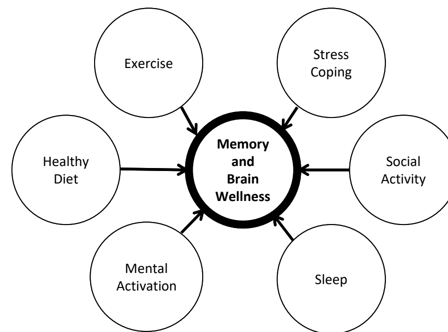
Driving and Dementia



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NW GWEC, February 23, 2021

Disclosures

- Nothing to disclose

Presentation Objectives

- Identify most prevalent cognitive risk factors threatening driving skills
- Identify screening/assessment measures for cognitive function with combined ecological validity and suitability for primary and specialty care settings
- Identify resources and referral processes for further evaluation and additional community mobility services

Case Study

Consult: 73 year-old female with memory loss, personality changes, and increasing problems with independent living, including a recent MVA.

Depression, VaD, or AD?

Case Study (cont.)

Presenting Problem:

- **Initial Evaluation:**
  - Two-year history of memory loss
    - Names
    - Spelling
    - Word-finding problems
    - Can't remember movies and TV shows
    - Conversations
  - Insidious onset, gradual progression
  - No hallucinations, fluctuations
  - Changes in behavior and personality
    - Increasingly frustrated/irritable
    - Physically aggressive
  - Denies changes in ADLs

Case Study (cont.)

Medical History:

- No neuro risk factors
- Depression
- Meds: amitriptyline, fluoxetine, alprazolam
- 13 vitamins/supplements
- Family Hx: vascular, PD in an uncle
- Evasive about ETOH (~2 drinks a day)
- Denies tobacco, MJ, drugs, meds

Educational/Occupational History:

- 17 years of education
- Above average grades
- Teacher
- Highly active

Case Study (cont.)

Psychosocial Factors:

- Current legal involvement- accident
- Historical and recent marital therapy
- Separated 1 year ago
- 2 children, poor relationships
- Deteriorating relationships with family and friends

Behavioral Observations:

- Emotionally labile
- Tangential and digressive
- Perseverative on accident
- Irritated when redirected
- Fidgety vs. anxious

Diagnosis?

Driving & Dementia in the News

- "Missing 81-year-old with Alzheimer's Last Seen Driving off in Ford Escape"
- "Illinois State Trooper Spots 87-year-old with Dementia, Driving the Wrong Way on I-55"
- "Colorado Couple Found after Vanishing During Road Trip to Missouri"
- "Driver in Fatal Hit-and-Run Crash Granted Probation"
- "Police Attempted To Locate Driver With Alzheimer's Before Deadly Wrong-Way Crash"

Background

- Driving as a complex, overlearned, multidimensional task
  - Cognitive domains
    - Attention
    - Processing speed
    - Visuospatial skills
    - Executive functioning
    - Memory
  - Psychological/emotional domains
  - Identity and independence
  - Needs vs. wants
  - Privileges vs. rights
  - Public health concern
  - Ethical and legal dilemmas

Background (cont.)

- Driving skills inversely correlated with dementia severity
  - Higher risk = mild dementia
  - <75% will pass an on-road driving test
- How to balance risk and safety with preserved independence and autonomy?
- Traditional screening measures are marginally effective
  - Improved with a careful history
  - Cognitive testing?

Increased Life Expectancy and Epidemic of Alzheimer's

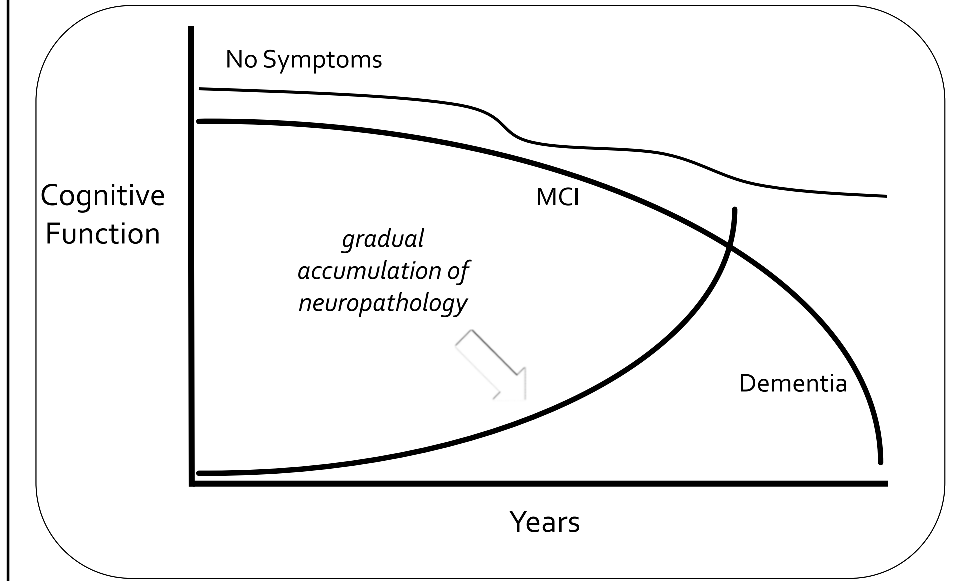
- 10,000 Americans reach 65 each day
- Current life expectancy 78 years
  - 47 years in 1900
- **Age** is single greatest risk factor for Alzheimer's disease
- 80 million Baby Boomers (born 1946-1964)

Alzheimer's in Washington State

- 120,000 cases in WA
  - 27% increase by 2025
- 3rd leading cause of death
  - 6th highest rate in the US
  - Mortality rate= 49.8
- Who provides care?
  - 353,000 unpaid caregivers
    - 132 geriatricians (399 needed to serve 10% of those 65+)
  - 402,000,000 hours = $5.3 billion
  - $250 million in additional health care costs

Alzheimer's Association. 2020 Alzheimer's Disease Facts and Figures. Alzheimers Dement 2020;16(3):391+.

What's Normal, What's Not?

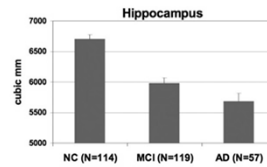


Age-Related Memory/Cognitive Changes

- **Few changes:**
  - **Crystallized Intelligence**
  - **Procedural Memory**
  - **Long-term Memory**
  - **Auditory Attention**
  - **Verbal Fluency**
  - **Working Memory?**
- **Declines:**
  - **Sensory Memory**
  - **Short-term Memory**
  - **Complex/Selective Attention**
  - **Executive Skills**
  - **Processing Speed**
  - **Motor Tasks**
  - **Working Memory?**

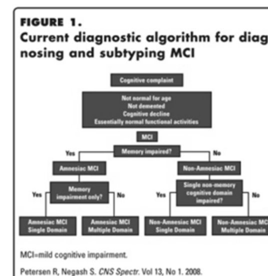
Mild Cognitive Impairment (MCI)

- Memory complaints/impairment
  - ~1.5+ SD difference (norm vs. premorbid)
- Otherwise normal cognitive function
- No functional impairment
- Subtypes
  - Amnestic
  - Single domain, nonamnestic
  - Multiple domain (amnestic vs. non)



Mild Cognitive Impairment

- Amnestic MCI ~10% /year convert to AD
- Multiple Domain MCI
  - Alzheimer's disease
  - Vascular Dementia/Mixed (VCI)
  - Normal aging
- Single non-memory domain MCI
  - Frontotemporal Dementia
  - Lewy Body Dementia
  - Alzhiemers Dementia



Dementia

- Clinical Presentation: A syndrome of acquired impairment of memory and other cognitive domains sufficient to affect daily life.
- Etiology: Any disorder causing structural damage to brain systems involved in memory.

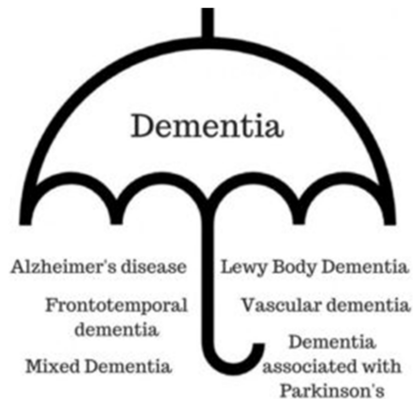
Playing the Odds

- **Alzheimer's Disease (60-80%)**
- **Vascular Dementia (15-20%)**
- **Dementia with Lewy Bodies (8-12%)**
- **Frontotemporal Dementia (5%)**

Alzheimer's and Dementia

Dementia is not a "disease" itself – it is a general term that describes a set of symptoms caused by a variety of diseases or conditions.

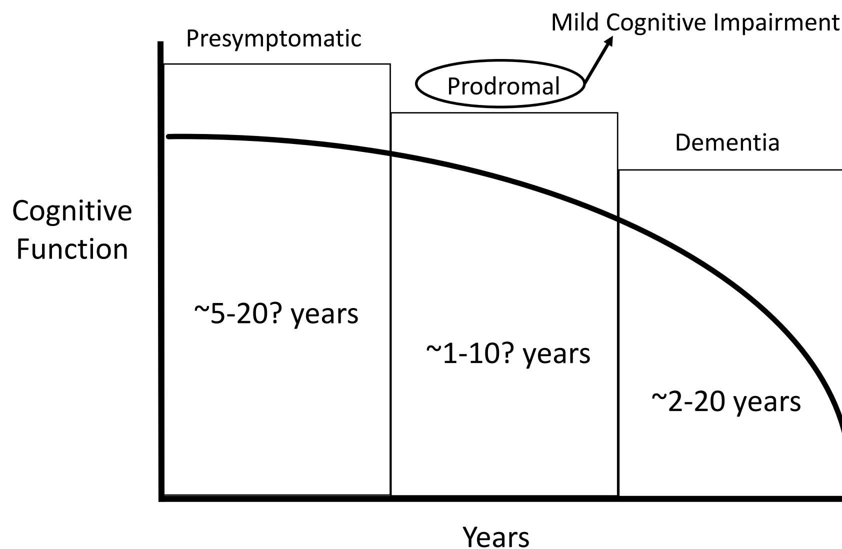
Alzheimer's is the most common disease causing dementia.



Dementia: What are the Differences?

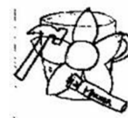
	Alzheimer's Disease	Vascular Dementia	Dementia with Lewy bodies	Frontotemporal Dementia
Prevalence	60–80%	15-30%	12-20%	10-15%
Early Symptoms	Memory loss Executive dysfunction Aphasia Apraxia Apathy/Depression Poor insight	Slow processing speed Poor attention Less memory impairment Poor acquisition/learning Apathy/Depression	Visual hallucinations Muscle rigidity Parkinsonism Tremors Fluctuating cognition Visuospatial problems Memory loss	Behavioral issues Personality change Attention problems Executive dysfunction Language problems
Cortical Changes	Temporal (medial) Parietal Frontal	Cortical Subcortical Lesion-specific	Parietal/Occipital Frontal Temporal	Frontal Temporal (anterior)
Course	Progressive, gradual	Progressive, gradual or stepwise	Progressive, fluctuations	Progressive, rapid
Associated Factors	Beta-amyloid (plaques) Tau (tangles)	Microvascular ischemic Hemorrhagic infarct Ischemic infarct Hypoprofusion	Alpha-synuclein (Lewy bodies)	Tau TDP-43

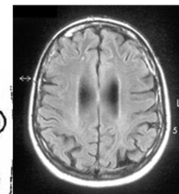
Progression of Alzheimer's Disease



AD: Variants

- Logopenic Progressive Aphasia
  - Left posterior temporal cortex & parietal lobule
    - Slowed, non-fluent speech
    - Poor comprehension of complex language
- Posterior Cortical Atrophy (Benson's syndrome)
  - Visual variant AD
  - Bilateral parietal and temporal involvement
    - Balint's syndrome
    - Prosopagnosia
    - Alexia
    - Agraphia





Vascular Cognitive Impairment

- Symptoms
  - Greater executive dysfunction
  - Variable attention and concentration
  - Slowed processing speed
  - Motor impairment/slowing
  - Mild episodic memory impairment
  - Weakness in limbs
  - Unsteadiness
  - Gait disturbance

Dementia with Lewy Bodies

- Cognitive impairments
  - Executive Functioning (i.e., problem solving)
  - **Visuospatial skills**
  - **Attention and concentration**
  - Memory (subtle early on, evident later)
- Parkinsonism
  - Slow movement and
  - Rigidity (without resting tremor)
- Fluctuations in cognition
- Visual hallucinations
  - Early in disease

(Yamin et al., Intl. Journal of AD, 2015)

Parkinson's Disease

(Aarsland et al., 2009; Bronnick et al., 2007; Cholerton et al., 2014; Litvan, et al., 2012; Noe et al., 2004; Svenningsson et al., 2012; Stern et al, 1993; Watson & Leverenz, 2010)

- Frontal-subcortical impairments
  - Complex attention
  - Executive functioning
    - Set shifting/mental flexibility
    - Inhibition
    - Planning
  - **Visuoperceptual/spatial**
    - Object recognition
    - Visual analysis/synthesis/discrimination

FTD: Distinguishing Features

- Less severe: Memory impairments
- More severe: Executive problems
  - Personality changes/coarsening
  - Disinhibition, apathy, lack of insight, lack of empathy
  - Decreased grooming, decreased sense of personal space,
  - Socially inappropriate
- Earlier onset (late 40's to early 50's)
- Faster progression

- Increased speeding tickets, stop signs violations, accidents, average speed

(de Simone, L. Kaplan, N. Patronas, E.M. Wassermann, J. Grafman 2007)

Driving with Dementia

- Crash involvement triples at age 80
  - trend starts at 74, but not as high as teens
- Fatality rates are higher due to fragility
  - 13x higher at age 80 than at ages 30-59
- MVA= 23% of accidental deaths
- Risk to self, not the population
- 1.5M elders with dementia drive
- No proven office tools for predicting safety
- Road testing is not cost effective

Driving with Dementia

- Studies evaluating driving skills in dementia are fraught with methodologic difficulty
- Office based tests correlate grossly with driver test failure- real or simulated
- There is no clear cutoff point in office tests to differentiate the driver most at risk
- Office tests as a referral trigger for detailed evaluation

COCHRANE, 2009: Driving assessment for maintaining mobility and safety in drivers with dementia.

Primary Care Concerns

- Mixed feelings at best around fitness to drive evals
  - Assessment of cognitive impairment
  - Lack of familiarity with legal requirements
  - Uncertainty about local resources
  - Negative impacts
    - Relationship
    - Patient QOL
- Significant value to specialized assessment
  - OT
  - Geriatrics
  - Memory Disorders

Sinnott et al., 2018, PLoS One.

AAN Practice Parameter

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

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

ABSTRACT

Objective: To review the evidence regarding the usefulness of patient demographic characteristics, driving history, and cognitive testing in predicting driving capability among patients with dementia and to determine the efficacy of driving risk reduction strategies.

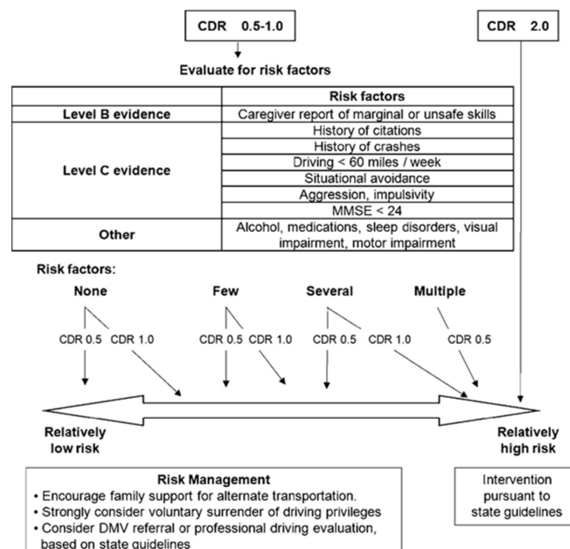
Methods: Systematic review of the literature using the American Academy of Neurology's evidence-based methods.

Recommendations: For patients with dementia, consider the following characteristics useful for identifying patients at increased risk for unsafe driving: the Clinical Dementia Rating scale (Level A), a caregiver's rating of a patient's driving ability as marginal or unsafe (Level B), a history of crashes or traffic citations (Level C), reduced driving mileage or self-reported situational avoidance (Level C), Mini-Mental State Examination scores of 24 or less (Level C), and aggressive or impulsive personality characteristics (Level C). Consider the following characteristics not useful for identifying patients at increased risk for unsafe driving: a patient's self-rating of safe driving ability (Level A) and lack of situational avoidance (Level C). There is insufficient evidence to support or refute the benefit of neuropsychological testing, after controlling for the presence and severity of dementia, or interventional strategies for drivers with dementia (Level U). *Neurology*® 2010;74:1316-1324

AAN Practice Parameter

- Level A
  - CDR of .5-**1**
    - However, 41-85% are found to be safe
  - Do not rely on patient
- Level B
  - Caregiver rating as marginal or unsafe
- Level C
  - MMSE<25
  - Traffic citations & crashes
  - Reduced mileage & situational avoidance
  - Aggressiveness or impulsivity

Evaluating Risk (AAN, 2010)



	Risk factors
Level B evidence	Caregiver report of marginal or unsafe skills
Level C evidence	History of citations
	History of crashes
	Driving < 60 miles / week
	Situational avoidance
	Aggression, impulsivity
	MMSE < 24
Other	Alcohol, medications, sleep disorders, visual impairment, motor impairment

AAN Practice Parameter

- Level U
  - Neuropsychological evaluation
  - Rehabilitation/interventional strategies

CFP Practice Parameter

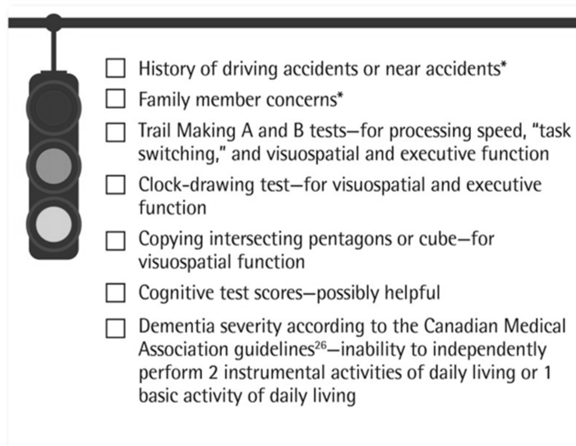


Figure 1. Checklist of considerations in driving safety

- ☐ History of driving accidents or near accidents*
- ☐ Family member concerns*
- ☐ Trail Making A and B tests—for processing speed, "task switching," and visuospatial and executive function
- ☐ Clock-drawing test—for visuospatial and executive function
- ☐ Copying intersecting pentagons or cube—for visuospatial function
- ☐ Cognitive test scores—possibly helpful
- ☐ Dementia severity according to the Canadian Medical Association guidelines[26]—inability to independently perform 2 instrumental activities of daily living or 1 basic activity of daily living

*Ask the patient and a family member separately.

Lee L & Molnar F. Driving and dementia: Efficient approach to driving safety concerns in family practice. Can Fam Physician. 2017 Jan;63(1):27-31.

Office Assessment

- Past and Current Driving History
  - Miles per week and where
  - Traffic stops
  - Violations/tickets
  - Accidents
    - Been in, caused, at fault
  - Concerns about safety
    - Self and others
  - Changes in habits
    - Limits
    - Situational avoidance (night, rain, freeway, traffic)

Office Assessment

- Past and Current Driving History
  - Speeding
    - How fast if sure not going to get caught
  - Red lights
  - Following distance
  - Alcohol/medications
  - Horn/gestures/road rage
    - Aggressor vs. recipient
  - Damage to vehicle/wheels

Office Assessment

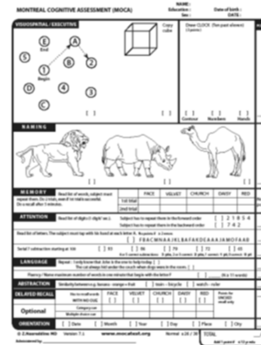
- Past and Current Driving History
  - Navigation
    - Familiar, infrequent, new
  - GPS use
  - Three point turns
    - Parking spaces
  - Family members who often offer to drive
    - Anyone who won’t ride in the car with you?
  - Responsibilities
    - Child care, friends, spouse

Office Assessment

- Collateral informant
  - All of the above, but:
    - Interviewed separately, ideally
    - Last time they rode with the patient?
    - Under what circumstances
- Assessing insight and plans
  - Beginning the conversation about transitions
  - “Retirement” from driving
  - Education about liability

Cognitive Screening

- MMSE *(Folstein et al, 1975)*
  - Sensitivity = 66-73%
  - Specificity = 87-92%
- Mini-Cog *(Borsen et al., 2000)*
  - Sensitivity = 65-85%
  - Specificity = 87-91%
- MoCA *(Nazreddine et al., 2005)*
  - Sensitivity = 90-100%
  - Specificity = 87-90%



Screening: MoCA

- MMSE vs. MoCA Driving Test Prediction
  - Persma, et al., Acta Neuro, 2018
    - N=81
    - Outcome: Standardized road test
    - MMSE<20, all failed
    - MMSE>24, one third failed
  - Hollis et al., JAGS 2015
    - N=92
    - Outcome: Standardized road test
    - Only useful for those with existing cognitive impairment
    - 1-pt decrease = 1.36 times as likely to fail road test
    - MoCA < 18
  - Esser et al., JNNP 2015
    - N = 243
    - Outcome: Road test
    - MoCA > 27 likely to pass
    - MoCA <12 likely to fail
    - 50/50 otherwise

NPE: When is it helpful?

- Clarifying/detecting mild impairments
- Differential diagnoses
  - MCI vs depression vs mixed
  - Parkinson's-plus syndromes
- Decision making capacity
- IADLs
  - Driving
  - Medication management
  - Financial management
- Treatment planning/response
- Rehabilitation
- Adjustment

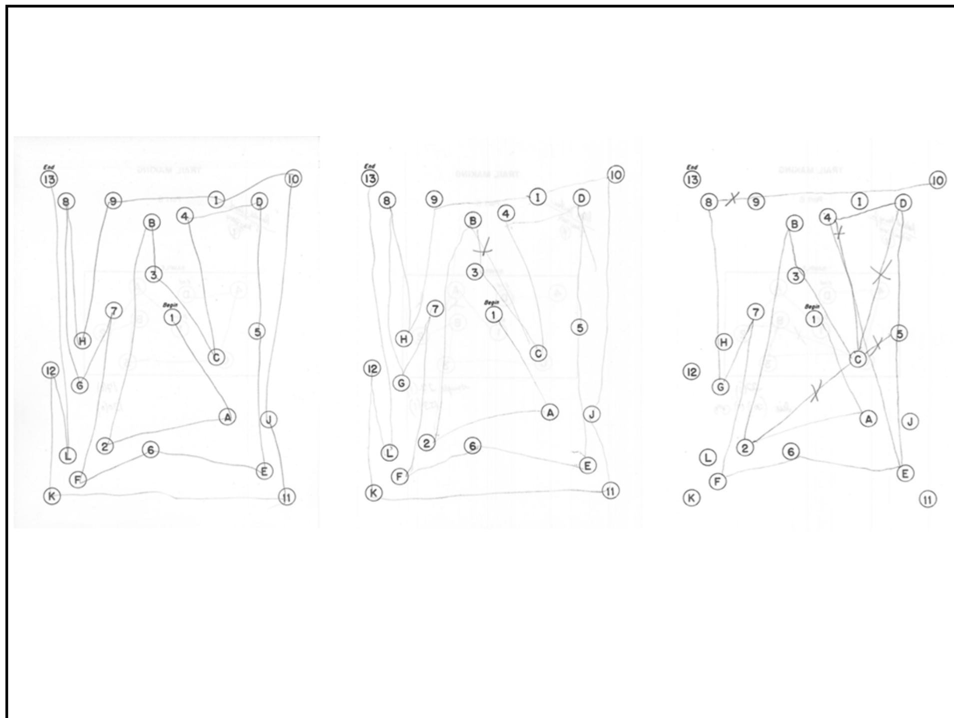
NPE: When is it not so helpful?

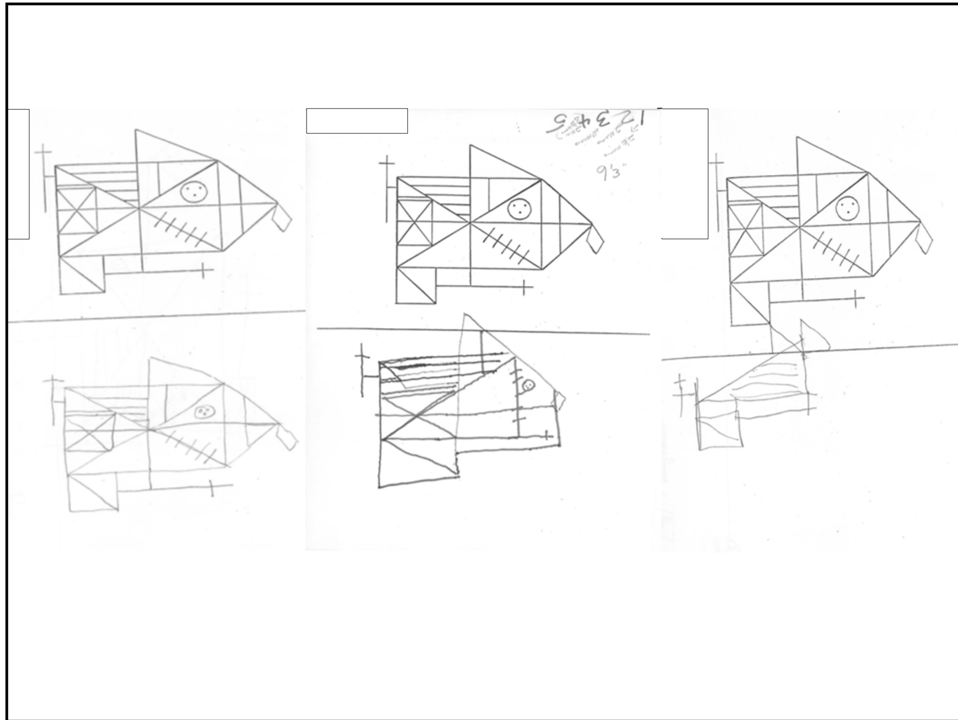
- Severe/profound impairments
  - Brief eval/screening
- Unwilling/uncooperative patients
- Active substance abuse*
- Acute delirium
- Active psychosis
- Severe anxiety/depression*
- Within 6 months of prior testing

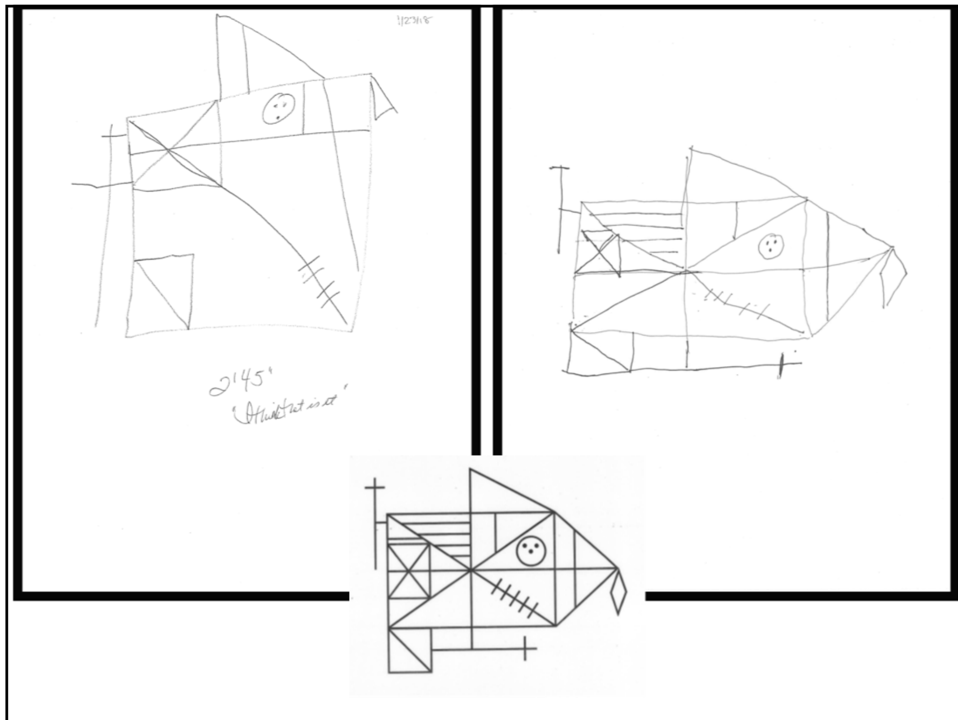
NPE: What's most helpful?

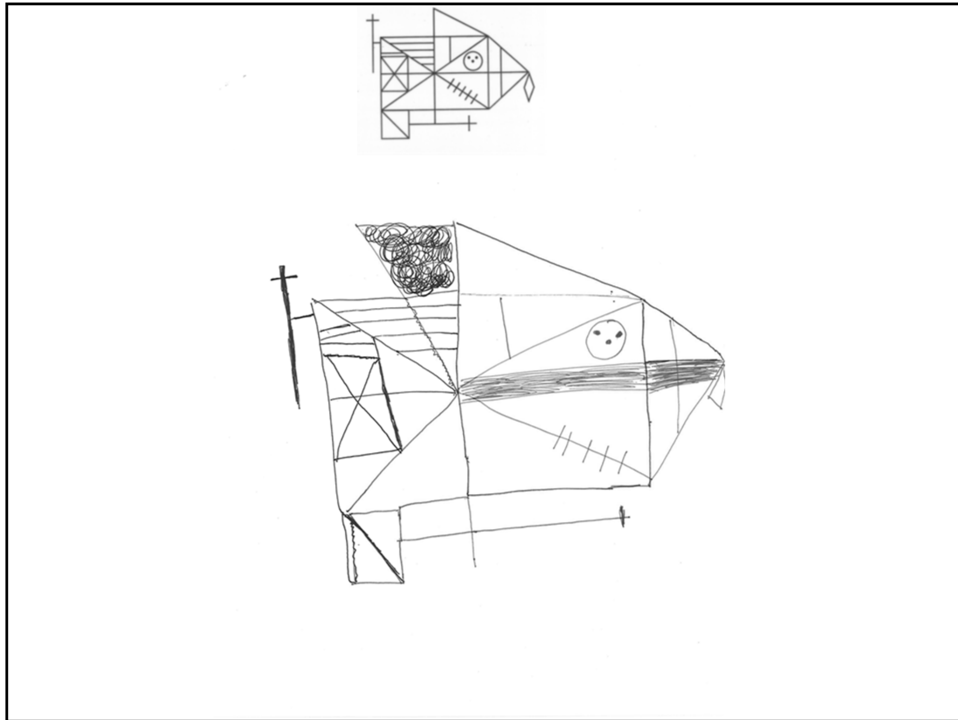
- Trail making test (B-A)
- Clock drawing
- Block Design
- Rey complex figure
- Benton Line orientation
- Facial Recognition
- Depression (in MCI)
  - Beratis et al, 2016

2009 Meta-analysis, Mathias & Lucas, Intl Psychogenetics









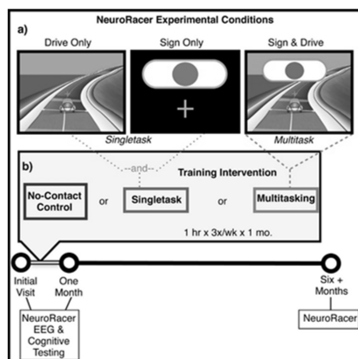
Driving Skills Evaluations

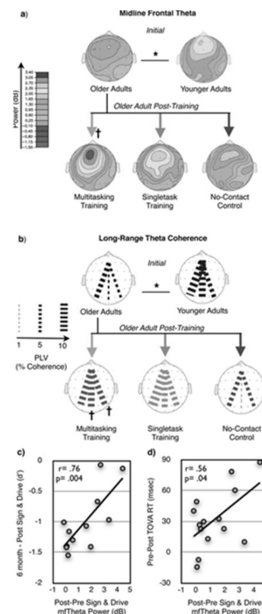
- Private, non-clinical assessment
  - Vehicle operation
  - Driver-vehicle fit
  - Risk perception
- Outcome recommendations:
  - Supplemental in-car training
  - A clinical driving assessment by an OT-DRS
  - No supplemental training
- Cost = ~$100 to $200
  - Training sessions ~$75 to $150 per hour

Clinical Assessment

- Occupational Therapist/Driving Rehabilitation Specialists
  - Medical history
  - Physical assessment
  - UFOV
  - Cognitive assessment
  - Functional/on-road assessment
    - Adherence to traffic rules and regulations,
    - consistent use of compensatory strategies
- Outcome recommendations
- Cost = ~$200 to $400
  - $100 an hour for rehabilitation.

Cognitive Training: NEURORACER





Anguera et al., Nature, 2013

Driving with Dementia

- American Academy Neurology 2010 Practice Parameter:… *"clinicians should reassess dementia severity and appropriateness of continued driving every 6 months."*

Small prospective studies correlating office cognitive assessment with road tests:

- *4 of 7 with Alzheimer's failed their 2nd test @ 6 mos*
- *Worsening survival curve in drivers w/ AD, even at 6 mos post initial assessment with mild dementia*

Now What?

Counseling

- Validate the difficulty
  - But don't dwell on it
  - Privilege, not a right
    - Careful with this one
- Recommendations are not all or nothing
  - Identify as needing tracking and re-evaluation
  - Restrictions/limitations
  - Consultation/evaluation from other providers
  - Behavioral interventions
    - Disabling the car
    - Changing the keys

Counseling

- Educate
  - Literature/evidence
  - Legal and financial risks
  - Medical records inclusion
  - Progressive nature of some diseases
- Elicit patient's sense of responsibility
- Maintain awareness of own reactions
  - Especially resistant or agitated patients
- Stay up to date on resources

Pragmatic Advice for Families

- Avoid triggers (keys, car, mentioning driving)
- Avoid confrontation
- Avoid arguing about ability/capacity

Community Resources

- DOL
  - Safe Driving for Seniors Collision Prevention Courses
    - Age 55+
    - 8 hours, wide array of content
    - Insurance discount
    - Offered online or in person
  - Request for Re-evaluation
  - Reporting

- Reporting- Washington

  - Physician/medical reporting permitted but not required
  - No immunity
  - No legal protection
  - Not anonymous or confidential.

  - The DMV sends a letter to the driver
    - Due process
    - Action following failure to respond

  - Will accept information from courts, other DMVs, police, family members, and other competent sources.
    - May be required to establish firsthand knowledge/standing

- Reporting

Click here to START or CLEAR, then hit the TAB button

WASHINGTON STATE DEPARTMENT OF LICENSING

Driver Evaluation Request

You can use this form to request we evaluate an individual's driving ability. You must provide specific information about their medical/visual conditions and/or driving ability. Age is not a consideration. Based on the information provided, we will investigate and take action as necessary. Insufficient information may result in no action. We are unable to divulge the outcome to you, however, **we will provide this form to the driver or their attorney upon written request.**

Additional witnesses must complete separate forms.

Return this form and any additional information or documents to:
Driver Records, Department of Licensing, PO Box 9030, Olympia, WA 98507-9030

Based on my personal observation and knowledge, I request the Department evaluate this driver's qualifications.

Name of driver *(First, Middle, Last)* | Date of birth

Residence address

City | State | ZIP code | Driver license number

Statement

I am concerned that this driver has one or more of the following conditions that may affect their ability to safely drive:
☐ Medical condition ☐ Vision condition ☐ Poor driving skills

Details

Knowledge of this driver is based on observation as a

☐ Law enforcement officer Agency ______ Badge number ______
☐ Check here if there was a collision with a serious injury or fatality and the driver was at fault

☐ Medical professional Professional license number ______

☐ Concerned citizen

Name of requestor *(First, Middle, Last)*

Mailing address

City | State | ZIP code | (Area code) Telephone number

I certify under penalty of perjury under the laws of the State of Washington that the foregoing is true and correct.

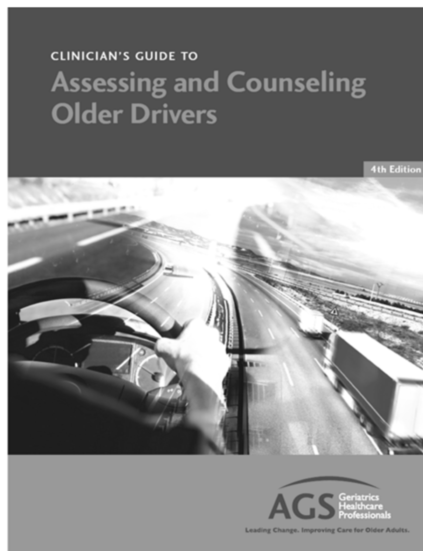
Date and place ______ X When you have completed this form, please print it out and sign here. Signature

DR-500-008 (R/3/12)WA

Reporting- WWAMI

- Alaska (https://doa.alaska.gov/dmv/akol/medical_impair.htm)
  - If requested, information will be kept confidential. However, if an administrative hearing is requested, it may be necessary to release information
- Idaho (https://www.accessidaho.org/itd/driver/profile/index)
  - No specific form, but age 62+ must renew in person every 4 years with vision test
  - Online & renewal changes with COVID, now up to age 75
- Montana (https://media.dojmt.gov/wp-content/uploads/Recommendation-for-Re-examiniation.pdf)
  - All licenses expire at age 75, the renewal every 4 years
  - There is a statute granting physicians immunity from liability for reporting in good faith any patient whom the physician diagnoses as having a condition that will significantly impair the patient's ability to safely operate a motor vehicle.
- Wyoming (http://www.dot.state.wy.us/driverservices)
  - Physicians providing information concerning a patient's ability to drive safely are immune from liability for their opinions and recommendations.

Resource



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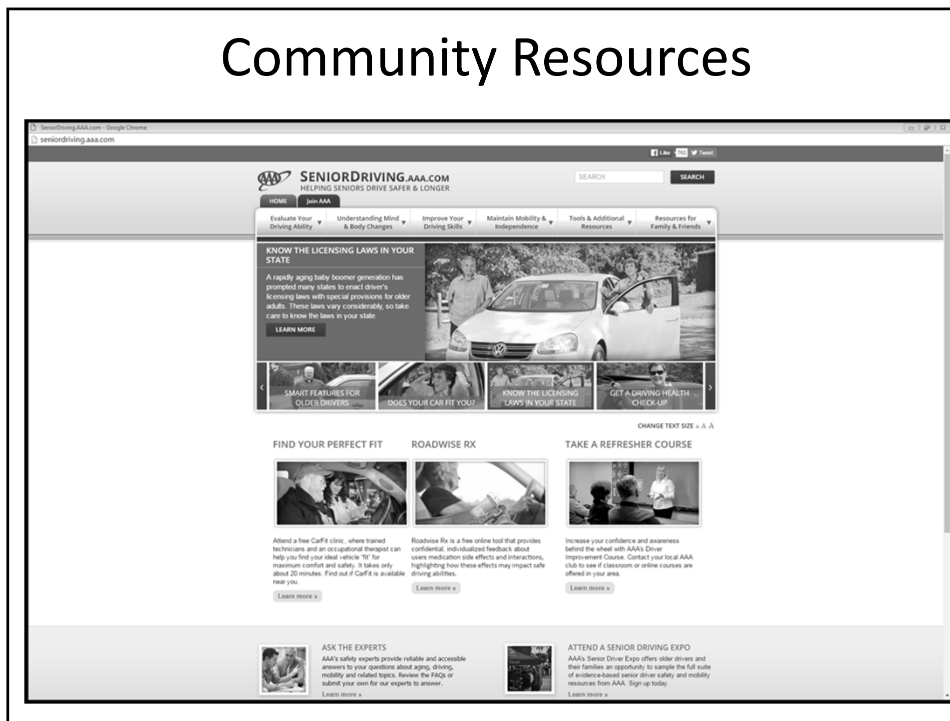
https://geriatricscareonline.org/toc/clinicians-guide-to-assessing-and-counseling-older-drivers-4th-edition/B047

Community Resources

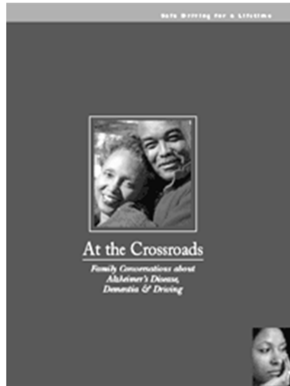


Community Resources

- AAA (www.seniordriving.aaa.com)

Community Resources

- The Hartford Group



Community Resources

- ACCESS
- Area Agencies on Aging
  - Community Living Connections
- DSHS
- Senior Information and Assistance
- VA Benefits
- Local organizations and societies
  - APDA taxi voucher program

Community Resources

Washington Association of Area Agencies on Aging

Community Resources

COMMUNITY LIVING CONNECTIONS

Home Explore Find Connect Plan

Quick Links | About Community Living Connections (CLC) | CLC Resource Directory Information | Email your Local Office Directly

Connect with your local CLC in Washington

Select a county on the map to display local CLC contact information

San Juan, Whatcom, Okanogan, Ferry, Pend Oreille, Skagit, Island, Colville Confederated Tribes, Stevens, Clallam, Snohomish, Chelan, Jefferson, Kitsap, Douglas, Lincoln, Spokane, Mason, King, Grays Harbor, Grant, Pierce, Kittitas, Adams, Thurston, Whitman, Pacific, Lewis, Yakima, Franklin, Garfield, Columbia, Cowlitz, Wahkiakum, Skamania, Yakama Nation, Benton, Walla Walla, Asotin, Clark, Klickitat

Case Study

Consult: 73 year-old female with memory loss, personality changes, and increasing problems with independent living.

Depression, VaD, or AD?

Case Study (cont.)

Presenting Problem:

- **Initial Evaluation:**
  - Two-year history of memory loss
    - Names
    - Spelling
    - Word-finding problems
    - Can't remember movies and TV shows
    - Conversations
  - Insidious onset, gradual progression
  - No hallucinations, fluctuations
  - Changes in behavior and personality
    - Increasingly frustrated/irritable
    - Physically aggressive
  - Denies changes in ADLs

Case Study (cont.)

Medical History:

- No neuro risk factors
- Depression
- Meds: amitriptyline, fluoxetine, alprazolam
- 13 vitamins/supplements
- Family Hx: vascular, PD in an uncle
- Evasive about ETOH (~2 drinks a day)
- Denies tobacco, MJ, drugs, meds

Educational/Occupational History:

- 17 years of education
- Above average grades
- Teacher
- Highly active

Case Study (cont.)

Psychosocial Factors:

- Current legal involvement- accident
- Historical and recent marital therapy
- Separated 1 year ago
- 2 children, poor relationships
- Deteriorating relationships with family and friends

Behavioral Observations:

- Emotionally labile
- Tangential and digressive
- Perseverative on accident
- Irritated when redirected
- Fidgety vs. anxious

NP Test Results

Test	Result
MoCA	**27/30 (-3 recall- ok with cues)**
Intellectual Functioning	**Intellectual**
– Vocabulary (WAIS-IV)	– High Average
– WTAR	– Superior
Attention/Concentration	**Attention**
– Trails A	– Average
– Digit Span (WAIS-IV)	– Average
– Stroop	– Average
Verbal Memory	**Verbal Memory**
– LM I (WMS-IV)	– Low Average
– LM II (WMS-IV)	– Low Average
– CVLT-II	– Low Avg to Severely Impaired
Visual Memory	**Visual Memory**
– VR I (WMS-IV)	– High Average
– II (WMS-IV)	– Low Average
– BVMT-R	– Mildly Impaired
Visuospatial	**Visuospatial**
– Block Design (WAIS-IV)	– Impaired
– VRII Copy	– High Average
– JOLO	– Low Average
– Hooper	– Low Average
Language	**Language**
– Phonemic Verbal Fluency	– Average
– Semantic Verbal Fluency	– Low Average
– Naming	– Low Average
– Narrative Writing	– Low Average
– Token	– WNL

NP Test Results

Test	Result
Executive Functioning	**Executive**
– Stroop C/W	– Borderline Impaired
– Trails B	– Low Average (2 set loss errors)
– Tower of London	– Low Average (5 rule violations)
– RCFT	– WNL, but poorly organized
– WSCT	– Borderline – 5 categories – Conceptual level responses – Learning to learn
GDS	**Normal**
GAI	**Mildly elevated**

Case Study (cont.)

What’s her diagnosis?

Is she safe to drive?

Thank you for your attention!

Questions?

Contact Information

Memory and Brain Wellness Center

https://depts.washington.edu/mbwc/
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Seattle, WA 98104
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MEDICAL CENTER