Providing Driving Recomendations to Older Adults and Patients with Dementia

Mark A. Reger, Ph.D.

Department of Psychology,
Madigan Army Medical Center

Department of Psychiatry and Behavioral Sciences,
University of Washington School of Medicine

Overview

- Brief dementia overview
- The ethical dilemma
- Who should provide recommendations?
- Risk of MVA: Healthy older adults and dementia
- Relationship between cognitive testing and driving
- Why do patients cease driving?
- Clinical strategies for providing difficult recommendations

Differential Diagnosis

- Alzheimer's disease
- Vascular dementia
- Dementia with Lewy Bodies
- Substance use
- Hypoxia
- Normal pressure hydrocephalus
- Thyroid deficiency, B12 deficit
- Major depression

Neuropathological Diagnosis

- 68% of cases are AD or AD + other dementia
  - 25% AD only
  - 27% Vasc + AD

- Vascular only 7%
- Lewy Body Dementia 4%
- Hippocampal sclerosis 3%

ADRC Data; n=124 incident cases
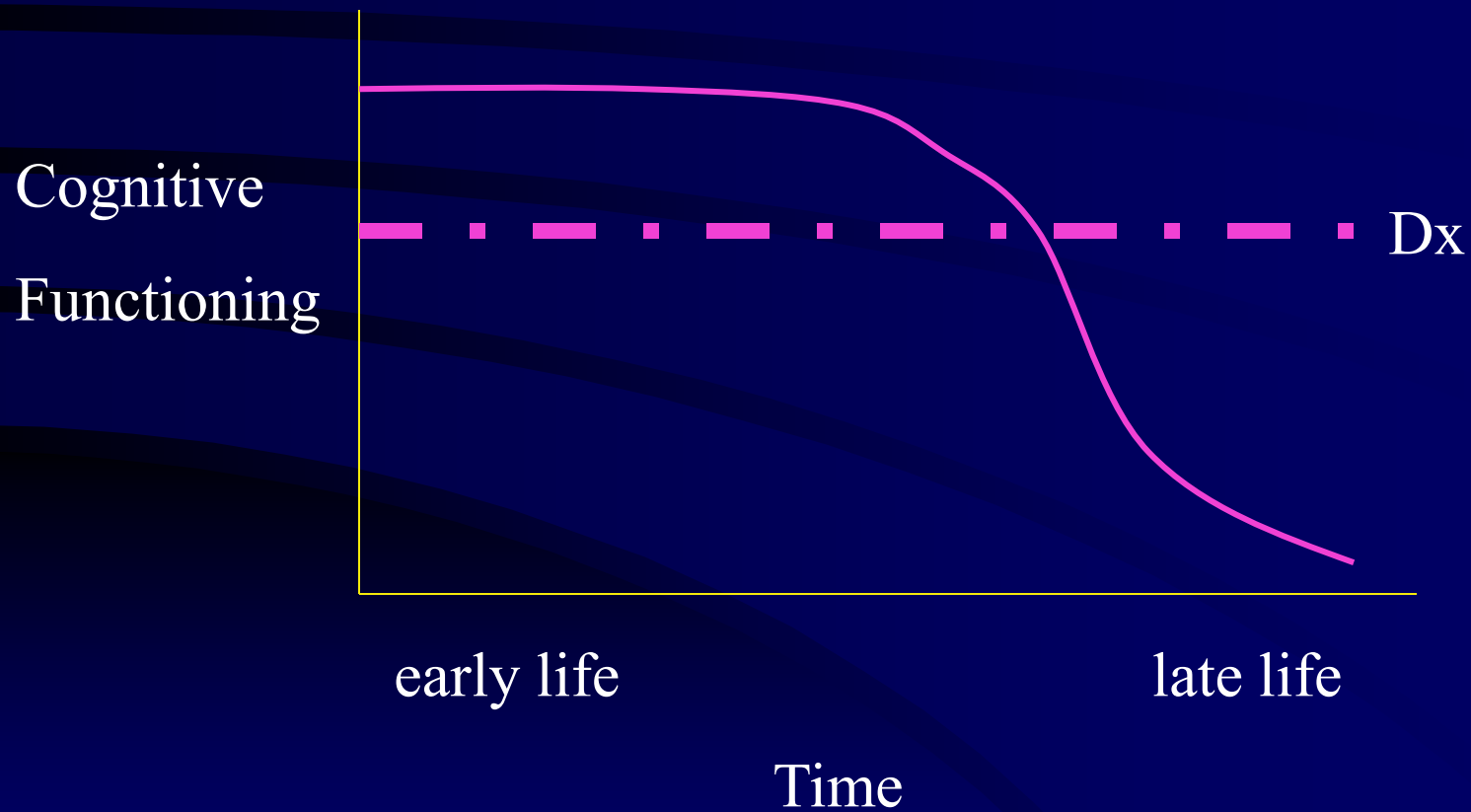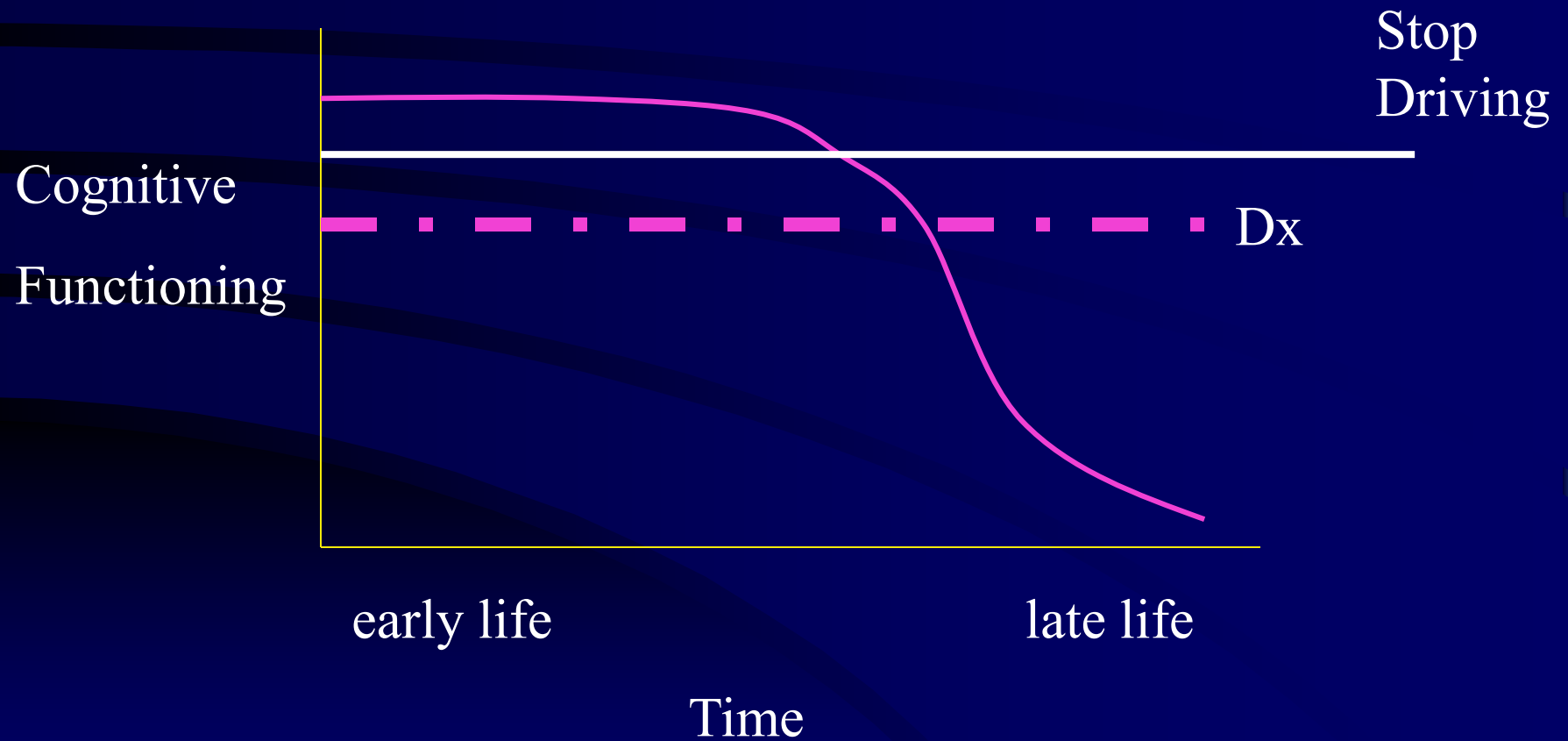
Projected Incident Cases of AD
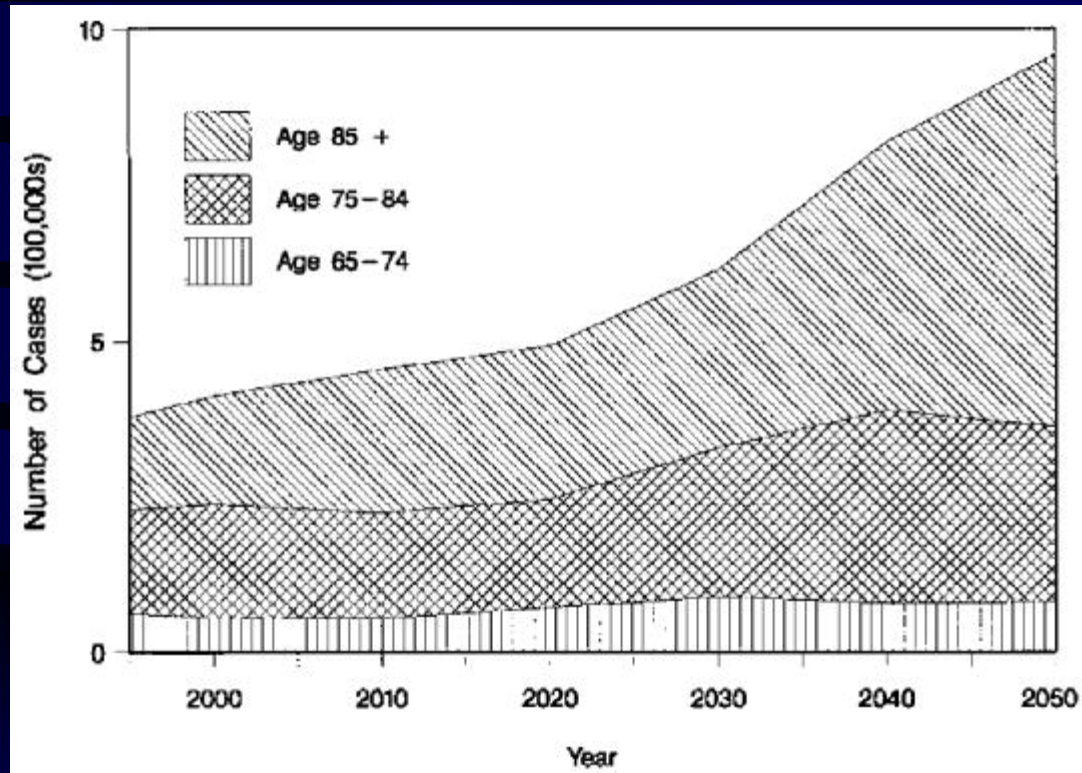
1995 = 377,000

2050 = 959,000

Liesi et al., 2001

Progressive Course

Progressive Course

Stop and Think: Life without Driving

- May be more relevant to quality of life in early dementia (Weiner, 2006)

Weighing Values

Practice Within Competence

Protect the Patient

Protect Civil Liberties

Maintain Confidentiality

Protect the Public

Protect Children

Encourage independent living

Should Neuropsychologists Make Driving Recommendations?

- Sometimes, we really do know what to recommend

- Reality Factor – families and consult requests ask (Perkinson, 2005)

- We often have more information than many other biased people offering advice!

- Recommendations are not all or nothing. We can play a variety of roles in the assessment process

- Help families reflect and listen to themselves

Physicians Role

- AMA Policy E-2.24
  - "The physician must be able to identify and document physical and mental impairments that clearly relate to the ability to drive"

Skills Necessary for Safe Driving

- Judgment of distances
- Management of multiple stimuli
- Sustained attention
- Emergency reactions
- Interpretation of signs, signals, and situations
- Accurate adjustment of driving style to abilities

Assessment: Aspects of a Driving Assessment

- Vision
- Cognition
- Acute events (seizures, syncope)
- Motor function
- Medications
- Chronic medical conditions
- Driving Test Performance

Does "Normal Aging" Rule Out Driving?

- 33 healthy older adults and 27 patients with dementia (Median MMSE=23)

- Road test assessed by Approved Driving Instructor blind to diagnosis

- All controls passed driving test

- 10 patients failed the road test

Lincoln, in press

Does "Normal Aging" Rule Out Driving?

- Many other studies report increased driving problems in large groups of older adults
  - Cohorts are not evaluated diagnostically and clearly include dementia patients

- Need additional research across continuum of aging
  - Example – Lincoln study's NC median age = 67

Dementia and Driving

- 30% of a dementia clinic's referrals had been in an accident since onset of Sx (Lucas-Blaustein et al., 1988)

- Individuals with dementia are 2.5 to 4.7 times more likely to be involved in a crash (Friedland et al., 1988; Tuokko et al., 1995)

- Some patients with early AD can drive safely (Dubinsky, 2000)

Assessment: Can Cognitive Testing Help?

- Mental Status
- Memory
- Attention
- Executive Functioning
- Visuospatial Skills
- Language Functions

Goal of Meta-Analysis

- Quantitative summary of the driving and dementia literature

- Determine if some cognitive domains relate to driving skills better than others

- Consider methodological issues significant to the field

Research Sample

27 research studies that met the following
inclusion criteria:

1) Included subjects with dementia
2) Used well-known neuropsychological instruments
3) Measured driving ability - road test, non-road test (e.g. simulator) or caregiver report
4) Reported sufficient information for computation of effect size

Coding

	Mental Status	Memory	Attention
Road Test	r	r	r
Non-Road Test	r	r	r
Caregiver Report	r	r	r

Computation of Effect Size

- r was calculated as the individual effect size
- Timed tests adjusted so that positive r indicates positive relationship
- Fisher's variance stabilizing z transform (Shadish et al., 1994) used in computations
- Weighted r's according to study sample sizes
- Homogeneity of mean ESs tested

Inclusion of Control Subjects

- The clinical question: which AD subjects are safe drivers?

- Inclusion of control subjects may inflate correlations (artifact of Dx)

- How do cognitive tests relate to driving abilities WITHIN AD SAMPLES

- Data was re-analyzed excluding 9 studies that used control subjects
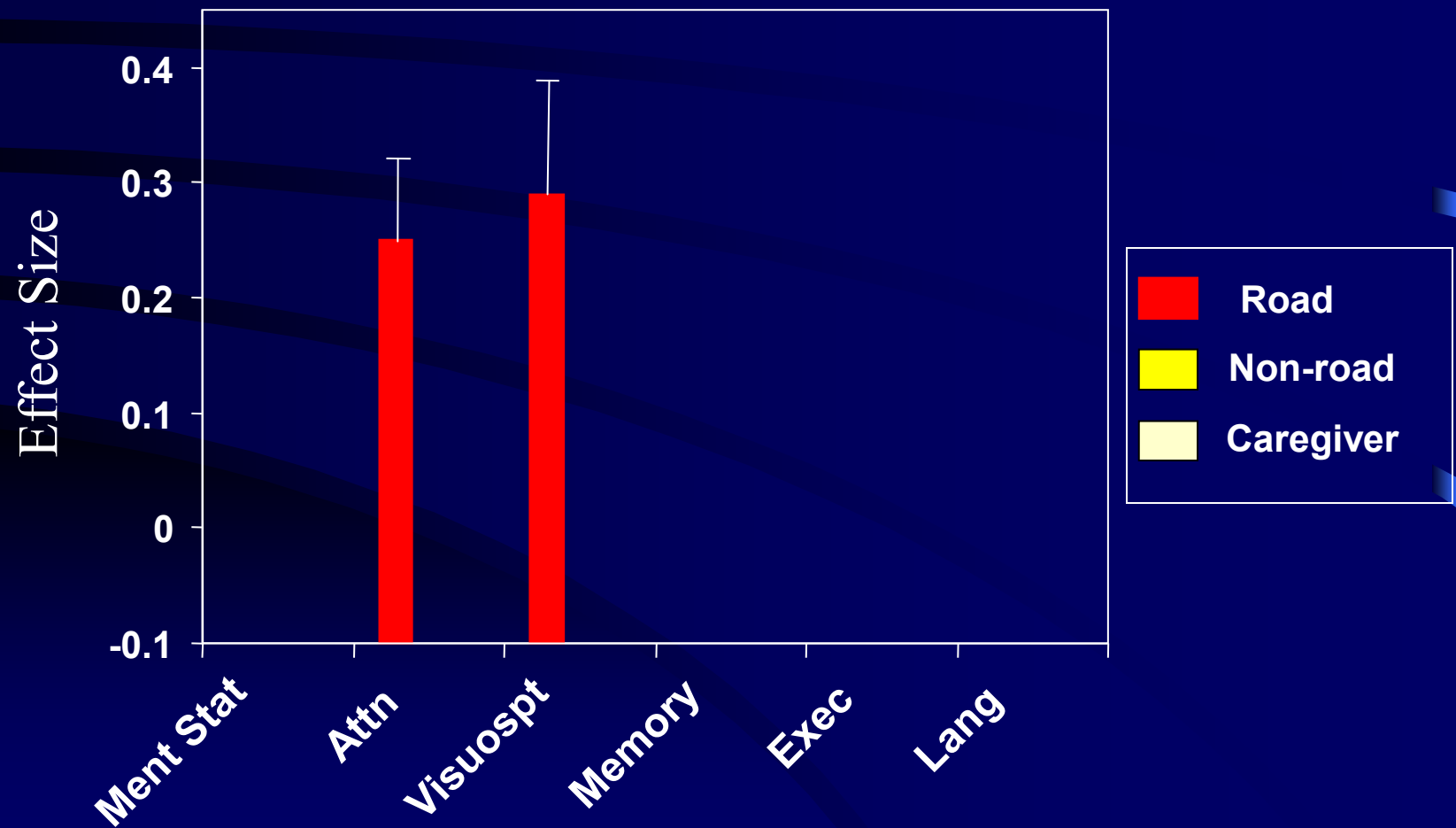
Effect Size Estimates

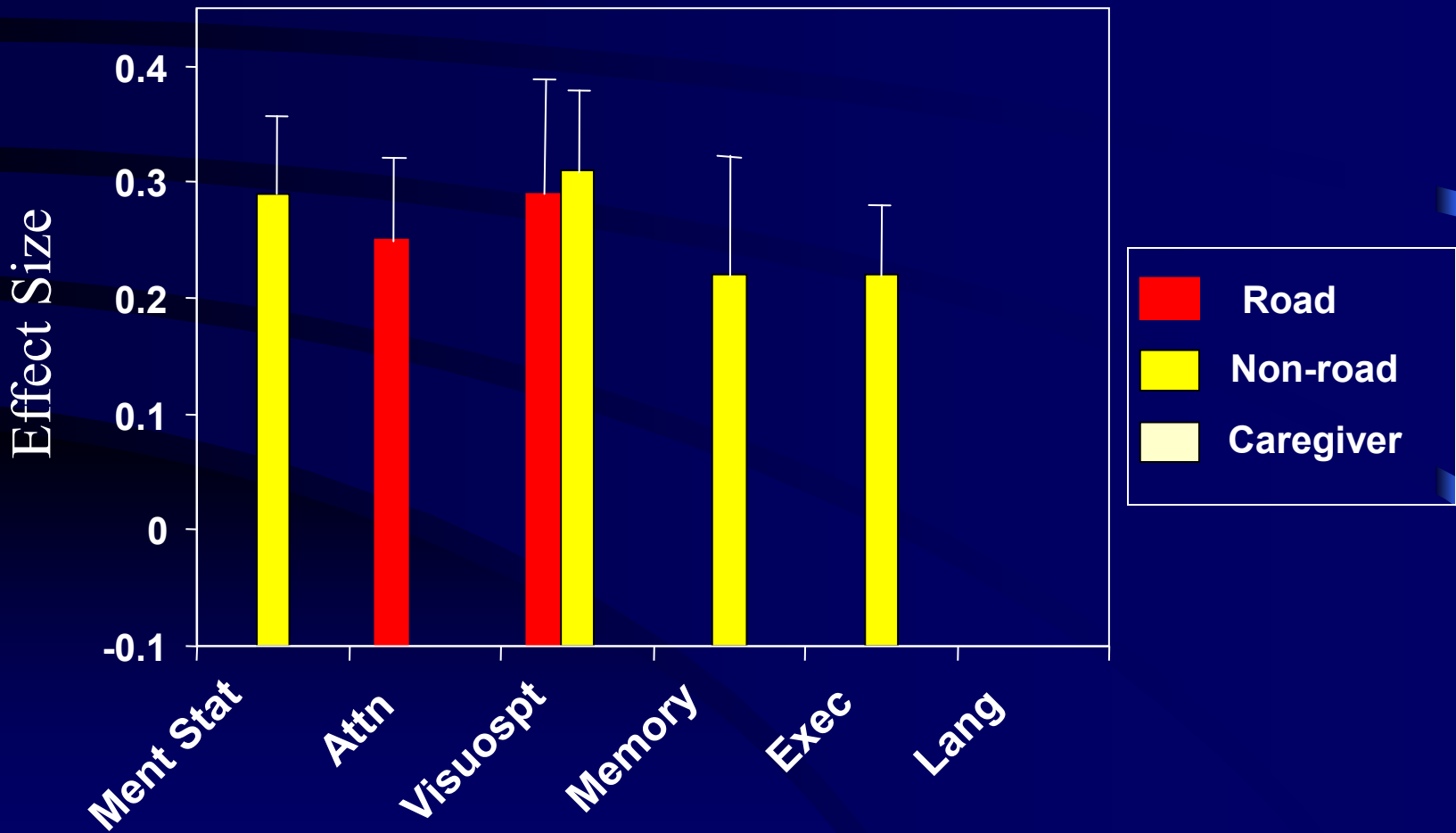.10 Small Effect Size

.30 Medium Effect Size

.50 Large Effect Size

(Cohen, 1988)

Road Tests Effect Sizes
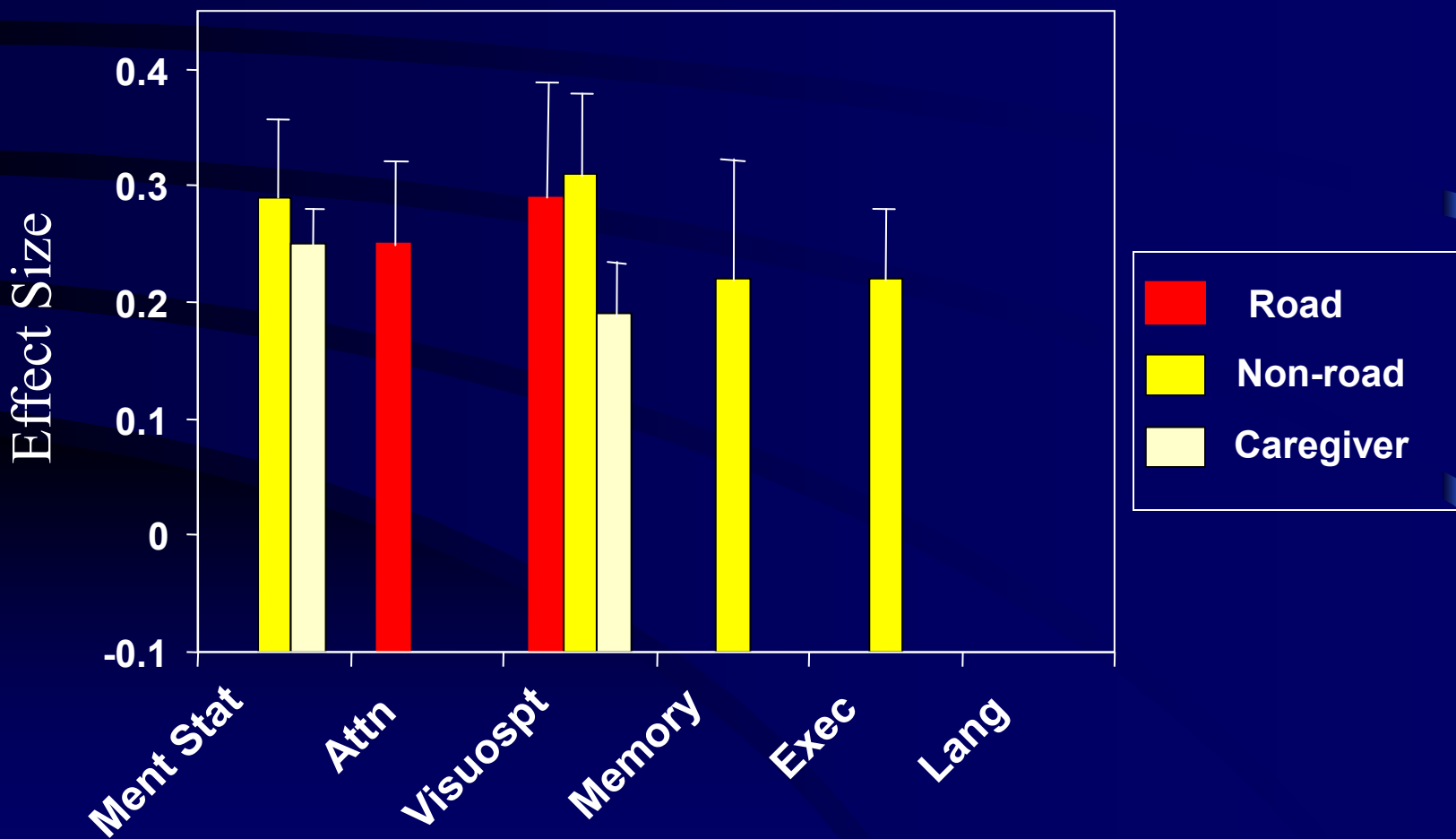
Road and Non-Road Test Effect Sizes

Adding Caregiver Report
Effect Sizes

Effect Sizes Classification Ranges (Controls Excluded)

Neuropsychological Domain	Road	Non-Road	Caregiver
Mental Status		M	S
Attention/Concentration	S		
Visuospatial	M	M	S
Memory		S	
Executive Functions		S	
Language			

*p< .05

Problem: What is the Gold Standard for Testing Driving

- Road Test

- Simulators

- MVA

- Other

Proposed Batteries

- MMSE, Stroke Drivers Screening Assessment, Behavioral Assessment of the Dysexecutive Syndrome, Stroop, Visual Object Space Perception Battery (Incomplete Letters), Adult Memory and Information Processing Battery, and Salford Objective Recognition Test

- 37 patients with dementia

Table 4. Comparison of actual road test performance with predictive equation in people with dementia (including participants with missing data)

		Predicted group membership	
		Unsafe	Safe
Road Assessment	Unsafe	9	1
	Safe	2	25

Sensitivity for safety = 25/27 = 93%; Sensitivity for unsafe = 9/10 = 90%; Specificity of safety = 25/26 = 96%; Specificity of unsafe = 9/11 = 82%; Accuracy 34/37 = 92%.

Lincoln, in press

Proposed Batteries

- Tested formula with second sample of 17 patients
- Correctly classified 59%
  - Sensitivity for safety 67%
  - Specificity 73%

Lincoln, in press

Assessment: AMA Battery

- Assessment of Driving Related Skills (ADReS)
  - Snellen E Chart (>20/70 = road test rec)
  - Visual Fields by Confrontation Testing
  - Trail-Making Test B (180 s)
  - Clock Drawing (any error = "intervention")
  - Rapid Pace Walk (>9 s = intervention)
  - Manual Test of Range of Motion (Not WNL=interv)
  - Manual Test of Motor Strength (<4/5 = intervention)

AMA, 2003

Assessment: AAA

- ## AAA Roadwise Review
  - CD Rom Self-test materials
    - Leg Strength & General Mobility
    - Head/Neck Flexibility
    - High-Contrast Visual Acuity
    - Low-Contrast Visual Acuity
    - Working Memory
    - Visualizing Missing Info
    - Visual Search
    - Visual Info Processing Speed

Provides feedback in each area and an overall driving recommendation

Assessment: How Well Do Clinicians Judge?

- Experienced neurologist ratings related to on-road driving score in 50 AD patients and 25 NCs (Brown, 2005)

Table 3. Predictive Value of Ratings by Participant, Informant, and Physician for the Categorical Rating of "Safe" by Driving Instructor

Rater Characteristic	Participant Self-Rating	Informant Rating	Physician Rating
		%	
Sensitivity	100	81.8	90.9
Specificity	10.7	47.8	60.7
Positive predictive value	46.7	60.0	64.5
Negative predictive value	100	73.3	89.5
Correctly classified	53.2	64.4	74.0

Assessment: How Well Do Clinician's Judge?

50 dementia patients assessed clinically and on the road

Dementia specialists (with fewer yrs experience) showed best ratings

Clinician	JB	BO	AD	CW	AC	DA
Sensitivity	59.1	95.2	49.5	59.1	40.9	45.5
Specificity	92.9	59.3	96.4	82.1	82.1	75
Positive predictive value	86.7	64.5	90.9	72.2	64.3	58.8
Negative predictive value	74.3	94.1	69.2	71.9	63.9	63.6
Correct classification	78*	75*	74*	72*	64*	62
	G Psy Fel	Dem	Neur Fel	Dem	G NP	GP

*$P < .05$, chi-squares

Ott, 2005

Practice Guidelines

- International Consensus Conference on Dementia and Driving:
  - Consensus that moderate to severe dementia precludes driving (Johannson, 1997)

American Academy of Neurology: Practice Parameter, 2000

- Clinical Dementia Rating ≥ 1 (MMSE<25 and >19); substantially increased accident rate and driving errors, pts should be told not to drive (standard).

- CDR = .5 (MMSE=25); significant safety problem, consider referral for driving test (Guideline), reassess dementia severity and driving appropriateness every 6 months (Standard)

American Academy of Neurology: Practice Parameter, 2006+

- Re-evaluation of the current evidence/ recommendations

- Are there more specific, brief, office-based testing we can suggest?

Literature Search

- 1006 articles identified in initial Pubmed search
- Consulting with a reference librarian to conduct additional searches:

  - EBSCOhost: CINAHL Plus, Academic Search Elite
  - Ovid: PsycINFO, Global Health, EBM Reviews – Cochrane Controlled Trials Register
  - Cambridge Scientific Abstracts (CSA)
  - SCA Neurosciences Abstracts
  - Bioengineering Abstracts
  - National Technical Information Service (NTIS)
  - Health and Safety Science Abstracts
  - Risk Abstracts
  - Web of Science
  - Ageline (via SilverPlatter WebSpirs)
  - WorldCat
  - Transportation Research Information Service (TRIS)
  - National Transportation Library (NTL)
  - Transportation Research Board Research in Progress (TRB)
  - Safety Lit
  - National Highway Traffic Safety Administration (NHTSA) reports/ US DOT

American Academy of Neurology: Practice Parameter, 2006+

Rating of Diagnostic Article	Rating of Prognostic Article	Rating of Screening Article
Class I: Evidence provided by a prospective study in a broad spectrum of persons with the suspected condition, using a reference (gold) standard for case definition, where test is applied in a blinded evaluation, and enabling the assessment of appropriate tests of diagnostic accuracy. All patients undergoing the diagnostic test have the presence or absence of the disease determined.	**Class I:** Evidence provided by a prospective study of a broad spectrum of persons who may be at risk for developing the outcome (e.g. target disease, work status). The study measures the predictive ability using an independent gold standard for case definition. The predictor is measured in an evaluation that is masked to clinical presentation and, the outcome is measured in an evaluation that is masked to the presence of the predictor. All patients have the predictor and outcome variables measured.	**Class I.** A statistical, population-based sample of patients studied at a uniform point in time (usually early) during the course of the condition. All patients undergo the intervention of interest. The outcome, if not objective, is determined in an evaluation that is masked to the patients' clinical presentations.
Class II: Evidence provided by a prospective study of a narrow spectrum of persons with the suspected condition, or a well designed retrospective study of a broad spectrum of persons with an established condition (by "gold standard") compared to a broad spectrum of controls, where test is applied in a blinded evaluation, and enabling the assessment of appropriate tests of diagnostic accuracy.	**Class II:** Evidence provided by a prospective study of a narrow spectrum of persons at risk for having the condition, or by a retrospective study of a broad spectrum of persons with the condition compared to a broad spectrum of controls. The study measures the prognostic accuracy of the risk factor using an acceptable independent gold standard for case definition. The risk factor is measured in an evaluation that is masked to the outcome.	**Class II.** A statistical, non-referral-clinic-based sample of patients studied at a uniform point in time (usually early) during the course of the condition. Most patients undergo the intervention of interest. The outcome, if not objective, is determined in an evaluation that is masked to the patients' clinical presentations.

Why do Dementia Patients Stop Driving?

- Canadian Outcomes Study of Dementia
- 883 patients with mild-moderate dementia
- 719 had ever driven
- 28.2% still driving at baseline (n=203)
- Observed for average of 23 months

Herrmann et al., 2006

Why do Dementia Patients Stop Driving

- 48.5% stopped driving (n=97)
- Factors predicting driving cessation:
  - GDS (HR 1.68, CI=1.15-2.45)
  - MMSE score (HR 0.90, CI=0.83-0.97)
  - NPI (HR 1.63 for presence of > or = 3 behaviors, CI 1.01-2.62)
    - Agitation decreased likelihood of cessation
    - Apathy and hallucinations increased likelihood of cessation

Why do Dementia Patients Stop Driving

- Other studies:
  - Cognition is associated with cessation in some (Talbot et al., 2005), but not all studies
  - Living in the city
  - Older age (Tablot, 2005)
  - May be more likely to cease driving when cared for by spouse compared to children (Wackerbarth et al., 1999)

Intervention

- Consider options on a continuum:
  - Raise the issue for family tracking and schedule re-evaluation
  - Recommend restricting/limiting driving
  - Recommend further assessment from other specialties
  - Recommend driving test (and ensure it happens!)
  - Report patient to DOL
  - Recommend disabling car, etc. ?

Intervention: Counseling Patients

- Use family sessions
- Emphasize how seriously you take driving recommendations, acknowledge assessment limitations
- Explain the evidence – Trails B
- Process what cessation means – fears related to becoming an immobile, dependent victim of disease
- Plan a compromise in advance
- Affirm patient's driving in usual circumstances ("believe them"), but question the unusual

Intervention: Counseling Patients (cont)

- Explain the legal and financial risks to the family
- If the assessment is unequivocal, don't be equivocal
- Remind of progressive nature - Ask patient, "Under what circumstances will you be willing to stop driving."
- Monitor how your personal feelings affect what you say – especially with resistant, agitated patients
- Be prepared with transportation resources

Resources

- AMA Physician's Guide to Assessing and Counseling Older Drivers, 2003

- http://www.ama-assn.org/ama/pub/category/10791.html

Summary

- Neuropsychologists can and should play a helpful role in driving recommendations for patients with dementia

- Assessment of driving in patients with dementia is multi-factorial including at least cognition, vision, and motor function

- Cognitive function relates to driving skills (especially spatial skills)

- Careful counseling of patients and families significantly improves compliance

Acknowledgements

Suzanne Craft, Ph.D.

Stennis Watson, Ph.D.

Laura D. Baker, Ph.D.

Brenna Cholerton, Ph.D.

Robert Welsh, Ph.D.

Karen Lowman