

research community should agree on surrogate measures for validation of visual skills and vision tests. There is a need for uniformly accepted behavioral performance measures that would be considered safety-related. There is a need to validate the new vision tests relative to these measures. And there is a need for large scale research that would simultaneously evaluate multiple measures, to eliminate redundancies.

Actions

The following actions are recommended:

1. Develop simple self awareness tests - and test kits - to check on some of the simpler critical functions such as contrast sensitivity, acuity, visual field. The use of these tests can then be promoted through AAA, AARP, and AAAM.

2. Promote annual or bi-annual clinical and functional vision tests with inclusion of tests for specific diseases (cataracts, lens opacity/transmission), retinitis pigmentosa, scotomas, glaucoma.

3. Evaluate the cumulative experiences of states with different programs for elderly drivers. Mobility needs and patterns are not the same across the nation, and different licensing approaches are emerging in several states. A compendium of the existing alternative approaches with information on their successes and benefits should be written and disseminated to all DMVs.

4. Conduct/continue research on:

- a. Relevance of different visual skills to specific driving maneuvers (rather than accidents).

- b. Effective compensating behaviors - e.g., head turning, mirror checking, for reduced visual field; directing gaze away from glare sources to overcome phototropism.

- c. Continue research on association between accident involvement and performance on selected vision tests including contrast sensitivity, divided attention, effective visual field (Useful Field of View), and dynamic acuity and contrast sensitivity. The tests should focus on older drivers, and should control for co-morbidity.

5. Until there is sufficient conclusive data on alternatives to the 20/40 acuity standard, state licensing agencies would do best to set up an expert panel who will issue recommended guidelines for state DMVs. The current vision-related licensing recommendations can serve as a starting point. The panel's role would be to update the recommendations in the following areas:

- a. The indications for waivers and variations from the standard (whatever each state's standards are).

- b. Recommended additional tests, relative to the referral issues and observed impairments (candidates include tests of visually-based divided attention, glare sensitivity, and contrast sensitivity).

- c. Recommended limits on the license (including range of driving within residence, hours of driving, and speed of driving, and road types).

USE OF TRAFFIC RECORDS TO IDENTIFY HIGH RISK DRIVERS

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Identifying a method for detecting drivers with functional impairments that may affect their ability to drive has long been the goal of driver licensing authorities. The use of traffic records to identify high risk older drivers is attractive given that there is great individual variation in driver performance decrements, that older drivers constitute the fastest growing proportion of the driving population, that there are limited resources for screening drivers, and that traditional methods for identifying drivers at risk are changing, i.e., new license renewal procedures have meant that the period of time between visits to license examiners is increasing. However, the question remains "Is there a cost effective model that can be employed to better predict future crash involvement so as to permit pre-crash intervention through reexamination, retraining and/or driving restriction?"

Problem

Compared with other age groups, older drivers have relatively few crashes. In general, their crash risk does not exceed that of the general driving population until around age seventy. There is a substantial body of research indicating that when driving exposure is taken into account, the crash rate of older drivers begins to rise around the age of fifty and increases sharply around the age of seventy. As in other age groups, only a small portion of this population experiences a crash or violation within a particular year, and most crash-involved drivers have 'clean' records in the year following a crash.

Identifying that group of older drivers who are at elevated risk is especially important because older drivers are more vulnerable to injury when involved in a crash. Unfortunately, identifying driving impairment and predicting crash risk is especially difficult because decrements in driving ability occur in an unpredictable fashion and there is not definitive age after which one should not drive.

There is a complex interaction between age and decrements in driving performance. Several physical and mental changes may occur during the aging process that may adversely affect functional driving ability. These include loss of visual acuity, declines in glare recovery ability, peripheral vision, and various attentional factors that affect information processing speed. However, because older drivers have an increasing number of physical problems does not necessarily mean that they are poorer drivers. Most older drivers are aware of these changes and moderate their driving to times and circumstances that present the least risk.

Identification of drivers who may have functional driving disabilities has traditionally been the responsibility of driver license examiners. While this approach is central to driver licensing, there is a trend in this country to extend both the license renewal period and to permit license renewal by mail of those with 'clean' driving records. Thus, it may be over ten years between appearances in a driver licensing station. Furthermore, most people who are experiencing decrements in driving ability chose their 'best' day to appear for examination. These factors weaken the effectiveness of this method for identifying high risk drivers.

Due to the complexity of identifying age-related decrements in driving performance, a more useful predictor of crash risk in older drivers may be prior driving performance as recorded on the driving record. Many states use some combination of points accrued as a result of traffic violations or crashes to identify drivers who should be reexamined or sent for retraining at driver improvement clinics. There is justification for this action because research indicates that prior record is the best single predictor of crash risk (Gebers and Peck, 1992). With the exception of special programs targeting provisional licensees with poor driving records, criteria used to identify these drivers have been based on driving performance rather than on age-specific indicators. Only in the area of license renewal do some states use age-related criteria to determine the period of time between license renewal and reexamination.

Needs

In order to consider the feasibility of using traffic records to identify high risk drivers, three types of information are needed:

- Data on the availability of past driving records to predict future crash involvement in older persons;

- Data on the portion of the at-risk population that may be identified in this manner;

- Analysis of patterns of crashes and violations to examine the possibility that certain configurations might be better predictors of elevated risk;

A study by Gebers and Peck (1992) examined the ability of driving records to predict future crash involvement. It reports that "older drivers exhibit a steeper increase in future accident risk at successive prior incident levels, relative to drivers in general." Furthermore they found that a record of traffic convictions presents a higher risk of crashes for older drivers. Using these findings for support, California modified its existing algorithm for identifying older (age 70+) high-risk drivers to become activated at a lower number of incidents. California requires all drivers involved in a fatal crash or 3 or more crashes within a calendar year to appear for reexamination. Based on their findings that older drivers have an increased risk of subsequent crash, they changed their criteria for older persons so that older drivers experience two or more crashes within a 1 year period are required to appear for reexamination. Even though only one percent of older drivers are affected by this program modification, California felt that the anticipated reductions in crashes in this vulnerable group of road users justified the costs of the program.

Action

Clearly there is justification for using traffic records to assist in the identification of highest risk stratum of older drivers. Since crash records contain important information not only about the number of crashes but also about the details of the crash including crash configuration, time-of-day, roadway conditions, weather conditions, location, driver condition, and culpability, they provide data that may be useful both for assessing individual driver's crash risk and for identifying groups of drivers who have certain crash patterns that may present great risk after experiencing just one incident, e.g., stopped in middle of roadway. Computer identification may provide a low cost alternative to screening large groups of older drivers. However, further research is needed to refine this application to traffic records. For example, are older drivers who crash while turning more likely to have future crashes? Is there justification for reexamining drivers involved in certain crash configurations after one crash?

The use of traffic records to identify high risk older drivers should be part of a more comprehensive

program for identifying high risk drivers. However, such a program will never be able to identify the entire target population. Since most older persons have not had a crash within the preceding year, and since a large proportion of those older drivers involved in crashes come from this pool of crash free drivers, the effectiveness of using traffic records to trigger reexamination will be small but important. Yet, further analysis should enable licensing authorities to refine their procedures for recalling high risk older drivers.

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