Summary of recommendations for quality of care in cataract surgery management

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Assessment and management of conflict of interest from external reviewers

Each member of the expert group and all external reviewers completed a declaration of interest completed a declaration of interest form prior to the work, disclosing potential conflicts of interest that may affect, or may reasonably be perceived to affect, their objectivity and independence in relation to the subject matter of this resource. WHO reviewed each of the declarations and concluded that none could give rise to a potential or reasonably perceived conflict of interest related to the subjects covered. A summary of the declaration of interest statements and how conflicts of interest were managed is included in Annex 1. Each member of the expert group and all the external reviewers acted in their independent and individual capacity.

Executive summary

Cataract is the leading cause of blindness globally, with an estimated 94 million people aged 50 years and over having vision impairment or blindness that could be corrected through access to cataract surgery. In recognition of the substantial unmet need for cataract care, and the existence of a highly cost–effective intervention, WHO Member States endorsed a global target for cataract surgery at the Seventy-fourth World Health Assembly in 2021, namely, to achieve a 30-percentage point increase in effective cataract surgery coverage (eCSC) by 2030.

Key challenges in expanding the coverage of cataract surgery in low- and middle-income countries include, but are not limited to, a shortage and unequal distribution of human resources to examine and perform cataract surgery; high costs of accessing surgery; long wait times for surgery; the ability to provide services for underserved populations; and ensuring sufficient operative and postoperative quality control and correction for residual refractive error.

As countries set about strengthening cataract surgery services and meeting the 2030 target, improving both "access" and "quality" of services must be considered. In countries where the delivery of quality services for cataract surgery remains a challenge, there is significant opportunity to improve eCSC, often through measures that do not involve significant additional investments.

In order to assist Members States that may require guidance in this area, WHO, through consultation with a group of international experts, developed this *Summary of recommendations for quality of care in cataract surgery management*, which provides expert-agreed recommendations for improving the quality of cataract surgery across the three main phases of cataract surgery management: preoperative, intraoperative, and postoperative. The set of recommendations provided serves as a reference for policy-makers, technical decision-makers, and health-care planners to ensure that quality is taken into consideration when planning for cataract surgery services at national and subnational levels.

Background

Cataract blindness: the global situation

Cataract is the leading cause of blindness globally, with an estimated 94 million people aged 50 years and over having vision impairment or blindness that could be corrected through access to cataract surgery *(1)*. Due to the growth in the global ageing population, these figures are projected to rise since cataract development increases with age *(2)*. The burden of cataract-related vision impairment and blindness is estimated to be four times higher in low- and intermediate-resource settings than in high-income settings *(1)*. Unoperated cataract and subsequent loss of vision significantly impacts an individual's well-being, reducing their overall quality of life; it also impairs daily functioning, cognitive development, mental health, and social life *(3)*.

Concerted efforts during the past three decades have resulted in a substantial increase in rates of cataract surgery in many low- and middle-income countries *(4,5)*. While these efforts contributed to reductions in the age-standardized prevalence of cataract blindness between 1990 and 2020, the absolute number of cases continues to rise due to population growth and ageing *(1)*. Key challenges in expanding the coverage of cataract surgery in low- and middle-income countries include, but are not limited to, a shortage and unequal distribution of human resources to examine and perform cataract surgery; high costs of accessing surgery; long wait times for surgery; the ability to provide services for underserved populations; and ensuring sufficient operative and postoperative quality control and correction for residual refractive error.

Cost–effectiveness of cataract surgery

Cataract surgery is among the most cost–effective surgical interventions to implement *(6,7)*. It has been identified as one of only a select few surgical interventions costing less than US$ 200 per disability-adjusted life years averted *(6)*, with cost–effectiveness compared favourably to other surgical procedures in low- and intermediate-resource settings *(8,9)*. A study across 19 countries found that providing cataract treatment to 39.9 million people could save 117.9 million years of sight saved. This measure reflects the years during which an individual lives after their sight is restored, leading to improved quality of life and economic productivity *(10)*. The benefit–cost ratio across 19 countries was estimated to be 20.5, indicating that every 1 US$ invested in cataract surgery yields US$ 20.50 in economic returns *(10)*.

The global 2030 target for cataract surgery

In recognition of the substantial unmet need for cataract care, and the existence of a highly cost–effective intervention, WHO Member States endorsed a global target for cataract surgery at the Seventy-fourth World Health Assembly in 2021 *(11)*, namely to achieve a 30-percentage point increase in effective cataract surgery coverage (eCSC) by 2030. Importantly, eCSC captures not only the extent of coverage, but also quality of care (hence the definition "effective" coverage), thus ensuring that all people who need surgical services achieve the best possible outcome for their vision *(12)*.

The importance of "quality" in cataract surgery management

Cataract surgeons are trained to achieve the best possible outcome for their patients – that is, the complete restoration of vision. However, important prerequisites for achieving this include having in place the appropriate surgical environment and working equipment; availability of consumables; having a comprehensive diagnosis of the patient's eye status, including comorbidities; and patients and caregivers receiving the proper information and education about the surgery and aftercare.

As countries set about strengthening cataract surgery services and meeting the 2030 target, both components of eCSC – access and quality – must be considered. The importance of "quality" was highlighted in the 2022 WHO *Report of the 2030 targets on effective coverage of eye care*, which found that, according to published data, the relative quality gap between "coverage" and "effective coverage" was 33.9% *(13)*. This means that while the majority of patients who underwent cataract surgery achieved a visual acuity outcome which was considered "good" according to international standards, approximately one third did not. In countries where the delivery of quality services for cataract surgery remains a challenge, there is significant opportunity to improve eCSC, often through measures that do not involve significant additional investments. Such measures include strengthening the quality of training of eye care personnel; implementing best practice protocols; adopting good documentation to enable continuous quality improvement processes.; and strengthening post-operative follow-up to address residual refractive errors.

Although the measure of eCSC captures an important element of quality (that is, "effectiveness"), in planning for cataract management, several other important components of quality health care must be considered:

1. **People-centeredness:** ensuring, as far as possible, that care provided responds to individual preferences, needs, and values while involving patients in decision-making.
2. **Safety:** minimizing harm to the patient across all stages of care.
3. **Timeliness:** reducing delays in care and providing interventions at the appropriate time.
4. **Equity:** providing care that does not vary in quality, in relation to gender, ethnicity, geographical location, and/or socioeconomic status.
5. **Integration:** coordinating care across the full range of health services throughout the life course.
6. **Efficiency:** maximizing the benefit of available resources and minimizing waste while maintaining high-quality care.

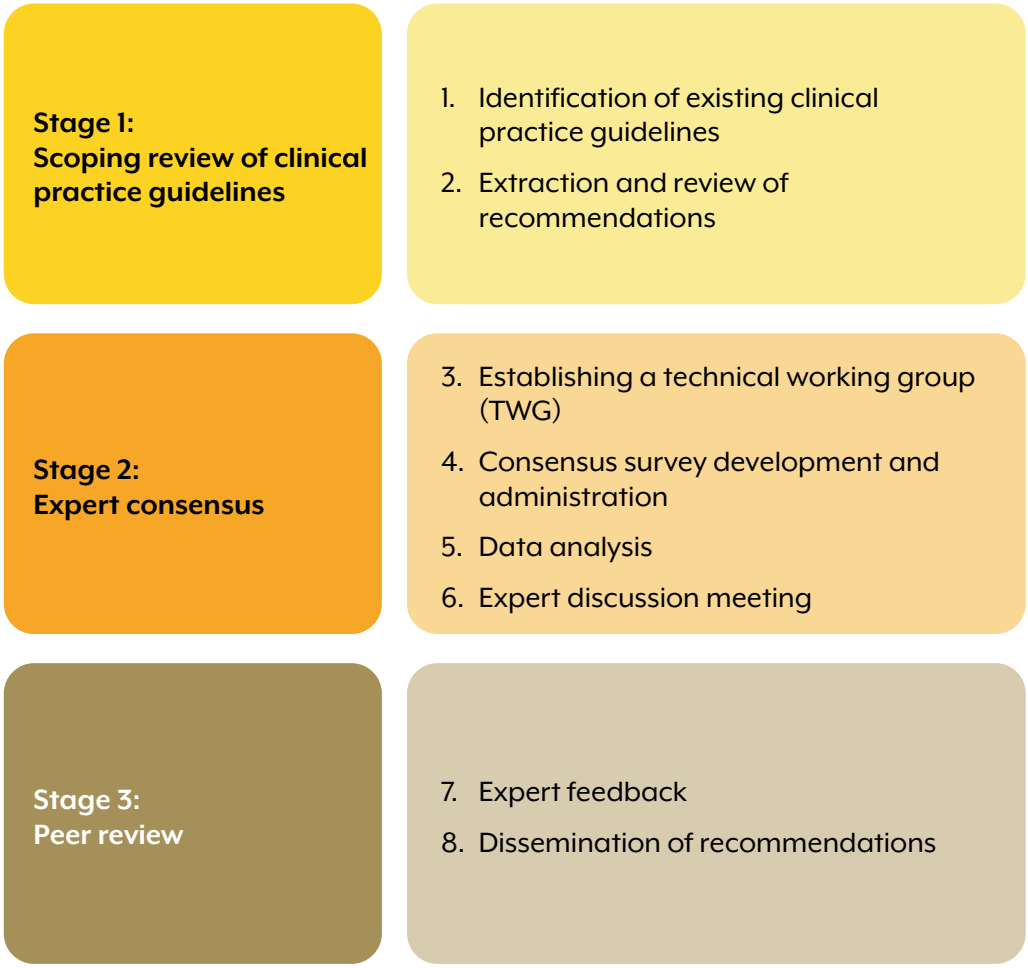
Objectives of developing the summary of recommendations for quality of care in cataract surgery management

In November 2020, at the Seventy-third World Health Assembly, WHO Member States adopted resolution WHA73.4, "Integrated people-centred eye care, including preventable vision impairment and blindness" *(14)*. This resolution requested WHO to "develop guidance on evidence-based and cost–effective eye care interventions and approaches to facilitate the integration of eye care into universal health coverage" *(12)*. In order to assist Members States that may require guidance in this area, WHO, through consultation with a group of international experts, developed this document, *Summary of recommendations for quality of care in cataract surgery management*, which provides evidence-based and expert-agreed recommendations for improving the quality of cataract surgery across the three main phases of cataract surgery management: preoperative, intraoperative, and postoperative. The information provided serves as a reference for policy-makers, technical decision-makers, and health-care planners to ensure that quality is taken into consideration when planning for cataract surgery services at national and subnational levels.

Methodology

The methodology used for this *Summary of recommendations for quality of care in cataract surgery management* was developed by the WHO Vision and Eye Care Programme with the involvement of a broad range of stakeholders. The stepwise approach adopted includes: i) identification of recommendations extracted from existing clinical practice guidelines; ii) expert consensus on quality recommendations; and iii) peer review. The selection of recommendations was guided by the following criteria: a) the recommendation was evaluated as sufficient based on the strength and quality of evidence; and b) it was considered practical and realistic that the recommendation could be implemented within low- and intermediate-resource settings. The latter was based on expert consensus after considering the target population of the source document of each recommendation and existing evidence on cost and effectiveness of each surgery technique *(15–21)*. To ensure that cataract surgery services meet the established standards of care, the recommendations were developed in line with the quality elements of care – effectiveness, safety, efficiency, people-centredness, timeliness, equity, and integration. The three stages of development are described in Figure 1, with further details provided in Annex 2. The list of guidelines for the quality recommendations can be found in Annex 3.

Figure 1. Stages and steps for developing the summary recommendations for quality of care in cataract surgery management



Scope and target audience

Scope

The set of recommendations presented in this document are drawn from published evidence, and practices that are applicable in most settings. They cover the three phases of cataract surgery care: preoperative, intraoperative, and postoperative. The clinical aspects contributing to the quality of care for each phase were fully considered and discussed.

The recommendations are evidence-based; they reflect the current state of practice as published within existing clinical practice guidelines and are practical and applicable in most settings. It is acknowledged that in implementing quality-of-care recommendations, the starting points for different countries will vary depending on the maturity of their health system, the resources available, and local needs. This document serves as a resource to support Member States when planning for establishing or expanding coverage of high-quality cataract services.

Target audience

WHO *Summary of recommendations for quality of care in cataract surgery management* is relevant to those involved in planning for the delivery of quality cataract surgery services, particularly those in low- and middle-income settings.

The primary audience for this resource includes policy-makers and cataract surgery services planners, who are responsible for developing national and local health-care protocols and policies, as well as managers of eye care programmes. Other potential end-users include those directly involved in the provision of cataract surgery, such as (i) eye care service providers to put into action the recommendations on a facility level; and (ii) eye care and allied health professionals to verify or align the care provided with standardized, evidence-based clinical care. Finally, the information in this resource will be useful to donors and development agencies when supporting cataract services provision in low- and intermediate-resource settings.

Summary of recommendations for quality of care

I. Preoperative care

Table 1. Recommendations for quality of preoperative care

Key components	Summary of recommendations for quality of care
1. Preoperative medical and ophthalmic assessment	History-taking – A thorough history of the patient should be obtained before surgery, including past ocular and medical history, use of medications, history of allergies, and previous ocular surgeries. Ocular examination – All patients should undergo a preoperative comprehensive eye examination, to confirm the indication for surgery and to tailor their perioperative care plan. – Accurate evaluation of preoperative presenting visual acuity and best corrected visual acuity should be obtained in order to monitor postoperative visual acuity improvement. The diagnosis of visually significant cataract should be based ideally on symptoms that include blur, glare, and refractive change, and not visual acuity alone. – Decisions about surgery should be discussed with patients and be based on their visual needs and preferences for daily life activities, such as working, reading and driving. Ocular comorbidities – Ocular comorbidities that may affect surgery outcomes should be managed appropriately ahead of surgery. – Ocular conditions that require extra equipment or an experienced surgeon (e.g. pseudoexfoliation or zonular weakness) should be identified and prepared for appropriately ahead of surgery to ensure surgical safety. – Ocular comorbidities impacting visual outcomes or surgical complexity should be discussed with the patient before surgery.

Key components	Summary of recommendations for quality of care
2. General medical condition and systemic comorbidities	General medical assessment – The basic cognitive function required by a patient to cooperate during surgery and postoperative care should be determined. – Preoperative medical examinations and laboratory investigations, as appropriate, should be performed according to the patient's status, symptoms, and medical conditions. Management of systemic comorbidities – Active infection should be managed before proceeding with surgery. – Blood pressure and blood glucose should be tested and recorded; both should be within acceptable limits. – Uncontrolled systemic conditions, such as high blood glucose, coronary heart disease, or severe hypertension, should be properly treated and stabilized before surgery to avoid intraoperative and postoperative complications. Medication management – Systemic medications should be carefully considered and managed close to surgery in consultation with other care providers.
3. Informed consent	– Personalized counselling should be provided to the patient before they give their consent to ensure that detailed information about the surgery, such as anaesthesia type, expected outcomes, and potential risks, have been clearly communicated and understood. – An informed consent form should be signed by the patient prior to surgery, indicating that the patient understands the information provided and voluntarily agrees to proceed with the procedure. – It must be ensured that the patient understands the information being provided, and a translator, interpreter, or reader should be available if necessary. For vulnerable people who cannot consent, it is essential to obtain consent from the appropriate authority (for example, carer/family member) for the surgery. – The informed consent form should be written in plain language. At a minimum, this document must contain: the patient identification; description of the condition and the procedure; potential benefits; possible risks and complications; IOL options; alternatives to the intervention; and postoperative expectations. – Patients should also confirm they had the opportunity to clarify any concerns and ask questions, receiving satisfactory answers.
4. Wait time before surgery	– Possible wait times for surgery, and the factors affecting delays, should be communicated to patients. – Prioritization for surgery may be scheduled (e.g. for high-risk patients, such as those with monocular vision, serious ocular comorbidities, or patients who struggle with independent living).

Key components	Summary of recommendations for quality of care
5. Timing of cataract surgery for the second eye	– The clinical and visual status, and the needs and of the patient, should be considered when planning the timing of cataract surgery for the second eye. – In general, cataract surgery for the second eye follows that for the first eye after a period of one week. This is to closely monitor for any complications, such as endophthalmitis, before second surgery is performed. – The benefits and risks of immediate sequential bilateral cataract surgery (ISBCS) versus delayed second eye surgery should be made clear, to allow patients to make informed decisions. ISBCS may be considered an option for patients who have significant barriers to surgery, such as those needing general anaesthesia, or those with serious travel constraints. – ISBCS should be recommended only in settings where strict control measures against infection are consistently assured; the high risks involved should never be neglected.
6. Optical biometry and intraocular lens type and power	Biometry and measurements – Reliable axial length measurements should be mandatory for all patients who plan to undergo cataract surgery. Wherever feasible, optical biometry should be considered for all patients as a first-line method for measuring axial length. Ultrasound A-scan biometry remains an effective option to obtain reliable axial length measurements, where optical biometry is not available or not feasible due to significant lens opacity. – Reliable keratometry measurements should be obtained for all patients. As far as possible, measurements should be performed before any eye drops are instilled or intraocular pressure is measured. – Evidence-based protocols should be followed when measuring axial length and keratometry. Equipment maintenance and calibration – Manufacturer's recommendations for the maintenance and calibration of optical biometry equipment should be regularly followed to maintain accuracy. Intraocular lens selection – Wherever feasible, the decision about the selection of intraocular lens type, material, and power should take into account the patient's visual goals and preferences.
7. Preoperative antibiotic use	– Preoperative topical antibiotic use is not routinely recommended.

II. Intraoperative care

Table 2. Recommendations for quality of intraoperative care

Key components	Summary of recommendations for quality of care
8. Operating theatre sterilization *(22)*	– Recommendations for maintaining safe operating theatres, including for surgical procedures, infection control and sterilization, should adhere to national and international standards, and be in line with manufacturer's guidelines. (Additional information is provided in the list of resources in Annex 3.) – The sterilization of operating theatres should be integrated into infection control programmes and carried out by trained personnel. – The safety of operating theatres, in terms of design and maintenance, must be ensured. This includes ventilation/cooling systems, sharps disposal bins, and back-up power supply. – Staff must be immunized against diseases relevant to the locality *(23)*. – Safe and adequate staffing levels must be ensured for the size and duration of the daily operation list and complexity of cases. – The maintenance and sterilization procedures of operating instruments must consider the volume of surgery lists. – Document sterilization processes for monitoring purposes (e.g., in case of post-operative infections).
9. Infection control, draping and patient sterilization procedures	Patient sterilization – Ensure application of povidone-iodine or chlorhexidine prior to surgery and ensure that adequate supplies are available for the planned volume of surgeries. Equipment sterilization – Reusable sterilized drapes and equipment can be a cost–effective alternative to single-use items. However appropriate sterilization protocols must be adhered to, as set out in WHO's guidelines on decontamination and reprocessing of medical devices for health-care facilities *(22)*. Disposables – Disposable drapes and single-use sterile instruments may be considered, if resources permit, to reduce preparation time without compromising sterility. Planning for environmentally-respectful disposal should be considered.
10. Timeout checklist	– A structured timeout verification list – including key information such as the patient's name, targeted eye to be operated, procedure, intraocular lens type and power – should be used to avoid incorrect surgical events. – The WHO surgical safety checklist *(24)* may be modified to include a cataract surgery checklist and be integrated into broader patient safety programmes.

Key components	Summary of recommendations for quality of care
11. Anaesthesia	– The choice of anaesthesia type should be determined by the surgeon taking into consideration the patient's needs and circumstances. – The choice of anaesthesia type should be discussed with the patient to ensure they are informed of, and understand, the potential outcomes and risks. – Topical anaesthesia is a safe and cost–effective option, requiring fewer procedural steps than general anaesthesia and reducing the need for additional instruments. – Surgeons should receive proper training on peribulbar and retrobulbar anaesthesia techniques as these reduce the risk of globe perforation. – When general anaesthesia is recommended, the availability of trained personnel and adequate equipment, such as resuscitation devices and medication, should be ensured.
12. Surgery techniques	– Phacoemulsification, small-incision cataract surgery, and extracapsular cataract extraction, are all acceptable surgical techniques for cataract removal. – The choice of technique should be guided by the patient's clinical condition, resource availability and surgeon expertise. – The surgeon should explain to the patient, as appropriate, the benefits and risks of all available surgical options. – In low- and intermediate-resource settings, extracapsular cataract extraction and small-incision cataract surgery are the most performed techniques, presenting the advantages of a good safety profile, a relatively simple technique, low cost, and low dependence on costly devices.
13. Intracameral antibiotics *(25–29)*	– Intracameral antibiotic injections should be used as standard practice to prevent endophthalmitis. – Both intracameral antibiotic cefuroxime and moxifloxacin are equally effective in preventing endophthalmitis. – The use of commercially-available intracameral antibiotics (such as cefuroxime and moxifloxacin) should be preferred over locally-compounded solutions, to minimize the risk of endophthalmitis, toxic anterior segment syndrome, or retinal toxicity.

Key components	Summary of recommendations for quality of care
14. Intraoperative complications	– Intraoperative complications and the mechanisms for monitoring complication rates should be documented. – Clear guidelines should be adopted on how to manage common complications, such as posterior capsule rupture, vitreous loss, and dropped nucleus. An anterior vitrectomy machine should be available. – Access to vitreoretinal surgery should be ensured so that complications requiring vitreoretinal surgery can be addressed within 24 hours. – For complications with anaesthesia, close coordination between surgeons, anaesthetists, and nursing staff is crucial to enhance timely response and improve outcomes. – It is important to match the expected surgical complexity with the surgeon's experience using standardized cataract grading and complexity system *(30)*. – For low-risk patients, whose surgery may be assigned to senior trainees, a more experienced surgeon should be at hand to complete the procedure should unexpected complications arise.

III. Postoperative care

Table 3. Recommendations for quality of postoperative care

Key components	Summary of recommendations for quality of care
15. Postoperative medical care	Postoperative antibiotic eye drops – Postoperative topical antibiotics are used as standard practice to reduce the risk of infection. Decisions on the type, frequency, and duration of antibiotic use should be made based on the patient's risk of infection and the current patterns of antimicrobial resistance of the common ocular pathogens. Postoperative anti-inflammatory eye drops – Steroid eye drops are used as standard practice for all patients to reduce the risk of inflammation. The frequency and duration of steroid eye drops should be tailored based on the patient's risk of postoperative inflammation, such as in diabetic patients, and the postoperative status of the eye. – A tapering regimen is recommended for the use of steroid eye drops, starting with high-frequency doses, followed by gradual withdrawal to ensure effectiveness while reducing the risk of steroid-induced glaucoma. – A combined regimen of anti-inflammatory eye drops, such as steroids and nonsteroidal anti-inflammatory drugs (NSAIDs), should be considered for patients at high risk of developing cystoid macular oedema. Postoperative eye pad/shield – A sterile eye pad or shield can be used to maintain wound healing postoperatively for a time period based on the patient's potential risks.

Key components	Summary of recommendations for quality of care
16. Postoperative follow-up visits	Frequency of follow-up visit – The frequency of postoperative follow-up visits should be scheduled based on the patient's risks and needs. – All patients are normally examined at 24–48 hours following surgery to check wound integrity and inflammation. – A follow-up visit at 1 week after surgery is commonly recommended in practice guidelines to check visual acuity, intraocular pressure, and wound healing. Postoperative care can be modified depending on the findings. – A follow-up visit 4–6 weeks after surgery is recommended in practice guidelines to evaluate visual acuity and address the need for refractive correction for both distance and near vision. Special considerations – In patients with high-risk conditions, such as monocular vision, glaucomatous eyes, or surgical complications, it is strongly recommended that examinations take place within 24 hours after surgery and additional follow-up visits can be considered. – In the event of an outbreak of endophthalmitis, additional follow-up visits should be considered.
17. Postoperative outcomes	– Surgical outcomes can be monitored through patient satisfaction surveys and patient reported outcome measures. This ensures that both subjective (patient feedback) and objective (visual acuity) aspects of postoperative care are considered. – Key postoperative outcome data, such as postoperative visual acuity, should be integrated within facility health information systems and be used by providers to audit outcomes. – Modified from previous WHO guidance, the benchmark of ≥80% should be considered for the percentage of patients attaining a postoperative presenting visual acuity of 6/12 or better, tested between 4 and 12 weeks postoperatively *(12,31,32)*.
18. Postoperative complications	– Patient counselling is important if complications occur during surgery. Patients should be engaged in a discussion about the next steps. – Patients and caregivers should be instructed to contact the surgeon, or the hospital, directly if the patient develops symptoms that require immediate attention, such as sudden reduced vision; pain or increased redness in the eye; or other red flags that could indicate endophthalmitis. A referral pathway must be agreed with patients to ensure timely advice and treatment for any potential postoperative complications. – Specific benchmarks or targets for intraoperative and postoperative complication rates (for example, capsule rupture, vitreous loss, endophthalmitis incidence, corneal oedema) should be based on local evidence-based criteria or by using clinical practice guidelines as a reference.

Related WHO tools to support planning, implementation and monitoring

WHO has developed a number of resources to support the planning, implementation and monitoring of comprehensive, high-quality, eye care services. A summary of these resources can be found in WHO's comprehensive list of vision and eye care programme resources *(33)*.

Eye care in health systems: guide for action (the Guide) was developed as a manual for health planners. The Guide outlines strategies and approaches proposed by WHO that provide practical, step-by-step support to Member States in the planning and implementation of integrated people centred eye care *(34)*. The guide links four resources, or tools, to support countries in their development of eye care plans and frameworks:

1. Eye care situation analysis tool (ECSAT)
A questionnaire-based survey tool to comprehensively assess eye care in a country. The tool provides a snapshot of the current situation in a country, identifying priority areas that need to be addressed in eye care strategic planning *(35)*.

2. Eye care indicator menu (ECIM)
A comprehensive set of indicators, including for cataract services, to facilitate the monitoring of strategies and actions for eye care provision *(32)*. These indicators offer a structured outline to monitor and evaluate the quality, accessibility, and impact of cataract services within national health systems and are summarized in Annex 4.

2.1. Routine health information systems – sensory functions toolkit

To support the integration of eye care data into the facility level reporting system, a Routine health information systems toolkit was developed comprising a digital package developed with the District Health Information Software 2 (DHIS2) and a guidance document *(36)*. ECIM indicators whose preferred data source is routine data from health facilities were included in this toolkit to guide data collection and reporting.

3.Package of eye care interventions (PECI) *(37)* A set of recommended, evidenced-based eye care interventions across the continuum of care, including cataract services, and the material resources required for implementation. The PECI serves to facilitate policy-makers and technical decision-makers in low- and middle-income countries to integrate eye care into the packages and policies of their health services. Interventions from the Package of eye care interventions were integrated into the WHO UHC Compendium, a database of health services and intersectoral interventions designed to assist countries in making progress towards universal health coverage *(38)*. Medical devices and equipment's were integrated into the WHO Priority Medical Devices Information System, MeDevIs, that is an open access electronic database of medical devices developed by WHO *(39)*. Medicines related to or used in cataract surgery are also included in the WHO Model List of Essential Medicines *(40).(32)*

4. Eye care competency framework (ECCF)
A tool that conveys the expected performance of an eye care worker for the purpose of workforce planning and development, and that aligns to standards of competencies *(41)*.

Updating the recommendations

The WHO Vision and Eye Care Programme will regularly review WHO's current portfolio of cataract surgery recommendations. In the event that new evidence that could potentially impact the current evidence base is identified, these recommendations may be updated. If no new reports or information is identified, the recommendations may be revalidated.

WHO welcomes suggestions regarding additional questions for inclusion in the updated recommendations. Please email your suggestions to vision@who.int.

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Annex 1. Summary and management of declared interests from experts

Name	Expertise contributed to the recommendation's development	Declared interest	Management of declared interest
Technical working group			
Paul Cotran	Ophthalmology; public health; content expert and end-user.	None declared	Not applicable
Nazaradden Ibrahim	Ophthalmology; public health; programme management and implementation in low-resource settings; content expert and end-user.	None declared	Not applicable
Jonathan Lake	Ophthalmology; public health; content expert and end-user.	None declared	Not applicable
Susan MacDonald	Ophthalmology; programme management and implementation in low-resource settings; content expert and end-user.	None declared	Not applicable
Lila Raj Puri	Ophthalmology; public health; international development; programme management and implementation in low-resource settings; content expert and end-user.	None declared	Not applicable
Mansur Rabiu	Ophthalmology; public health; content expert and end-user.	None declared	Not applicable
Rajesh Rajpal	Ophthalmology; public health; programme management and implementation; content expert and end-user.	None declared	Not applicable
Serge Resnikoff	Ophthalmology; public health; international development; programme management and implementation in low-resource settings; content expert and end-user.	None declared	Not applicable
Mohamad Aziz Salowi	Ophthalmology; public health; policy-maker; content expert and end-user.	None declared	Not applicable

Name	Expertise contributed to the recommendation's development	Declared interest	Management of declared interest
John Szetu	Ophthalmology; public health; international development; programme management and implementation in low-resource settings; content expert and end-user.	None declared	Not applicable
Geoffrey Tabin	Ophthalmology; public health; content expert and end-user.	None declared	Not applicable
Anna Cheng Sim Tan	Ophthalmology; research; public health; international development; programme management; content expert and end-user.	None declared	Not applicable
Chundak Tenzing	Ophthalmology; public health; international development; programme management and implementation in low-resource settings; content expert and end-user.	None declared	Not applicable
Geoffrey Wabulembo	Ophthalmology; public health; international development; programme management and implementation in low-resource settings; content expert and end-user.	None declared	Not applicable
Fasika Woreta	Ophthalmology; public health; content expert and end-user.	None declared	Not applicable
David Yorston	Ophthalmology; public health; content expert and end-user.	None declared	Not applicable
Peer review group			
Habeeb Ahmad	Ophthalmology; public health; content expert and end-user.	Global medical director – cataract surgery – at Johnson & Johnson Surgical Vision	This declared conflict of interest was not considered significant enough to pose any risk to the resource development process or to reduce its credibility. The conflict constitutes intellectual bias that does not pose major risk.

Name	Expertise contributed to the recommendation's development	Declared interest	Management of declared interest
Reshma Dabideen	Optometry; public health; programme development, management and implementation in low-resource settings; capacity building; content expert and end-user.	None declared	Not applicable
Josie Noah	Health equity; public health; international development; content expert.	None declared	Not applicable
Katherine Overbey	International development; public health; eye care programme development, management and implementation in low-resource settings; content expert.	None declared	Not applicable
Ravindran Ravilla	Public health; eye care programme development, management and implementation in low-resource settings; capacity building; content expert and end-user.	None declared	Not applicable
Thulasiraj Ravilla	Public health; eye care programme development, management and implementation in low-resource settings; capacity building; content expert and end-user	None declared	Not applicable
Nitin Verma	Ophthalmology; public health; international development; content expert and end-user.	None declared	Not applicable
Sheila West	Ophthalmology; research and epidemiology; guideline and systematic reviews development; health systems strengthening; content expert.	None declared	Not applicable
Sumrana Yasmin	Optometry; public health; programme development, management and implementation in low-resource settings; capacity building; content expert and end-user.	None declared	Not applicable

Annex 2. Stages of development of the cataract quality recommendations

Stage 1. Scoping review of existing clinical practice guidelines for cataract

1.1. Scoping review of guidelines

The aim of Stage 1 was to identify existing clinical practice guidelines and extract recommendations related to the provision of quality services for cataract surgery. The extracted recommendations were then used in Stage 2 to inform the selection of the final set of recommendations to be included in this *Summary of recommendations for quality of care in cataract surgery management*.

In 2020, WHO, together with academics from the field, undertook a thorough systematic review and quality appraisal (using the Appraisal of Guidelines for Research and Evaluation [AGREE] II tool) of clinical practice guidelines for cataract *(1)*. In summary, only four guidelines met the stringent inclusion criteria, with three of them being developed in high-income settings. The recommendations were extracted from these guidelines, including information on the strength and quality of evidence. However, the breadth of this information alone was not considered sufficient to robustly develop the content of the current document and to ensure the recommendations were pertinent to low- and middle-income settings.

Thus, to supplement this information with relevant guidance targeted at populations living in low and intermediate resource settings and to ensure that guidelines published since 2020 were considered, a separate scoping review was conducted to identify additional sources. A detailed protocol for the scoping review was developed by WHO Vision and Eye Care Programme team members and the WHO collaborating centre Dana Centre for Preventive Ophthalmology, Wilmer Eye Institute, Johns Hopkins University. The protocol was published in the Open Science Framework (see: https://osf.io/rpjat). In brief, a literature search of academic and selected guideline databases and websites of professional associations was conducted in April 2024. To ensure consistency, one investigator extracted information from each identified guideline using a standardized data extraction form developed within the Systematic Review Data Repository. All extractions were reviewed by another senior reviewer independently.

For the scoping review, there was no restriction on the level of evidence certainty on which the guidelines were based, but, for each guideline, it was noted whether there was (i) no or unknown evidence base, (ii) some references were provided, or (iii) directly supporting evidence. Results were limited to records published in or after 2010, in one of the six official languages of the United Nations (Arabic, Chinese, English, French, Russian, and Spanish), or Portuguese or German. The titles and abstracts of all identified documents from the literature search were screened centrally by at least two individuals from the WHO collaborating centre above mentioned. Data was captured on the number of times a particular recommendation was mentioned across the identified guidelines. All extracted information was provided to the technical working group (TWG) members prior to undertaking the survey and was considered during the consensus meetings.

1.2. Data extraction and preparation

Relevant recommendations from selected clinical practice guidelines were extracted in a standardized data extraction form within the Systematic Review Data Repository Plus (SRDR+) and were categorized as preoperative, intraoperative or postoperative.

Stage 2. Selection of recommendations for inclusion

2.1. Establishment of a technical working group

A TWG was established comprising 16 public health professionals, academics, and clinical specialists in the field of eye care from all six WHO regions (2 from the African Region; 7 from the Region of the Americas; 1 from the Eastern Mediterranean Region; 2 from the European Region; 1 from the South-East Asia Region; and 3 from the Western Pacific Region). Members of the TWG were selected based on their context-specific expertise in implementing cataract surgery programmes in low- and intermediate-resource settings. Given the highly technical/clinical nature of the work, where expert knowledge is deemed to be the primary source of relevant input, patient representatives or people with lived experience were not consulted in the development of this document. In order to achieve consensus on the selection of recommendations for inclusion, a stepwise process was carried out with the TWG which included: i) an initial survey completed online; ii) "virtual" group consultations; and iii) written feedback provided independently by members of the TWG.

2.2. TWG survey

Following an introductory meeting conducted online, TWG members were sent a survey detailing recommendations for potential inclusion, based on data extracted during Stage 1 of the development process. The survey was open for completion for two weeks during December 2024.

Members voted on the inclusion of each recommendation using the following criteria: i) evidence on the effectiveness of the intervention was evaluated as sufficient; and ii) it was considered practical and realistic that the intervention could be implemented within low- and intermediate-resource settings.

Survey responses were collected and analysed using descriptive statistics for binary and multiple-choice questions. Open-ended responses were analysed to identify and merge common themes, concerns, or suggestions. Recommendations with ≥75% of TWG member votes were included; recommendations with <50% of votes were excluded; and recommendations with 50–75% of votes were classified as "borderline" and underwent further discussion.

2.3. TWG consensus meeting

Following completion of the survey, an online consensus meeting was held in which TWG members provided technical input to WHO on the inclusion/exclusion of "borderline" or missed interventions. Prior to the meeting, the WHO team had assessed the level of evidence for the "borderline" interventions and prepared recommendations. Discussion between WHO and TWG members facilitated WHO in making the ultimate decision on inclusion or exclusion of these "borderline" or missed recommendations. In selecting the recommendations, attention was also given to environmental considerations. Specifically, recommendations considered minimizing the adverse environmental effects of the surgery, provided it did not pose a risk to patient safety or compromise the quality of the procedure *(2)*.

Stage 3. Peer review

A peer review group was formed comprising relevant external experts, acting in their individual capacity, and WHO Vision and Eye Care Programme members. Group members were responsible for independently reviewing the document and providing feedback. Specifically, the final version of the document was distributed for review to each member, with clear guidance that any suggested changes should be limited to errors of fact, clarifications, and considerations related to implementation, adaptation, and the conditions under which the recommendations apply. A final version of the document, with changes marked and responses to the comments, was shared with the peer review group members.

References: Annex 2

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Annex 3. Resources used to guide the development of the recommendations

The following list provides (in alphabetical order) organizations and guidelines used for the development of the recommendations.

Organization or authors ***(in English)***	**Official title or title given by the extractor** ***(in English)***	**Year**
All India Ophthalmological Society (AIOS)	AIOS Guidelines on Manual SICS	2018
American Academy of Ophthalmology (AAO)	Cataract in the adult eye preferred practice pattern	2021
American Society of Cataract and Refractive Surgery (ASCRS)	Recommendations regarding use of enzyme detergent for cleaning intraocular surgical instruments	Not stated
American Society of Cataract and Refractive Surgery (ASCRS)	ASCRS clinical advisory on intracameral moxifloxacin injection for infection prophylaxis	2023
Aravind Eye Care System	In-patient protocol cataract surgery: Aravind Eye Care System	2020
Aravind Eye Care System	Aravind Eye Care System: Outpatient Department Protocol	2020
Australian Commission on Safety and Quality in Health Care	Cataract clinical care standard	2021
Australian Commission on Safety and Quality in Health Care	Cataract Clinical Care Standard	2021
Cataract and Intraocular Lens group; Ophthalmology branch of Chinese Medical Association	Expert consensus on prevention and treatment of infectious endophthalmitis after cataract extraction surgery. Chin J Ophthalmol. Nov 2017 Vol 53 No.11.DOI 10.3760/cma.j.cn112142-20201013-00680	2017
China Medical Education Association, Ophthalmology Committee of World Association of Translational Medicine	Consensus for measurement and application of ocular biometric parameters before cataract surgery	2023
Chinese Cataract and Refractive Surgery Society	Chinese adult guideline for cataract surgery	2023
Chinese Cataract and Refractive Surgery Society	Chinese expert consensus on prevention and treatment of dry eye during perioperative period of cataract surgery	2021
Christian Blind Mission (CBM)*	International Eye Health Quality Management tool (Information provided by Dr Babar Qureshi, CBM)	Not stated

Organization or authors ***(in English)***	**Official title or title given by the extractor** ***(in English)***	**Year**
Christian Blind Mission (CBM)*	Minimum standards for cataract surgical services. A joint project effort with Fred Hollows, Sightsavers, CBM, and ORBIS (Information provided by Dr Babar Qureshi, CBM)	Not stated
Cleveland Clinic, Cole Eye Institute	Cataract surgery outcomes	Not stated
Colombia Society of Ophthalmology*	Sociedad Colombiana de Oftalmología; Guías de Práctica Clínica en Oftalmología (Information provided by a member of the Society)	2022
European Society of Cataract and Refractive Surgeons (ESCRS)	Evidence-based guidelines for cataract surgery: Guidelines based on data in the European Registry of Quality Outcomes for Cataract and Refractive Surgery database	2012
European Society of Cataract and Refractive Surgeons (ESCRS)	ESCRS Guidelines for prevention and treatment of endophthalmitis following cataract surgery	2013
Furtado JM, Lansingh VC, Peña FY, Melgar MY, Barría F.	Practical guide to senile cataract for Latin America	2012
German Society of Ophthalmology (DOG)	Intravitreal operative drug administration (IVOM) during cataract surgery	2012
Government of British Columbia, Canada	Cataract – treatment of adults	2023
HelpMeSee	Manual small incision cataract surgery	Not stated
International Agency for the Prevention of Blindness (IAPB)	Cataract Facts	Not stated
International Agency for the Prevention of Blindness (IAPB)	Cataract Surgery Protocol – Nepal	2015
International Agency for the Prevention of Blindness (IAPB)	Essential List for Cataract Surgery	2015
Italian Association of Ophthalmologists (AIMO)	Adult cataract surgery: indications for surgery, preoperative path, surgical techniques and postoperative path	2022
Light for the World*	Light for the World: Cataract surgery practices (Information provided by Dr Geoffrey Wabulembo, Light for the World)	Not stated
Lions Clubs International*	Lions Clubs International: Minimal standards (Information provided by Dr Silvio Mariotti, World Health Organization)	Not stated

Organization or authors ***(in English)***	**Official title or title given by the extractor** ***(in English)***	**Year**
Lundström M, Barry P, Henry Y, Rosen P, Stenevi U.	Evidence-based guidelines for cataract surgery: Guidelines based on data in the European Registry of Quality Outcomes for Cataract and Refractive Surgery database	2012
Massachusetts General Brigham, Massachusetts Eye and Ear	Ophthalmology outcomes: Cataract surgery	Not stated
Ministry of Health of Uganda	Ministry of Health guidelines for eye care	2016
Mission for Vision	Guidelines for the management of cataract in India	2020
National Institute for Health and Care Excellence (NICE)	Cataracts in adults: Management	2017
Ophthalmology Society of Taiwan*	Cataract surgery self-care tips Health Education Forum: Cataract surgery timing and post operative care instructions	Not stated
Rajavi Z, Javadi MA, Daftarian N, et al.	Customized clinical practice guidelines for management of adult cataract in Iran	2015
Seva Foundation*	Patient safety and quality assurance. Initiative for hospitals supported by the Seva Foundation (Material provided by Dr Chundak Tenzing, the Seva Foundation)	Not stated
Seva Foundation*	Standard operating procedures for eye hospitals (Document provided by Dr Chumdak Tenzing, the Seva Foundation)	2020
Sightsavers*	Protocol for pre-operative cataract surgery patients (Document provided by Dr N Ibrahim, SightSavers)	Not stated
Sightsavers*	Protocol for administering ophthalmic anaesthesia (Document provided by Dr N Ibrahim, SightSavers)	Not stated
Sightsavers*	Protocol for post operative cataract surgical management (Document provided by Dr N Ibrahim, SightSavers)	Not stated

Organization or authors ***(in English)***	**Official title or title given by the extractor** ***(in English)***	**Year**
Sightsavers*	Quality Self-Assessment Tool: Means of verification. Guidance: cataract (Document provided by Dr N Ibrahim, SightSavers)	Not stated
The College of Optometrists, United Kingdom of Great Britain and Northern Ireland	NICE Guideline: Cataracts in adults: Management (Membership required to access website. Information provided by colleague)	2017
The Eye Foundation	Cataract eye surgery: Restore your vision today	Not stated
The Royal Australian and New Zealand College of Ophthalmologists (RANZCO)	Options to reduce waste in cataract surgery	2022
The Royal Australian and New Zealand College of Ophthalmologists (RANZCO)	Preferred practice patterns: Cataract and intraocular lens surgery	2021
The Royal Australian and New Zealand College of Ophthalmologists (RANZCO)	Ocular surgery guidelines for ensuring correct patient, correct eye, correct site and correct procedure	2019
The Royal College of Ophthalmologists	High Flow Cataract Surgery	2022
The Royal College of Ophthalmologists	WHO Cataract Surgery Checklist	2019
The Royal College of Ophthalmologists	Quality Standard Self-Assessment Tool: Cataract Services	2021
The Royal College of Ophthalmologists	Ophthalmic Services Guidance: Managing an outbreak of postoperative endophthalmitis	2022
The Royal College of Ophthalmologists	Correct IOL implantation in cataract surgery	2018
Tilganga Institute of Ophthalmology*	Standard operating procedures of outpatient department (Document provided by Mr Pitambar Adhikari, Tilganga Institute of Ophthalmology)	Not stated
Unite for Sight*	Database requirement on each patient cataract surgery supported by Unite for Sight	Not stated
Wilmer Eye Institute*	Monitoring for cataract surgery (Material provided by Vice Chair for Quality, Wilmer Eye Institute)	2021

* *Material provided by a member of the association/nongovernmental organization in response to a request from WHO.*

Annex 4. Core and expanded indicators for monitoring and evaluating cataract surgery services adapted from the WHO Eye care indicator menu

Every setting where services and programmes for cataract surgery are implemented should establish a comprehensive monitoring framework. This framework must incorporate indicators from all the domains of the result chain, which can be assessed through health information systems (input, output, and outcome) and health status indicators (impact).

Indicators that are related to cataract and included in the WHO *Eye care indicator menu,* are presented in Table A3 below. Those marked as "Core" are considered essential and represent a minimum set necessary for the monitoring and evaluation process. Indicators whose preferred data source is routine data from health facilities, can be collected and analysed using the District Health Information Software 2 (DHIS2) platform, or any other health facility information system *(1)*.

Further information on definition, metadata and preferred data sources for each indicator, can be found in the WHO *Eye care indicator menu (2)*, or the WHO *Guidance on the analysis and use of routine health information systems: eye and ear care module (1)*.

Table A4. Indicators for cataract included in the WHO Eye care indicator menu

Input and processes	Output	Outcome	Impact
Eye care governance Eye care integrated into the national health plan **[Core]**	**Eye care service access** Cataract surgical rate Waiting time for cataract surgery Preoperative visual acuity among cataract surgery patients	**Eye care coverage** Effective cataract surgical coverage (eCSC) **[Core]**	**Eye care impact** Prevalence of vision impairment and blindness **[Core]**
Eye care financing Financial risk protection for cataract surgery **[Core]**	**Eye care service quality** Cataract surgical outcome (visual acuity) **[Core]**		
Eye care information Eye conditions and visual acuity categorized by International Classification of Diseases (ICD) code (or equivalent) **[Core]**			
Eye care workforce Eye care workforce density and distribution **[Core]**			

References: Annex 4

1. Guidance on the analysis and use of routine health information systems: eye and ear care module. Geneva: World Health Organization; 2023 (https://iris.who.int/handle/10665/372092, accessed 3 August 2025).
2. Eye care indicator menu (ECIM): a tool for monitoring strategies and actions for eye care provision. Geneva: World Health Organization; 2022 (https://apps.who.int/iris/handle/10665/354257, accessed 3 August 2025).

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https://www.who.int/health-topics/blindness-and-vision-loss