

Summary:

Vision and cognitive functioning among elderly drivers – importance for driving performance. A follow-up study

In the year 2002, a research project was carried out in the city of Tønsberg in Norway. The aim of this study was to examine whether different tests of visual and cognitive impairments could identify elderly drivers believed to constitute a danger for themselves and/or others in traffic. Four different tests for vision and cognitive functioning were found to predict driving performance well. The tests were relatively easy to administer concerning the use of time and equipment needed. In 2005/2006 a similar study was carried out among elderly drivers in the city of Oslo. In the study from 2005/2006, the scores on the different tests were either weakly related or not related at all to driving performance. The results indicate that it is not sufficient to use the test scores on these tests for vision and cognitive functioning in order to determine whether a driver is a danger to oneself and/or to others in traffic.

Background and methods

In the year 2002, a research project was carried out in the city of Tønsberg in Norway. The aim of this study was to examine whether different tests of visual and cognitive impairments could identify elderly drivers believed to constitute a risk for themselves and/or others in traffic. The results from the 2002-study showed that in particular four different tests for vision and cognitive functioning predicted driving performance well; visual acuity under glare conditions (measured through the Brightness Acuity Test), Amsler's test for defect in the central field of vision, Trail Making Test B (TMT B) for cognitive impairment and the Useful Field of View test for perception and attention in the peripheral field of view. These four tests can easily be included in the mandatory medical examination drivers aged 70 years and older have to go through in Norway in order to maintain their driver license. Before the test can be included in the medical examination, it is necessary to examine whether the results from the 2002-study can be replicated and if so, to determine the cut-off values of the different tests in relation to driving performance. This is the background for the study carried out in Oslo in 2005/2006.

91 drivers aged 67-91 years participated in the Oslo study. In addition, 18 employees aged 42-63 years from the National Public Road Administration took part in the study. Two key elements comprised the study; (1) assessment of driving performance (2) administering various tests for vision and cognitive functioning.

The participants drove a standardized route in real traffic during daytime. The route included driving in a broad range of different traffic environments (roundabouts, intersections, different speed regulations etc.) for approximately 45 minutes. A trained observer sat in the car with the participants during the tour. The observer rated the participants' driving performance on six main dimensions; technical handling, use of indicators, observation, positioning on the road, speed adaptation, and adaptation to traffic. A five-point evaluation scale was applied to assess performance on each of the main elements. In addition, an overall evaluation was made by categorizing the participants' driving performance as whether or not the driver was regarded as representing a danger to either him-/herself or to others in traffic.

About one week later, four main types of visual function were assessed; visual acuity; visual acuity under glare conditions, central and peripheral visual field. Four tests of cognitive functioning were also administered. Three of the tests measured cognitive impairments commonly associated with age-related dementia: the Mini Mental Status Examination, the Trail Making Test Part B and the Clock Drawing Test. The Useful Field of View test was applied to measure perception and attention in the peripheral field of view.

Results and conclusion

In the study from 2005/2006, the scores on the different tests for vision and cognitive functioning were found to be either weakly related or not related at all to driving performance. The most promising test was the Trail Making Test part B and the UFOV test part 3. The relationship the test scores on these tests had to driving performance was however much weaker than the 2002-study.

It is difficult to point out a single explanation why the results from the study in Tønsberg is not replicated in the Oslo study. A combination of the following is believed to be the most probable explanation:

- The sample in Oslo was more selected in terms of driving performance as compared to the sample in the Tønsberg study, i.e. the Oslo sample was evaluated to have a much better driving performance on the average.
- All participants in Oslo used the same car (with an automatic transmission) when driving performance was assessed. In Tønsberg, the participants drove in their own private car (most of these having a manual transmission).
- Different routes driven in the two cities.
- The relationship between test scores and driving performance could be a bit overestimated in the 2002-study.

The results indicate that it is not sufficient to use the test scores on the tests for vision and cognitive functioning in order to determine whether a driver is a danger to himself and/or others in traffic. In order to make such a decision, it is concluded that a practical test for driving performance is most suitable. The application of the different tests for vision and cognitive functioning are, however, not useless within this context. The test scores can signify increased risk for impairments in driving performance, and the tests thus be used as a tool for referring drivers to a practical driving test, or to a more comprehensive assessment of visual and cognitive functioning as related to driving.