Driver fitness evaluation with respect to vision

S Adams, Centre for Occupational and Environmental Health Research, School of Public Health and Family Medicine, University of Cape Town E-mail: shahieda.adams@uct.ac.za

Sections based on The South African Society of Occupational Medicine’s Guideline No.6, Medical requirements for fitness to drive. 2009.

ABSTRACT
Drivers with a marked loss of visual acuity or visual field will not be able to drive safely as they may not detect other vehicles or potentially dangerous situations. Workers whose jobs involve driving and who have reduced vision can be a threat to their own safety as well as co-workers, the public and the environment. Various medical conditions can affect vision. The purpose of this article is to describe visual disorders indicated in driver fitness standards and discuss driver fitness evaluation with respect to vision. Relevant legal requirements in South Africa and standards of fitness to drive are outlined.

Key words: vision, driving, fitness, evaluation, visual disorders

INTRODUCTION
Good vision is essential for jobs involving driving, as drivers with a marked loss of visual acuity or visual field will not be able to drive safely as they may not detect other vehicles or potentially dangerous situations. Various medical conditions can affect vision. The purpose of this article is to describe visual disorders indicated in driver fitness standards and discuss driver fitness evaluation with respect to vision.

Visual disorders indicated in driver fitness standards

Visual acuity
Visual acuity is the best obtainable vision with or without glasses or contact lenses.

Cataract
A cataract is an opacity of the lens. Loss of contrast, glare (halos and starbursts around lights), requiring increased light to see well, and difficulty in differentiating dark blue and black are early symptoms. Later, painless blurring of vision is experienced, with the degree of blurring related to location and extent of the opacity. Diplopia or double vision occurs rarely. An opacity in the centre of the lens (a nuclear cataract) worsens distance vision. In a posterior subcapsular cataract, vision is disproportionately affected because the opacity is at the crossing point of incoming light rays. With this type, visual acuity is most reduced with pupil constriction such as in bright light or during reading, and loss of contrast as well as glare from bright lights or car headlights is common. Diabetes can cause swelling of the eye lens, causing blurring of vision and cataracts. Cataracts are also more common in the elderly.

Diabetic or hypertensive retinopathy
Diabetes can affect the fine network of blood vessels in the retina resulting in retinopathy. It occurs in two forms, maculopathy and proliferative diabetic retinopathy. In maculopathy the blood vessels in the retina leak so that central vision deteriorates and the person experiences difficulty in recognising objects at a distance or seeing detail, such as road signs. Proliferative diabetic retinopathy refers to occlusion of the retinal blood vessels and the resultant growth of new but weak vessels on the retinal surface. These
bleed easily, forming scar tissue which distorts the retina. Blurred and patchy eyesight and even total loss of vision can follow. Hypertensive retinopathy is characterised by haemorrhages and infarcts visible on the retina which may lead to papilloedema (swelling of the optic disc). Malignant hypertension (severe uncontrolled hypertension) may present with visual disturbances.

**Keratoconus**
Keratoconus is a slowly progressive thinning and cone-shaped bulging of the cornea, which is usually bilateral. The changes in the refractive characteristics of the cornea (irregular astigmatism), reduces visual acuity which cannot be fully corrected with glasses.

**Macular degeneration**
Degeneration of the macula results in permanent central vision loss, commonly in the elderly. The dry form causes retinal pigmentation changes in the form of yellow spots and areas of chorioretinal atrophy. The wet form can follow, in which choroidal neovascularisation occurs under the retina. Haemorrhage or localised macular oedema can elevate an area of the macula or result in a retinal pigment epithelial detachment. Eventually, an elevated scar is formed under the macula.

**Diplopia**
The perception of two images of a single object is termed diplopia. It may be monocular (present when only one eye is open) as a result of distortion of light transmission through the eye to the retina, due to a cataract, corneal shape problems, uncorrected refractive error (e.g. astigmatism), scarring and a dislocated lens. Binocular diplopia (disappears when either eye is closed) suggests disconjugate alignment of the eyes. Possible causes are 3rd, 4th, or 6th cranial nerve palsy, myasthenia gravis, orbital infiltration, mechanical interference with ocular motion or a general neuromuscular transmission disorder.

**Visual fields**
Driving requires adequate visual fields since peripheral vision is important in tasks such as merging into a traffic stream, changing lanes, and seeing objects to the side of the line of vision. Lesions in the neural visual pathways from the optic nerves to the occipital lobes can affect the visual field. Apart from the conditions listed hereafter, head trauma, brain tumour, stroke, cerebral infection, optic atrophy, retinal detachment, localised retinal or choroidal infection, and ptosis or lid redundancy and blepharospasm can also reduce visual fields.

Homonymous hemianopia is the loss of part or all of the left half or right half of both visual fields (it does not cross the vertical median). Homonymous quadrantanopia refers to the loss of part or all of the left quarter or right quarter of both visual fields. The loss of all or part of the lateral half of both visual fields (does not cross the vertical median) is known as bitemporal hemianopia.

**Glaucoma**
The glaucomas are a group of eye disorders, which are the third most common cause of blindness worldwide. They are characterised by progressive optic nerve damage at least partly due to increased intraocular pressure.
Retinitis pigmentosa
Genetic mutations cause a slowly progressive, bilateral degeneration of the retina and retinal pigment epithelium, resulting in night blindness and loss of peripheral vision.

Contrast sensitivity
The ability to perceive visual stimuli that differ in contrast and spatial frequency declines with age. Although binocular measures of contrast sensitivity have been found to be a valid predictor of crash risk in patients with cataracts, there are no standardised cut-off points for contrast sensitivity and safe driving, and it is not routinely measured in eye examinations.¹

Defective colour vision
Despite evidence that people with red deficient vision have difficulty in detecting red lights and stopping in laboratory testing, there is no unequivocal evidence that colour-blind drivers are less safe drivers.¹² Red-deficient persons should be warned that they may be less aware of detecting red lights and hence should pay particular attention to traffic lights, rear braking lights and other sources of red light relevant to driving.¹

Poor night vision and glare recovery
Ageing can decrease the person’s ability to adapt to changes in light and heighten their sensitivity to glare, which impair night driving.³

Fitness evaluation of drivers with respect to vision

Legal requirements
The most important of the statutes relevant to work fitness and disability in South Africa is the Road Traffic Act (RTA)

Table 1. SASOM categories of driver in relation to the Road Traffic Act⁵ and other legislation⁸-¹⁰

<table>
<thead>
<tr>
<th>SASOM category</th>
<th>Categorisation in terms of the legislation</th>
</tr>
</thead>
</table>
| I | RTA: Standard vehicle drivers operating light vehicles  
Driving in standard transport circumstances where no special requirements exist over and above the required licence and personal skills to operate the vehicle. |
| II | RTA: Drivers who require a PDP  
The highest risk category. Within this group, there is a gradient of risk as follows:  
• Category “D”: highest risk – authorises the driving of a motor vehicles carrying hazardous/dangerous goods;  
• Category “P”: second highest risk – authorises the carrying of passengers; and  
• Category “G”: third highest risk – authorises the driving of large motor vehicles conveying goods. |
| III | Special vehicle drivers in control of specialised vehicles  
Vehicles used for specific purposes where skill, method of operation and place of operation require attention, e.g. forklift truck operators, crane drivers, etc.  
Note that the legislation that governs fitness to drive these vehicles is not the RTA, but the Construction Regulations (regulation (21)(1)(d)(ii) – Operators of construction vehicles and/or mobile plants)⁷ and the National code of practice for the evaluation of training providers for lifting machine operators (GNR.145 of 18 February 2005), as per the Driven Machinery Regulations of the Occupational Health and Safety Act.¹³  
Therefore, the provision of a certificate of fitness does NOT automatically entitle the driver to operate the applicable mobile equipment on the public roads.  
The risks associated with drivers in this category can vary enormously, depending upon the circumstances, such as the terrain, traffic density (people and/or equipment), equipment size, and the material being worked, making it difficult to place minimum standards on this group. For some, the mix of circumstances requires that the driver meet the most stringent minimum standards, whilst for others the requirements would be far more tolerant. Consequently, the minimum standards are to be considered on a case-by-case basis, in accordance of the mix of circumstances. As a guideline, the medical adjudicator should consider the category 1 standards as a minimum, although in MOST circumstances, the standards for category 2 would apply. |
No. 93 of 1996, 5 which outlines the health conditions that would disqualify applicants from driving. With respect to vision, Section 15 of Chapter IV states that “15(1) A person shall be disqualified from obtaining or holding a learner’s or driving licence if he or she is suffering from ....(i) defective vision ascertained in accordance with a prescribed standards.” Section 16 gives a legal responsibility to the holder of a driving licence to disclose any disqualification on health grounds when applying for a new licence or if a new problem, within 21 days, to the licencing authority.

Other statutes focus more generally on fitness standards and the management of ill-health and disability in the workplace, for example, the Occupational Health and Safety Act 6 and the Mine Health and Safety Act. 7

**Categories of drivers**
The employer is required in terms of the RTA to categorise all drivers according to the relative risks involved specific to their industry and according to the requirements for the issuing of the Professional Driving Permit (PDP). Table 1 shows the categorisation recommended by South African Society of Occupational Medicine (SASOM). 8

**Driver health evaluation**
Goals of driver health evaluation 9
• To determine whether the driver meets the minimum fitness standards to enable him to perform his duties as a driver, safely and effectively.
• To determine whether the driving duties are impacting negatively on his health and make recommendations on how best to address this.
• To ascertain whether the driver is suffering from any health condition which is likely to impact on his driving ability in the future such as epilepsy or diabetes or which may disqualify him from holding a licence in terms of the RTA.
• To ascertain continued fitness to drive following major illnesses and surgery which may cause impairment affecting the ability to drive.

**Health evaluation interval schedule**
SASOM’s recommended health interval schedule is shown in Table 2. 8

**Health evaluation action**
The evaluation requires a clear understanding of the inherent visual requirements of the job which could impact on driving ability. All new drivers must have a full history and examination to provide information for baseline measurements. Baseline clinical status and identification of progression of disease necessitates good record-keeping and continuity of care. For SASOM’s recommended health evaluation protocol see Table 3. 8

---

Table 2. Health evaluation interval schedule

<table>
<thead>
<tr>
<th>Type of health evaluation</th>
<th>I (PRDP)</th>
<th>II (D/P/G)</th>
<th>III special</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-employment</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>PRDP (Time interval in months)</td>
<td>24</td>
<td>24</td>
<td>N/A</td>
</tr>
<tr>
<td>Periodic (recommended time interval in months)</td>
<td>On request</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Return to work after significant ill-health absence (&gt;10 days)</td>
<td>On request</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Post incident (evaluation immediately or soon after incident)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 3. Health evaluation action protocol

<table>
<thead>
<tr>
<th>Medical:</th>
<th>Pre-employment</th>
<th>Periodic/PRDP</th>
<th>Return to work</th>
<th>Post incident</th>
</tr>
</thead>
<tbody>
<tr>
<td>Past history</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td>Current history</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td>Occupational:</td>
<td>Past history</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td>Current history</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td>Physical examination</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
<td>Required</td>
</tr>
<tr>
<td>Sensory:</td>
<td>Vision (and fields)</td>
<td>Required</td>
<td>Optional</td>
<td>Optional</td>
</tr>
<tr>
<td>Hearing</td>
<td>Required</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
</tr>
<tr>
<td>Special investigations</td>
<td>Required</td>
<td>Optional</td>
<td>Optional</td>
<td>Optional</td>
</tr>
</tbody>
</table>

---

“... peripheral vision is important in tasks such as merging into a traffic stream, changing lanes, and seeing objects to the side of the line of vision.”
Consultant opinion required. If mild, driving can be allowed subject to satisfactory medical reports. Control of mild blepharospasm with botulinum toxin may be acceptable provided that treatment does not produce debarring side effects such as uncontrollable diplopia. MEC should be informed of any change or deterioration in condition. Driving is not normally permitted if condition severe, and affecting vision, even if treated.

### Table 4. Minimum requirements for fitness to drive with respect to vision

<table>
<thead>
<tr>
<th>VISUAL DISORDERS</th>
<th>GROUP 1: Cars, LMVs, Motor Cycles</th>
<th>GROUP 2(3): Trucks, Passenger, Special</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACUITY</strong></td>
<td>According to the Snellen rating a minimum visual acuity, with or without refractive correction, of 6/12 (20/40) for each eye, or where the visual acuity of one eye is less than 6/12 (20/40) or where one eye of the person concerned is blind, a minimum visual acuity for the other eye of 6/9 (20/30).</td>
<td>According to the Snellen rating a minimum visual acuity, with or without refractive correction, of 6/9 (20/30) for each eye.</td>
</tr>
<tr>
<td><strong>VISUAL FIELD DEFECTS</strong></td>
<td>A minimum visual field of 70 degrees temporal, with or without refractive correction, in respect of each eye, or where the minimum visual field in respect of one eye is less than 70 degrees temporal, or where one eye is blind, a minimum total horizontal visual field of at least 115 degrees with or without refractive correction.</td>
<td>A minimum visual field of 70 degrees temporal in respect of each eye, with or without refractive correction.</td>
</tr>
<tr>
<td><strong>MONOCULAR VISION</strong> (Includes the use of one eye only for driving)</td>
<td>Complete loss of vision in one eye (ie. If there is any light perception, driver is not considered monocular). May drive when clinically advised that driver has adapted to the impairment and the prescribed eyesight standard in the remaining eye can be satisfied and there is a normal monocular visual field in the remaining eye, i.e. there is no area of defect which is caused by pathology.</td>
<td>See appendix in the Guideline 6.8</td>
</tr>
<tr>
<td><strong>COLOUR BLINDNESS</strong></td>
<td>Driving may continue with no restriction on licence.</td>
<td>Driving may continue with no restriction on licence.</td>
</tr>
<tr>
<td><strong>NIGHT BLINDNESS</strong></td>
<td>Acuity and field standards must be met. Cases will be considered on an individual basis.</td>
<td>Group 2 acuity and field standards must be met and cases will then be considered on an individual basis.</td>
</tr>
<tr>
<td><strong>CATARACT</strong> Includes severe bilateral cataracts, failed bilateral cataract extractions and post cataract surgery where these are affecting the eyesight.</td>
<td>Must be able to meet the above eyesight requirement. In the presence of cataract, glare may prevent the ability to meet the number plate requirement, even with apparently appropriate acuities.</td>
<td>Must be able to meet the above prescribed acuity requirement. In the presence of cataract, glare may prevent the ability to meet the number plate requirement.</td>
</tr>
<tr>
<td><strong>DIPLOPIA</strong></td>
<td>Cease driving on diagnosis. Resume driving on confirmation to the Licensing Authority that the diplopia is controlled by glasses or by a patch which the licence holder undertakes to wear while driving. (If patching, note requirements above for monocularity). Exceptionally a stable uncorrected diplopia of 6 months' duration or more may be compatible with driving if there is consultant support indicating satisfactory functional adaptation.</td>
<td>Permanent refusal or revocation if insuperable diplopia. Patching is not acceptable.</td>
</tr>
<tr>
<td><strong>BLEPHAROSPASM</strong></td>
<td>Consultant opinion required. If mild, driving can be allowed subject to satisfactory medical reports. Control of mild blepharospasm with botulinum toxin may be acceptable provided that treatment does not produce debarring side effects such as uncontrollable diplopia. MEC should be informed of any change or deterioration in condition. Driving is not normally permitted if condition severe, and affecting vision, even if treated.</td>
<td>Consultant opinion required. If mild, driving can be allowed subject to satisfactory medical reports. Control of mild blepharospasm with botulinum toxin may be acceptable provided that treatment does not produce debarring side effects such as uncontrollable diplopia. MEC should be informed of any change or deterioration in condition. Driving is not permitted if condition severe, and affecting vision, even if treated.</td>
</tr>
</tbody>
</table>
Declaring a vehicle driver fit/unfit in relation to vision for driving duties

SASOM has developed a list of criteria to assist the medical officer in deciding on endorsement or rejection of a driver on health grounds with respect to vision. Special investigations or specialist opinion may be required for some decisions. Clinical experience, an understanding of the illness, the nature of the workplace and occupational requirements of the job as well as the safety risk posed by the driver will guide decisions. Minimum requirements for fitness to drive with respect to vision are listed in Table 4. A prescribed incapacitation is a medical condition listed in terms of the RTA (Section 15(1)(f)(A)-(g)) and its presence legally bars the person from the holding of the licence. A licence holder or applicant is regarded as suffering a prescribed incapacity if unable to meet the eyesight requirements. A relevant incapacity is any medical condition that is likely to make the person a source of danger while driving, such as a visual field defect. The Snellen standard equates to the ability to read in good light (with the aid of glasses or contact lenses if worn) a registration mark fixed to a motor vehicle and containing letters and figures 79 mm high and 50 mm wide at a distance of 20 metres, or at a distance of 20.5 metres where the characters are 79 mm high and 57 mm wide. People unable to meet this standard must not drive and the licence must be refused or revoked.

The South African legal standard is based on category of vehicle, so the lesser standard is prescribed for drivers of categories code A1, A, B or E6 vehicles (motor cycles and old code 08) (equivalent of SASOM Group 1), and the higher standard is prescribed for drivers of categories code C1, C, EC1 or EC vehicles (old code 10+) (equivalent of SASOM Group 2 or 3). Registration for sight impairment or severe sight impairment will normally be regarded as incompatible with holding a driving licence. However, attention will be given to the standards indicated in Table 4 in deciding on fitness to drive. Guideline 6 also contains an appendix on the field of vision requirement for the holding of group I licence entitlement.

Vision testing (apart from the use of the Snellen wall chart and confrontation tests to check visual fields) is covered in detail in the SASOM Guideline for vision testing. A detailed and comprehensive list of conditions and fitness standards for driving is contained in the SASOM Guideline 6 and the Driver and Vehicle Licensing Booklet. They provide clear management strategies for most conditions that could impair driving ability.

Conclusions and recommendations

Various visual disorders can have an adverse effect on vision. Since good vision is necessary for safe driving, workers whose jobs involve driving and who have reduced vision can be a threat to their own safety as well as co-workers, the public and the environment. It is therefore essential that their health is evaluated to check that they meet the fitness standards to drive with respect to vision.

“SASOM has... a list of criteria to assist the medical officer in deciding on endorsement or rejection of a driver on health grounds...”

References