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# Driving Assessment Results in Patients with a Diagnosis of Dementia

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## Introduction

Many patients are actively driving when they are diagnosed with Alzheimer's disease or related dementia. Elderly persons generally self-police their driving activities and cut back or cease driving when they develop deficits. Those with dementia frequently do not, and may be vehement in their refusal to stop driving. Obtaining an objective assessment of driving skills can be of assistance to the primary care physician or the family member who is counseling a patient in this circumstance, providing a solid platform from which recommendations can be made. The patients themselves may be illogical and unmoved by a report from such an assessment, but it is easier for families and professionals to insist upon or

initiate changes if they have objective documentation of the loss of skills.

Formal Driving Assessment programs are not widely available in spite of the value of such testing; nor are primary care offices uniformly using office-based screening such as the "ADReS"<sup>1</sup> tool developed by the National Highway Traffic Safety Administration and the AMA. We investigated whether any correlations existed between the diagnosis of dementia and any specific findings in patients who have had full assessment of driving skills. If so, the presence of these findings might clarify for PCPs which patients they should attempt to prohibit from driving and which need further evaluation. To look for such correlations, we reviewed records of all patients evaluated at our Driving Assessment Clinic at the Hanshaw Geriatric Center since the inception of our electronic health record in late 2007.

## The Evaluation

The clinic accepts self or physician referrals, and the only requirement is that the person has been previously licensed to drive. A number of younger patients who sustained a traumatic brain injury or stroke have been referred since there is no age limitation. However, the bulk of referrals have been older patients

with dementia. The evaluation is done by an interprofessional team which includes a Geriatrician, a Physician Assistant and an LPN with geriatrics expertise, and an Occupational Therapist.

The testing protocol includes a driving-relevant past history and review of systems, basic cardiopulmonary, eye and ear, and musculoskeletal examinations, mental status testing, and tests of several cognitive functions which are closely related to driving. Useful Field of View<sup>®</sup> software is employed, as the results of it have been correlated with risk of car crash.<sup>2</sup>

Full assessment requires about 90 minutes, and would not be practical to duplicate in a small primary care office. The ADReS tool, described in reference one, is a practical and adequate driving assessment tool which PCPs can incorporate into their practices. ADReS has seven components, ROM and muscle strength testing, Rapid Pace Walk, visual acuity and fields testing, the clock drawing test, and Trail-making Part B. Once trained, non-physicians can administer this test protocol, and the time required is patient dependent, probably about 15 minutes on average. It can yield basic information in situations which are reasonably straightforward, or when it would be impossible

## Objectives

*Primary care physicians are frequently involved in cases in which they must decide if a patient with dementia should stop driving. The decision is complex, and there are no firm clinical guidelines available. We examined the results of a number of patients who have undergone assessment in our Driving Assessment Clinic, to determine if any of our findings correlated with the diagnosis of dementia. If any associations exist, recommendations may be possible to assist PCPs in making the decision to have patients stop driving, even if full formal testing cannot be done.*

to have a patient go to a central location for full testing. There is no E&M code activated at this time for reimbursement for a driving assessment per se, and it must be billed by its separate components.

### Characteristics of Patients

Since our EHR was initiated, 49 persons have been tested, three of whom have undergone testing twice, for a total of 52 evaluations. Mean age is 75.4 (range 41-90). Twenty-nine men were evaluated (one tested twice), and 19 women (two tested twice). Thirty-nine referrals were from physicians, 11 from families, and two patients were self-referred. In twenty-seven of the evaluations (52%), the patient had a diagnosis of dementia. Eleven (21%) had suffered head trauma, four of whom also had a dementia diagnosis. Nine patients (17%) had had strokes, and five of them had a concurrent diagnosis of dementia. In two cases, all three

diagnoses (dementia, stroke, and head trauma) coexisted, and yet the patients were still actively driving.

### Findings

For this paper, we examined the portions of our protocol that most directly assess cognition. This includes a standard 30-item memory screening test, the MMSE<sup>®</sup>. Scores ranged from 30 to 9, and among those with a pre-existent diagnosis of dementia, from 28 to 9. We used a conventional categorization in which scores of 28 to 30 represent "normal", 21 or less represents "significantly impaired", and the mid-range scores 22 to 27 represent "equivocal" findings. Our full cohort fell into roughly equal groups – 17 tests were normal, 21 equivocal, and 14 were significantly impaired. Of the 27 examinees with a diagnosis of dementia, three tested in the "normal" range, 11 were equivocal, and 13 were clearly impaired.

A multiple choice test of driver's knowledge, resembling the written part of a DMV-administered driving examination is given to examinees; a total of 19 (36.6%) did not reach an acceptable score. Of the 19 tests with failing scores, 15 of the patients had an existing diagnosis of dementia and four did not. Eleven individuals with a diagnosis of dementia passed the Driver's Knowledge test.

A third test in the Hanshaw Clinic protocol which might yield correlations with the diagnosis of dementia is a sign recognition test. This is a matching test in which patients match a picture of a traffic sign with a description of what the sign instructs the driver to do, e.g., ∇ = "yield to oncoming traffic". Eighteen of 27 patients with a dementia diagnosis failed this test and nine passed it. In patients without a dementia diagnosis, pass and failure rates were equal (13 of 25 failed and 12 of 25 passed).

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### **Advice to Patients at Completion of Testing**

We inform all persons being tested that we only make recommendations; only the DMV has authority to restrict driving privileges. We will strongly advise whoever referred the patient as to whether the patient should retire from driving, modify their driving or their vehicle, or continue to drive without restriction, and we base the recommendation on a balanced review of all test parameters. Physical findings alone tend to result in modification suggestions, whereas cognitive impairments are more likely to culminate in recommendations to cease driving. The UFOV, of all our test components, has been the most thoroughly correlated with crash risk, and therefore carries more weight in the final recommendation. (UFOV is also the item most difficult to incorporate into regular primary care practice.)

The final recommendation in 37 of our evaluations (71.2%) was to discontinue driving; in 5 (9.6%) to continue to drive with significant modifications; and in 10 (19.2%) to continue driving as usual or with minimal modifications. Of those with preexisting dementia diagnoses, 26

of 27 were advised to cease driving. One individual who entered testing with a dementia diagnosis scored so well on all parameters that no recommendation to discontinue or modify driving could be justified based on the testing results. This same patient went on to be re-tested by the DMV, and passed their written and on-road testing.

### **Discussion**

For most of the 20th century, the growth of the elderly population (65 and over) far outpaced that of the total population.<sup>3</sup> Not surprisingly, the number of elderly drivers increased as well. The 2007 statistics from the National Safety Council show that drivers over the age of 65 represent a total of 15% (30 million) of the licensed drivers in the U.S, and this is predicted to reach 25% in 2030. This age group experiences the second-highest death rate in motor vehicles accidents (per mile driven), exceeded only by the rate for those aged 15 to 24 years old.<sup>4</sup>

The Insurance Institute for Highway Safety (IIHS) confirms that, starting at the age of 75 and more notably after the age of 80, the rate of fatal crashes per mile driven is increased.<sup>5</sup> In addition to age, the presence of dementia is a factor in increased crash risk.<sup>6</sup> In cases of dementia, the risk of becoming lost while driving may be as serious a risk as crashing, as was documented in a recent study of major newspapers' reports of the fates of drivers who had become lost. In that study, among reports of 218 lost drivers, 70 were never found, 32 were found dead, and 35 of 116 "found alive" drivers were significantly injured.<sup>7</sup>

The best evaluative approach for determining whether a person at a given stage of dementia should continue driving remains very unclear. Our small sample precludes statistically significant conclusions,

but does point out several findings which demonstrate that certain intuitive notions about the expected performance of persons with dementia diagnoses may be incorrect.

No single sub-test in our protocol predicted a specific diagnosis, result, or final recommendation (although all patients who had any two or all three diagnoses of stroke, head injury, and dementia failed the assessment). Having a diagnosis of dementia at the time of testing was strongly correlated with a final recommendation to discontinue driving. Twenty-six of 27 examinees with dementia were advised to cease driving; however, many persons *without* the diagnosis were also advised to stop driving. Thus our cohort demonstrates two important aspects for policy makers who may consider banning driving privileges for those diagnosed with dementia. First, substantial cognitive impairment may be present in drivers who have not been formally given the diagnosis. Additionally, as demonstrated in larger studies with numerous patients, our group had one patient diagnosed with dementia who did not fail any aspect of the testing. It is definitely not yet widely accepted that merely having the diagnosis of mild dementia is sufficient cause to disallow all driving.<sup>6</sup>

The MMSE score did not correlate with the presence or absence of a dementia diagnosis, and in our sample, higher scores did not correlate with our final recommendations. A number of patients who scored within the normal range were advised to stop driving and one person with an equivocal score of 25 was judged to maintain sufficient overall skills to continue driving without modifications. In this particular group of patients, all who scored 24 or less were advised to discontinue

driving. Practitioners are advised against using this specific number *in isolation* as a breakpoint, since a larger study could reach a different conclusion, but certainly there was a trend toward low scores being more predictive of a final decision supporting driving cessation.

As with the MMSE score, the final results of the UFOV testing could not be taken alone as determinants of the final recommendation, but trends were apparent. Every patient with a UFOV category 1 score (best performance), was assessed as being able to continue driving, as were 5 of 7 persons with a category 2 score. Thirty of 32 with a category 5 (worst performance) score were advised to completely cease driving.

Offering advice to continue or discontinue driving is a situation into which primary care physicians are frequently thrust, and is a very momentous decision from the patients' perspective. The patient and family ultimately consider a number of factors outside the scope of this paper, and we are aware that the small size of our study and the referral bias introduced by the nature of our clinic make it impossible for us to render conclusions with broad societal implications. However, we feel that our findings support certain practical recommendations for Primary Care Physicians. These include:

- Any patient with any combination of at least two of the three most significant diagnoses - stroke, significant head trauma, and dementia - should be advised to stop driving.
- Physicians can consider telling patients with a dementia diagnosis and an MMSE score of 24 or less to discontinue driving without additional testing, but if they resist, ADReS testing or referral is indicated.

**Table 1. Dementia Diagnosis Status and Driving Assessment Results**

Test component	Test result	WITH Dementia Diagnosis N=27	WITHOUT Dementia Diagnosis N=25
MMSE®	"Normal" 28-30	3 (11%)	14 (56%)
	"Equivocal" 22-27	11 (40%)	10 (40%)
	"Significantly impaired" 9-21	13 (48%)	1 (4%)
UFOV®	1 (Low Crash Risk)	1 (4%)	3 (12%)
	2	1 (4%)	6 (24%)
	3	4 (14%)	2 (8%)
	4	2 (7%)	1 (4%)
	5 (Very High Crash Risk)	19 (70%)	13 (52%)
Sign Recognition	Pass	9 (33%)	12 (48%)
	Fail	18 (67%)	13 (52%)
Driver's Knowledge	Pass	12 (44%)	21 (84%)
	Fail	15 (56%)	4 (16%)
Final Recommendation	Continue to drive	1 (4%)	9 (36%)
	Drive with modifications	0 (0%)	5 (20%)
	Discontinue driving	26 (96%)	11 (44%)

- Patients with a dementia diagnosis who have shown a propensity for getting lost should be encouraged to retire from driving.
- Refer for a formal driving assessment any patient whom you diagnose with dementia, if there is any question at all as to when they should stop driving.

## References

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## CME POST-TEST

25. The percentage of all US drivers who are 65 years old or older is approximately:
- a. 2%
  - b. 15%
  - c. 30%
26. T/F: It is widely accepted that patients should stop driving as soon as they are diagnosed with dementia.
- a. True
  - b. False
27. In a study of reports of demented patients who became lost while driving, 137 of 207 (66%):
- a. Were found safe by authorities
  - b. Returned home on their own
  - c. Were found an average of 100 miles from home
  - d. Were found dead, injured, or never found

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