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Establishing a Framework for Driving Rehabilitation in Multiple Sclerosis

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Objective: To establish a framework for driving rehabilitation by identifying the critical cognitive, visual, and motor deficits leading to impaired on-road driving in multiple sclerosis (MS).

Design: Prospective study.

Setting: Shepherd MS Center in Atlanta and Augusta University Simulator Lab

Participants: A total of 102 active drivers with MS who underwent detailed cognitive, motor, and visual testing as well as an on-road test.

Interventions: Not applicable

Main Outcomes Measures. Performance on off-road cognitive, visual, and motor tests was correlated with performance on 13 specific on-road driving skills. These driving skills were mapped onto an existing theoretic model of operational, tactical, visuo-integrative, and mixed driving clusters. Stepwise regression analysis was employed to determine the off-road impairments influencing performance on the on-road test and each cluster.

Results. Visuospatial function, inhibition, binocular acuity, vertical visual field, and stereopsis explained 37% ($R^2=0.37$) of the variance in total on-road scores. Attentional shift, stereopsis, glare recovery, and use of assistive devices best predicted the operational cluster ($R^2=0.28$). Visuospatial function, inhibition, reasoning, binocular acuity, and stereopsis best determined the tactical cluster ($R^2=0.41$). The visuo-integrative model comprised binocular acuity and stereopsis ($R^2=0.12$). Inhibition and binocular acuity provided the best model to predict performance in the mixed cluster ($R^2=0.25$).

Conclusions and relevance. Driving rehabilitation for individuals with MS should include remedial training of visuospatial and executive functions as well as compensatory strategies to correct for impaired visual acuity and field of view. Different training programs can be developed to target specific on-road driving skills.