Hong Kong Reference Framework for Preventive Care for Older Adults in Primary Care Settings

Module on Visual Impairment

2017
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Advisory Group on Hong Kong Reference Framework for Preventive Care for Older Adults in Primary Care Settings

College of Ophthalmologists of Hong Kong

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Chapter 1 Introduction

1.1 Definition, prevalence and relevance to primary care providers in Hong Kong

Visual impairment is an important functional disability among older adults, which can be caused by a number of conditions. Visual impairment and blindness can be defined as:

- **Visual impairment**: visual acuity (VA) worse than 6/18, but equal to or better than 3/60 in the better eye
- **Blindness**: VA worse than 3/60 in the better eye

It is noted that:

- Refractive error is a common but correctable cause of visual disturbance; up to one third of persons older than 50 years are affected

Findings from a pilot study in Hong Kong suggested that cataract is the commonest cause of visual disability in people aged 40 years or older.

Other common conditions leading to visual impairment are age-related macular degeneration and glaucoma.

Role of primary care providers in caring older adults with visual impairment

1. **Prevention**:
   Promote awareness on eye health in older adults
   - e.g. general eye hygiene, eye protection against ultraviolet radiation exposure
   - Advise them to consult doctor if there is any suspicious symptom, e.g. sudden or rapidly progressive vision loss

2. **Early recognition and diagnosis**:
   Identify older adults with visual impairment
   - Especially for those who are independent, live alone and have limited social support, when early management may allow them to live independently and safely in the community

3. **Management and referral**:
   Older adults with severe visual impairment are prone to poor mobility, increased risk of accidental falls and hip fractures, social isolation, depression and poor social relationships. Primary care provider can help them to reduce these risks by:
   - Giving advice on daily living, and referring them to appropriate rehabilitation services and community resources
   - Promoting environmental and home safety
   - Offering a commitment to provide ongoing support and continued care
   - Offer appropriate referral according to the cause of visual impairment:
     - Ophthalmologist: when the suspected eye disease requires further assessment and treatment by ophthalmologist, or the treatment required cannot be offered by the primary care providers
1.2 Conditions leading to visual impairment in older adults

1.2.1. Common eye conditions in older adults

The four commonest causes of visual impairment are:
- Cataract
- Refractive errors
- Glaucoma
- Age-related macular degeneration

Other conditions that are frequently encountered in primary care settings:
- Diabetic/retinal vascular occlusion
- Eyelid pathologies
- Dry eyes

1.2.2 Conditions that require urgent specialist attention

Acute medical and ophthalmological conditions can cause visual impairment in older adults. For example,
- Transient ischaemic attack (amaurosis fugax)
- Arterial and venous occlusion
- Temporal arteritis
- Herpes zoster ophthalmicus (shingles)
- Herpetic keratitis/all other form of keratitis
- Acute glaucoma attack
- Retinal detachment/retinal break
- Macular degeneration with haemorrhage

Primary care providers should pay special attention in evaluating visual disturbance associated with alarming features (Table 1). Urgent ophthalmologist referral should be made for prompt diagnosis and interventions in order to reduce morbidity.

<table>
<thead>
<tr>
<th>Alarming features in older adults with visual disturbance</th>
<th>Possible underlying conditions</th>
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<tr>
<td>Visual disturbance of sudden onset</td>
<td>Transient ischemic attack (amaurosis fugax)</td>
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<td>Retinal thrombo-embolism</td>
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<td>Other acute ophthalmological conditions:</td>
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<td>Acute glaucoma</td>
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<td>Retinal detachment</td>
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<td>Retinal vein occlusion</td>
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<td>Macular degeneration with haemorrhage</td>
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</tbody>
</table>
| Red eye | Acute glaucoma attack  
Uveitis  
Keratitis  
Conjunctivitis |
|------------------|---------------------------------------------------------------|
| Severe eye pain | Acute glaucoma attack  
Uveitis  
Keratitis  
Orbital cellulitis |
| Severe headache +/- vomiting | Temporal arteritis  
Migraine  
Acute glaucoma  
Scleritis  
Iritis  
Malignant hypertension |
| Light flashes | Retinal detachment  
Retinal breaks  
Retinal tear  
Migraine  
Posterior vitreous detachment |
| Sudden increase in amount of eye floaters | Vitreous haemorrhage  
Retinal breaks  
Retinal detachment  
Posterior vitreous detachment |
| Double vision (diplopia), either binocular or monocular | Cranial nerve (e.g. oculomotor) palsy  
Opacity in cornea  
Cataract |
| Vesiculo-papular rash on tip of the nose or on the forehead | Herpes zoster ophthalmicus |
| Trauma or injury | Perforating injury  
Foreign body  
Chemical burns  
Corneal abrasion  
Orbital fracture  
Hyphema  
Retinal detachment  
Glaucoma |
Chapter 2 Opportunistic screening of visual impairment in older adults

2.1 Background

The recommendation regarding screening of eye problems differ between overseas authorities:

American Academy of Ophthalmology recommends patients aged 65 or older without risk factors for eye disease should have comprehensive medical eye evaluations in every 1–2 years\(^5\).

However, the United States Preventive Service Task Force (USPSTF) concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening for impaired visual acuity in older adults\(^6\).

Hong Kong Reference Framework for Preventive Care for Older Adults in Primary Care Settings recommends opportunistic screening of visual impairment for community-dwelling older adults\(^7\).

2.2 Recommended opportunistic screening strategies for asymptomatic older adults

The recommended methods for opportunistic screening include:

1. Direct enquiry on any visual disturbance
2. Visual acuity (VA) test: with Snellen chart and pin hole

2.2.1 Direct enquiry on any visual disturbance

Ask questions such as\(^8,\,9\):

- “Do you have any visual problems?”
- “Do you have difficulty in reading or any of your daily activities because of your eyesight (even with eyeglasses)?”

If the older adults have concerns on their vision, primary care providers can proceed with visual acuity test with Snellen chart (Section 2.2.2) and carry out further evaluation (Section 3.2).

2.2.2 Visual acuity (VA) test

Snellen chart is a more accurate method in assessing visual acuity than screening questions\(^10\). Annex I of this module describes the use of a 6-metre Snellen chart for measurement of VA. Suggested follow up of the opportunistic screening results will be described in Chapter 3.

Points to note when performing VA test

- Carry out the test in an unhurried manner
- Ensure the older adults are able to follow the instructions
- Test one eye each time and ensure correct placement of pinhole cover when testing each eye
- Document visual acuity of each eye clearly
- VA test can be carried out by adequately trained health care workers
2.3 Older adults with known eye diseases or diabetes mellitus

The approach for older adults with known eye diseases or diabetes mellitus should be different from asymptomatic individuals (as below):

2.3.1 Older adults with known eye disease

Older adults with known eye disease should be reminded to seek medical consultation with their primary care providers or ophthalmologists if there is any new or worsening of eye symptom.

2.3.2 Older adults with known diabetes mellitus

According to Module 10 (diabetic eye disease), Hong Kong Reference Framework for Diabetes Care for Adults in Primary Care Settings\(^{11}\), older adults with diabetes mellitus should have regular systematic eye assessment, which includes:

- Visual acuity, lens opacity and retinopathy at the diagnosis of diabetes mellitus
- Retinal photography by experienced personnel (either trained technicians or optometrists). The results should be interpreted carefully by doctors, to decide if referral to ophthalmologist is needed

These examinations should be done annually. Less frequent examinations (every 2 to 3 years) may be considered following one or more normal examinations. More frequent examinations should be done if the patient is at high risk of developing diabetic retinopathy.
Chapter 3 Follow up after opportunistic screening

3.1. Follow up actions according to the opportunistic screening results

1. **No visual complaints on direct enquiry**
   - Repeat opportunistic screening in about one year’s time as appropriate
   - Provide advice on visual health such as protection against ultraviolet radiation (e.g. sunlight) exposure
   - Advise the older adults to consult doctor if there is any suspicious symptom, e.g. sudden or rapidly progressive vision loss

2. **Corrected VA 6/12 or better in Snellen chart**
   Primary care providers can proceed with:
   - Asking the older adults is there any other eye symptoms, and
   - Carrying out appropriate eye examination (including cornea, pupils and direct ophthalmoscopy)
   If the older adults have no other eye symptoms or signs, they can be referred to optometrist for eyeglasses prescription.

3. **Corrected VA worse than 6/12 OR any eye symptoms or signs**
   - The older adults should be further evaluated by primary care providers -- as described in the next section (Section 3.2)

The diagram shown on next page (Figure 1) has summarised the recommended opportunistic screening and follow up actions of visual impairment in older adults.
Figure 1. Opportunistic screening of visual impairment in older adults

**Older adults (age 65 or above); non-diabetic**
Ask questions; such as:
- “Do you have any visual problems?”
- “Do you have difficulty in reading or any of your daily activities because of your eyesight (even with eyeglasses)?”

**Yes**

**Test visual acuity (VA) with Snellen chart and pin hole**
- Carry out unhurried and ensure that the older adults are able to follow the instructions
- Test one eye at a time and ensure correct placement of the pinhole cover
- Document visual acuity of each eye clearly

**Corrected VA 6/12 or better**

**Primary care doctor can proceed with**
- Asking if there is any other eye symptom
- Appropriate eye examination (including cornea, pupils and direct ophthalmoscopy)

**No other eye symptoms or signs**
- Optometrist for eyeglasses

**Corrected VA Worse than 6/12**

**Other eye symptoms or signs present**
- Further evaluation by primary care doctor
3.2. Further evaluations in primary care setting

The purpose of the evaluations is to:
- Identify the cause(s) of visual impairment
- Guide the subsequent management, referral and follow up

The evaluations include:
- History
- Physical examination
- Investigation

3.2.1. History

Important history that should be included in the evaluations:
- Description of the visual disturbance
- Past and present medical history
- Medications: look for possible adverse ocular reactions (refer to Section 5.1.2)
- Social history: smoking and alcohol consumption
- Unprotected ocular exposure to ultraviolet radiation, e.g.
  - Outdoor activities with excessive sunlight exposure
  - Occupation involving outdoor work or arc-welding
- Family history of eye diseases, e.g. glaucoma and age-related macular degeneration
- Impact on daily activities e.g. reading, writing, television, telling the time, cooking, telephoning, social interactions
- Past ocular history

3.2.2. Physical Examination

The aim of physical examinations is to look for signs of:
- Common causes of visual impairment in older adults:
  - Cataract
  - Age-related macular degeneration (AMD)
  (Refractive errors should have been noted by VA test with Snellen chart in the opportunistic screening)
- Other common eye diseases
- Medical conditions that could cause visual impairment

Suggested approach:
1. Gross inspection
   - Eyelids (e.g. skin conditions, swellings, ptosis, lid retraction)
   - Eye surface and cornea (e.g. pterygium encroaching onto the visual axis)
2. Light torch examination
   - Pupillary reflexes
   - Corneal opacities
3. Visual fields by confrontation, and eye movements (if indicated)
4. Amsler grid:
   - For suspected age-related macular degeneration (e.g. complaint of distorted images or blurring of central vision). Please refer to Annex II on the use of Amsler grid.

5. Direct ophthalmoscopy
   - For signs of cataract such as shadows in or absence of red reflex
   - Retina, optic disc, blood vessels, macula

6. General medical examinations
   - Blood pressure (hypertension)
   - Pulse: check for irregularity (atrial fibrillation; which increases the risk for thromboembolism)
   - Carotid bruit and heart murmurs (thromboembolism)
   - Goitre and signs of thyrotoxicosis (thyroid eye disease)

3.2.3. Investigations
Primary care providers can perform selective investigations, if the older adults’ visual impairments are possibly related to certain common medical conditions / risk factors:

- Blood tests
  - Blood sugar: diabetes mellitus
  - Lipid profile: cardiovascular risk
  - Thyroid function tests
  - Erythrocyte sedimentation rate (ESR): for suspected temporal arteritis

- Electrocardiography (ECG): atrial fibrillation

Other investigations are preferably to be done after consultation with ophthalmologists. For example:

- Serum autoimmune disease markers: in uveitis related to rheumatological conditions
- Imaging: e.g. computed tomography (CT) or magnetic resonance imaging (MRI) of brain/ orbits

Annex III is a diagrammatic summary of screening and follow up management of older adults’ visual impairment in primary care setting.
Chapter 4 Common eye diseases in older adults

4.1. Refractive errors

Refractive errors affect up to one third of people older than 50 years\(^1\). For patients with uncontrolled diabetes, hyperglycaemia can cause transient refractive changes\(^{12, 13}\). One of the common causes of refractive errors among older adults is presbyopia. Other common causes of refractive errors are myopia, hyperopia and astigmatism\(^{14}\).

**Symptoms of presbyopia\(^{15}\)**
- Difficulty in focusing near objects. To compensate, the patient may look at the objects a bit further away
- Eye strain (tiredness, burning sensation) and headache after prolonged reading, which may be relieved by rest
- Difficulty to switch focus from close to distance objects and vice versa, resulting in a short period of blurring

**Physical examination**

Snellen chart (for distant vision) can detect refractive errors. Improvement in visual acuity with a pinhole card usually indicates an existing refractive error worth correcting with eyeglasses.

**Role of primary care providers in caring older adults with refractive errors**
- Review the older adults’ functional status and manage according to their needs
- Refer older adults to optometrist for correcting refractive errors as appropriate
  - For those with corrected visual acuity 6/12 or better and with no other eye symptoms or signs (see Section 3.1).
- Advise on proper choice of eyeglasses
  - Use appropriate prescription eyeglasses
  - Discourage the use of ready-made eyeglasses bought over-the-counter which are not customised
  - Warn about use of bifocals or progressive lenses
    - There has been a concern that these lenses may impair distant depth perception and distant edge-contrast sensitivity, hence increase the risk of fall in older adults\(^{16}\)
    - The users should be advised to allow sufficient time to accommodate in daily use and be cautious when going up or down stairs
- Screen for diabetes mellitus in older adults who present with visual symptoms suggestive of fluctuation of refractive status
4.2. Cataract

Cataract is defined as a partial or complete opacity in the lens or its capsule, impairing vision or causing blindness. The prevalence of cataract rises from about one in five in the 65 to 74 age group, to about three in four in those aged over 85\textsuperscript{17}.

**Risk factors**
- Advancing age
- Diabetes mellitus
- Ocular exposure to ultraviolet radiation
- Steroid use
- Cigarette smoking
- Female Sex

**Symptoms**
- Decreased visual acuity
- Loss of contrast sensitivity
- Glare (especially around lights at night)
- Monocular diplopia

**Treatment**
Cataract can be treated by surgery. Cataract surgery involves extraction of cataract, followed by implanting intra-ocular lens. Early cataract surgery, for at least one eye, has been shown to reduce falls and other injuries in a longitudinal cohort study\textsuperscript{18}.

**Role of primary care providers in caring older adults with cataract**
- Control risk factors: smoking cessation, eye protection against ultraviolet or solar radiation exposure
- Advise on appropriate illumination
- Screen for diabetes mellitus if indicated
- Make appropriate referral to ophthalmologists especially when there is:
  - Significant visual impairment (e.g. VA 6/18 or worse) affecting daily functions
  - Presence of other ocular morbidities (e.g. glaucoma, age-related macular degeneration, diabetic retinopathy, etc.)

4.3 Age-related macular degeneration

Age-related macular degeneration (AMD) causes damage to the retina, resulting in loss of vision in the centre of the visual field. AMD is the leading cause of blindness among those above 60 years of age\textsuperscript{19}.

AMD is classified into dry and wet types:
- Dry (non-exudative) AMD
About 90% of AMD cases are of this type

Characterised by drusen and areas of depigmentation in the retinal pigmented epithelium, alternating with bands of hyperpigmentation

Visual acuities in dry AMD patients are relatively stable over time (in terms of years)

- Wet (exudative) AMD

  Characterised by neovascularisation (growth of abnormal blood vessels from choroidal to the sub-retinal space)\(^{20}\). The new blood vessels are fragile and may leak fluid or bleed into the macula, eventually leading to the formation of a fibro-vascular scar and resulting in irreversible blindness

  Visual acuity worsens over a short period (within weeks) with metamorphopsia

Risk factors\(^{21}\)

- Advancing age
- Family history of AMD
- Hypertension
- Smoking
- Hyperlipidaemia
- Ultraviolet radiation exposure

Symptoms

Majority of patients with non-exudative AMD are asymptomatic or suffer from gradual loss of vision. Loss of vision may occur in geographic atrophy (advanced form of dry AMD), or wet AMD.

Classical symptoms of wet AMD are:

- Blurred central vision and distorted vision (metamorphopsia)
- Central scotoma

Treatment

Wet AMD requires timely referral to and treatment by ophthalmologist since delay in treatment may result in permanent damage to central vision. Treatment aims at preserving the remaining vision and lifelong monitoring is often needed.

Possible options

- Direct focal laser (photocoagulation)
  - Tiny burns on the retina were made with a special laser to seal the blood vessels
  - This treatment method is out-dated as it is associated with an immediate and dramatic drop in Snellen visual acuity of up to 6 lines\(^{21}\)
- Photodynamic therapy
  - A photosensitizer (e.g. verteporfin) is injected intravenously and the neo-vascular lesions are then irradiated with a diode laser. The excited photosensitizer generates free radicals which, by damaging vascular epithelium, cause thrombosis within the irradiated vessels\(^{22}\)
  - Can slow down visual impairment in selected cases
Injection of vascular endothelial growth factor (VEGF) inhibitors

- By intravitreal injection of anti-VEGF antibody, e.g. bevacizumab, ranibizumab and aflibercept
- Can effectively control the disease with improvement in vision and macular condition in selected cases. Timely referral to ophthalmologists for treatment is required for better outcome

The use of anti-oxidant vitamin and mineral supplements in patients with AMD

- Based on the hypothesis that oxidative damage to the retina are caused by free radicals, anti-oxidant supplements might be used for prevention of such damage
- A randomised clinical trial found that high-dose oral supplementation with vitamins C, vitamin E, beta carotene, and zinc may lower the risk of developing advanced age-related macular degeneration in high risk patients. However, addition of luteins, zeaxanthin (carotenoids), omega-3 long-chain polyunsaturated fatty acids (docosahexaenoic acid [DHA], eicosapentaenoic acid [EPA]) did not further reduce the risk of progression to advanced AMD in another randomised clinical trial.
- There is no solid evidence to support their use in asymptomatic individuals
- Primary care providers should alert patients on the possible adverse effects associated with these supplements in high doses. For example,
  - Beta carotene may cause yellowish discolouration of skin and may increase the risk of lung cancer in smokers
  - Zinc supplementation at high levels has been shown to increase hospitalisations due to genitourinary causes (e.g. urinary retention associated with benign prostatic hyperplasia, urinary tract infection, urinary lithiasis and renal failure)

Role of primary care providers in caring older adults with age-related macular degeneration

- Control risk factors: blood pressure control, smoking cessation, control hyperlipidaemia, eye protection against ultraviolet or solar radiation exposure
- Make appropriate referral to ophthalmologist for considering treatment options, particularly if the older adults have:
  - Wet (exudative) AMD
  - Accelerated phase with acute vision loss or metamorphopsia
  - Significant visual impairment (e.g. VA 6/18 or worse) affecting daily functions
  - Presence of other ocular morbidities (e.g. glaucoma, cataract, etc.)

4.4 Diabetic and hypertensive retinopathy

4.4.1 Diabetic retinopathy

Diabetes mellitus is a known risk factor for developing cataract, glaucoma and retinal disease (retinopathy). Diabetic retinopathy is the leading cause of blindness in elderly suffering from diabetes mellitus. Early diagnosis and treatment of diabetes can prevent up to 98% of severe visual loss.
**Symptoms**

- Can be asymptomatic
- Some patients may have decrease in visual acuity, contrast sensitivity, colour perception, or dark/light adaptation
- Some may also have disabling glare, visual distortion and scotomas

**Physical examination**

Ophthalmoscopy can be used to detect the following signs of diabetic retinopathy:

- **Non-proliferative stage**
  - Micro-aneurysms (capillary wall outpouching)
  - Dots and blot haemorrhages (rupture of the micro-aneurysms in the deep layers of the retina)
  - Flame-shaped haemorrhages (splinter haemorrhages in the superficial nerve fibre layer)
  - Hard exudates (break-down of the blood-retina barrier, allowing leaking of serum proteins and lipids from the blood vessels)
  - Cotton-wool spots (nerve fibre layer infarctions from occlusion of precapillary arterioles)

- **Proliferative stage**
  - Neovascularisation (marker of the proliferative stage)
  - Pre-retinal haemorrhage: may appear as a boat shaped pocket of blood
  - Vitreous haemorrhage: may appear as a diffuse haze or as clumps of blood clots within the vitreous
  - Retinal detachment

- **Macular oedema**

**Treatment**

- **Good glycaemic control**
  - The Diabetes Control and Complications Trial (DCCT) found that intensive glucose control in patients with insulin-dependent diabetes mellitus reduced the incidence and progression of diabetic retinopathy. It would be logical to assume that the same principle could apply to non-insulin-dependent diabetes mellitus patients

- **Intravitreal injections of medications**
  - Steroids (triamcinolone): to reduce macular oedema
  - Anti-vascular endothelial growth factors (Anti-VEGF), e.g. bevacizumab, ranibizumab, aflibercept which may reduce macular oedema and neovascularisation

- **Laser photocoagulation**
  - In non-proliferative diabetic retinopathy: for treatment of clinically significant macular oedema
  - In proliferative diabetic retinopathy: pan-retinal laser photocoagulation is used when laser burns are applied over the entire retina, sparing the central macular area

- **Vitreous and retinal surgeries**
  - For treatment of non-resolving vitreous haemorrhage and severe diabetic retinopathy
role of primary care providers in caring older adults with diabetic retinopathy

- Ensure diabetic patients have systematic and regular eye screening (refer to Section 2.3)
- Optimise glycaemic control
- Refer patients with significant retinopathy to ophthalmologist for assessment, treatment and follow up

4.4.2 Hypertensive retinopathy

Hypertension is the risk factor for retinal vein and artery occlusion, ischaemic optic neuropathy, glaucoma and age-related macular degeneration\textsuperscript{34}. Uncontrolled high blood pressure may also cause direct damages to the retina, choroid and optic nerve, resulting in vision loss. Hypertensive retinopathy is found in 3-14\% of patients over 40 years of age and may predict cardiovascular outcomes, such as stroke and myocardial infarction, independent of blood pressure measurements\textsuperscript{34}.

Symptoms

Hypertensive retinopathy is usually asymptomatic. Blurred vision and visual field defects may occur at later stages when there are ocular complications (vascular occlusions) from hypertension e.g. branch retinal vein occlusion (BRVO), branch retinal artery occlusion (BRAO), central retinal vein occlusion (CRVO), central retinal artery occlusion (CRAO), and ocular ischemia syndrome, etc.

Physical examination

According to Keith-Wagener-Baker classification\textsuperscript{35}, the characteristic features of hypertensive retinopathy that can be detected by ophthalmoscopy are:

- Grade I: silver wiring (atherosclerotic change in arterioles)
- Grade II: arteriovenous nipping (compression of venules at arteriovenous crossing)
- Grade III: retinal oedema, cotton wool spots and flame-shaped haemorrhages
- Grade IV: swelling of optic disc (papilledema)

Treatment

- Optimise blood pressure control
- For significant visual impairment (usually resulting from complications of hypertension e.g. retinal vein occlusion and macula oedema subsequent to retinal vessels occlusion), referral to ophthalmologist is necessary
- Specific treatment depends on the nature of problems which may include:
  - Intravitreal injection of corticosteroids or anti-vascular endothelial growth factors (Anti-VEGF)
  - Laser treatment

Role of primary care providers in caring older adults with hypertensive retinopathy

- Optimise blood pressure control
- Screening
  - There was no evidence that screening hypertensive retinopathy can prevent vision loss
However, fundus photography may sometimes pick up retinal vascular complication, e.g. branch retinal vein occlusion in asymptomatic patients and they should be referred to ophthalmologists.

- Ophthalmological intervention is usually not necessary for most hypertensive retinopathy. However, if there is significant visual impairment, or when retinal vascular complication, e.g. retinal vein or artery occlusion, or macular oedema is suspected, referral to ophthalmologist for assessment and treatment is necessary.

### 4.5 Glaucoma

Glaucoma is the leading cause of blindness in Hong Kong. It is an optic neuropathy associated with characteristic structural damage of the optic nerve and visual field defect caused by various pathological process. It can be categorised into:

1. **Primary glaucoma**, which can be further classified into:
   - Open-angle: diagnosed by characteristic ophthalmological findings, in the setting of an open anterior chamber angle as measured by gonioscopy.
   - Angle-closure: appositional or synechial closure of the anterior chamber angle.

2. **Secondary glaucoma**, which is less common, and can be caused by eye diseases that lead to raised intraocular pressure, e.g. prolonged steroid use, uveitis, retinal diseases or trauma, etc.

**Risk factors**

Risk factors for open-angle glaucoma:
- Advancing age
- Family history of glaucoma
- Type 2 diabetes mellitus
- High myopia (defined as over -6.0 D)
- Long term steroid use
- Hypertension

Risk factors for angle-closure glaucoma:
- Advancing age
- Family history of angle-closure glaucoma
- Chinese or Indian ethnic origins
- Female
- Hyperopia

**Screening**

Currently there is no consensus on systematic screening of glaucoma. However, it is not uncommon that older adults express concerns and worries on glaucoma. Occasionally they would consult doctors with eye pressure measurement reports from optical shops.
Symptoms
Primary care providers should be aware of the different clinical presentations of acute and chronic glaucoma.

- **Acute angle-closure glaucoma** can present as acute painful eye, blurring vision and red eye. It is an ocular emergency requiring prompt referral and treatment, or else it can lead to irreversible blindness.
- Otherwise, most glaucoma patients are asymptomatic in early stage. There may be an initial insidious loss of peripheral vision that eventually progresses and leads to decrease in visual acuity. Other symptoms include difficulty seeing in dim light, decreased contrast sensitivity, disabling glare and decreased dark/light adaptations. Tunnel vision only occurs in advanced stage.

Physical examination
- Glaucoma patients may have decreased visual acuity.
- Peripheral visual field loss in both early and moderate diseases is usually not revealed by confrontation visual field examination, which can only detect significant visual field loss (e.g. tunnel vision) in advanced disease.
- Direct ophthalmoscopy examination on the optic disc may reveal an increased cup-disc ratio, thinning or notching of the disc rim or disc haemorrhages.

Further ophthalmological assessment
- Assessment by ophthalmologist is often required for the diagnosis of glaucoma.
- Measurement of intraocular pressure alone is insufficient as some glaucoma patients have normal intraocular pressure (21mmHg or below). Up to 30% of all chronic glaucoma cases are normal tension glaucoma.
- The diagnosis should include detection of typical optic disc abnormality and characteristic visual field defect (by perimetry).

Treatment
Effective treatments are available depending on the type of glaucoma. Occasionally, curative treatment may be available for certain types of secondary glaucoma. However, for chronic glaucoma, continued treatment and monitoring is required which aim at slowing down disease progression and preventing further visual loss.

Treatment modalities of glaucoma include:
- **Topical medications (eye drops)**
  - Aim at reducing intraocular pressure, e.g. beta-blockers (timolol), prostaglandins analogues (lantanoprost), carbonic anhydrase inhibitor and alpha-2 agonists.
- **Laser treatment**
  - There are different laser procedures which may be available for control of open-angle and angle-closure glaucoma. Detailed evaluation by ophthalmologists is required.
- **Surgery**
Usually only consider when the above treatment fails. Depending on the type and stage of glaucoma, it may involve surgical removal of part of the trabecular meshwork, hence allowing fluid flow through the eye’s drainage system.

**Role of primary care providers in caring older adults with glaucoma**

- Be aware of the clinical presentations of acute glaucoma which require prompt referral to ophthalmologist.
- Currently there is no consensus on systemic screening for glaucoma in asymptomatic individuals. Nonetheless, opportunistic screening for visual impairment (refer to Chapter 2 and Chapter 3), and if necessary, examination of the optic nerve by direct ophthalmoscopy and appropriate referral may help primary care providers to identify older adults with chronic glaucoma at an earlier stage.
Chapter 5 Management in primary care settings

Primary care providers are involved in the management of visual impairment in older adults in the following ways:

1. Identify and manage underlying modifiable factors of visual impairments (Section 5.1), including:
   - Cardiovascular risk factors that are frequently associated with eye diseases in older adults, such as diabetes mellitus, hypertension, hyperlipidaemia and smoking (Section 5.1.1)
   - Adverse drug reactions on the eyes (Section 5.1.2)
   - Exposure to ultraviolet or solar radiations (Section 5.1.3)

2. Refer them to optometrist for eyeglasses if they have been assessed to have refractive errors

3. Refer them to ophthalmologist when further assessment or the treatment required cannot be offered by the primary care providers (Section 5.2)

4. Support visually impaired older adults and their caregivers in the community (Section 5.3):
   - Give advice on daily living (Section 5.3.1)
   - Refer them to appropriate rehabilitation services (Section 5.3.2) and community resources (Section 5.3.3)
   - Promote environmental and home safety (Section 5.3.4)
   - Assess and reduce fall risk (refer to the “Module on Falls in Elderly, Hong Kong Reference Framework for Preventive Care for Older Adults in Primary Care Settings”)

5.1 Risk factor identification and management

5.1.1 Manage cardiovascular risk factors

Cardiovascular risk factors, such as diabetes mellitus, hypertension, hyperlipidaemia and smoking, are frequently associated with common eye diseases in older adults, as described in Chapter 4. Primary care providers are in the best positions in the detection and management of these risk factors, for example:

- Diabetes mellitus
  - For early detection of diabetes
    - Screen for diabetes in older adults who have visual symptoms suggestive of fluctuation of refractive status
  - For those are known to have diabetes
    - Ensure that they are receiving systematic and regular eye screening (refer to Section 2.3)
    - Optimise their glycaemic control
    - Ensure patients with significant retinopathy are properly referred or followed up by ophthalmologist

- Hypertension
  - Optimise blood pressure control

- Hyperlipidaemia
  - Optimise blood lipid control

- Smoking
  - Engage older adults to quit smoking
5.1.2  **Optimise medications to avoid adverse drug reactions on the eyes**

A number of drugs used by older adults can cause ocular adverse effects. Examples are:

- Anti-resorptive drugs for osteoporosis
- Anti-inflammatory drugs: cyclooxygenase-2 (COX-2) inhibitors
- Anti-tuberculosis drugs: ethambutol, isoniazid
- Erectile dysfunction treatment: phosphodiesterase type 5 (PDE5) inhibitors
- Hydroxychloroquine
- Tamoxifen
- Vitamin A
- Amiodarone
- Steroid (any route of administration)

Primary care providers should review older adults’ medications including drugs prescribed by doctors and over-the-counter drugs regularly for possible ocular adverse effects, and optimise these medications as appropriate.

5.1.3  **Promote awareness on the protection from ultraviolet (UV) and solar radiations**

Ocular exposure to UV and solar radiations is a known risk factor for cataract and age-related macular degeneration. Older adults should be advised to have adequate and routine protection from these exposures, for example, by wearing sunglasses and hats during outdoor activities. Centre for Disease Control and Prevention (CDC) of the United States recommends wearing sunglasses that block 99–100% of UV-A and UV-B radiation for eye protection.

5.2  **Referral**

5.2.1  **Referral to optometrist**

Referral to optometrist should be considered if the older adult has decreased visual acuity, which is correctable to 6/12 or better, and without other eye symptoms or signs.

Optometrist can help in the following ways:

- Eyeglasses prescription for refractive errors
- Education on general eye care
- Recommendations on low visual aids as appropriate, e.g. magnifiers, telescopes, filters and computer adaptive devices

5.2.2  **Referral to ophthalmologist**

Referral to ophthalmologist should be considered in the following conditions:

- Ocular emergency (Section 1.2.2), in which urgent referral is needed
- Corrected visual acuity (VA) worse than 6/12 in the opportunistic screening (Section 2.2): to confirm cause(s) and offer treatment accordingly
- When the suspected ocular pathologies:
require further assessment and treatment by ophthalmologist; or
require treatment that cannot be offered by the primary care providers

- Cataract: for consideration of surgery when the VA is 6/18 or worse; or when daily activities are affected

5.3 Supporting visually impaired older adults and their caregivers in the community

Primary care providers can help older adults to cope with visual impairment in the community, for example:

- General advice on daily living
- Referral to rehabilitation services
- Referral to community resources
- Advice on environmental and home safety

5.3.1 General advice on daily living

Brief and yet effective advice to visually impaired older adults includes:

- Adequate lighting
- Avoiding clutter and keeping things organised with the use of container and trays
- Bright colour contrast
- Tactile markings, e.g. use containers of different shapes, put rubber bands around containers
- Large and simple written/ print labels
- Use hand-held magnifiers
- Keeping finger downwards when reaching for an item on table, lightly touching the table top to avoid over-turning items.

Some of these advice are also useful in managing their own medications. For example, use pill organisers, label medication bottles/ packs with tapes of different colours, put rubber bands around some of the bottles, label bottles with large prints (e.g. C for calcium) and use hand-held magnifiers for reading the medicine labels.

5.3.2 Referral to rehabilitation services

Referral to rehabilitation services should be considered for visually impaired older adult who have problems on self-care, live alone or have limited caregiver support.

Allied health professionals in the rehabilitation services, for example, occupational therapists, can assess the older adult's condition, teach them new skills, help them to adapt activities of daily living, and modify their living environment. These strategies can maximise the functional status of the older adults as well as lower their risk of injury and fall.

Social Welfare Department of Hong Kong provides training service to visually impaired persons with a view to developing their independent living skills, helping them to regain self-confidence and re-integrating into
the community. Referrals can be made by medical social workers to the Hong Kong Society for the Blind. Self-referrals are also accepted.

(Refer to Annex IV for information)

5.3.3 Community resources
There are local resources that support visually impaired persons and their families in the community. The services include:

- Eye care and rehabilitation services
- Home and environmental safety services
- Escort services
- Education, peer and caregiver support and training
- Shopping and facilities

A non-exhaustive list of these resources is available in Annex IV.

5.3.4 Environmental and home safety
Selected local and overseas recommendations on environmental and home safety for visually impaired persons are summarised as follows:

1. The National Health Service (NHS) of United Kingdom recommends the use of
   - Big-button telephones
   - Computers with modified keyboards, special screen display and text readers software that can help the visually impaired to stay connected with others through internet
   - Community alarm
   - Bright lighting, allowing the obstacles to be shown clearly and hence reducing risk of fall

2. Environmental Advisory Service, a community architectural consultancy service under the Rehabaid Society, Hong Kong, has listed some tips on environmental hazards and solution for the visually impaired
   - Floor surface should be non-slip with secure coverings
   - Doors should not open to circulation areas
   - Electric induction cooker with auto switch-off will be more safe
   - Door knobs may be preferred to lever handles to avoid catching clothing
   - Appropriate environmental design, mobility and orientation training is essential

The Hong Kong Housing Society (Elderly Service) and the Hospital Authority of Hong Kong (Smart Elders) also provided information on home safety (Annex IV).
Annex I

Measurement of Visual Acuity (VA) using a 6-metre Snellen chart

Equipment:
- 6-metre (20 feet) visual acuity (VA) chart (e.g. Snellen’s E Chart)
- Pointer
- Occluder
- Pinhole

Procedure:
1. Test the patient’s right eye first by covering the left eye
2. Instruct and encourage the patient to read the VA chart until the smallest line possible
3. If the patient is able to read more than half of the letters on a particular line, instruct him/her to try reading the next line (with smaller letters) before determining the best VA
4. If more than half of all the smallest letters of a line can be read correctly, record the VA of that particular line, minus the number of letters missed in that line. Examples: If 3 out of 5 of the letters of the 6/6 line can be read correctly, record VA as 6/6 -2. If 4 out of 5 of the letters of the 6/7.5 line can be read correctly, record VA as 6/7.5 -1
5. If less than half of the all the letters of a line can be read correctly, record the VA of the previous line (with bigger letters)
6. If the patient is unable to achieve an acceptable VA (i.e. 6/12 or better), recheck the VA with a pinhole. If the VA improves with pinhole, record the best VA with pinhole.

Record method: VA (= Visual Acuity) Right 6/30   Left 6/60
PH (= Pinhole) Right 6/30   Left 6/30

7. Repeat the same procedures on left eye by covering the right eye

Points to note:
1. Ensure there is sufficient illumination on the visual acuity (VA) chart (e.g. use a well-lit room)
2. Ensure the chart is at the same eye level of the patient
3. Position the patient at the appropriate distance from the VA chart. If there is limited space, a mirror should be used with the distance reduced to half
4. Pinhole test is a quick way to distinguish between impaired vision due to uncorrected refractive errors and other ocular pathology. The pinhole focuses light and temporarily removes the effects of refractive errors such as myopia, hyperopia and astigmatism. Refractive error is likely when the VA is improved with pinhole test
5. Record method:
   • The numerator is the test distance and the denominator is the distance that a person with normal vision can see that particular line. Example: 6/30 means a patient can only see the letters of a line at 6 metres whereas a person with normal vision can see the same letters at 30 metres.
   • If the patient cannot read one letter from a line, represent it using a minus sign. Example: 6/30 -1 means there is a letter cannot be read from that line
   • If the patient has refractive error, he/she should wear the glasses for the testing, and ‘with glasses’ should state in the record
   • Normal vision: 6/6
   • VA can also be expressed as a decimal that is equal to the numeric value of the Snellen fraction so 6/6 would become 1.0 and 6/12 would be 0.5.

6. Sometimes VA is recorded in other notations e.g. LogMAR, which stands for Minimum Angle of Resolution which can be converted to a Snellen fraction for comparison.

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<th>Snellen 20ft</th>
<th>Snellen 6m</th>
<th>Decimal</th>
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<td>20/200</td>
<td>6/60</td>
<td>0.10</td>
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Annex II

Amsler Grid Test

- The Amsler grid consists of horizontal and vertical lines with a central dot which is used to assess a person's central visual field. The white lines on a black background version can produce more obvious distortion and scotoma
- A diagnostic tool aids in the detection of visual disturbances due to changes in the macula, such as age-related macular degeneration (AMD)
- Instructions to patient:
  - wear single vision reading glasses if any
  - stand a distance of 30cm from the chart, with one eye covered
  - ask the patient to focus on the central dot
  - ask if all four corners and all four sides of the chart are seen
  - ask if there are any areas of the chart that are missing or distorted in any way and are any of the lines not straight or unequal in size
  - repeat the procedure with the another eye

Amsler grid, as seen by a person with normal macula function:

![Amsler Grid (Normal)](image)

Amsler grid, as viewed by a person with age related macular degeneration:

![Amsler Grid (AMD)](image)

Annex III

**Opportunistic screening and management of visual impairment in older adults**

**Older adults (age 65 or above), non-diabetic**

- **Regular eye screening**

  - “Do you have any visual problems?”
  - “Do you have difficulty in reading or any of your daily activities because of your eyesight (even with eyeglasses)?”

  - **No**
    - Consider opportunistic screening one year later
  - **Yes**
    - Test visual acuity (VA) with Snellen chart and pinhole
      - Corrected VA 6/12 or better
      - Corrected VA worse than 6/12, OR presence of other eye symptoms or signs

- **Ask if any other eye symptom(s)**

  - **Eye examination (cornea, pupils, direct ophthalmoscopy)**
    - **No other eye symptoms or signs**
      - Optometrist for eyeglasses
    - **Other eye symptoms or signs present**

- **Further evaluations**
  - **History**
    - Description of visual complaints, medical Hx, drug Hx, social Hx, past and family Hx of eye diseases
  - **Appropriate physical exam**
    - Light torch exam (pupils and cornea), visual field by confrontation, eye movement, Amsler grid (if AMD is suspected), direct ophthalmoscopy, blood pressure and pulse check, thyrotoxic signs, etc.
  - **Consider investigations**
    - Blood sugar, lipid profile, ESR, autoimmune disease markers; CT/MRI of brain/orbits

**Management**

- Manage eye diseases at primary care level (e.g. conjunctivitis, chalazion)
- Identify and manage modifiable factors:
  - Manage cardiovascular risk factors, e.g. diabetes mellitus, hypertension, smoking
  - Optimise medications to avoid adverse drug reactions on the eyes
  - Advise on ultraviolet or solar radiation protection
- Support visual impaired older adults and their caregivers in the community
  - Give advice on daily living and refer them to allied health professions or community resources as appropriate
  - Promote environmental and home safety

**Ophthalmologist referral**

- Corrected VA worse than 6/12: for diagnosis and management accordingly
- Suspicion of any eye disease that needs further assessment and treatment by ophthalmologist, or the treatment cannot be offered by the primary care providers
- Consider surgical treatment of cataract: VA 6/18 or worse; or daily activities affected
Annex IV

Resources on rehabilitation, patient education and community support

Disclaimers: The list is not exhaustive and is for reference only. Links to other websites are inserted for the convenience of the readers and do not constitute endorsement of material at those sites, or any associated organisation, product or service. Fee may be applied to services and readers are reminded to access the respective websites for updated information.

Rehabilitation services:

- Social Welfare Department 社會福利署:  
- The Hong Kong Society for the blind (HKSB) 香港盲人輔導會:  http://www.hksb.org.hk/
- School of Optometry, the Hong Kong Polytechnic University 理大眼科視光學院: offers visual rehabilitation service in the Optometry Clinic and eye care centre  
  http://www.polyu.edu.hk/so/patients.php

Home and environmental safety:

- Hong Kong Federation of the Blind (HKFB) 香港失明人互聯會: provides outreach services for isolated and visually impaired elders, home safety assessment and minor repair services  
  http://www.hkfb.org.hk/node/848
- Smart Elders, Hospital Authority 醫院管理局智老友: home care advice  
- Elderly Services, Hong Kong Housing Society 房協長者通: advocates the 5S method for home safety and comfort – Structurise, Systematise, Sanitise, Standardise, Self-discipline  
  http://www.hkhhselderly.com/tc/house/designing/5

Escort services:

- Hong Kong Blind Union (HKBU) 香港失明人協進會: provides escort service to attend medical appointments, handle personal business and shopping and other community support services  
  http://www.hkbu.org.hk/b5_services3.php

Residential services:

- Social Welfare Department 社會福利署: Care and Attention Homes for the Aged Blind  
- The Hong Kong Society for the blind (HKSB) 香港盲人輔導會: operates four homes for the aged blind in Shamshui, Tokwawan, Yuen Long and Tuen Mun, under supervision of Social Welfare Department  
  http://www.hksb.org.hk/
Education:
- Hong Kong Ophthalmological Society 香港眼科學會: Public education materials
  http://www.hkos.org.hk/?section=Top&id=25
- Smart Patient website, Hospital Authority 醫院管理局智友站:
  https://www21.ha.org.hk/smartpatient/SPW/zh-hk/Disease-Information/Chronic-Diseases-Zone/List/
- Elderly Health Service, Department of Health 衛生署長者健康服務:

Peer support
- Hong Kong Blind Union (HKBU) 香港失明人協進會: http://www.hkbu.org.hk/
- Hong Kong Federation of the Blind (HKFB) 香港失明人互聯會: http://www.hkfb.org.hk/
- Care the Visually Impaired 香港視障全人士協會: serves the visually impaired individuals living in Hong Kong Island http://ctvihongkong.org/
- Hong Kong Cornea Concern Association 香港眼角膜關懷協會: http://www.cornea.org.hk/
- Hong Kong Glaucoma Patients' Association 康青會(香港青光眼病人互助組織): http://www.hkgpa.org/
- Retina Hong Kong 香港視網膜病變協會: http://www.retna.org.hk/

Shopping and facilities
- So-Biz無障消費 led by the Hong Kong Council of Social Service: http://www.sobiz.hk/
- Easy Buy購物易 run by the Hong Kong Blind Union: Sells daily accessories, assistive tools and education tools designed for the visually impaired http://www.hkbu.org.hk/en_services7.php

Hospitals and clinics
- Hong Kong Eye Hospital 香港眼科醫院:
  http://www.ha.org.hk/visitor/ha_visitor_index.asp?Content_ID=100159&Lang=CHIB5&Dimension=100&Parent_ID=10036&Ver=HTML
- The Optometry Clinic, School of Optometry, the Hong Kong Polytechnic University 理大眼科視光學診所:
  http://www.polyu.edu.hk/so/patients.php
- The Hong Kong Society for the Blind 香港盲人輔導會: operates two General Eye and Low Vision Centres providing medical eye care and low vision services to the general public and the visually impaired in Shek Kip Mei and Yuen Long http://www.hksb.org.hk/

Professional organisations
- The Medical Council of Hong Kong 香港醫務委員會: list of registered specialists in ophthalmology http://www.mchk.org.hk/
- College of Ophthalmologists of Hong Kong 香港眼科醫學院: http://www.cohk.org.hk/
References


4) Stevenson MR, Hart PM, Montgomery AM, McCulloch DW, Chakravarthy U. Reduced vision in older adults with age related macular degeneration interferes with ability to care for self and impairs role as carer. Br J Ophthalmol 2004 Sep;88(9):1125-1130.


