



by Howard Larkin

When should a visually impaired patient stop driving?

With clinical measures uncertain, driving tests may be the best way to tell

Because driving is so dependent on vision, common sense dictates that driving must be unsafe beyond a certain threshold of visual impairment.

This idea is so compelling that traffic authorities worldwide restrict or prohibit driving by persons with defects in visual acuity and often in visual field.

Problem is, the scientific evidence linking these clinical measures of vision to unsafe driving performance is weak to non-existent, says Eli Peli, OD, professor of ophthalmology at Harvard Medical School in Boston, US. The correlation with visual acuity is especially tenuous.

"There are no firm, evidence-based standards, so people make decisions based on weak reasoning," Dr Peli says. "Legislators look at the state next door and they adopt similar standards because that is what people are used to and what they will accept."

The result is a wide variation in the vision requirements for driver licensing. A 2002 survey by the International Council of Ophthalmology found minimum acceptable corrected visual acuity ranged from 0.8 in Mexico and Algeria all the way down to 0.1 for restricted licenses in some US states. Most European countries were at or near the 1991 European Commission guidelines of 0.5 for binocular and 0.6 for monocular drivers, though some were higher, such as Switzerland at 0.6 and 0.8, and Hungary at 0.8 and 1.0.

Visual field requirements ranged from not less than 150° in Japan to no restrictions at all, with 120° horizontal field extent most common. In addition, guidelines for measuring visual performance were highly variable. Many countries do not specify how tests must be conducted. Even when methods are spelled out they are sometimes so vague that they are not reproducible, such as a UK statute requiring that drivers be able to read a standard vehicle number plate at 20 metres "in good light".

In Dr Peli's view, these standards are not just intellectually questionable – they are potentially discriminatory. Research does show that low-vision drivers have higher than average accident rates. But the absolute rates are still quite low. In 12 studies cited in a 2005 report by the Eyesight Working Group of the European Driving License Committee, the relative risk or odds ratio of visually impaired subjects having an accident compared with controls ranged from 0.12 to 7.68, with seven studies putting the figure between 1.17 and 1.6. Drivers with other common medical conditions, including impaired hearing, coronary disease, and movement disorders, present a similar risk, as do drivers generally over the age of 70 years. Those drivers, however, are not singled

out for restriction, Dr Peli points out.

Prohibiting low-vision drivers who have demonstrated proficiency in road tests would have a negligible impact on overall accident rates at the cost of restricting the mobility of many, mostly older, citizens, Dr Peli says. He cites a California study estimating that banning all low-vision drivers using bioptic telescopes would cut the state's 1.6 million annual auto accident total by only about two accidents per year.

Indeed, if public safety is the issue, the evidence is overwhelming that the biggest problem is at the lower end of the age spectrum. Youth, gender, and years of driving experience are far better predictors of poor driving performance than low vision. "The worst offenders are young men. Their accident rate is as high as 20 times that of the general population, yet no one suggests they should be denied licences," notes Dr Peli, who is also the Moakley Scholar in Aging Eye Research at the Schepens Eye Research Institute, and guest editor of an upcoming special issue on low vision driving in the journal *Visual Impairment Research*.

Still, driving competence should be assessed for any patient with a potentially disabling medical condition. And many visually impaired patients should curtail or alter driving practices for safety reasons, Dr Peli says.

But even tests such as contrast sensitivity, glare sensitivity, dynamic visual acuity, and useful field of vision – all of which correlate more strongly with driving performance than static visual acuity – are weak predictors. Far more important than how clearly drivers see is how quickly and appropriately they respond in traffic, Dr Peli emphasises. "At the moment, we cannot tell by vision tests alone who should or shouldn't be on the road. The only reliable test is to take them on the road and see if they can drive safely."

Toward functional tests for driving

The proper role for visual performance tests is to screen the patient, Dr Peli believes. Those who fall below a reasonable standard, perhaps 0.5 visual acuity and 120° visual field, should be referred for additional assessment. Also, tests for glare, contrast sensitivity, and useful visual field of view might be helpful additional screening tests for older drivers.

Dr Peli is not alone in these views; indeed his view is forging a consensus. The 2005 International Council of Ophthalmology report, "*Vision Requirements for Driving Safety*," recommends that countries worldwide adopt 0.5 visual acuity and 120° horizontal visual field as a screening point for an unrestricted licence.

The report recommends such requirements "not because one becomes



A person spotting through a monocular bioptic telescope. Shown is a 3.0X Keplerian telescope (Mini, manufactured by Ocutech, inc). This telescope was used by some of the subjects in the Dutch study

Courtesy of Eli Peli MD

unsafe at 0.4 but it includes a safety margin for adverse conditions." In other words, anyone who has 0.5 visual acuity is likely to retain enough vision to drive safely in the dark, rain, fog or other poor conditions.

However, the report further recommends that individual consideration be given to those in the 0.5-0.1 range, with additional vision, cognitive, and functional tests, including a road test, if there is any doubt. Restricted licences also should be available for the purpose of "improv[ing] the safety margin (inherent in the standard requirements) through avoidance of hazardous conditions, especially for those who have prior experience and a good driving record."

In its 2005 report, the EU Eyesight Working Group recommended that the 1991 visual acuity and visual field standards be retained, but acknowledged that the evidence for them was weak and called for further study. Also recommended were provisions for road tests for those falling below the screening standards, and development of more-explicit criteria for issuing restricted licences, including for use of bioptic telescopes (small telescopes mounted at the top of the spectacle lens that are permitted for use by drivers with moderately reduced visual acuity in many states in the US).

Based on these recommendations, several pilot studies designed to evaluate standards for low vision driving, including the use of bioptic telescopes to improve acuity and prisms to correct hemianopia, have been undertaken in Europe. The results of a study of bioptic telescopes carried out in The Netherlands will be reported in the upcoming special issue of *Visual Impairment Research*, Dr Peli says. "They found that 25 per cent of the low vision patients they trained to drive with bioptic telescopes could drive well enough to pass the official on-road driver licensing test. Hopefully that will lead to licensure of bioptic drivers in The Netherlands, but it could run into

problems with attempts to unify standards across Europe. This was a demonstration project; much more research will have to be done to convince the skeptics."

Until such standards are adopted, though, ophthalmologists will continue to be bound by existing standards whether they make sense or not. Depending on local law, they may even be required to report patients who fail statutory tests.

When it is possible to appeal a licence denial, Dr Peli recommends doing so if the patient may be able to drive safely. He also recommends working with patients whose vision or cognitive functions appear to put them at risk. For example, if patients express concern about driving at night, suggest that they stop doing it. If glare is a problem, discuss getting off the road during the 15 to 30 minutes in the morning and the evening when the sun makes vision difficult.

For patients who are losing visual field, see if they can improve performance by moving their heads more when driving. Special training may be able to help patients with bioptic telescopes and those recovering from a recent loss of vision improve enough to pass a driving test and operate vehicles safely, Dr Peli says.

He also recommends having a family member present in the room when examining older patients who might need to restrict their driving. "It helps create some pressure if they are reluctant to address the problem."

Finally, if there is any question about driving confidence, have the patient take a road test. "I tell them 'if you think you are still good enough to drive, why not get yourself evaluated?' If they don't think they can pass, they may take themselves off the road. If they take the test and the guy tells them 'pull over, I am not going to continue riding with you,' that's a pretty good sign that it's time to stop driving."

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