Ms. Daisy is still driving…
So when is it time to take an Uber?
An Evidenced-Based Review on Dementia and Driving

David B. Carr, M.D
Alan A and Edith L Wolff Professor of Geriatric Medicine
Department of Medicine and Neurology
Washington University at St. Louis
Disclosures

- Funding Support (last two years)
  - National Institute of Health (NIA, NEI)
  - Missouri Department of Transportation
  - Missouri Foundation For Health
- Consulting Relationships
  - Traffic Injury Research Foundation
  - Medscape
  - AGS
  - Alzheimer’s Association
  - UpToDate
- Medical Director and Consultant
  - Parc Provence
  - Gatesworth Communities
- Drug Industry Sponsored Trials (WU ATU)
  - Hoffman La Roche (Graduate and DIAN-TU)
  - Eisai (Clarity and AHEAD)
  - Biogen (ENGAGE/EMBARK)
  - Eli Lilly and Company (TRAILBLAZER/A4)
  - Green Valley (Green Memory)
  - Johnson and Johnson (Autonomy)
- Investment/Stock/Equity
  - None
PRESENTATION OBJECTIVES

Review a recent national guideline on dementia and driving
Follow a patient with dementia in our memory clinic as we try to make clinical decisions related to driving
Pose some additional observations and questions...
This talk does not cover MCI, preclinical AD, non-AD dementias

<table>
<thead>
<tr>
<th>Etiology</th>
<th>MCI</th>
<th>Mild Dementia</th>
<th>Moderate Dementia</th>
<th>Severe Dementia</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADD</td>
<td>Slightly Increased</td>
<td>Moderate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VaD</td>
<td>Increased</td>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FTD</td>
<td>Increased</td>
<td>High</td>
<td>Very High</td>
<td></td>
</tr>
<tr>
<td>DLB</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PDD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Case-Based Approach

• An 83 year old female presents with dementia
• Daughter raises concerns about driving given mother’s slowed reaction time, medications, and other medical conditions
• PMH: HTN, Type II DM, Anxiety Disorder (GAD)
• Medications:
  Atenolol 50mg BID, Metformin 500g BID
  Sertraline 25mg QD
  Alprazolam .125 mg BID prn
Clinical Questions One Might Ask…

Should clinicians be involved in fitness-to-drive evaluations?

Should a diagnosis of Alzheimer’s disease result in immediate cessation of driving privileges? (crash risk or failure on a road test)

Is there a level of dementia severity where driving becomes unsafe?

How can one rate dementia severity if they don’t use the Clinical Dementia Rating (CDR)?
Can AD patients demonstrate driving competency?

A convenience sample of 58 controls, 36 subjects with very mild DAT, and 29 subjects with mild DAT.

Results: Analysis of road test ability of controls (2 subjects [3%] failed the test), very mild DAT subjects (7 subjects [19%] failed), and mild DAT subjects (12 subjects [41%] failed) disclosed a significant association between driving performance and dementia status \(N=123; P<.001\).

Interrater reliability for assessment of driving performance ranged from \(k=0.85\) to 0.96. One-month test-retest stability on the road test was 0.76 (quantitative scoring) and 0.53 (clinical judgment).

Conclusion: Some patients with AD can drive safely

Update on the Risk of Motor Vehicle Collision or Driving Impairment with Dementia: A Collaborative International Systematic Review and Meta-Analysis

Justin N Chee, Mark J Rapoport, Frank Molnar, Nathan Herrmann, Desmond O'Neill, Richard Marottoli, Sara Mitchell, Mark Tant, Jamie Dow, Debbie Ayotte, Krista L Lancôt, Regina McFadden, John-Paul Taylor, Paul C Donaghy, Kirsty Olsen, Sherrilene Classen, Yoassry Elzohairy, David B Carr

- Databases: MEDLINE, CINAHL, Scopus, CENTRAL, EMBASE, PsychInfo, and TRID
- Limits: English-language articles only, published after 2004, any type of dementia (any severity), outcomes related to number of motor vehicle accidents and any formal on-road or naturalistic driving assessment

- Search results combined (n = 12860)
- Duplicate records removed (n = 3695)
- Records screened on the basis of titles (n = 9165)
- Excluded (n = 6378)
- Records screened on the basis of abstracts (n = 2787)
- Excluded (n = 2389)
- Full-text studies assessed for eligibility (n = 398)
- Excluded (n = 363)
  - No Outcomes of Interest: 70
  - No Dementia-Healthy Comparisons: 100
  - No Outcomes of Interest or Dementia-Healthy Comparisons: 71
  - Prior to 2005: 60
  - Wrong Publication Type: 29
  - Irrelevant to Research Question 1: 25
  - Simulator Studies: 8
- Studies available for data extraction (n = 35)
  - Later Exclusions (n = 26)
    - Irrelevant Outcomes: 10
    - No Patient-Healthy Comparisons: 4
    - No Extractable Data: 4
    - Common Data Sample: 8
- Studies included in this knowledge synthesis (n = 9)
  - Qualitatively described (n = 8)
  - Quantitatively synthesized (n = 4)
Results of four pooled studies on road test performance indicated:

RR of 10.77 (3.00, 38.62) for failure on road test in comparison to controls
Our Case: Initial Evaluation in Memory Clinic

- Gradual onset/decline in episodic (short-term) memory
- Needing some assistance with checkbook
- Still cooking, but less complex meals
- Clinical Dementia Rating 0.5 or very mild dementia
- Labs/MRI unrevealing, SBT 6, MMSE 24, Dx AD

What if you can’t do a CDR or Full Psychometrics?

<table>
<thead>
<tr>
<th>Clinical Measure of Dementia Severity</th>
<th>No Dementia (CDR=0)</th>
<th>Questionable or Very Mild Dementia (CDR=0.5)</th>
<th>Mild Dementia (CDR=1.0)</th>
<th>Moderate to Severe Dementia (CDR=2.0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>For the Dementia Specialist: Clinical Dementia Rating</td>
<td>No memory loss or inconsistent memory loss Fully oriented Judgment intact Function intact Personal care intact</td>
<td>Consistent slight forgetfulness Slight difficulty with orientation or judgment Slight impairment in community activities or home activities Personal care intact</td>
<td>Memory loss interferes with everyday activities Geographic disorientation Moderate impairment in judgment Mild but definite impairment of community or home activities Needs prompting for personal care</td>
<td>Severe memory loss Severe difficulty with time relationships and judgment No longer independent in activities Only simple chores preserved Needs assistance in personal effects</td>
</tr>
<tr>
<td>For the Clinician: Short Blessed Test (SBT)</td>
<td>N (SD) 1.2 (1.9) 28.9 (1.3)</td>
<td>N (SD) 4.8 (5.9) 23.1 (2.5)</td>
<td>N (SD) 15.4 (5.2) 20 (3.9)</td>
<td>N (SD) 18.5 (5.5) 16.1 (4.7)</td>
</tr>
<tr>
<td>MMSE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>For the Psychologist: Logical Memory</td>
<td>8.8 (2.9)</td>
<td>4.3 (2.7)</td>
<td>1.9 (1.7)</td>
<td>1.5 (2.3)</td>
</tr>
<tr>
<td>Block Design</td>
<td>30.1 (8.6)</td>
<td>22.2 (9.8)</td>
<td>12.0 (9.6)</td>
<td>3.2 (6.6)</td>
</tr>
<tr>
<td>Digit Symbol</td>
<td>45.6 (11.5)</td>
<td>31.7 (13.6)</td>
<td>17.0 (13.3)</td>
<td>8.3 (8.7)</td>
</tr>
<tr>
<td>Trailmaking A</td>
<td>40.9 (20.0)</td>
<td>70.2 (39.2)</td>
<td>108.3 (50.5)</td>
<td>???</td>
</tr>
<tr>
<td>Benton Copy</td>
<td>9.6 (8.8)</td>
<td>9.1 (1.6)</td>
<td>7.3 (2.7)</td>
<td>???</td>
</tr>
</tbody>
</table>

1. Should clinicians be involved in fitness-to-drive evaluations? **YES**

2. Should a diagnosis of Alzheimer’s disease result in immediate cessation of driving privileges? **No**

3. Is there a level of dementia severity where driving definitely becomes unsafe? **YES CDR 2 and CDR 3**

4. How can one rate dementia severity if they don’t use the Clinical Dementia Rating? **Not easily**
Our patient has AD and CDR 0.5.
What are next steps in the evaluation?

What history and examination findings may assist in assessing risk for unsafe driving?

What is the role of cognitive testing in assessing fitness to drive?

What tests and cut-offs (if any) should clinicians adopt to assist with driving recommendations?
Algorithm: Evaluating Driving Risk

Evidenced Based Driving History (Our Patient)

- Crashes (none)
- Moving Violations (none)
- Informant Rating (fair)
- Exposure (daily)
- Personality (no behavioral issues)
- IADL impairment (finances/cooking)
- Unsafe driving behaviors (slow in traffic)
- Medications (alprazolam prn)
Co-Morbid Conditions

Physical Exam

- Visual Acuity (20/25 OU)
- Visual Fields (intact)
- Motor Examination wnl
  - Muscle Strength
  - Range of Motion
- Co-Morbid Conditions
  - Hypersomnolence/OSA (8 ESS)
  - Medication Review (alprazolam)
  - Medical Conditions (DM-no comps)
- Cognitive Screens:
  - Clock (normal)
  - TMT A (62 secs), TMT B (170 secs)

Narcotics
Barbiturates
Benzo’s (present)*
Antihistamines
Antidepressants
Antipsychotics
Hypnotics
Alcohol
Muscle Relaxants
Antiemetics
Antiepileptic
What are reasonable cutoffs for TMT A and TMT B?

TMT A is as good as TMT B
In a dementia sample in prediction

TMT A>50 secs and TMT B >110 secs
ID many at risk for unsafe driving

Many dementia participants that fail the road test TMT-A scores > 60 secs or TMT-B score >180 secs

Papandonatos GD, et al. JAGS; 2015; 63
### National Guideline on Driving and Dementia

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5a</strong></td>
<td>People with dementia with progressive loss of two or more IADLs due to cognition (but no basic ADL loss) are at higher risk of driving impairment.</td>
<td>A</td>
<td>138, 95.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>5b</strong></td>
<td>A formal assessment and ongoing monitoring of fitness to drive is recommended in this situation if the patient wishes to continue driving.</td>
<td>B</td>
<td>136, 93.8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6a</strong></td>
<td>No in-office test or battery of tests including global cognitive screens (e.g. MMSE, MOCA) have sufficient sensitivity or specificity to be used as a sole determinant of driving ability in all cases.</td>
<td>A</td>
<td>141, 97.2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6b</strong></td>
<td>However, abnormalities on these tests may indicate a driver at risk who is in need of further assessment.</td>
<td>B</td>
<td>139, 95.9%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>9a</strong></td>
<td>Caregivers are able to predict driving safety more accurately than can the patients themselves, although in some circumstances, the caregivers may have a vested interest in preserving the patient’s autonomy beyond a safe window...</td>
<td>C</td>
<td>119, 82.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>10</strong></td>
<td>Medical comorbidities, physical frailty and the use of multiple medications are also factors that must be taken into consideration when assessing fitness to drive.</td>
<td>C</td>
<td>135, 93.1%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**This patient was referred for a performance based-road test due to AD and risk factors**

Two impaired IADL’s, Caregiver Rating of Fair and Psychometric Test Performance

**She passed!**
Clinical Questions One Might Ask…

How often should patients be retested with a progressive disease if they pass their initial evaluation?

Does the performance based road test as administrated by occupational therapists and/or the licensing authority result in a safety benefit in drivers with dementia?

When and how do you make a referral to the licensing authority?

How do you take a patient off the road that refuses to stop driving?
When should drivers with AD be retested?

Are patients that pass the road test safe?

The MVA rate per driver per year was .06 for patients and .04 for controls at baseline and .01 for patients and .06 for controls during the 3 yr period based on self-reports or state reports.

Ott B et al. Neurology 2008; 70:1171-1178
Our patient returns at one year…

She had one minor “fender bender” when backing into a car in a parking lot. The daughter noted additional cognitive and functional decline (higher order IADL’s). CDR 1 and TMT A 73 secs and TMT B could not perform. Recommended to stop driving and patient refuses.

Do you
A: Refer to the case manager
B. Write a formal letter to the patient stating they should not drive
C. Refer to the DMV for license revocation or testing
D. Remove the car from the premises
E. All of the Above
REMOVING THE RESISTANT DRIVER

• The clinician should “prescribe” driving retirement orally/writing
• Focus on other medical conditions as the reason to stop driving
  • (e.g. vision too impaired, reaction time too slow)
• Use a contract (see THE HARTFORD At the Crossroads guide)
• Vehicle-Related Tactics
  • Hiding/filing down keys
  • Replacing keys
  • Do not repair the car/ send car for “repairs” but do not return
  • Remove the car by loaning, giving or selling
  • Disable the car
• Discuss financial implications of crash or injury
• Revoke license
• Other?
Contact Information/Discussion
dcarr@wustl.edu