Screening for Cognitive Impairment at Driver License Renewal

A Presentation to the

Annual International Conference

of the

American Association of Motor Vehicle Administrators

by

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Why consider functional screening at renewal?

- With an aging population, an increasing number/proportion of drivers will evidence diminished capacity.

- Fatal crash involvement by older drivers is rising, while overall motor vehicle fatalities are falling.

- Existing (referral) methods of catching functionally impaired drivers are haphazard; and once referred for medical review, there are no stand-ardized tools to quantify functional status (except vision) for potentially at-risk drivers, which negatively impacts licensing outcomes.

- Screening results help target the right drivers for more in-depth assessment, permitting better allocation of limited resources.

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Why focus on cognitive abilities?

- Current mechanisms exist for detecting drivers with impaired vision or physical impairments.

- Epidemiological trends/projections underscore an increasing prevalence of (older) drivers with dementia.

- Cognitive loss (especially dementia) robs the driver of his/her capacity to self-regulate; and self-regulation is the cornerstone of our existing system of ensuring driver competence.

- Case-control research shows the strongest validity for measures of cognitive ability as crash predictors.

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Choosing the best tools for the job

- Many different measures of cognitive ability (impairment) have been used in laboratory and clinical settings.

- The most suitable for use as a screening application in a DMV setting should:

  1. Tap into domains of cognitive ability for which there is the strongest evidence as <u>crash</u> <u>predictors</u>.

  2. Be complementary to, and easily integrated with, a State's existing medical review system, serving as simply one more referral source.

  3. Be implemented using techniques and procedures that are standard-ized, objective (unbiased), and 'user-friendly' for the driving public.

  4. Not place excessive demands on the DMV in terms of staffing, equip-ment, support, or other operational costs.

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Evidence: Prospective Crashes

2003 NHTSA / NIA "Maryland Pilot Older Drivers Study"

- ~2,000 drivers 55+ completed functional measures at MVA offices
- Sample was a representative cross-section of MD older drivers
- Police-reported crashes were the validation criteria

Key findings: Cognitive abilities (measures) emerging as significant crash predictors were *visual search with divided attention* (Trail-making Part B); *visual information processing speed with divided attention* (UFOV subtest 2); *visualizing missing information* (MVPT/VC); and *working memory* (cued/delayed recall).

Ball, K.K., Roenker, D.L., Wadley, V.G., Roth, D.L., McGwin, G. Jr., Raleigh, R., Joyce, J.J., Cissell, G.M., & Dube, T. (2006). Can high-risk older drivers be identified through performance-based measures in a Department of Motor Vehicles setting? *Journal of the American Geriatric Society, 54,* 77-84.

Staplin, L., Gish, K., and Wagner, E. (2003). "MaryPODS revisited: Updated crash analysis and implications for screening program implementation," *Journal of Safety Research, 34(4),* 389-397.

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Evidence: Prospective Crashes (con't)

2009 NHTSA Study: "Older Drivers: Relationship Between Assessment Tool Scores and Safety Outcomes"

2012 NHTSA Study: "Older Driver Assessment Scores, Citations, and Crashes"

- 692 drivers age 70 and older completed functional measures at MVA offices
- Sample was a representative cross-section of MD older drivers
- Police-reported crashes were the validation criteria

Key findings: In a 'route planning' task, using mazes presented on a computer touch-screen, results identified specific mazes as highly significant predictors of future safety risk for older drivers. These findings support the use of the Maze Test as a measure of *executive function*, complementing other screening tools keyed to narrower domains of cognitive ability that predict crash risk.

Staplin, L., Gish, K., Lococo, K., Joyce, J. and Sifrit, K. (2012). "The Maze Test: A significant predictor of older driver crash risk," *Accident Analysis and Prevention*.
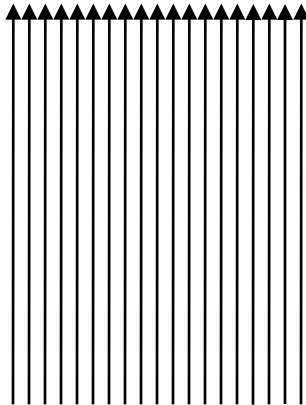http://dx.doi.org/10.1016/j.aap.2012.05.025

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Branch Office Experience

Customer exits
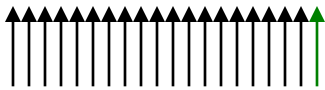
Standard License Renewal Process

Brief Cognitive Screen

Customer enters

Integration with a State's existing License Renewal process

•   The licensing authority adds brief cognitive screening to the license renewal process at a specified age.

•   This screening adds 5 - 15 minutes to the individual's transaction. The screening proceeds unattended.

•   Customer resumes standard renewal process.

Nothing in this process precludes the licensing authority from refusing or restricting licensure to any driver license applicant as it would in its current operations.

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Generating referrals to a State's existing Medical Review system

Branch Offices

(Network)

HQ Server

- **Data Storage**
- **Rules Application**
- **Referrals**
- **Reporting**

Existing Referral Sources

Existing Medical Review Process

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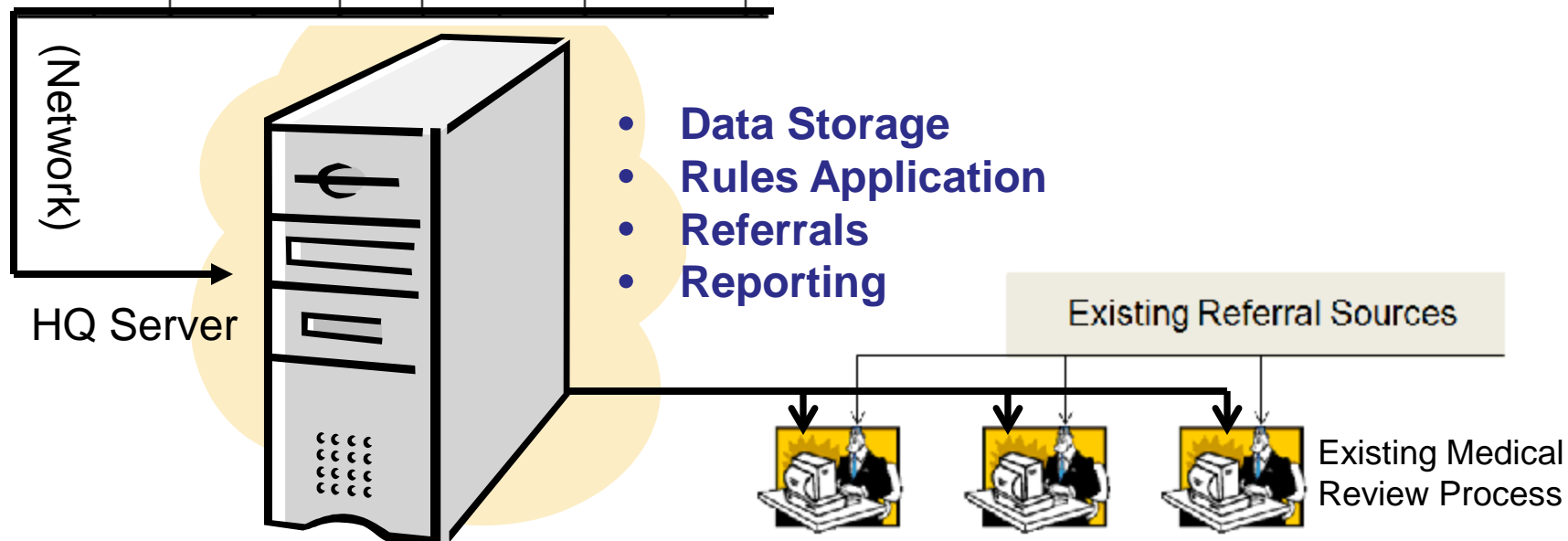
A user-friendly, operationally feasible application

Key attributes:

•The user interface for cognitive screening must accommodate a high proportion of elderly drivers ➔ simple, easy instructions; not intimidating or causing discomfort. A computer-based system should be operated by touch, not mouse; and with no need for keyboard entries.

•Potentially large volumes of drivers must be accommodated without imposing unacceptable demands for personnel (number of staff, level of training) on a DMV: a self-administered screen holds clear advantages.

•The test protocol should minimize demands on drivers' time by using a progressive program flow: use measures most sensitive to dementia/MCI first to identify the most at-risk drivers, then proceed with measures more sensitive to cognitive decline among normally aging drivers.

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[State logo]

Safe Driving
BASICS
_____

Brief Auto-Screening Instrument for Cognitive Status

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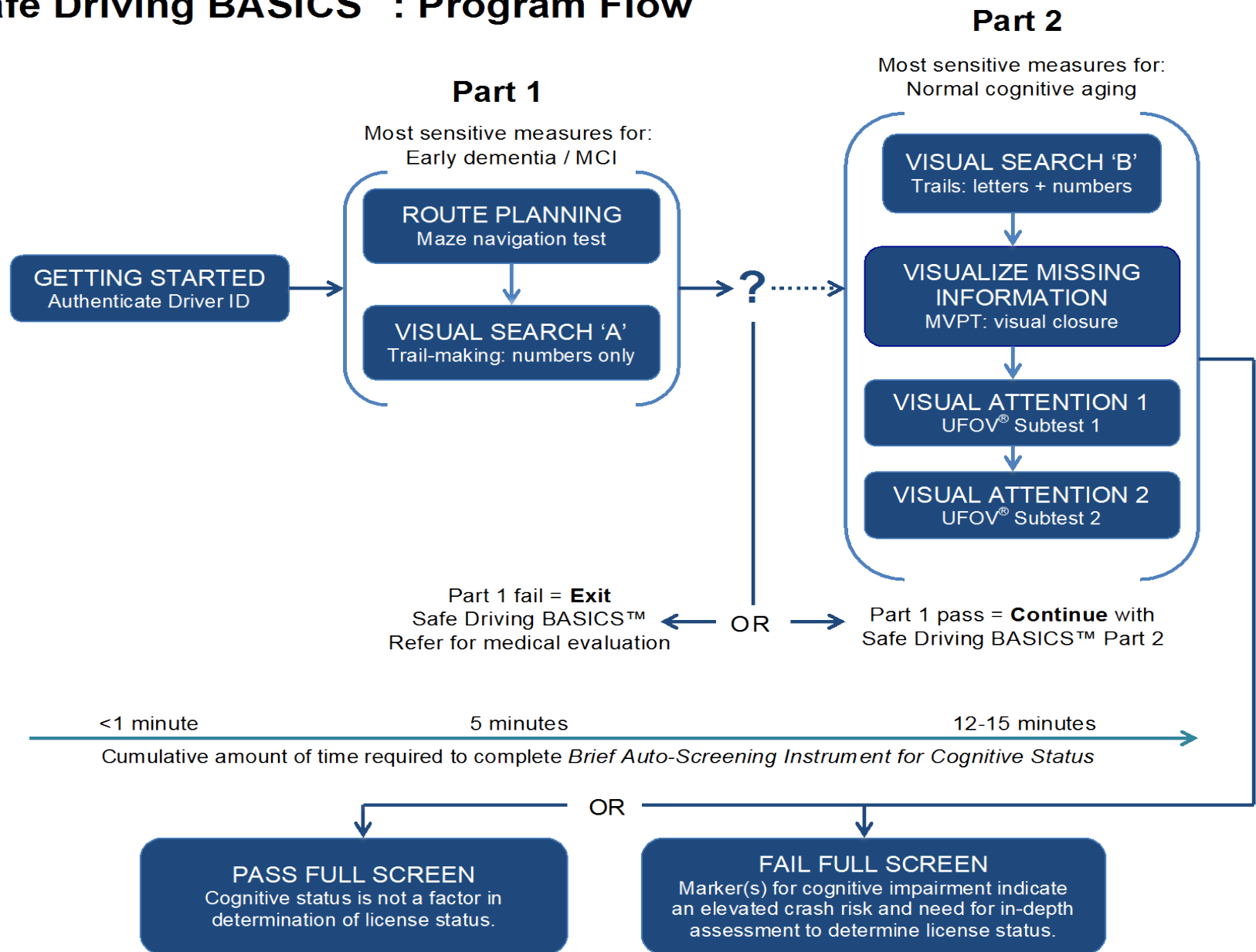
Safe Driving
BASICS

Brief Auto-Screening Instrument for Cognitive Status

- Born from widely-recognized, peer-reviewed studies of crash predictors.
- Represents 'next generation' of system in current use by Maryland MAB.
- Versatile and reliable: A DMV can take this system and plug it into their existing process with virtually no changes to existing methodology.

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Safe Driving BASICS™: Program Flow

Part 1

Most sensitive measures for:
Early dementia / MCI

Part 2

Most sensitive measures for:
Normal cognitive aging

GETTING STARTED
Authenticate Driver ID

ROUTE PLANNING
Maze navigation test

VISUAL SEARCH 'A'
Trail-making: numbers only

VISUAL SEARCH 'B'
Trails: letters + numbers

VISUALIZE MISSING INFORMATION
MVPT: visual closure

VISUAL ATTENTION 1
UFOV® Subtest 1

VISUAL ATTENTION 2
UFOV® Subtest 2

?

Part 1 fail = **Exit**
Safe Driving BASICS™
Refer for medical evaluation

OR

Part 1 pass = **Continue** with
Safe Driving BASICS™ Part 2

<1 minute   5 minutes   12-15 minutes

Cumulative amount of time required to complete *Brief Auto-Screening Instrument for Cognitive Status*

OR

PASS FULL SCREEN
Cognitive status is not a factor in
determination of license status.

FAIL FULL SCREEN
Marker(s) for cognitive impairment indicate
an elevated crash risk and need for in-depth
assessment to determine license status.

What about concerns over age discrimination?

•There are precedents in applying special criteria for driver qualifications at particular (older) ages: FL (vision); PA (exam with physician report); other states (see www.seniordrivers.org).

•Applying the "medical model," it is appropriate and cost-effective to screen for impairing conditions only among those with the highest probability of manifesting them.

•Prominent policy studies endorse age-based screening (cf. AAAFTS Licensing Policy Workshop, pg 6).

•Another constituency, another perspective: Baby boomers with aging parents strongly support DMV initiatives in this area.

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