

## UNIT NO. 5

## VISION

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## ABSTRACT

**Among Singaporean adults of Chinese origin aged 40 to 79 years old, 1.1% and 0.5% were reported as being visually impaired and blind in both eyes respectively. Visual impairment and blindness can significantly affect one's quality of life. The key role of primary care doctors in the management of a patient with impaired vision is to diagnose its likely cause so that the patient can be referred to the appropriate eye care professional (i.e. optometrist or ophthalmologist) for treatment.**

**Keywords:** Blindness; Visual acuity

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## BACKGROUND

Visual impairment is defined by the World Health Organisation (WHO) as visual acuity worse than 6/18 but equal or better than 6/120 in the better eye, while blindness is defined as visual acuity worse than 6/120 in the better eye. Among Singaporean adults of Chinese origin aged 40 to 79 years old, 1.1% and 0.5% were reported as being visually impaired and blind in both eyes respectively.

Visual impairment and blindness have a significant negative impact on one's quality of life. They are associated with increased morbidity such as falls, hip fractures, road traffic accidents and depression. Less recognised is the fact that impaired vision is also associated with a higher mortality in the elderly population. It is therefore important to correct any visual impairment whenever possible.

## ASSESSMENT

A visual acuity chart (e.g. Snellen Chart) is recommended to identify the presence of visual impairment.

For details on measurement and recording of visual acuity, refer to Annex 1.

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## INTERPRETING RESULTS

## Interpreting Abnormal Visual Acuity

Patients with:

- Visual acuity worse than 6/12 (abnormal visual acuity) without pinhole on initial screening should have their visual acuity test repeated with a pinhole.
- Impaired vision correctable with a pinhole to a visual acuity of 6/12 or better are likely to have a refractive error(s) and should be referred to an optometrist in an optical outlet.
- Pinhole visual acuity worse than 6/12 may have eye conditions other than a refractive error(s) and should be referred to an ophthalmologist.

Any patient who complains of a subjective decrease in vision, even if his visual acuity with pinhole is 6/12 or better, should be referred to an optometrist if refractive error(s) is suspected or to an ophthalmologist if other ocular pathology is suspected.

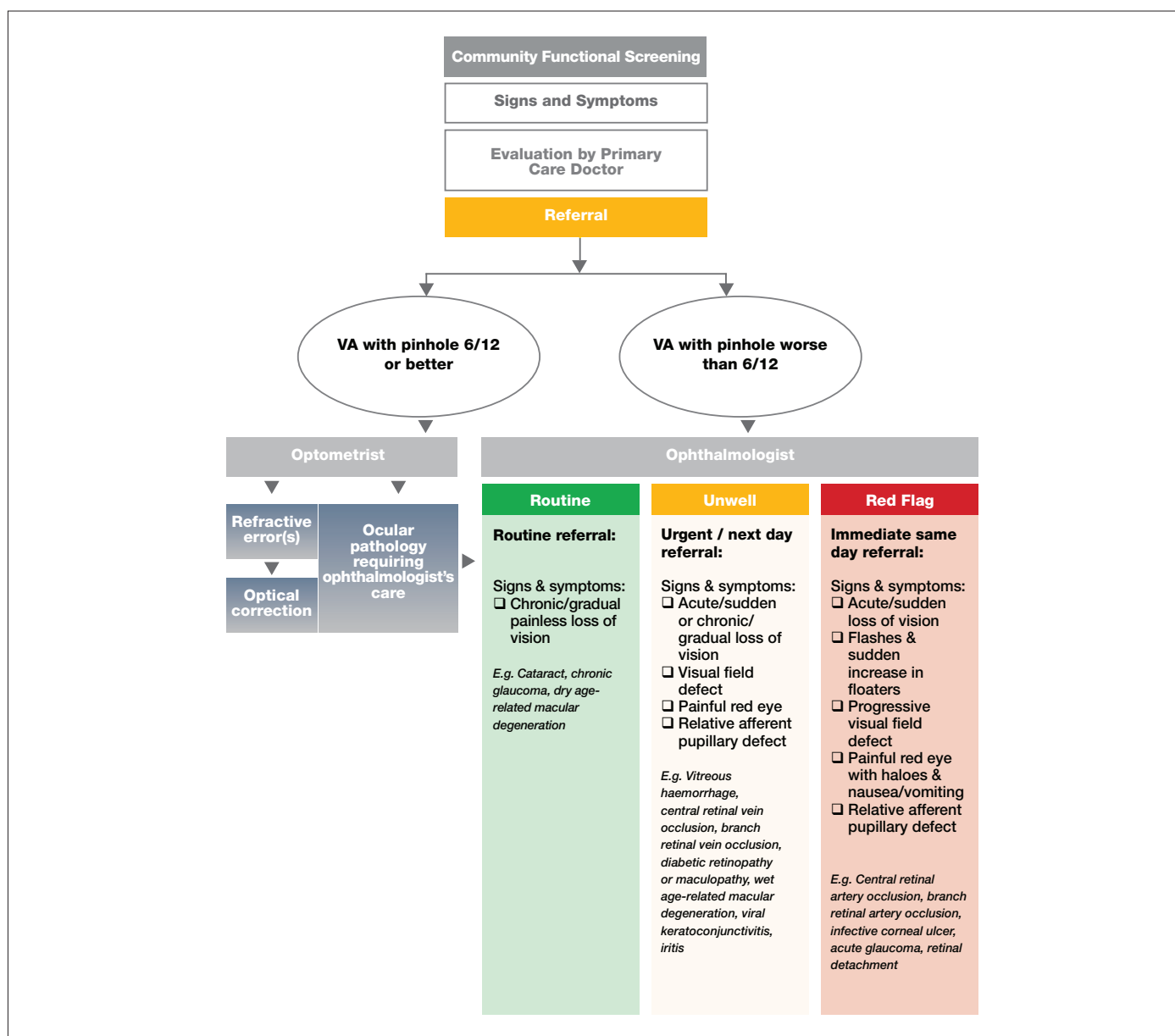
## Identifying Causes

Take a detailed ocular and medical history, and examine the eyes to determine the most likely cause of impaired vision:

- History of presenting symptom(s) e.g. onset (sudden/gradual), duration, progression (improving/deteriorating/stable), monocular or binocular, associated/aggravating/relieving factors (pain, redness, headache, vomiting), visual field defect.
- Past ocular history e.g. trauma, surgery, infection.
- Systemic history e.g. diabetes mellitus, stroke, pituitary tumour.
- Family history of ocular diseases e.g. glaucoma, age-related macular degeneration.
- Physical examination e.g. pupil (direct and indirect pupillary reflexes, size, shape), conjunctiva (circumcorneal injection), cornea (opacity, advanced pterygium), lens (opacity).
- Direct ophthalmoscopy e.g. decreased red reflex (cataract, corneal opacity, vitreous haemorrhage), retinal haemorrhages (diabetic retinopathy, age-related macular degeneration, retinal vein occlusion), hard exudates (diabetic retinopathy, age-related macular degeneration), cotton wool spots (diabetic retinopathy, retinal vein occlusion), mobile elevated retina (retinal detachment), enlarged optic cup/disc ratio (glaucoma), optic disc pallor (glaucoma, optic atrophy), optic disc splinter haemorrhage (glaucoma)

## CLINICAL PATHWAY

The clinical pathway to take from screening to intervention is shown in Figure 1.

**Figure 1: Clinical pathway for vision assessment**

Source: 'Community Functional Screening Follow Up Resource for Primary Care Doctors', March 2011

## MANAGEMENT AND REFERRAL

The key role of primary care doctors in the management of a patient with impaired vision is to diagnose its likely cause so that the patient can be referred to the appropriate eye care professional (i.e. optometrist or ophthalmologist) for treatment.

Specifically, 2 groups of patients should be differentiated:

- Those with refractive error(s).
- Those with ocular pathology other than or in addition to refractive error(s).

Pinhole testing is a quick way to distinguish between impaired vision due to uncorrected refractive error(s) and other ocular pathology. The pinhole focuses light, as in a pinhole camera, and temporarily removes the effects of refractive errors such as

myopia, hyperopia and astigmatism. Defects in the shape of the cornea and lens [refractive error(s)] have little effect when the pinhole is used because light rays pass through the visual axis undeviated. This allows the examiner to estimate the maximum improvement in a patient's vision that can be attained by lenses to correct the refractive error(s).

Refer to:

- Optometrist if impaired vision is likely due to refractive error(s)
- Ophthalmologist if impaired vision is likely due to ocular pathology other than refractive error(s)

It is not uncommon for both refractive error(s) and other ocular pathology to coexist in the same eye. In such a case, the patient should be referred to an ophthalmologist.

In patients with ocular pathology other than refractive

error(s), consider the urgency of referral according to the likely clinical diagnosis:

Conditions requiring emergency (immediate/same day) referral e.g. central retinal artery occlusion (Figure 2), branch retinal artery occlusion, infective corneal ulcer (Figure 3), acute glaucoma (Figure 4), retinal detachment (Figure 5).

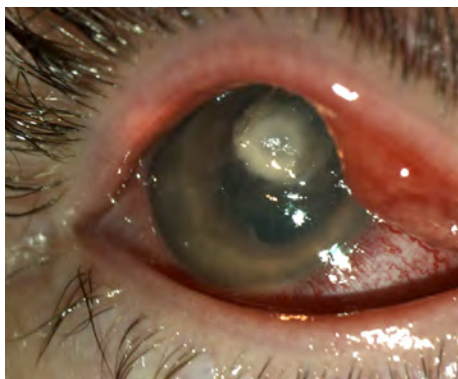
Conditions requiring early (urgent/next day) referral e.g.

vitreous haemorrhage (Figure 6), central retinal vein occlusion (Figure 7), branch retinal vein occlusion (Figure 8), diabetic maculopathy (Figure 9), wet age-related macular degeneration (Figure 10).

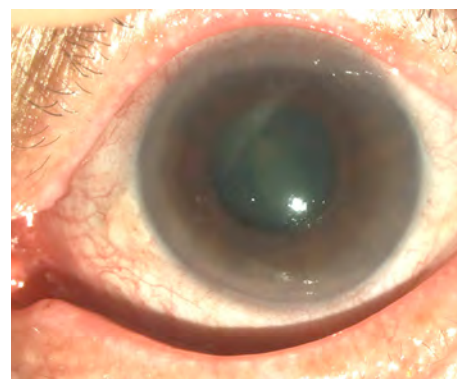
Conditions requiring routine referral e.g. dry age-related macular degeneration (Figure 11), cataract (Figure 12) and chronic glaucoma (Figure 13).



**Figure 2:** A “cherry-red spot” at the fovea in a patient with painless sudden profound loss of vision due to central retinal artery occlusion.



**Figure 3:** Corneal opacity and conjunctival injection due to infective corneal ulcer.



**Figure 4:** Conjunctival injection, corneal haziness and mid-dilated pupil secondary to acute glaucoma.



**Figure 5:** A large area of elevated retina in an eye causing visual field defect in a patient with retinal detachment.



**Figure 6:** Moderate vitreous haemorrhage obscuring details of the ocular fundus.



**Figure 7:** Retinal vein tortuosity, scattered retinal haemorrhages and cotton wool spots in all quadrants of the ocular fundus due to central retinal vein occlusion.



**Figure 8:** Retinal haemorrhages in the area drained by the superotemporal retinal vein with some hard exudates in the macula due to branch retinal vein occlusion.



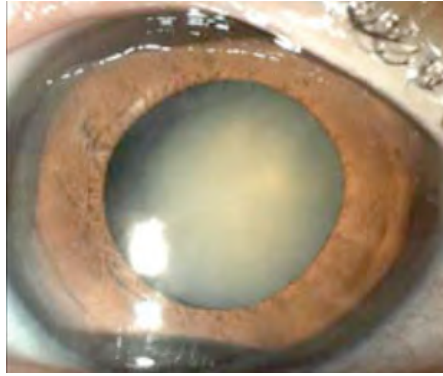
**Figure 9:** Severe hard exudates and retinal haemorrhages due to sight threatening diabetic maculopathy.



**Figure 10:** Severe hard exudates and sub-retinal haemorrhage due to wet age-related macular degeneration.



**Figure 11: Multiple small yellowish drusen in the fovea in dry age-related macular degeneration.**



**Figure 12: A cloudy, yellowish crystalline lens due to nuclear sclerotic cataract.**



**Figure 13: Splinter haemorrhage at optic disc margin due to chronic glaucoma.**

Source:

Figures 2, 3, 5 and 7 to 13 are courtesy of Singapore International Eye Cataract Retina Centre at Mount Elizabeth Medical Centre, Singapore.

Figures 4 and 6 are courtesy of Department of Ophthalmology and Visual Sciences at Khoo Teck Puat Hospital, Singapore.

## RESOURCES

For further information, prescribe to the patient:

- HealthLine - 1800 223 1313 to speak to a Nurse Advisor (available in 4 languages)
- Health Promotion Board website - <http://www.hpb.gov.sg>

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## LEARNING POINTS

- **Visual impairment is defined by the World Health Organisation (WHO) as visual acuity worse than 6/18 but equal or better than 6/120 in the better eye.**
  - **Blindness is defined as visual acuity worse than 6/120 in the better eye.**
  - **Any patient who complains of a subjective decrease in vision, even if his visual acuity with pinhole is 6/12 or better, should be referred to an optometrist if refractive error(s) is suspected or to an ophthalmologist if other ocular pathology is suspected.**
  - **Pinhole testing is a quick way to distinguish between impaired vision due to uncorrected refractive error(s) and other ocular pathology.**
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## ANNEX I – MEASUREMENT OF VISUAL ACUITY (VA)

1. Ensure there is sufficient illumination on the visual acuity (VA) chart (e.g. use a well-lit room).
2. Stand the patient at the appropriate distance from the VA chart (e.g. 3 metres for a 3-metre chart).
3. Test the patient's right eye by covering his left eye (always test the right eye first).
4. Instruct and encourage the patient to read the VA chart until the smallest line possible without squinting.
5. If the patient is unable to read more than half of the letters on a particular line, instruct him to try reading the next line (with smaller letters) before determining his best VA.
6. If the patient can read the VA chart, record his VA as follows:
  - a. If all the letters of a line can be read correctly, record the VA of that particular line.  
Example:

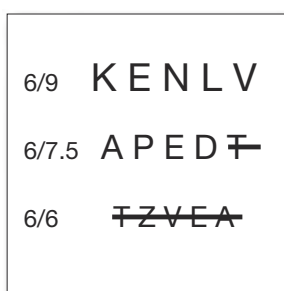


If 5 out of 5 of the letters of the 6/7.5 line can be read correctly but not any letter of the 6/6 line, record VA as 6/7.5.

- b. If more than half of all the 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<sup>-2</sup>.



If 4 out of 5 of the letters of the 6/7.5 line can be read correctly, record VA as 6/7.5<sup>-1</sup>.

- c. 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) plus the number of letters read correctly of that particular line.  
Example:



If 2 out of 5 of the letters of the 6/6 line can be read correctly, record VA as 6/7.5<sup>+2</sup>



If 1 out of 5 of the letters of the 6/7.5 line can be read correctly, record VA as 6/9<sup>+1</sup>

7. If the patient is unable to read any letter on the VA chart, proceed as follows:
  - a. Move the patient towards the chart until the biggest letter can be seen. Record the VA as follows:
    - i. If the patient can read the 6/120 line at 5 metres, record VA as 5/120.
    - ii. If the patient can read the 6/120 line at 4 metres, record VA as 4/120.
    - iii. If the patient can read the 6/120 line at 3 metres, record VA as 3/120.
    - iv. If the patient can read the 6/120 line at 2 metres, record VA as 2/120.
    - v. If the patient can read the 6/120 line at 1 metre, record VA as 1/120.
  - b. If the patient is unable to read the biggest letter at 1 metre, hold several fingers in front of the patient and instruct him to count the fingers. If the patient can count the number of fingers, record VA as “counting fingers” or CF.
  - c. If the patient is unable to count fingers, move your hand to and fro in front of him (either up and down or side to side). If the patient can perceive the hand movement, record VA as “hand movement” or HM.
  - d. If the patient is unable to perceive hand movement, shine a bright light source directly into the eye. If the patient can perceive the light, record VA as “light perception” or LP.
  - e. If the patient is unable to perceive the light, record VA as “no light perception” or NLP.
8. 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. If the VA is unable to improve with pinhole, record “no improvement with pinhole” or NIPH.
9. Repeat the same for the left eye by covering the right eye.

“The above extract is taken from the ‘Community Functional Screening Follow Up Resource for Primary Care Doctors’, published by the Health Promotion Board in partnership with Dr Au Eong Kah Guan and Ms Yulianti, March 2011.”