SUMMARY BENCHMARKS FOR PREFERRED PRACTICE PATTERN® GUIDELINES

Introduction

These are summary benchmarks for the Academy's Preferred Practice Pattern® (PPP) guidelines. The Preferred Practice Pattern series of guidelines has been written on the basis of three principles.

- Each Preferred Practice Pattern should be clinically relevant and specific enough to provide useful information to practitioners.
- Each recommendation that is made should be given an explicit rating that shows its importance to the care process.
- Each recommendation should also be given an explicit rating that shows the strength of evidence that supports the recommendation and reflects the best evidence available.

Preferred Practice Patterns provide guidance for the pattern of practice, not for the care of a particular individual. While they should generally meet the needs of most patients, they cannot possibly best meet the needs of all patients. Adherence to these Preferred Practice Patterns will not ensure a successful outcome in every situation. These practice patterns should not be deemed inclusive of all proper methods of care or exclusive of other methods of care reasonably directed at obtaining the best results. It may be necessary to approach different patients' needs in different ways. The physician must make the ultimate judgment about the propriety of the care of a particular patient in light of all of the circumstances presented by that patient. The American Academy of Ophthalmology is available to assist members in resolving ethical dilemmas that arise in the course of ophthalmic practice.

The Preferred Practice Pattern® guidelines are not medical standards to be adhered to in all individual situations. The Academy specifically disclaims any and all liability for injury or other damages of any kind, from negligence or otherwise, for any and all claims that may arise out of the use of any recommendations or other information contained herein.

For each major disease condition, recommendations for the process of care, including the history, physical exam and ancillary tests, are summarized, along with major recommendations for the care management, follow-up, and education of the patient. For each PPP, a detailed literature search of PubMed and the Cochrane Library for articles in the English language is conducted. The results are reviewed by an expert panel and used to prepare the recommendations, which are then given a rating that shows the strength of evidence when sufficient evidence exists.

To rate individual studies, a scale based on the Scottish Intercollegiate Guideline Network (SIGN) is used. The definitions and levels of evidence to rate individual studies are as follows:

- I++: High-quality meta-analyses, systematic reviews of randomized controlled trials (RCTs), or RCTs with a very low risk of bias
- I+: Well-conducted meta-analyses, systematic reviews of RCTs, or RCTs with a low risk of bias
- I–: Meta-analyses, systematic reviews of RCTs, or RCTs with a high risk of bias
- II++: High-quality systematic reviews of case-control or cohort studies; high-quality case-control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal
- II+: Well-conducted case-control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal
- II–: Case-control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal
- III: Nonanalytic studies (e.g., case reports, case series)

Recommendations for care are formed based on the body of the evidence. The body of evidence quality ratings are defined by Grading of Recommendations Assessment, Development and Evaluation (GRADE) as follows:

- Good quality (GQ): Further research is very unlikely to change our confidence in the estimate of effect
- Moderate quality (MQ): Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate
- Insufficient quality (IQ): Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate; any estimate of effect is very uncertain

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Key recommendations for care are defined by GRADE as follows:

- Strong recommendation (SR): Used when the desirable effects of an intervention clearly outweigh the undesirable effects or clearly do not
- Discretionary recommendation (DR): Used when the trade-offs are less certain—either because of low-quality evidence or because evidence suggests that desirable and undesirable effects are closely balanced

In PPPs prior to 2011, the panel rated recommendations according to its importance to the care process. This "importance to the care process" rating represents care that the panel thought would improve the quality of the patient's care in a meaningful way. The ratings of importance are divided into three levels.

- Level A, defined as most important
- Level B, defined as moderately important
- Level C, defined as relevant but not critical

The panel also rated each recommendation on the strength of evidence in the available literature to support the recommendation made. The "ratings of strength of evidence" also are divided into three levels.

- Level I includes evidence obtained from at least one properly conducted, well-designed randomized controlled trial. It could include meta-analyses of randomized controlled trials.
- Level II includes evidence obtained from the following:
  - Well-designed controlled trials without randomization
  - Well-designed cohort or case-control analytic studies, preferably from more than one center
  - Multiple-time series with or without the intervention
- Level III includes evidence obtained from one of the following:
  - Descriptive studies
  - Case reports
  - Reports of expert committees/organizations (e.g., PPP panel consensus with external peer review)

This former approach, however, will eventually be phased out as the AAO adopted the SIGN and GRADE rating and grading systems.

The PPPs are intended to serve as guides in patient care, with greatest emphasis on technical aspects. In applying this knowledge, it is essential to recognize that true medical excellence is achieved only when skills are applied in a such a manner that the patients' needs are the foremost consideration. The AAO is available to assist members in resolving ethical dilemmas that arise in the course of practice. (AAO Code of Ethics)

Primary Open-Angle Glaucoma (Initial Evaluation)

Initial Exam History (Key elements)

- Ocular history (e.g., refractive error, trauma, prior ocular surgery)
- Race/ethnicity
- Family history
- Systemic history
- Review of pertinent records
- Current medications
- Prior glaucoma laser or incisional surgery

Initial Physical Exam (Key elements)

- Visual acuity measurement
- Pupil examination
- Confrontational visual fields
- Slit-lamp biomicroscopy
- IOP measurement
- Gonioscopy
- Optic nerve head (ONH) and retinal nerve fiber layer (RNFL) examination
- Fundus examination

Diagnostic Testing (Key elements)

- Central corneal thickness (CCT) measurement
- Visual field evaluation
- ONH, RNFL, and macular imaging

Management Plan for Patients in Whom Therapy is Indicated

- The goal of treatment is to control the IOP in a target range and ensure the ONH/RNFL and visual fields are stable
- Target IOP is an estimate and must be individualized and/or adjusted during the course of the disease
- Set an initial target pressure of at least 25% lower than pretreatment IOP. Choosing a lower target IOP can be justified if there is more severe optic nerve damage, if the damage is progressing rapidly, or if other risk factors are present (e.g., family history, age, or disc hemorrhages)
- The IOP can be lowered by medical treatment, laser therapy, or incisional surgery (alone or in combination)
- Medical therapy is presently the most common initial intervention to lower IOP (see Table 4 of the POAG PPP for an overview of options available); consider balance between side effects and effectiveness in choosing a regimen of maximal effectiveness and tolerance to achieve the desired IOP reduction for each patient
- If progression occurs at the target pressure, undetected IOP fluctuations and adherence to the therapeutic regimen and recommendations for therapeutic alternatives should be discussed before adjusting target IOP downward
- Assess the patient who is being treated with glaucoma medication for local ocular and systemic side effects and toxicity
- Laser trabeculoplasty may be used as initial or adjunctive therapy in patients with POAG (see Table 5 of the POAG PPP). Laser trabeculoplasty is effective in lowering IOP and may be performed to 180 degrees or to 360 degrees of the angle.

Perioperative Care for Laser Trabeculoplasty Patients

- The ophthalmologist who performs surgery has the following responsibilities:
  - Obtain informed consent from the patient or patient's surrogate decision maker after discussing the risk, benefits, and expected outcomes of surgery
  - Ensure that the preoperative evaluation confirms that surgery is indicated
  - At least one IOP check immediately prior to surgery and within 30 minutes to 2 hours after surgery
  - Follow-up examination within 6 weeks of surgery or sooner if there is concern about IOP-related damage to the optic nerve

Perioperative Care in Incisional Glaucoma Surgery Patients

- The ophthalmologist who performs surgery has the following responsibilities:
  - Perform gonioscopy preoperatively, especially when considering trabecular meshwork/Schlemm's canal-based MIGS (see Table 6 of the POAG PPP)
  - Obtain informed consent from the patient or patient's surrogate decision maker after discussing the risk, benefits, and expected outcomes of surgery
  - Ensure that the preoperative evaluation accurately documents findings and indications for surgery
  - Prescribe topical corticosteroids in the postoperative period
  - Follow-up evaluation on the first postoperative day and at least once during the first 1 to 2 weeks to evaluate visual acuity, IOP, and status of the anterior segment
  - In the absence of complications, perform additional postoperative visits during a 3-month period to evaluate visual acuity, IOP, and status of the anterior segment
  - Schedule more frequent follow-up visits, as necessary, for patients with postoperative complications (flat or shallow anterior chamber, early bleb failure, increased inflammation, or Tenon's cyst)

Primary Open-Angle Glaucoma (Initial Evaluation) *(continued)*

- Undertake additional treatments as necessary to improve aqueous flow into the bleb and lower IOP if evidence of bleb failure develops, including injection of antifibrotic agents, bleb massage, suture adjustment, release or lysis, or bleb needling
- Manage postoperative complications as they develop, such as repair of bleb leak or reformation of a flat anterior chamber
- Explain that filtration surgery places the eye at risk for endophthalmitis for the duration of the patient's life, and that if the patient has symptoms of pain and decreased vision and the signs of redness and discharge he or she should notify the ophthalmologist immediately

Patient Education for Patients with Medical Therapy

- Discuss diagnosis, severity of the disease, prognosis and management plan, and likelihood of lifelong therapy
- Educate about eyelid closure or nasolacrimal occlusion when applying topical medications to reduce systemic absorption
- Encourage patients to alert their ophthalmologist to physical or emotional changes that occur when taking glaucoma medications

Primary Open-Angle Glaucoma (Follow-up Evaluation)

Follow-up Exam History

- Interval ocular history
- Interval systemic medical history
- Side effects of ocular medications
- Review of pertinent medication use, including time of last administration

Follow-up Physical Exam

- Visual acuity measurement
- Slit-lamp biomicroscopy
- IOP measurement
- Perform gonioscopy if there is a suspicion of angle-closure component, anterior chamber shallowing or anterior chamber angle abnormalities, or if there is an unexplained change in IOP. Perform gonioscopy periodically
- ONH and visual field evaluation

Adjustment of Therapy

- Target IOP is not achieved and benefits of a change in therapy outweigh the risks
- Progressive optic nerve damage despite achieving the target IOP
- Patient's intolerant of the prescribed medical regimen
- Contraindications to individual medications develop
- Stable optic nerve status and low IOP occur for a prolonged period in a patient taking topical ocular hyopotensive agents. Under these circumstances, a carefully monitored attempt to reduce the medical regimen may be appropriate
- Downward adjustment of target pressure can be made in the face of progressive optic disc, imaging, or visual field change
- Upward adjustment of target pressure can be considered if the patient has been stable and if the patient either requires or desires less medication

Patient Education

- Educate about the disease process, the rationale and goals of intervention, the status of their condition, and relative benefits and risks of alternative interventions so that patients can participate meaningfully in developing an appropriate plan of action
- Patients considering keratorefractive surgery should be informed about the possible impact laser vision correction has on reducing contrast sensitivity and decreasing the accuracy of IOP measurements
- Patients with substantial visual impairment or blindness can be referred for and encouraged to use appropriate vision rehabilitation and social services

Follow-Up:

Consensus-based Guidelines for Follow-up Glaucoma Status

Target IOP Achieved	Progression of Damage	Duration of Control (months)	Approximate Follow-up Interval (months)*
Yes	No	≤6	6
Yes	No	>6	12
Yes	Yes	NA	1–2
No	Yes	NA	1–2
No	No	NA	3–6

IOP = intraocular pressure; NA = not applicable

*Patients with more advanced damage or greater lifetime risk from primary open-angle glaucoma may require more frequent evaluations. These intervals are the maximum recommended time between evaluations.

Primary Open-Angle Glaucoma Suspect (Initial and Follow-up Evaluation)

Initial Exam History (Key elements)

- Ocular history (e.g., refractive error, trauma, prior ocular surgery)
- Race/ethnicity
- Family history
- Systemic history
- Review of pertinent records
- Current and prior ocular and nonocular medications
- Prior cataract surgery, LASIK and/or incisional surgery

Initial Physical Exam (Key elements)

- Visual acuity measurement
- Pupil examination
- Confrontation visual field
- Slit-lamp biomicroscopy
- IOP measurement
- Gonioscopy
- Optic nerve head (ONH) and retinal nerve fiber layer (RNFL) examination
- Fundus examination

Diagnostic Testing (Key elements)

- Central corneal thickness (CCT) measurement
- Visual field evaluation. If visual field glaucomatous damage is newly detected in a glaucoma suspect patient, it is best to repeat testing
- ONH, RNFL, and macular imaging. Clinicians should include all perimetric and other structural information in addition to digital imaging technology when formulating patient management decisions

Management Plan for Patients in Whom Therapy is Indicated

- The goal of treatment is to monitor or lower IOP through treatment if an eye is likely to progress to POAG; monitor for structural changes in optic disc and retina; and monitor for functional changes of the optic nerve assessing the visual field
- The decision to treat a glaucoma suspect patient may arise in various settings (see POAG Suspect PPP for detailed considerations)
- Target IOP is an estimate and must be individualized and/or adjusted during the course of the disease
- Medical therapy is presently the most common initial intervention to lower IOP (see Table 2 of the POAG Suspect PPP for an overview of options available); consider balance between side effects and effectiveness in choosing a regimen of maximal effectiveness and tolerance to achieve the desired IOP reduction for each patient
- If a medical therapy fails to reduce IOP sufficiently, then either switching to an alternative medication as monotherapy or adding additional medication is appropriate until the desired IOP level is attained

Follow-up Exam History

- Interval ocular history
- Interval systemic medical and medication history
- Side effects of ocular medications if the patient is being treated
- Review of pertinent medication use if the patient is being treated, including the time of the last administration

Follow-up Physical Exam

- Visual acuity measurement
- Slit-lamp biomicroscopy
- IOP measurement
- Gonioscopy is indicated when there is a suspicion of development of an angle-closure component, anterior chamber shallowing, anterior chamber angle abnormalities, or unexplained change in IOP

Adjustment of Therapy

- Target IOP is not achieved and the benefits of a change in therapy outweigh the risks for the patient
- The patient is intolerant of the prescribed medical regimen
- The patient does not adhere to the prescribed medical regimen due to costs or other factors
- New systemic conditions or treatments develop that could be a contraindication to the current glaucoma therapy
- The patient under treatment has been stable for a prolonged period without progression to POAG, in which case cautious withdrawal of therapy may be considered
- The patient has converted to POAG (see Primary Open-Angle Glaucoma PPP)

Primary Open-Angle Glaucoma Suspect (Initial and Follow-up Evaluation) *(continued)*

Patient Education

- Discuss number and severity of risk factors, prognosis, life expectancy, management plan, and likelihood that therapy, once started, can be continued long term
- Educate about their condition and its potential to lead to glaucoma, the status of their condition, the rationale and goals of intervention, and relative benefits and risks of alternative interventions
- Educate about eyelid closure or nasolacrimal occlusion to reduce systemic absorption after medication instillation
- Encourage patients to alert their ophthalmologist to physical or emotional changes that occur when taking glaucoma medications
- Patients with substantial visual impairment or blindness can be referred for and encouraged to use appropriate vision rehabilitation and social services

Primary Angle-Closure Disease (Initial Evaluation and Therapy)

Initial Exam History (Key elements)

- Ocular history (e.g., blurred vision, halos around lights, eye pain, headache, eye redness)
- Family history of acute angle-closure crisis (AACC)
- Systemic history (e.g., use of topical or systemic medications)

Initial Physical Exam (Key elements)

- Refractive status
- Pupil examination
- Slit-lamp biomicroscopy
  - Conjunctival hyperemia (in acute cases)
  - Central and peripheral anterior chamber depth narrowing
  - Anterior chamber inflammation suggestive of a recent or current attack
  - Corneal swelling. (Microcystic edema and stromal edema are common in acute cases.)
  - Small corneal diameter (indicative of a smaller eye at greater risk for PACD)
  - Iris abnormalities, including diffuse or focal atrophy, posterior synechiae, abnormal pupillary function, irregular pupil shape, and a mid-dilated pupil (suggestive of a recent or current attack)
  - Lens changes, including cataract and glaukomflecken
  - Corneal endothelial cell loss
- IOP measurement
- Gonioscopy
- Evaluation of fundus and optic nerve head using direct ophthalmoscope or slit-lamp biomicroscope with an indirect lens, the central portion of the gonioscopy lens, or by imaging the retina and optic nerve with photography using a nonmydriatic camera through an undilated pupil

Diagnostic Testing (Key elements)

- Anterior segment imaging
- Ocular biometry
- Provocative testing

Management Plan for Patients in Whom Iridotomy is Indicated

- In patients with Primary Angle-Closure Suspect (PACS), iridotomy may be considered to reduce the risk of developing angle closure
- In acute angle-closure crisis (AACC), use medical therapy first to lower the IOP to reduce pain and to clear corneal edema (see Table 4 of the POAG PPP). Iridotomy should then be performed as soon as possible
- Laser iridotomy is the preferred surgical treatment for AACC because it has a favorable risk-benefit ratio; but patients with PACS who have not had an iridotomy should be warned of potential risk for AACC and certain medicines could cause pupil dilation and induce AACC
- Selection of cyclophotocoagulation over other procedures should be left to the discretion of the treating ophthalmologist, in consultation with the individual patient
- The fellow eye should be scheduled for a prophylactic iridotomy if the chamber angle is anatomically narrow, since approximately half of fellow eyes can develop AACC within 5 years
- Given the lack of convincing evidence for prophylactic use of iridoplasty in patients with plateau iris, and since iridoplasty can be painful and may cause inflammation, the decision of whether to observe or treat these eyes is left to the judgment of the testing ophthalmologist

Perioperative Care for Iridotomy Patients

- The ophthalmologist who performs surgery has the following responsibilities:
  - Obtain informed consent from the patient or patient's surrogate decision maker after discussing the risk, benefits, and expected outcomes of surgery
  - Ensure that preoperative evaluation confirms the need for surgery
  - Consider the preoperative use of a parasympathomimetic to facilitate LPI
  - Use topical ocular hypotensive agents perioperatively to prevent sudden IOP elevation, particularly for patients who have severe disease
  - Ensure the patency of the iridotomy by directly visualizing fluid flow of aqueous and pigment from the posterior to anterior chamber. Visualization of a red reflex alone is insufficient to confirm patency
  - Enlarge the iridotomy as necessary to achieve diameter of at least 100 microns
  - Perform at least one IOP check immediately prior to surgery and within 30 minutes to 2 hours following surgery
  - Prescribe topical corticosteroids in the postoperative period
  - Ensure that the patient receives adequate postoperative care

Primary Angle-Closure Disease (Initial Evaluation and Therapy) *(continued)*

- Follow-up evaluations include:
  - Confirm patency of iridotomy by visualizing zonules, the anterior lens capsule, or ciliary processes
  - IOP measurement
  - Perform dark-room gonioscopy with compression/indentation to assess the extent of peripheral anterior synechiae (PAS) if it was not performed immediately following iridotomy
  - Examine the fundus as clinically indicated

Follow-up of Patients after Iridotomy

- Patients (with or without glaucomatous optic neuropathy) with a residual open angle or a combination of open angle and some PAS should be followed at appropriate intervals to check for increasing PAS
- If IOP remains elevated long term and patient develops PAC or PACG, then ongoing medical therapy to lower IOP may become necessary (see follow-up procedures and intervals in POAG PPP)

Patient Education

- Patients with PAS who have not had an iridotomy should be warned of potential risk for AACC and that certain medicines could cause pupil dilation and induce AACC
- Patients should be informed about the symptoms of AACC and instructed to notify their ophthalmologist immediately if symptoms occur
- Patients with substantial visual impairment or blindness can be referred for and encouraged to use appropriate vision rehabilitation and social services