Mild Cognitive Impairment, Dementia and Driving: Concluding remarks

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Overview

- The various Cognitive functions which contribute to a successful driving are compromised in patients with Mild Cognitive Impairment (MCI) or dementia.
- These conditions are highly prevalent in the elderly population (~25%)
- and can have diverse etiologies: AD (dementia – pre-dementia /amnestic MCI), vascular (VaD -VascMCI), PD, drug induced.

- Taking into account that the percentage of the elderly in society is increasing while at the same time the level of motorization also increases, **the need to investigate the impact of these conditions on driver performance becomes critical**.

Risk of accidents (I) AD

- AD patients are 2.5 to 4.7 times more likely to be involved in a car crash than age-matched controls (Brorsson, 1989; Massie & Campbell, 1993; Tuokko et al., 1995)

- Higher CDR scores have been associated with worse driving (Dubinsky et al., 2001; Hughes et al., 1982)

Predictors-AD

- Performance on neuropsychological tests measuring
- visuospatial and
- attentional abilities,
- executive functioning and
- *possibly memory* is associated with driving competence in patients with AD (Brown et al., 2005; Grace et al., 2005; Ott et al., 2008; Uc et al., 2005)

Studies have suggested that:

- ***Neuropsychological tests in combination with neurological variables*** and performance on actual or simulated road tests *could be used to make driving recommendations in patients with AD* (Frittelli et al., 2009; Ott et al., 2008; Ott et al., 2003; Rizzo et al., 1997)

Risk of accidents MCI

- MCI population is **at risk** for driving difficulties, although their performance on on-road or on simulator testing is not consistently worse than that of controls (Fritteli et al., 2009; Kawano et al., 2012; Wadley et al., 2009)
- The presence or not of an increased crash risk in individuals with MCI warrants further investigation

Predictors-MCI

- Measures of **mental flexibility, inhibitory control and visual attention** appear to be associated with driving performance in patients with MCI, but this issue needs further investigation (Kawano et al., 2012)

Risk of accidents (II) PD

•Increased risk. Related mostly to Cognitive alterations but also to motor symptoms

•15% of PD patients with an active driving license were engaged in a car accident during a period that covered the past five years (Meindorfner et al., 2005)

•a more advanced H&Y scale score was associated with more motor vehicle accidents (MVAs).

Predictors-PD

- Tests that engage executive, attentional, and visuospatial resources are related to driving competence in patients with PD (Amick et al., 2007; Classen et al., 2009; Classen et al., 2011; Uc et al., 2006; Uc et al., 2009)

- Also, fitness to drive in patients with PD is associated with manual dexterity, contrast sensitivity, duration of the disease, and severity of the disease according to the H&Y scale (Devos et al., 2007; Worringham et al., 2006)

Risk of accidents (III) Stroke

- Increased Risk: odds ratio ranging between 1.9 and 7.7

- (Lundqvist et al., 2008; Margolis et al., 2002; Sagberg, 2006; Sims et al., 2000)

- increased risk of crashing after adjusting for driving frequency by using measures, such as annual or weakly mileage driven

Predictors-Stroke

• Measures assessing **executive functioning, visuospatial organization, visual perception**, and aspects of attention are associated with post stroke driving capacity (Akinwuntan et al., 2006; Fisk et al., 2002; George & Crotty, 2010; Lundberg et al., 2003; Mazer et al., 2003)

• Also, previous research has associated post-stroke driving capacity with the **side** of the brain damage as well as with driving experience and frequency of driving before the stroke episode (Akinwuntan et al., 2002; Lee et al., 2003; Soderstrom et al., 2006)

•**No data for vascular MCI due to small vessel disease or VaD-SIVD.**

Role of the Neurologist

•The aforementioned highly prevalent clinical conditions leading to Cognitive Impairment/Dementia, have a negative impact on driving competence

•However, although a diagnosis of dementia is generally considered as exclusionary for driving, **some studies have shown that a number of patients in the early stages of dementia are still able to drive efficiently**.

Role of the Neurologist

•Hence, there is a strong need for the development and application of thoughtful national policies.

• The restriction or total loss of driving privileges in a patient, is a complicated and serious decision that should involve:

the active participation of a well-trained Neurologist with deep understanding of the information provided by

neurological and neuropsychological measures

Previous Work (Dementia & Driving)

- The American Academy of Neurology: **Practice Parameters for patients with dementia** *(Iverson et al., Neurology, 2010)*

- However, although useful, these guidelines are rather general (e.g. a CDR of 2.0 indicates relatively high risk…)

- The proposed algorithm for evaluating driving competence includes only general cognitive measures (MMSE) which are not closely related to driving competence.

- The results are <u>not</u> reported in terms of a precise relative risk based on the presence of a risk factor or a cutoff score

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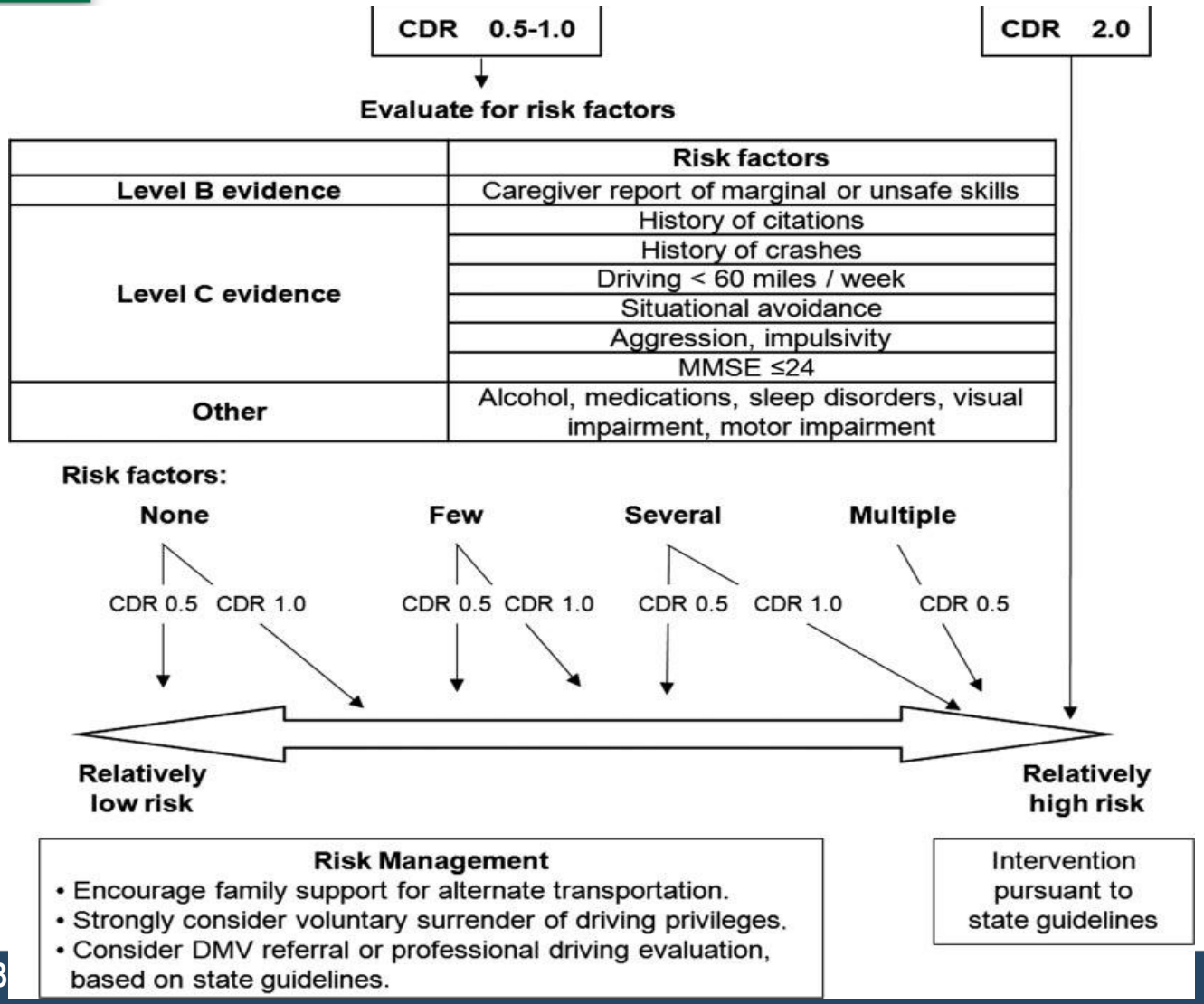
SPECIAL ARTICLE

AMERICAN ACADEMY OF NEUROLOGY

Practice Parameter update: Evaluation and management of driving risk in dementia

Report of the Quality Standards Subcommittee of the American Academy of Neurology

Iverson et al., 2010



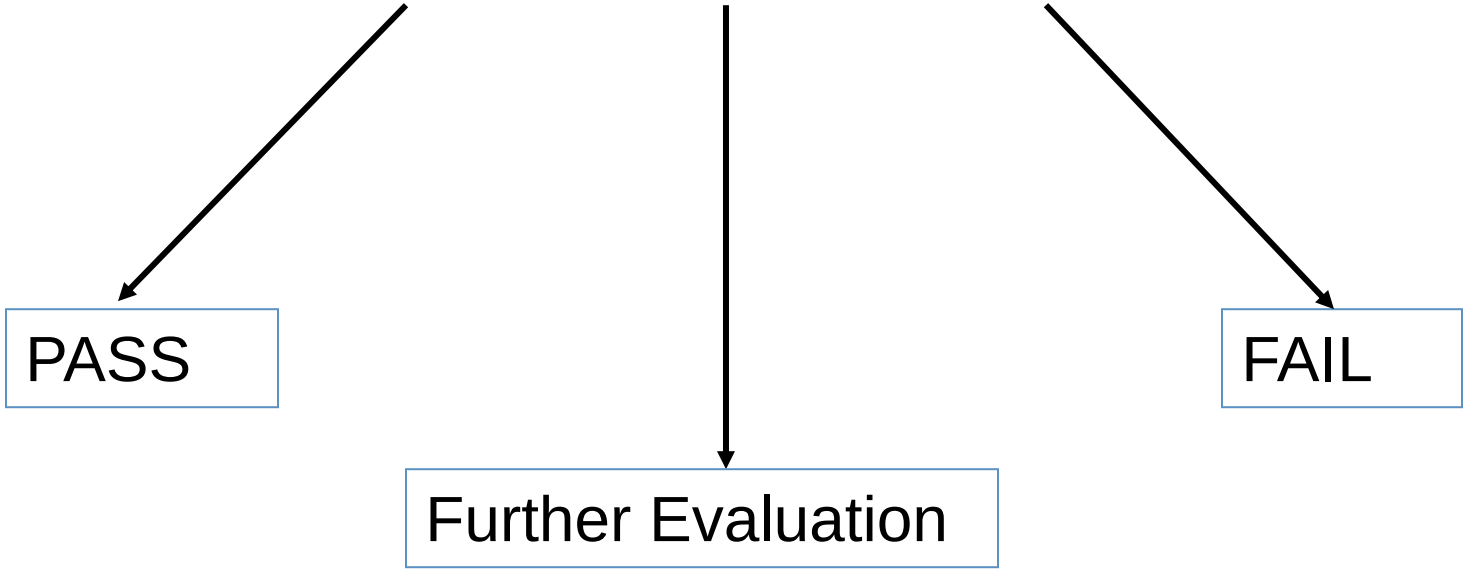
Future studies will help to define:

•specific guidelines-recommendations for the use of neurological and neuropsychological measures as **tools for the prediction of driving competence**, in the various clinical groups previously mentioned

with the **collaboration of traffic experts** (engineers, psychologists etc.) for the identification and quantification of the critical parameters of the fitness to drive.

Combined use of the **appropriate neurological** and **neuropsychological** predictors of driving competence according to the clinical diagnosis (MCI, AD, PD, stroke)

In order to help the neurologist's decision for the patient



And the possible definition of specific Restrictions (speed,traffic conditions,night driving,…) according to the **specific characteristics of each patient-driver** (disease, stage, age, neuropsychological tests, …)

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- A **large driving simulator experiment** on driver distraction including drivers with cerebral diseases

- By an **interdisciplinary research team,** co-funded by the Greek Research Secretariat and the European Commission