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85th Annual AOTA Conference

Assessment of Older Drivers: National Older Driver Research and Training Center:

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Long Beach
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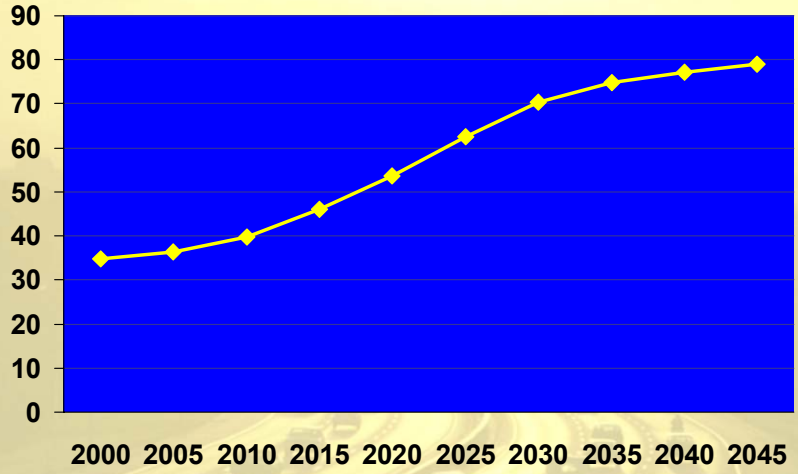
Today's Presentation

- **Background: NODRTC**
- **Consensus Conference Results**
  - **Aging and driving**
  - **Assessment**
  - **Remediation**
  - **Alternatives**
- **Research at the University of Florida**

Background

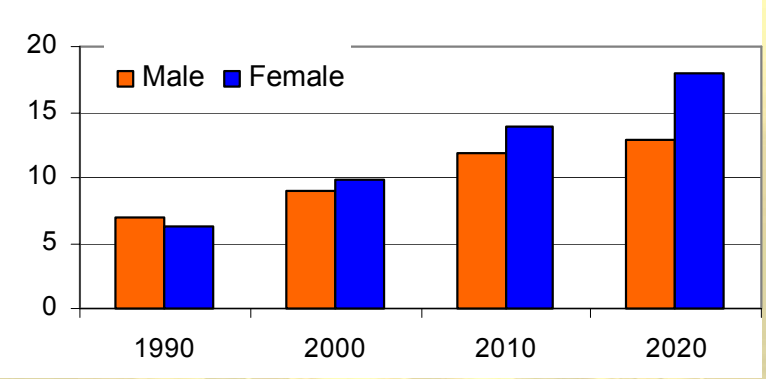
- Increasing awareness of older driver issues
  - Aging population
  - Increased number of older drivers
  - Increased likelihood of injury or death
  - Consequences of driving cessation

Census Population Estimates



Persons Aged 65+

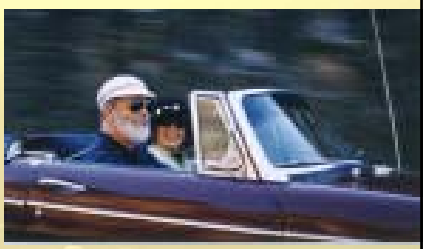
Increased Number of Licensed Drivers



Age 75+

Reliance on the Automobile

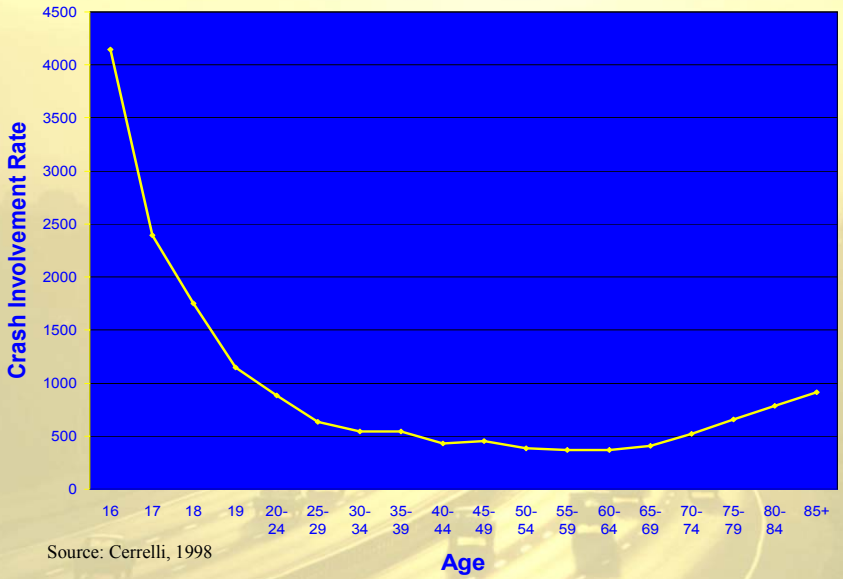
- The automobile is used by 90% as their primary source of transportation
- Driving cessation associated with decreased quality of life
- Few alternatives to driving



Crash Statistics

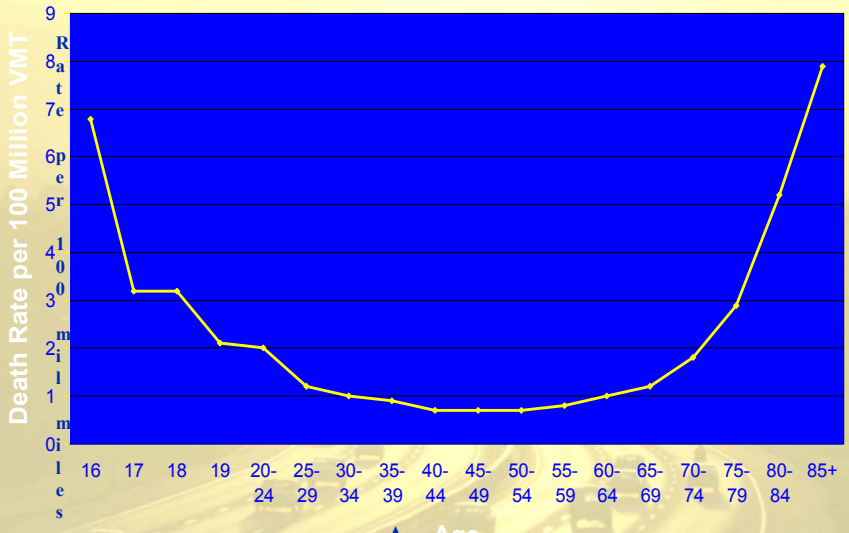
- Safest, for age group
- Dangerous, per mile driven (?)
- Increased injury and fatality rates

Crash Rate by Age



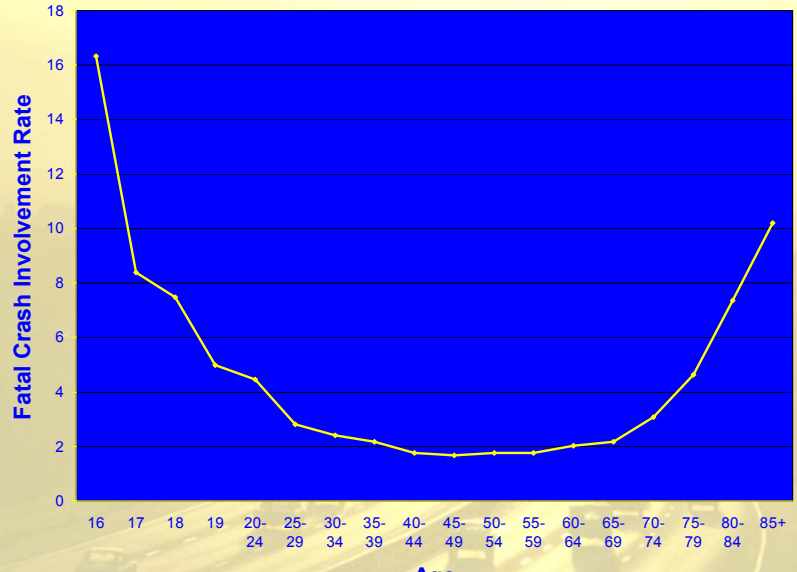
Source: Cerrelli, 1998

Fatal Crash Rate by Miles



Source: Cerrelli, 1998

Fatal Crash Rate by Age



Source: Cerrelli, 1998

Background

Congress earmarked funds for older driver research

- To:
  - University of Florida
  - National Older Driver Research and Training Center (NODRTC)
- Through:
  - Centers for Disease Control
  - Federal Highway Administration

National Older Driver Research and Training Center

NODRTC

Multidisciplinary Team

- **OT, psychology, mechanical engineering, computer science, civil engineering, medicine, pharmacy, rehabilitation science**

Development of Service Program

Service programs and data collection sites:

- **Gainesville**
- **Ocala**
- **Jacksonville**
- **Orlando**
- **Others?**

Services offered:

- **Assessment**
  - **Clinical**
  - **On-road**
- **Intervention**
  - **In vehicle**
  - **Alternatives**

International Older Driver Consensus Conference

- Health related changes in perceptual, cognitive, and physical abilities associated with unsafe driving
- Effective means of assessing these age-associated changes
- Good practice for remediation of driving skills
- Use of alternatives to driving and access to services that enable independent community living

Health Related Changes Associated with Unsafe Driving

Health-Related Changes

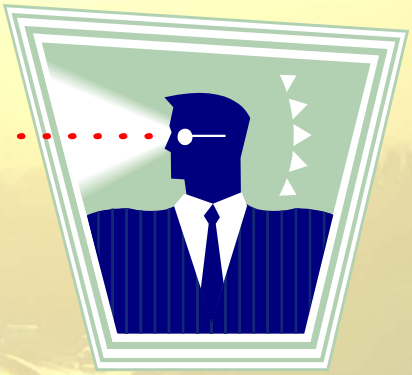
- vision
- perception
- cognition
  - attention
  - memory
  - information processing
- motor

Vision

- **90% of sensory cues used in driving are visual** (Malfetti 1986)
- **Vision begins to decline in one's 20's**
- **Wide variability with amount, rate, and onset of deterioration**

Vision: Normative Changes

- **static acuity**
  - **near and distant**
- **dynamic acuity**



Vision: Normative Changes

Contrast Sensitivity

Vision: Normative Changes

- glare recovery
- night vision

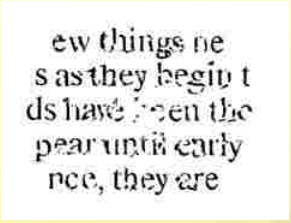
Vision: Normative Changes

•peripheral fields
•scanning

Color Recognition

- **Non-positional signals**
- **Signals at night**

Vision: Pathological Changes



- cataracts
- glaucoma
- macular degeneration
- diabetic retinopathy

Hearing

- Hearing acuity decreases progressively as early as age 40
- No direct implications on driving performance
- Affects ability to receive auditory stimuli

Cognition

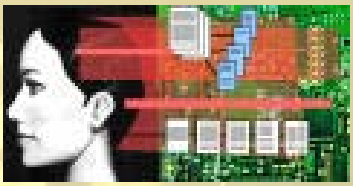
- Attention
- Memory
- Information processing
- Decision making

Cognition

- Attention
  - –focused
  - –divided
  - –control

Cognition

- Memory
  - short-term memory
  - long-term memory
  - procedural memory



Cognition

- Information processing
  - Slowing of response speed
- Decision making

Other Factors

- Motor
  - diminished strength and flexibility
- Increased incidence of medical conditions
  - increased use of medications

Evaluation of Driving Skills

Evaluation Issues

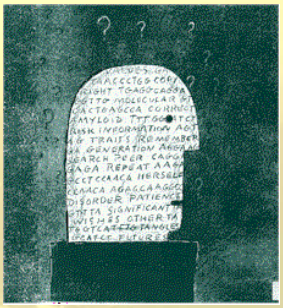
- Screening vs. assessment
- *Who* should do screening/assessments?
- How do individuals enter the process?
- Age-based or capacity-based?
- What about those that fail?
- What is the appropriate criterion for evaluating outcomes?
- Costs and licensing issues?
- Consistent and fair administration?

Evaluating Driving Skills

- Identify domains important for driving
- Identify clinical tests for each domain
- Followed by “gold standard”: On-road, Behind-the-Wheel testing

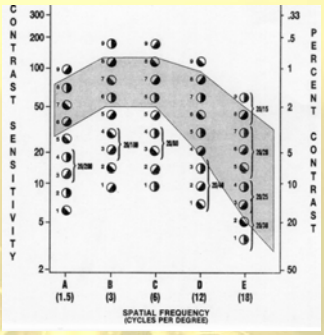
Domains/Components

- Cognition
  - Attention
  - Visual search
  - Memory
  - Driving knowledge
  - Spatial ability
  - Visualization of missing information



Domains/Components

- Perception
  - Reaction time
  - Proprioception
  - Visual fields
  - Visual acuity
  - Contrast sensitivity



Domains/Component

- Physical abilities
  - Range of motion
  - Strength
  - Coordination
  - Mobility

NODRTC Clinical Tests

- OPTEC 2500
  - Visual acuity
  - Peripheral vision
  - Color discrimination
  - Depth perception
  - Contrast sensitivity
  - Phorias

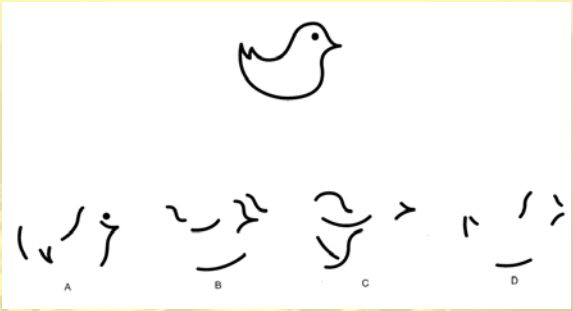
NODRTC Clinical Tests

- Useful Field of View Visual Analyzer
  - Sustained attention
  - Divided attention
  - Selective attention

NODRTC Clinical Tests

•Motor-Free Visual Perception Test (MVPT)

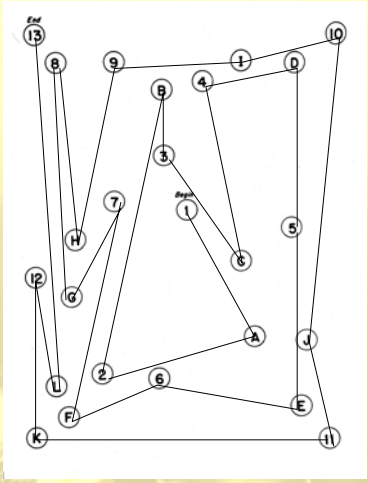
- Verbal test of visual perception skills
- Visual closure task
- Spatial orientation



NODRTC Clinical Tests

Trail Making, Part B

- Paper and pencil test of divided attention
- Connect alternating numbers and letters



NODRTC Clinical Tests

- Symbol Digit Modalities Test
  - Measure of cognitive function
  - Paper and pencil task
  - Fill in box with correct number associated with symbol

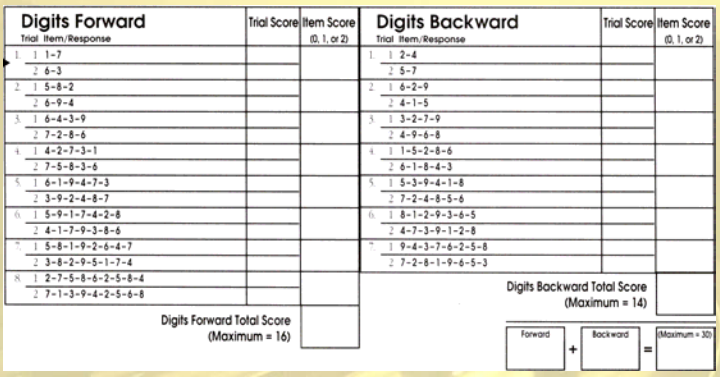
NODRTC Clinical Tests

- Letter Cancellation Task
  - Test of visual scanning and selective attention
  - Paper and pencil task
  - Mark off a particular letter throughout page

GCHCFANABHDFDHEGHEHNEDBNAFBHGCHDEBGAHECHNFGNBABDCACEGHFHFHDN
HBCEBDNEHGNHFGACFNCHDEAHAGFDBHABCEFHDANHCFGDHAEHBNCHGDGFNEHB
EBDHCACHDFGFAHNEBEHNHNGBGDAFHCEHDFHEAGHGCBNBNCAHDFBNEAHFDGHC

NODRTC Clinical Tests

- Digit Span
  - Verbal and auditory test of working memory
  - Series of numbers repeated back to examiner



Digits Forward Trial Item/Response	Trial Score	Item Score (0, 1, or 2)
1. 1 1-7		
2 6-3		
2. 1 5-8-2		
2 6-9-4		
3. 1 6-4-3-9		
2 7-2-8-6		
4. 1 4-2-7-3-1		
2 7-5-8-3-6		
5. 1 6-1-9-4-7-3		
2 3-9-2-4-8-7		
6. 1 5-9-1-7-4-2-8		
2 4-1-7-9-3-8-6		
7. 1 5-8-1-9-2-6-4-7		
2 3-8-2-9-5-1-7-4		
8. 1 2-7-5-8-6-2-5-8-4		
2 7-1-3-9-4-2-5-6-8		
Digits Forward Total Score (Maximum = 16)		

Digits Backward Trial Item/Response	Trial Score	Item Score (0, 1, or 2)
1. 1 2-4		
2 5-7		
2. 1 6-2-9		
2 4-1-5		
3. 1 3-2-7-9		
2 4-9-6-8		
4. 1 1-5-2-8-6		
2 6-1-8-4-3		
5. 1 5-3-9-4-1-8		
2 7-2-4-8-5-6		
6. 1 8-1-2-9-3-6-5		
2 4-7-3-9-1-2-8		
7. 1 9-4-3-7-6-2-5-8		
2 7-2-8-1-9-6-5-3		
Digits Backward Total Score (Maximum = 14)		

Forward	+	Backward	=	(Maximum = 30)

NODRTC Clinical Tests

- Screening of Physical Function
  - Range of motion
  - Strength
  - Coordination
  - Sensation

NODRTC Clinical Tests

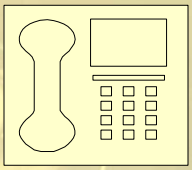
- Rules of the Road Test
- Signs Test

Q: What does a yellow, five-sided sign indicate?

a)No passing zone
b)Construction zone
c)No U-turn
d)School zone or school crossing

NODRTC Phone Interview

- Demographics
- Functional Independence Measure
- Driving Behaviors Questionnaire
- Jette Pain Scale
- Geriatric Depression Scale



NODRTC On-Road Test

- Fixed course, graded for difficulty
  - Closed course
  - Residential area
  - Higher volume roads
  - Interstate

Remediation of Driving Skills

Driver Rehabilitation

- Findings from evaluation used to determine appropriateness for rehab
  - Insight into deficits
  - Capacity to learn new strategies
- Methods are associated with client's physical, cognitive, and sensory characteristics
  - Remediation
  - Compensation

Alternatives to Driving and Driving Alternatives

Alternatives to Driving and Driving Alternatives

- Counseling
- Training
- Ensures continued participation in desired activities

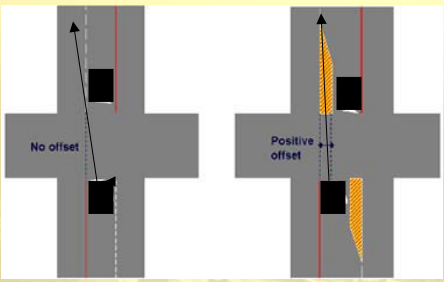
www.fssrc.phhp.ufl.edu

Explore the Use of Vehicle Instrumentation

- **Braking**
- **Acceleration**
- **Video**
- **Lane Keeping**
- **Steering**
- **GPS**

Federal Highway Administration Projects

Background: Particular roadway conditions have been determined to be problematic for older drivers



Simulated Driving

Research Goals

- the validity and reliability of approaches to older driver evaluation: clinical tests and on-road tests
- the effectiveness of driver remediation and other interventions, including highway design
- the effectiveness of counseling and training programs to keep elders mobile and living in their communities

Outcome Measures

1. **Global pass/fail**
2. **Driving errors**
3. **Data obtained by instrumentation**
4. **Data obtained from simulator**
5. **Subjective data**
6. **Sustained safe driving**
7. **Sustained community mobility**

Process and Outcomes Evaluation AMA Guide

- Study Purpose:
  - To gather reliability and validity data of screening tool (ADReS)
  - Determine sensitivity, specificity, predictive value
  - Characteristics of those who seek assessments

NHTSA
People Saving People
www.nhtsa.dot.gov

ADReS Description

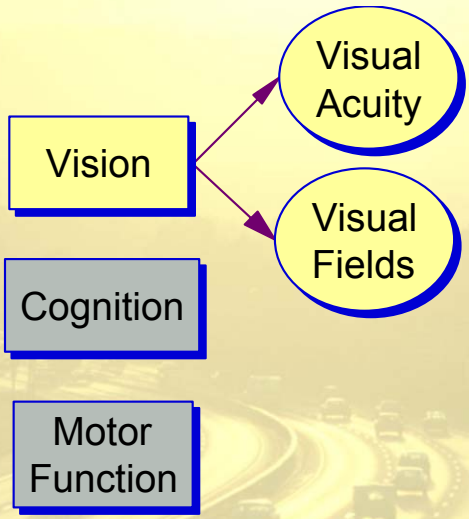
- American Medical Association
- Physician's Guide to Assessing and Counseling Older Drivers
- AMA's Assessment of Driving Related Skills (ADReS)

Assessment of Driving-Related Skills (ADReS)

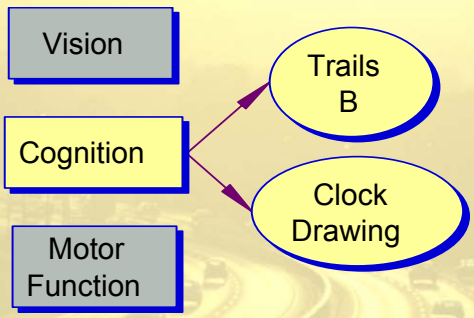
Key Functions for Safe Driving

- Vision
- Cognition
- Motor Function

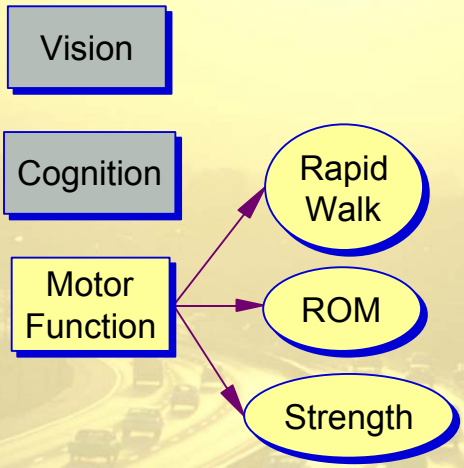
Vision

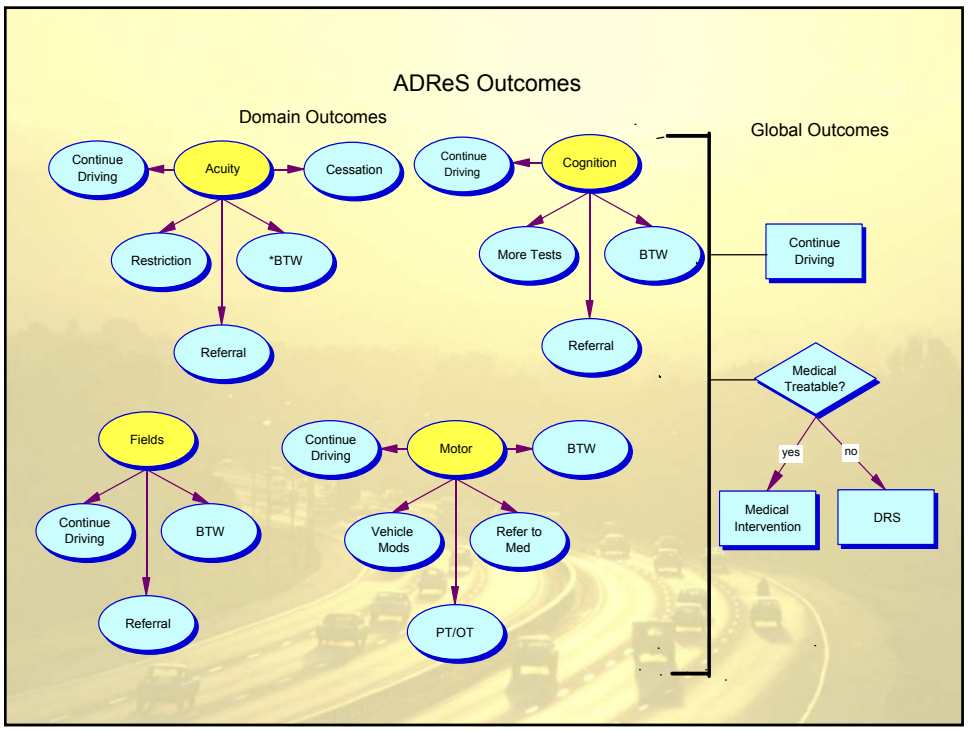


Cognition



Motor Function





Questions and Comments

For additional information:

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Consensus Conference Summary Report available at:
http://driving.phhp.ufl.edu