

PRACTICAL ASSESSMENT OF COLOUR VISION TO CERTIFY FITNESS FOR DRIVING

Dr Phoon Kwong Yun Ian, Dr Chang Wei Tee

ABSTRACT

A patient with red-green colour blindness came to the polyclinic for a medical examination for the purpose of applying for a vocational driving license. He had been driving a private vehicle for years. As he could not read all the plates in the Ishihara, the attending doctor decided not to certify him fit, but referred him to an ophthalmologist. This upset the patient. A review of the guidelines suggests that for colour-blind patients, the Ishihara should not be the standard to assess a patient's fitness to drive. We propose a simple colour chart that is more practical for this purpose.

Keywords:

Colour-blindness; driving; fitness to drive; colour vision assessment

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PATIENT'S REVELATION: WHAT HAPPENED?

Mr ABC was a 44 year old Indian gentleman who visited our polyclinic for a medical examination to apply for a vocational licence to drive a taxi. He already held a license for a private vehicle, and has been driving for years.

He was known to have a history of partial colour vision deficiency. He failed the colour vision testing using Ishihara Chart on that day at the nurse's station prior to consultation. He had difficulty identifying several plates on the Ishihara Chart.

During his consultation with the doctor for medical examination, his partial colour vision deficiency was noted and he was offered to be referred to an ophthalmologist for review for fitness for driving as a taxi-driver. He was very unhappy regarding the need to be referred to another doctor for a second assessment, citing reasons like additional cost and time. The consultation turned unpleasant with the patient insisting to be certified fit on the spot while the doctor requested for a review by an ophthalmologist to assess his fitness to driving in view of his partial colour vision deficiency.

He was not certified fit on that day and was referred to an ophthalmologist for further review.

A similar patient who had been referred to the Singapore National Eye Centre before after failing the Ishihara chart had a reply from the Centre stating that he was able to distinguish red from green.

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GAINING INSIGHT: WHAT ARE THE ISSUES?

The issue raised in this case is regarding how to practically assess and certify fitness for driving in patients with colour vision deficiency.

In Singapore, the governing body for issuing of driving license is the Singapore Traffic Police (STP), and for vocational license, it is the Land Transport Authority (LTA). As with many countries these authorities require a statutory medical examination by a certified medical practitioner to assess and certify "fitness to drive" in specific groups of patients, namely, those 65 years old or older, applicants for vocational licenses, and licenses for heavy goods vehicles. Those driving heavy goods vehicles (class 4 and 5), and vocational drivers are pegged at a higher standard of fitness versus those driving private vehicles. A copy of the driving assessment form from the LTA (Figure 1) and STP (for those more than 65 years old) (Figure 2) is shown for comparison. Both asked for colour vision assessment.

Colour blindness is a sex-linked disorder, affecting mostly males. In a study in on school children in Singapore¹ it was estimated that 5.3% of males and 0.2% of females aged 13-15 years old have colour blindness when tested with an Ishihara Charts. Thus this condition is not rare locally.

Polyclinics, assessing patient's fitness to drive, use the Ishihara Charts to assess the patients colour perception. This is a common practice, as the Ishihara Chart is a well-established tool to detect those with colour vision deficiencies, the most common of which is the red-green colour blindness. The sensitivity of the Ishihara to pick up colour blindness has been reported² to be about 98.4% when compared to the gold standard Nagal anomaloscope, if 3 or more (Ishihara) colour plate errors are used as the cut-off for detecting colour blindness.

When colour deficiency is noted with the Ishihara Chart, the polyclinic doctor has to decide if the patient should be certified fit to drive, and may refer the patient to an ophthalmologist for further review regarding fitness for driving, if unsure.

However, a review of the Singapore Medical Association (SMA) Medical Guidelines on Fitness to Drive (second edition, 2011)³ noted that *"For all classes of driving, the driver should be able to identify red, green and amber lights, This can be tested by showing the person the standard red, green and amber colours exhibited one at a time and in a random manner."*

Indeed, for those less than 65 years old applying for an ordinary license for a private vehicle (class 1-3), the Traffic Police Department only requires that the applicant declares that he is not suffering from any condition that will impair his driving ability, such that he poses a danger to other road users. For the vision test, the applicant needs to pass a visual acuity test, and

Figure 1. Two-paged medical driving assessment form for vocational licence (issued by LTA). Circle highlights portion where colour vision is asked for.

Land Transport Authority

Medical Examination Form for Vocational Licence

Section A: Information of Applicant

Name of Applicant: _____
 Date of Birth: _____
 Date of Issue: _____

Section B: Medical Examination

1. General Health: _____
 2. Vision: _____
 3. Hearing: _____
 4. Blood Pressure: _____
 5. Heart Rate: _____
 6. Blood Sugar: _____
 7. Urine: _____
 8. Other: _____

Section C: Medical History

1. Diabetes: _____
 2. Hypertension: _____
 3. Heart Disease: _____
 4. Stroke: _____
 5. Other: _____

Section D: Medical Examination Results

1. Vision: _____
 2. Hearing: _____
 3. Blood Pressure: _____
 4. Heart Rate: _____
 5. Blood Sugar: _____
 6. Urine: _____
 7. Other: _____

Section E: Medical History Results

1. Diabetes: _____
 2. Hypertension: _____
 3. Heart Disease: _____
 4. Stroke: _____
 5. Other: _____

Section A: Information of Applicant

Name of Applicant: _____
 Date of Birth: _____
 Date of Issue: _____

Section B: Medical Examination

1. General Health: _____
 2. Vision: _____
 3. Hearing: _____
 4. Blood Pressure: _____
 5. Heart Rate: _____
 6. Blood Sugar: _____
 7. Urine: _____
 8. Other: _____

Section C: Medical History

1. Diabetes: _____
 2. Hypertension: _____
 3. Heart Disease: _____
 4. Stroke: _____
 5. Other: _____

Section D: Medical Examination Results

1. Vision: _____
 2. Hearing: _____
 3. Blood Pressure: _____
 4. Heart Rate: _____
 5. Blood Sugar: _____
 6. Urine: _____
 7. Other: _____

Section E: Medical History Results

1. Diabetes: _____
 2. Hypertension: _____
 3. Heart Disease: _____
 4. Stroke: _____
 5. Other: _____

Figure 2. Two-paged medical driving assessment form for drivers more than 65 years old (issued by STP). Circle highlights portion where colour vision is asked for.

TRAFFIC POLICE, SINGAPORE

MEDICAL EXAMINATION FORM FOR AN APPLICANT FOR

Section A: Information of Applicant

Name of Applicant: _____
 Date of Birth: _____
 Date of Issue: _____

Section B: Medical Examination

1. General Health: _____
 2. Vision: _____
 3. Hearing: _____
 4. Blood Pressure: _____
 5. Heart Rate: _____
 6. Blood Sugar: _____
 7. Urine: _____
 8. Other: _____

Section C: Medical History

1. Diabetes: _____
 2. Hypertension: _____
 3. Heart Disease: _____
 4. Stroke: _____
 5. Other: _____

Section D: Medical Examination Results

1. Vision: _____
 2. Hearing: _____
 3. Blood Pressure: _____
 4. Heart Rate: _____
 5. Blood Sugar: _____
 6. Urine: _____
 7. Other: _____

Section E: Medical History Results

1. Diabetes: _____
 2. Hypertension: _____
 3. Heart Disease: _____
 4. Stroke: _____
 5. Other: _____

Section A: Information of Applicant

Name of Applicant: _____
 Date of Birth: _____
 Date of Issue: _____

Section B: Medical Examination

1. General Health: _____
 2. Vision: _____
 3. Hearing: _____
 4. Blood Pressure: _____
 5. Heart Rate: _____
 6. Blood Sugar: _____
 7. Urine: _____
 8. Other: _____

Section C: Medical History

1. Diabetes: _____
 2. Hypertension: _____
 3. Heart Disease: _____
 4. Stroke: _____
 5. Other: _____

Section D: Medical Examination Results

1. Vision: _____
 2. Hearing: _____
 3. Blood Pressure: _____
 4. Heart Rate: _____
 5. Blood Sugar: _____
 6. Urine: _____
 7. Other: _____

Section E: Medical History Results

1. Diabetes: _____
 2. Hypertension: _____
 3. Heart Disease: _____
 4. Stroke: _____
 5. Other: _____

be able to identify coloured lights (red, amber and green) shown to them. The Ishihara is not used at all.

So it is not surprising that many people who are partially colour blind, and are able to distinguish these coloured lights, are already licensed to drive private vehicles. But when they come for their statutory medical examination, they may fail the Ishihara Chart. This causes a dilemma for the doctor, as there is no standard way in primary care to assess colour perception for the purpose of driving fitness. The Ishihara Chart, while a sensitive tool to pick up those with colour vision deficiencies, is not a good tool to assess functional disability. Those doctors not willing to certify these patients fit, will refer these patients to the ophthalmologist. This practice not only causes distress to the patient, but it also unnecessarily burdens the already very busy ophthalmology departments in our hospitals.

It's also interesting to note that while we debate on the "right" way to assess colour perception for driving, in the United Kingdom (UK), Australia, and New Zealand, their respective driving licensing authorities [Driving Vehicle License Authority (DVLA); National Transport Commission Australia (NTCA)/Austroads; New Zealand Transport Agency (NTZA)] puts no restriction on licensing for those with colour blindness^{4,5,6}.

STUDY THE MANAGEMENT: HOW DO WE APPLY IN OUR CLINICAL PRACTICE?

Going back to the SMA Medical Guidelines, the patient should be shown the "standard red, green, and amber colours... one at a time and in a random manner". The "standard colours" are shown on page 2 of the guidelines.

An informal survey done among the doctors in the polyclinic found that the way the colour perception assessment is performed (for those who fail the Ishihara) varies from showing the patient any random object of the 3 colours, to opening the above guidelines to the colour page and asking the patient to identify the colours, to showing a colour matrix (with all 3 colours placed randomly on the same chart). Thus there does not seem to be any standard way to assess colour perception for driving. Criticism of showing the 3 colours from the SMA Guidelines, and the colour matrix is that the patient may be able to distinguish red from green when the 2 colours appear together, and does not follow the Guidelines recommendation of showing the colours "one at a time" in a "random manner".

We propose having 3 separate colour panels, identical except for the colour (see Figure 3). These colours follow the SMA Guidelines "standard colours", and can be shown one at a time to the patient in a random manner. This not only standardises the way the polyclinics assess colour perception for driving, but it most closely follows the recommendations as stated in the SMA Guidelines. Patients who can correctly identify the colours can then be certified fit to drive.

However, the SMA Guidelines does not say what should be done

Figure 3. Proposed colour panels that can be shown to patients one at a time, for the purpose of colour vision assessment as part of the medical assessment for fitness to drive.



should the patient not be able to identify even these simple colour plates correctly. Based on the local context, where, unlike in the UK, Australia and New Zealand, our authorities require a certification that the patient can distinguish red from green to drive, we may then have to refer this patient to our ophthalmologist colleagues for certification.

The fortunate thing is that 2 more patients who came to our clinic for vocational driving license assessment (after this article was first written), and who failed the Ishihara test, subsequently "passed" our proposed 3-colour panels, thus saving 2 unnecessary referrals to the ophthalmologist. We hope that such referrals should be very rare once we have established using such a panel.

CONCLUSION

Colour blindness in our population, while not common, is not rare, and many primary care physicians would have encountered them. We owe it to the general public to ensure that these drivers are fit, especially the vocational, and heavy goods vehicle drivers. At the same time, we do not want to unnecessarily inconvenience our drivers, and over burden our ophthalmologist colleagues.

The Ishihara Chart is a sensitive tool to pick up those with colour vision perception deficiencies, but is poor in determining a patient's fitness to drive. The SMA guidelines had proposed a way to assess colour perception, but this is not practiced in a standard way in the polyclinics.

We propose having 3 separate colour panels, identical except for the colour, as the standard tool to which our primary care doctors can use to assess colour perception for driving.

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