Supplementary File 1. Summary of Preferred Practice Patterns for Selected Conditions

SUMMARY OF PREFERRED PRACTICE PATTERNS FOR SELECTED CONDITIONS

Although ophthalmologists in VIEW II can treat patients according to their preferences, when possible, the following guidelines should be followed. The following preferred practice patterns have been developed with Bharatpur Eye Hospital, and draw heavily from the American Academy of Ophthalmology's Preferred Practice Patterns for:

- Primary Open Angle Glaucoma
- Angle Closure Glaucoma
- Diabetic retinopathy
- Age-related macular degeneration
- Refractive Errors & Refractive Surgery
- Cataract in the Adult Eye

Cataract

Cataract will be operated on at the discretion of the ophthalmologist and using either phacoemulsification or small incision technique, depending on ophthalmologist and patient preference. Ophthalmologists should pay attention to the following:

- **Antibiotic prophylaxis for endophthalmitis***:* intracameral cefuroxime will be given at the end of the case

- **Post-operative dilated exam:** all patients should receive a dilated fundus examination, ideally 1 month after surgery. Special attention should be made to examine the optic nerve for evidence of glaucoma, and the macula for evidence of DR and/or AMD.

- **Posterior capsular opacification:** patients should be examined every 12-24 months after cataract surgery; consider YAG capsulotomy if reduced vision due to PCO.

Refractive Error

Refractive error will be treated with spectacle correction. Patients may choose lenses according to their preferences. The option of bifocal lenses should be discussed with patients.

Age-related Macular Degeneration

- **Diagnosis (AREDS Staging):**
    - *Early (Stage 2)*
        - Small drusen (<63μ)
        - or few medium drusen (63-125μ)
        - and/or minimally detected or no pigment epithelial abnormalities
    - *Intermediate (Stage 3)*
        - Extensive medium drusen (63-125μ)
        - or ≥1 large drusen (≥125μ) in one or both eyes

- *Advanced (Stage 4)*
  - Neovascular AMD
  - or Geographical atrophy involving the center of the macula

- **Treatment**

  - *Early AMD*
    - Encourage smoking cessation; repeat examination in 24 months.

  - *Intermediate AMD*
    - Vitamin supplementation (instruct patient to see their regular doctor to review medications)
    - Encourage smoking cessation; give Amsler grid. Repeat examination in 12 months.

  - *Advanced—neovascular AMD*
    - Intravitreal injections with bevacizumab 1.25mg
    - "Treat and extend" strategy: injections every month until CNV activity resolves on OCT, then extend injection interval by 2-week intervals until a recurrence is observed. When a recurrence is observed then shorten interval by 2 weeks
    - Encourage smoking cessation; give Amsler grid.

  - *Advanced—central geographic atrophy:*
    - Encourage smoking cessation; repeat examination in 12 months.

Diabetic Retinopathy

- **Diagnosis**

  - *Screening exam frequency:*
    - Type I diabetes: patients with type I diabetes should have a screening dilated fundus examination 5 years after initial diagnosis, and then annually.
    - Type 2 diabetes: Patients with type 2 diabetes should have a screening dilated fundus examination at the time of diagnosis, and then annually.
    - Pregnancy: Pregnant patients with diabetes should have a screening dilated fundus exam early in the first trimester, and then every 3-12 months unless severe nonproliferative or proliferative diabetic retinopathy is present, in which case

  - *Dilated fundus examination:* Assess for signs of nonproliferative and proliferative diabetic retinopathy:
    - Mild nonproliferative diabetic retinopathy (NPDR): microaneurysms only
    - Moderate NPDR: more than microaneurysms, but less than severe NPDR
    - Severe NPDR: any of the following ("4-2-1" rule):
      - Severe intraretinal hemorrhages and microaneurysms in all 4 quadrants
      - Definite venous beading in at least 2 quadrants

        - Moderate intraretinal microvascular abnormalities in at least 1 quadrant
    - Proliferative diabetic retinopathy (PDR): neovascularization of the disc or elsewhere, or vitreous/pre-retinal hemorrhage
        - High risk PDR: the presence of any 3 of the following:
            - Neovascularization at any location
            - Neovascularization at the optic disk
            - Severe neovascularization (new vessels within 2 disk diameter of the optic nerve that are larger than ¼ to ⅓ the disk area, or neovascularization elsewhere at least ½ disk area)
            - Vitreous or preretinal hemorrhage
    - Clinically significant macular edema (CSME):
        - Thickening of retina at or within 500µm of the center of the macula
        - Hard exudates within 500µm of the center of the macula, when associated with retinal thickening
        - Zone of retinal thickening 1 disk area or larger, where any portion of the thickening is within one disk diameter of the center of the macula

- *OCT:* recommended for any patient with diabetes and unexplained vision loss, or in questionable cases of diabetic macular edema

- *Fluorescein Angiography:* should be performed in any patient who will have focal laser, who has unexplained vision loss, or to identify suspected but questionable neovascularization.

- **Treatment**

    - *All patients:* Make sure the patient has a primary care doctor to manage their diabetes. Counsel to encourage medication adherence, diet, and exercise

    - *Mild to moderate NPDR without macular edema:* re-examination within 6-12 months

    - *Mild to moderate NPDR with CSME:* treatment depends on whether the center of the macula is edematous:
        - Non-center involving CSME: treat with anti-VEGF injection
        - Center-involving CSME: treat either with focal laser or anti-VEGF injection

    - *Severe NPDR/non-high risk PDR***:** panretinal photocoagulation; if eye has macular edema, then treat with anti-VEGF or focal laser first.

    - *High-risk PDR:* panretinal photocoagulation; vitreoretinal surgery if eye is not amenable to laser treatment

Open angle glaucoma

- **Diagnosis:** this diagnosis should be made on several grounds:

- *History:* Family history, topical, local or systemic steroid use, previous ocular surgery, and certain systemic diseases (diabetes, asthma/COPD, migraine, vasospasm, cardiovascular disease) may be risk factors

- *Optic nerve exam on indirect ophthalmoscopy:*
  - Cup-to-disc ratio: in the Bhaktapur Glaucoma Study, the average cup-to-disk ratio was 0.26, while the highest 97.5th percentile was 0.6 and the highest 99.5th percentile was 0.8.[91] Thus, a suspicion of glaucoma is warranted at cup-to-disk ratios above 0.6, although it is also important to take into account the size of the disk and presence of other conditions such as myopia.
  - Disk hemorrhages suggest progressive disease and should be treated aggressively
  - Vertical elongation of optic cup with associated decrease in neuroretinal rim width: normally the rim width is widest inferiorly and narrowest temporally (ISNT rule); 80% of glaucoma patients do not obey the ISNT rule
  - Excavation of the cup
  - Thinning of the inferior and/or superior rim
  - Large extent of parapapillary atrophy
  - Nasalization of central optic nerve head vessels
  - Baring of the circumlinear vessel
  - Absence of neuroretinal rim pallor

- *Intraocular pressure:* in the Bhaktapur Glaucoma Study, the average intraocular pressure by Goldmann applanation tonometry was 13.3mmHg, the highest 97.5th percentile was 18mmHg, and the highest 99.5th percentile was 20mmHg.[91] Thus, a suspicion of glaucoma is warranted in individuals with intraocular pressure above 18mmHg. IOP should generally be measured before dilation, and before gonioscopy.

- *Humphrey visual field:* for this study, the 24-2 SITA Standard is the preferred visual field test. Please review the papers by Keltner et al and Sikhota et al for a review on different types of glaucomatous field defects.[92,93] Be sure to look for the following types of glaucomatous defects: altitudinal, arcuate, paracentral scotomas, nasal steps, and temporal wedges.

- *Retinal Nerve Fiber Layer on OCT:* a region of retinal nerve fiber layer thinning (<1%) on the OCT that corresponds to a visual field defect is highly suggestive of glaucoma.

- *Central Corneal Thickness:* Thinner corneas tend to underestimate intraocular pressure and thicker corneas tend to overestimate intraocular pressure; set target pressures accordingly. In the Bhaktapur Glaucoma Study, the average central corneal thickness in Nepali subjects was 539 (SD 33).[94]

- *Gonisocopy:* open angles; see section on angle closure glaucoma.

- *Secondary open angle glaucoma***:** if pseudoexfoliative material, trauma, pigment dispersion, or other retinal or optic nerve disease is present, consider the diagnosis of secondary open angle glaucoma

- **Treatment:** Treatment depends on the severity of glaucoma and the social situation of the patient. The recommendation for the study is to start with topical medications for mild and moderate glaucoma, and consider immediate surgery for advanced glaucoma.

  - *Goals of therapy/monitoring for progression:*
    - Control of intraocular pressure in the target range: For this study, the goal of therapy is an intraocular pressure less than 18 or a >25% reduction, whichever would result in the lower pressure. Patients should be seen at least every 3 months for the first year of therapy in order to monitor IOP, and every 6 months thereafter
    - Stable optic nerve/RNFL: annual OCTs of the RNFL should be monitored for progression
    - Stable visual fields: annual visual fields should be monitored for progression

  - *Topical therapy:* this depends on the price and availability; agents are listed in order of preference. Consider combined agents in patients who can afford them:
    - Prostaglandin analog: before bed
    - Beta blocker: twice daily
    - Alpha adrenergic agonist: twice daily
    - Carbonic anhydrase inhibitor: twice daily
    - Pilocarpine: up to 4 times daily
    - Oral carbonic anhydrase inhibitors: twice daily

  - *Adherence:* adherence is key to glaucoma therapy, but difficult to achieve. For this study, the study coordinator will contact patients regularly to ensure that they are taking their eyedrops. However, it is also important for the ophthalmologist to stress adherence at each visit.

  - *Surgical therapy:* normally trabeculectomy should be attempted first, and then a tube shunt procedure if the trabeculectomy fails. It is preferred to use an antimetabolite like mitomycin C when performing trabeculectomy. In patients with uveitis or in children, consider a primary tube shunt.

  - *Laser:* cytophotocoagulation of the ciliary body should usually be reserved for eyes that do not respond to other therapies, since this treatment may reduce vision.

  - *Follow-up:*
    - IOP: For this study, the goal of therapy is an intraocular pressure less than 18 or a >25% reduction, whichever would result in the lower pressure. Patients should be seen at least every 3 months for the first year of therapy in order to monitor IOP, and every 6 months thereafter.
    - OCT and visual fields should be repeated at least annually to monitor for progression. If progression is suspected, then more aggressive IOP-lowering therapy should be pursued.

Angle closure glaucoma:

- **Diagnosis:** this diagnosis requires gonioscopy; the following classification comes from the American Academy of Ophthalmology's Preferred Practice Pattern:
    - *Primary Angle Closure Suspect (PACS):* iridotrabecular contact, defined as iris touching the anterior chamber angle at or anterior to the posterior pigmented trabecular meshwork, for at least 180° of the angle. No PAS should be present, IOP should be normal, and no optic neuropathy should be present.
    - *Primary Angle Closure (PAC):* at least 180° iridotrabecular contact plus elevated IOP or PAS without a secondary cause. Other signs that may be visible include iris whorling (distortion of radially oriented iris fibers), "glaukomflecken" lens opacities, or excessive pigment deposition on the trabecular surface.
    - *Primary Angle Closure Glaucoma (PACG):* primary angle closure with evidence of glaucomatous optic neuropathy
    - *Acute angle closure crisis (AACC):* sudden obstruction of the anterior chamber angle, leading to a rapid increase in IOP, often accompanied by corneal edema, conjunctival /episcleral injection, eye pain, nausea, and vomiting.
    - *Plateau iris configuration and syndrome:* the presence of iridotrabecular contact even after peripheral iridotomy, with gonioscopy showing the peripheral iris closely apposed to the angle despite a deep central anterior chamber. IOP does not become elevated after pupillary dilation. If this condition is accompanied by IOP spikes, it is referred to as plateau iris syndrome.
- **Treatment:**
    - *Goals of therapy:*
        - Reverse/prevent the angle closure process
        - Control IOP
        - Prevent damage to the optic nerve
    - *Laser peripheral iridotomy:* Should be considered for eyes with PACS, PAC, PACG, and AACC. In cases of AACC, topical and oral IOP-lowering agents should be started before iridotomy to clear the cornea and reduce pain.
    - *Fellow eye:* Angle closure is usually bilateral. Examine the other eye; treat with laser peripheral iridotomy as needed.
    - *Follow-up:* patients should be followed up at least every 3 months during the first year of therapy; if IOP is elevated or signs of glaucoma are present then the patient should follow the recommendations for open angle glaucoma.