
Postoperative
Follow-up, complications
VA, visual acuity

**Table 2. Analysis of recommendation**

Question P (E)	I	C	O	Question type	Reference guidelines	Phrase of recommendation	Level of evidence	Inconsistency of recommendations	Technical breakthrough	New systematic review	New studies
					G1						
					G2						
					G3						
					G4						

P, patient or population; I, intervention; E, exposure; C, comparison; O, outcome; G1, Cataract in the Adult Eye PPP-American Academy of Ophthalmology-2011; G2, Cataract surgery guidelines-The Royal College of Ophthalmologist-2010; G3, Canadian Ophthalmological Society evidence-based clinical practice guidelines for cataract surgery in the adult eye-2008; G4, Cataract in Adult eye-American Academy of Ophthalmology-Revised 2006

**Table 3. Analysis of evidences**

Code	Population	Intervention	Comparison	Primary outcomes	Effect size	Statistical value	Level of recommendation
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**Table 4. Level of evidence**

Level of evidence	Type of evidence
I	Randomized clinical trials Systematic reviews Meta-analysis
II	Controlled clinical study without randomization at least one Well-designed cohort study Well-designed case control Cross sectional study
III	Surveys, descriptive, case series studies
IV	Experts opinion, consensus

Finally, our team, as an internal reviewer, gave low, moderate, or high scores to the clinical advantages of each recommendation.

#### Customizing the recommendations

Customization of each recommendation was evaluated in Table 7. In this table, the applicability, external validity, and acceptability of each recommendation was determined, and each recommendation was given a score of low,<sup>[1-3]</sup> moderate,<sup>[4-6]</sup> or high.<sup>[7-9]</sup>

#### Consensus Process

##### First consensus (External peer review)

All customized recommendations and related data [Tables 2, 3, 6, and 7] were sent to expert in the field of cataract surgery at different public hospitals supervised by medical universities (Tabriz University of Medical Sciences, Shahid Beheshti University of Medical Sciences, Iran University of Medical Sciences, Tehran University of Medical Sciences, Ahvaz Jundishapur University of Medical Sciences, Zahedan University of Medical Sciences, and Mashhad University of Medical Sciences) after removing the internal scores.

Participants were asked to:

- Evaluate the recommendations and determine the clinical advantage score, customized potential score, and total score for each recommendation
- Add any evidence related to recommendations that were not included in our search, which could change the final decision, if possible.

##### Evaluation of total scores

After collecting the external peer review scores, agreement among the external peer review was assessed by our team, and the agreed recommendations were considered as final customized recommendations.

##### Second consensus

The external and internal reviewers gathered again and discussed non-agreed recommendations, some of which were modified and rescored to achieve agreement from both groups.

#### Final Assessment of Recommendations

All recommendation were re-evaluated by our team, and the final recommendations were recorded in a file with special codes in abbreviations, which included the name of the adopted CPG [Table 8], its level of evidence, and the number for its reference. For example (C4), (I), indicates that the recommendation has stemmed from recommendation number 4 from the Canadian Ophthalmological Society clinical practice guidelines for adult cataract surgery, a Clinical Practice Guideline with level of evidence of I.

## RESULTS

The result of customizing 4 prior guidelines for the Iranian population may be summarized into the 80 recommendations classified below.

#### Non-surgical Treatments/Risk Factors for Cataract Progression

1. It is recommended that ophthalmologists suggest that patients use sunglasses and hats with visors to reduce sun ray (UV-B) damage and progression of cortical cataracts.<sup>[15-17]</sup> (I), (A<sub>1,2</sub>)
2. Based on a high level of evidence, supplements such as antioxidants, Vit C, Vit E, Vit A and beta-carotene do not prevent or reduce the rate of progression of cataracts.<sup>[18-20]</sup> (I), (A<sub>1,2</sub>)
3. Considering the proven effect of quitting cigarette smoking in limiting the progression of cataracts, it is recommended that ophthalmologists ask all patients with lens opacity to quit smoking.<sup>[21-25]</sup> (I), (A<sub>1,2</sub>, R3-3)
4. It is recommended to inform patients about the



increased risk of cataracts after long-term use of oral or inhaled steroids, and alternative medications should be used, if possible.<sup>[26,27]</sup> (II), (A<sub>1</sub>)

- The use of steroids, amitriptyline, statins, anti-diabetes pills, insulin, and potassium-sparing diuretics increase the risk of cataracts and cause faster

progression of the condition, but aspirin and thiazides do not have a role in this respect. Discontinuation of cataract-causing drugs may be recommended by physicians, if possible.<sup>[28,29]</sup> (I), (A<sub>1</sub>)

- It is recommended that the increased risk of cataract be discussed with diabetic patients<sup>[30-32]</sup> (II), (A<sub>1</sub>)
- It is recommended that the increased risk of accidents and bone fractures be discussed with patients who have cataracts but do not wish to be operated on.<sup>[33-37]</sup> (I), (C4).

**Table 5. Level of evidence according to the type of study**

Level of evidence	Type of the study
Therapy (RX)	
I	SR, RCT
II	CT, cohort
III	Case control, cross sectional, case series
IV	Opinion
Etiology/harm (risk factor)	
I	RCT, cohort
II	Case control
III	Description studies, Survey
IV	Opinion
Diagnosis (DX)	
I	SR CPR*, cross sectional
II	Cohort
III	Case control
IV	Opinion
Prognosis (PX)	
I	Inception cohort**
II	Prospective cohort
III	Historical cohort, case control
IV	Opinion

\*Clinical prediction rules, these studies are designed to evaluate the combination effect of different clinical variables for diagnosis or prognosis of the disease and include two steps: first, estimation of the relationship of the variables and the second, validation; \*\*Inception cohort study, a type of cohort study in which the time of initial exposure to risk factors is important in determining the relation between risk factors and outcomes; these studies employ survival analysis. SR, systematic review; RCT, randomized clinical trial; CT, clinical trial

**Surgical Treatments/Preoperative/Indication of Cataract Surgery Based on Visual Acuity**

- If cataract is the main and primary cause of visual loss, surgery is indicated. (IV), (consensus C19)
- Cataract surgery is recommended when vision loss is not corrected with non-surgical methods meet patients' needs.<sup>[38,39]</sup> (IV), (A<sub>2</sub>, C2)
- It is recommended that in evaluating cataracts and determining the time of surgery, with the exception of visual acuity, other factors such as need for far sight, near sight, and sight under different lighting conditions be considered.<sup>[40-45]</sup> (I), (A<sub>1</sub>)
- In patients who have less than standard visual acuity according to their occupation (like drivers, soldiers, and pilots) and wish to continue their occupation, cataract surgery is indicated even when there are not many functional deficits under normal life circumstances. (IV), (consensus C3).

**Surgical Treatments/Preoperative/Indication for Fellow Eye Cataract Surgery**

- Indication for surgery on the second eye is the same as the first eye, but in some cases of anisometropia, earlier operation is recommended. The time between surgeries should be long enough for detecting possible complications of the first procedure

**Table 6. Clinical advantages of recommendations**

Question	Phrase of recommendation	Level of evidence	Costs	Clinical advantages of the recommendations			Clinical advantages score		
				Benefits	Effect size	Side effects	Low	Moderate	High

Low: Score 1-3; Moderate: Score 4-6; High: Score 7-10

**Table 7. Adaptability of the recommendation**

Question	P I C O	Type of the question	Phrase of recommendation	Adaptability of the recommendation			Adaptation score	Total score
				Applicability	Acceptability	External validity		
							Low	Low
							Moderate	Moderate
							High	High

P, patient or population; I, intervention; C, comparison; O, primary outcomes; Low: Score 1-3; Moderate: Score 4-6; High: Score 7-9

**Table 8. Abbreviations of the reference guidelines**

A <sub>1</sub> : American Academy of <i>Ophthalmology</i> : Cataract in the adult eye. Preferred practice pattern. (2006)
A <sub>2</sub> : American Academy of <i>Ophthalmology</i> : Cataract in the Adult Eye. Preferred practice pattern (2011)
C: Canadian Ophthalmological Society evidence-based clinical practice guidelines for cataract surgery in the adult eye (2008)
R: The Royal College of Ophthalmologists: Cataract Surgery Guidelines (2010)

such as endophthalmitis or residual refractive errors. (IV), (consensus, C11)

13. In bilateral cataract cases, it is recommended to perform surgery in separate sessions in order to achieve better binocular vision.<sup>[46-50]</sup> (I), (R5.2)
14. Because of the chance of endophthalmitis and bilateral toxic anterior segment syndrome (TASS), simultaneous surgery on both eyes is not recommended.<sup>[51-53]</sup> (III), (C12)
15. In one-eyed cataract patients, surgery is recommended if the advantages of performing the surgery are higher than its side effects.<sup>[54,55]</sup> (III), (C10)
16. Based on scientific evidence, performing cataract surgery might reduce intraocular pressure in patients who also have closed angle glaucoma.<sup>[56-63]</sup> (II), (A<sub>2</sub> 6)
17. If there is a chance of blindness due to increased intraocular pressure after cataract surgery and glaucoma surgery, simultaneous surgery is recommended. (IV), (consensus, C18)
18. Cataract surgery is indicated in patients with phacomorphic glaucoma, lens-induced uveitis, and posterior segment diseases, if lens opacity limits fundus examination or treatment. (IV), (consensus, C5).

### Surgical Treatments/Preoperative/Assessment/Eye Assessment

19. It is recommended for all cataract surgeons to answer the following questions prior to surgery in order to prevent or reduce some risk factors:<sup>[64]</sup>
  - Is the cataract the main cause of vision loss?
  - Is there any other eye disease like glaucoma that might worsen because of cataract surgery?
  - Is there any eye disease that might complicate the surgical process? (I), (C7)
20. The surgeon should refer the patients to facilities with more expertise if the surgery seems to be very complicated, has a high risk of complications, or the surgeon does not have enough experience.<sup>[65]</sup> (II), (C8)
21.  $\alpha$ -blockers (tamsulosin) should be discontinued before surgery because of the high risk of floppy iris syndrome (FIS) and other serious complications.<sup>[66-71]</sup> (I), (A<sub>2</sub>, 5)
22. Due to the absence of serious vision related

side effects, discontinuation of anti-coagulant medications (except for Warfarin and Clopidogrel) is not recommended.<sup>[72-75]</sup> (I), (C26, R7-5-1)

23. If a surgeon encounters a higher incidence of endophthalmitis compared to what has been reported in the literature, it is recommended to search for the source of this complication by taking serial microbial cultures from personnel, surgery room, and devices as well as controlling the sterilization process. Also preps of eyelashes with 10% betadine and preps of the cul-de-sac and conjunctiva with 5% betadine are recommended. (IV), (consensus, C57 and external consensus)
24. It is recommended that a form, including the eye undergoing surgery, IOL power, medications used by the patients, previous diseases, etc., be prepared at all eye surgical centers and filled out immediately before surgery by the surgeon or the operating room staff. It is also recommended that patient education brochures be given to all patients or their accompanying person after surgery (including information about post-surgical pain, introduction of drugs, time for post-operative visits, etc.).<sup>[76-81]</sup> (II), (A<sub>2</sub> 11).

### Surgical Treatments/Preoperative/Assessment/Lab Assessment

25. Performing general medical preoperative examinations, even when using local anesthesia, is recommended.<sup>[82,83]</sup> (I), (R4) and (IV), (external peer review).

### Surgical Treatments/Preoperative/Assessment/IOL Assessment

26. It is recommended to repeat A-scan biometry in the following circumstances:<sup>[84,85]</sup>
  - Axial length more than 26mm or less than 21mm
  - Keratometry more than 47 diopters or less than 41 diopters
  - Astigmatism more than 2.5D
  - Axial length difference more than 0.7 between the two eyes
  - Keratometry difference of more than 0.9 between the two eyes (III), (R 8-7-4)
27. It is recommended that optical (laser interferometry) biometry or ultrasonography with immersion technique be used to find the exact axial length. Both methods are superior to contact method.<sup>[86,87]</sup> (I), (C31)
28. In eyes with abnormal size, the surgeon should use Holladay 2 or Haigis formulas to achieve the best post-operative refractive outcomes. (IV) (consensus, C33)
29. To achieve the best postoperative refractive results, it is recommended to calculate the lens power using

- the new generation formulas (Hoffer Q, SRK/T, Holladay).<sup>[88]</sup> (III), (C32)
30. Surgeons should optimize their IOL A-constant based on their postoperative refractive results and consider it in IOL power calculation. (IV), (consensus, C34)
  31. The effect of A-constant optimization on IOL power prediction is more pronounced when using the modern IOL power calculation formulas. In some cases, the percentage of eyes with acceptable refractive range after surgery (Target refraction  $\pm$  1D) can be increased by 20% when A-constant optimization is applied. (IV), (consensus, R 8-7-5)
  32. The A-constant provided by the manufacturer which is calculated by contact sonography is different from optical optimized A-constant. To improve the A-constant of newer intraocular lenses in optical biometry, ULIB online website should be utilized. (IV) (consensus, R8-7-1)
  33. Patients with a history of refractive surgery should be informed about the possibility of errors in IOL power calculation and postoperative refraction even when utilizing adjustments. (IV), (consensus, C38)
  34. In patients who have a history of keratorefractive surgery, surgeons should be aware of the possibility of unusual postoperative refractive results and should calculate the real corneal refractive power using adjusted formulas, utilizing patient preoperative findings, or direct calculation of the central corneal power using SimKs or Scheimpflug methods. It is ideal to apply several methods for calculating the IOL power. (IV), (consensus, C36)
  35. It is recommended that the past medical and ocular history, including keratometry and biometry results, of all patients undergoing keratorefractive surgery be kept by the treatment center.<sup>[89]</sup> (II), (C37)
  36. It is recommended to use IOLs with sharp angles to lessen the chance of posterior capsule opacity.<sup>[90-109]</sup> (I), (R10, C62)
  37. The use of anterior aspheric IOLs is recommended to achieve better contrast sensitivity and visual performance particularly during the night. It should be noted that in conditions like zonular rupture and astigmatism, which increase the chance of IOL decentration, or after hyperopic corneal refractive surgery, spherical IOLs should be implanted.<sup>[110-112]</sup> (I), (C42, R 9-7-4)
  38. In the process of using multifocal or accommodative IOLs which correct different degrees of presbyopia, careful patient selection and consultation, informing the patient about the results, and utilizing necessary preoperative examinations are vital. (IV), (consensus, C44)
  39. It is recommended that multifocal and adjustable lenses be used based on patient needs and desires, and after giving the patient complete information about the advantages and disadvantages of such lenses, including glare/haloes, posterior capsular opacity and reduction of contrast sensitivity.<sup>[113-115]</sup> (I), (R 9-7-1)
  40. To use toric IOLs in patients with regular preoperative corneal astigmatism, accurate preoperative calculations, correct marking of the steep axis, and implanting the IOL in correct axis should be considered to eliminate undesirable surgical induced astigmatism. (IV), (consensus, C43)
  41. Visual outcomes after cataract surgery and implantation of UV filter IOLs and blue filter IOLs are comparable.<sup>[116,117]</sup> (I), (New) - (IV), (Internal and external consensus)
  42. When the PCIOL is placed in the ciliary sulcus, decreasing the power by 0 to 1.5 diopters should be considered. (IV), (consensus, C35).

### Surgical Treatments/Preoperative/Risk Factors of Cataract Surgery

43. It is preferable that the waiting time for cataract surgery be less than 2 to 3 months to avoid the chance of visual deterioration and possible accidents.<sup>[118,119]</sup> (I), (R 4)
44. Patients with cataracts and at danger of the consequences of reduced vision, namely falls, fractures or accidents, should undergo surgical correction as soon as possible.<sup>[120-125]</sup> (I), (C6)
45. It is recommended that all patients with cataracts be informed about the chance of PCO before surgery.<sup>[90-109]</sup> (III), (R10)
46. It is recommended that the chance of aggravation of diabetic retinopathy be discussed with patients with diabetes and lens opacity who are undergoing cataract surgery.<sup>[126,127]</sup> (III), (C21)
47. If the surgeon finds a serious condition in the pre-surgical examinations like tractional retinal detachment, it is recommended that consultation for performing combined vitrectomy and cataract surgery be considered.<sup>[128]</sup> (III), (C20)
48. Treatment of proliferative diabetic retinopathy (PDR) and clinically significant macular edema (CSME) should be performed before cataract surgery, if possible. (IV), (consensus, C20)
49. It is recommended that the risk of retinal detachment be discussed with high-risk patients (patients with posterior capsule tear and consequent anterior vitrectomy, age less than 60 years, male sex, and high myopia). They should also be informed of the warning signs and symptoms of retinal detachment to facilitate early diagnosis and treatment.<sup>[129-131]</sup> (I), (C64)
50. In patients with Fuchs' dystrophy and cataract, if the chance of corneal decompensation is considerable, combined cataract and corneal transplantation could be considered. (IV), (consensus, C17)
51. Anterior chamber depth less than 2.5mm in patients with pseudoexfoliation (PEX) increases the chance of complications during the cataract surgery.

Accompanying recommendation: It is recommended that cataract surgery in these patients be performed by a more experienced surgeon in order to decrease the risk of complications.<sup>[132]</sup> (II), (C23)

52. Cataract surgery after trabeculectomy (TX) increases the chances of TX failure. A shorter time interval between the two surgeries increases the risk of this failure<sup>[133]</sup> (I), (New) - (IV), (Internal and external consensus)
53. It is recommended that patients with age-related macular degeneration (ARMD) undergo cataract surgery only if there is a chance for improved vision. Informing the patient about the chance of worsening of macular degeneration following cataract surgery is necessary.<sup>[134-137]</sup> (I) (C 15).

### Surgical Treatments/Intraoperative

54. Treatment of blepharitis before surgery and also prep of the eyelashes with 10% betadine and prep of the cul-de-sac and conjunctiva with 5% betadine immediately before surgery is recommended to decrease the chance of endophthalmitis.<sup>[138-143]</sup> (II), (C55)
55. The choice of local anesthesia for cataract surgery is made based on the patient and surgeon's preference.<sup>[144-149]</sup> (I) (R 7-2-2)
56. Phacoemulsification using a small incision is the preferred method of cataract surgery compared to extracapsular cataract extraction since it causes less astigmatism, achieves fast and better visual outcomes, and has fewer complications.<sup>[150-152]</sup> (I) (C45)
57. Smaller incisions (3.2 mm) during cataract surgery are recommended due to less astigmatism and less short-term changes in the cornea.<sup>[153,154]</sup> (I), (C46)
58. Implantation of foldable IOLs is preferable to rigid IOLs since they require smaller incisions, cause less astigmatism, provide better visual acuity, and cause less postoperative inflammation.<sup>[155]</sup> (I) (C40)
59. Staining of the anterior capsule is recommended in mature cataracts, white cataracts, complicated cataracts and in children.<sup>[156]</sup> (I) (C50)
60. Smaller capsulorhexis (4.5mm to 5mm) which can completely cover the margin of the IOL optic are preferable to larger ones since they decrease the chance of PCO.<sup>[157]</sup> (I), (C47)
61. It is recommended that hydrodissection and hydrodelineation be performed routinely to reduce tension on the zonulae, facilitate cortical removal, and reduce the chance of PCO.<sup>[158]</sup> (I) (C48)
62. The surgeon should ask patients about the history of using alpha adrenergic blocker medications (e.g. Tamsulosin), which cause intraoperative floppy iris syndrome. If there is a positive history, atropine drops and intraocular epinephrine should be used both before and during surgery. The surgeon should also use less fluid circulation and more viscoelastic materials as well as iris retractors and pupil rings to reduce the chance of floppy iris syndrome. Due to chance of bleeding, iris sphincterotomy should be avoided.<sup>[159-164]</sup> (I), (A<sub>2</sub>5), (IV), (consensus C53)
63. To reduce surgical complications, a small pupil should be enlarged appropriately. To achieve this goal, different methods can be used based on surgeon's experience and methods with less trauma. Usual methods include stretching hooks, rings, and pupil retractors, and using ophthalmic visco-surgical devices (OVDs).<sup>[165]</sup> (IV) (consensus, C52)
64. Performing phacoemulsification with a torsional probe is preferred to conventional longitudinal probes since there is less chance of corneal trauma.<sup>[166-171]</sup> (I), (New) - (IV), (Internal and external consensus)
65. In patients with local or general zonular weakness, applying capsular tension rings is recommended to achieve better control during surgery, reduce complications, and provide better IOL centration.<sup>[172]</sup> (I), (51)
66. Considering the reduced incidence of side effects of using injectors (as compared to forceps) for implanting IOLs such as less wound damage, less IOLs damage, and a lower chance of endophthalmitis, it is recommended to implant the IOL using its special injector.<sup>[173]</sup> (III), (C41)
67. In the absence of inadequate capsular bag support, the surgeon should determine a suitable IOL (considering lens power and material) to be implanted in the ciliary sulcus.<sup>[174-178]</sup> (III), (A<sub>2</sub>, 10)
- 67-1: IOLs designed for in-the-bag implantation should not be implanted in the ciliary sulcus.<sup>[174-178]</sup> (III) (A<sub>2</sub>, 10-1)
- 67-2: When placing an IOL in the ciliary sulcus, the power should be reduced as compared to in-the-bag implanted IOLs.<sup>[174-178]</sup> (A<sub>2</sub>, 10-2)
- 67-3- Implantation of multifocal and aspheric IOLs in the ciliary sulcus are not recommended.<sup>[174-178]</sup> (III), (A<sub>2</sub> 10-3)
68. In case of posterior capsular rupture and inadequate capsular support for in- the-bag IOL implantation, ACIOLs, scleral fixation PCIOLs, or iris fixation IOLs may be used.<sup>[179]</sup> (III), (C39)
- 69-1- Intracameral antibiotic injections are not recommended to reduce the chance of endophthalmitis due to the toxic effects and likelihood of reduction in corneal endothelial cells.<sup>[180-187]</sup> (III), (A<sub>2</sub>8) - (IV), (Internal and external consensus)
- 69-2- Subconjunctival antibiotic injection may be recommended to reduce the chance of postoperative endophthalmitis with weak level of evidence.<sup>[180-187]</sup> (III), (A<sub>2</sub>8).



## Surgical Treatments/Postoperative/Complications

70. Use of high frequency postoperative antibiotics is recommended to reduce the chance of endophthalmitis.<sup>[180-187]</sup> (III), (A<sub>2</sub> 8) - (IV), (Internal and external consensus)
71. To treat postoperative cystoid macular edema (CME), topical non-steroidal anti-inflammatory drugs (NSAIDs) such as ketorolac 0.5 percent are recommended as the first step of therapy.<sup>[188,189]</sup> (I), (R4) - (IV), (Internal and external consensus)
72. Before performing Nd: YAG laser capsulotomy for treatment of PCO, patients at high risk of retinal detachment (RD) such as posterior capsule rupture in the other eye, axial length more than 23 mm, and male sex, should be informed of the possibility of RD following laser capsulotomy.<sup>[190]</sup> (II), (C63)
73. Postoperative intraocular inflammation is considered as a risk factor for corneal, trabecular and retinal complications, therefore the use of steroids or NSAIDs immediately after surgery to reduce inflammation is recommended. (IV), (consensus, C54)
74. Because of the common use of antibiotics, resistance to several antibacterial agents such as penicillin and fluoroquinolones for treatment of postoperative staphylococcal endophthalmitis is observed. Ophthalmologists should be aware of this problem and consider it when prescribing post-operative antibiotics (resistance to ciprofloxacin has also been reported in several reports).<sup>[191-197]</sup> (III), (A<sub>2</sub>7)
75. Although toxic anterior segment syndrome (TASS) is rare, ophthalmologists should be aware of its predisposing factors such as posterior capsule rupture, vitreous loss, and potential complications.<sup>[198,199]</sup> (III), (A<sub>2</sub>9)
76. It is recommended to consider complications like dysphotopsia and lens capsule opacity when choosing the IOLs.<sup>[200]</sup> (I), (C65).

## Surgical Treatments/Postoperative/Follow-up

77. All patients undergoing phacoemulsification surgery should be aware of the postoperative examination schedule and possible side effects of the surgery. It is recommended to perform the first postoperative examination up to 24 hours after the surgery. The exact timing of other postoperative visits depends on the circumstances of the operation and the method used, complications, and surgeon and patient preference. (IV) (consensus, C59-60) - (IV), (Internal and external consensus)
78. In high risk conditions like monocular patients, glaucomatous eyes or glaucoma suspects and surgical complications, the first visit should be performed by 24 hours after surgery and more frequent follow-up

- examinations are needed. Patients should be instructed to inform their ophthalmologists as soon as possible in case of severe reduction of vision, increased pain, redness, or inflammation around the eye as these might be signs of endophthalmitis. (IV) (consensus, C61)
79. Final evaluation of refractive power should be performed 2 weeks postoperatively in patients with small corneal incisions (under 3.5mm) and after 6 weeks in patients with larger incisions or extracapsular operations. More postoperative examinations during this period, or even after it, are recommended based on special circumstances of the surgery, postoperative complications, the need for removing corneal sutures, and also evaluating intraocular pressure (IV), (consensus, C61).
80. To evaluate patient satisfaction, visual assessment using a high contrast Snellen chart is not enough. Standard questionnaires like the VF14 will provide greater insight into patient satisfaction. (IV), (consensus, R12-6) - (IV), (Internal and external consensus).

## DISCUSSION

The current CPG for treatment of cataracts in adult Iranian patients was customized based on the standard method suggested by the Iranian Ministry of Health and Medical Education at the knowledge management unit (KMU) of Shahid Beheshti University of Medical Sciences. This guideline includes 80 recommendations covering preoperative, intraoperative, and postoperative aspects related to adult cataract management. In the process of preparing the guidelines, preliminary consensus was not achieved in 15 out of 80 recommendations. These 15 recommendations were further discussed in internal panels, and 6 primary recommendations were reapproved, 8 recommendations were modified, and one recommendation was omitted. The changes were applied to 8 recommendations as follows: Recommendation number 5, which initially recommended that "the use of steroid drugs, amitriptyline, statins, and potassium-sparing diuretics increase the risk of cataract or its progression, and the use of aspirin and thiazides do not increase this chance", was modified to "The use of steroids, amitriptyline, statins, anti-diabetes pills, insulin, and potassium-sparing diuretics increase the risk of cataracts and cause faster progression of the condition, but aspirin and thiazides do not have a role in this respect. Discontinuation of cataract-causing drugs may be recommended by physicians, if possible."

Recommendation number 23, which stated, "If a surgeon encounters a higher incidence of endophthalmitis compared to what has been reported in the literature or in instances that the risk of postoperative endophthalmitis is higher due to complicated surgery, the postoperative

injection of intracameral or subconjunctival antibiotics should be considered." was changed to "If a surgeon encounters a higher incidence of endophthalmitis compared to what has been reported in the literature, it is recommended to search for the source of this complication by taking serial microbial cultures from personnel, surgery room, and its devices as well as controlling the sterilization process. Also, preparation of eyelashes with 10% betadine and preparation of the cul-de-sac and conjunctiva with 5% Betadine is recommended."

Recommendation number 25 initially stated, "Considering the available data, preoperative examination does not increase the safety of cataract surgery. If the patient does not suffer from any special condition or diseases, performing routine preoperative exams are not recommended." Considering the condition among Iranian patients and the fact that they might not have any previous systemic evaluation, after panel discussion this was changed to: "Performing general medical preoperative examinations, even when using local anesthesia, is recommended."

Recommendation number 39 which stated that "The use of multifocal or adjustable lenses should be based on the necessity and the desire of the patient and after giving the patient a good understanding of advantages and disadvantages (glare/haloes, PCO)", was changed to "It is recommended that multifocal and adjustable lenses be used based on patient needs and desires, and after giving the patient complete information about the advantages and disadvantages of such lenses, including glare/haloes, posterior capsular opacity and reduction of contrast sensitivity)."

The first version of recommendation number 50 stated: "In cataract patients with Fuchs' dystrophy, if the surgeon gives a chance of corneal decompression, the cataract and corneal surgeries are better to be combined." After panel discussion, the term "is better" was changed to term "could", and the final recommendation was: "In patients with Fuchs' dystrophy and cataract, if the chance of corneal decompression is considerable, combined cataract and corneal transplantation can be considered."

The initial statement for recommendation number 64 was "Performing phacoemulsification using a torsional probe is recommended compared to the use of conventional longitudinal probes since there is less chance of corneal trauma." This recommendation was finalized in the discussion panel with a minor change as follows: "Performing phacoemulsification with a torsional probe is preferred to conventional longitudinal probes since there is less chance of corneal trauma."

Two recommendations which were about antibiotic usage during surgery and postoperatively were discussed in the panel and the primary recommendation of "inject proper antibiotic in the anterior chamber to reduce the chance of endophthalmitis" was rejected by

panel members, and intracameral prophylaxis antibiotic was not recommended as mentioned in recommendation 69-1.

Finally, before the panel discussion, recommendation number 71 suggested the use of NSAIDs for treatment of postoperative acute cystoid macular edema was not recommended, but it was changed to, "To treat postoperative cystoid macular edema (CME), topical non-steroidal anti-inflammatory drugs (NSAIDs) such as ketoralac 0.5 percent are recommended as the first step of therapy."

At the end of the discussion panel, all final recommendations were edited and finalized as final recommendations.

This guideline, as compared to the cited CPGs which were used, has more detailed recommendations considering different aspects of cataract surgery, including important pre-, intra-, and postoperative aspects of the surgery. For example, the Canadian Ophthalmological Society evidence-based clinical practice guidelines for cataract surgery in the adult eye (2008) contains 65 recommendations, but the present guideline consists of 80 recommendations. On the other hand, this customized guideline has the benefit of considering clinical advantages and practicality among Iranian patients, so its use among the Iranian population should be more effective.

In conclusion, the current clinical practice guideline for adult cataract management was customized for an Iranian adult population at KMU at the Ophthalmic Research Center, Shahid Beheshti University of Medical Sciences as suggested by the Standardization and CPG Development Office, Deputy of Curative Affairs, and the Iranian Ministry of Health and Medical Education. Therefore, its recommendations can be used to standardize different aspects in the management of adult patients with cataracts.

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## Conflicts of Interest

There are no conflicts of interest.

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