Driving and the Aging Brain

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St. Catherine University

Photo courtesy Kristi Haertl

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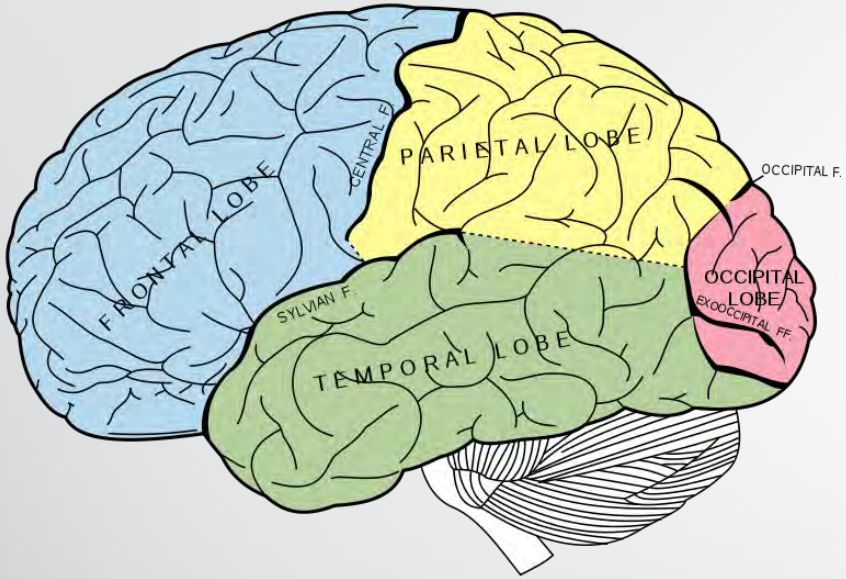
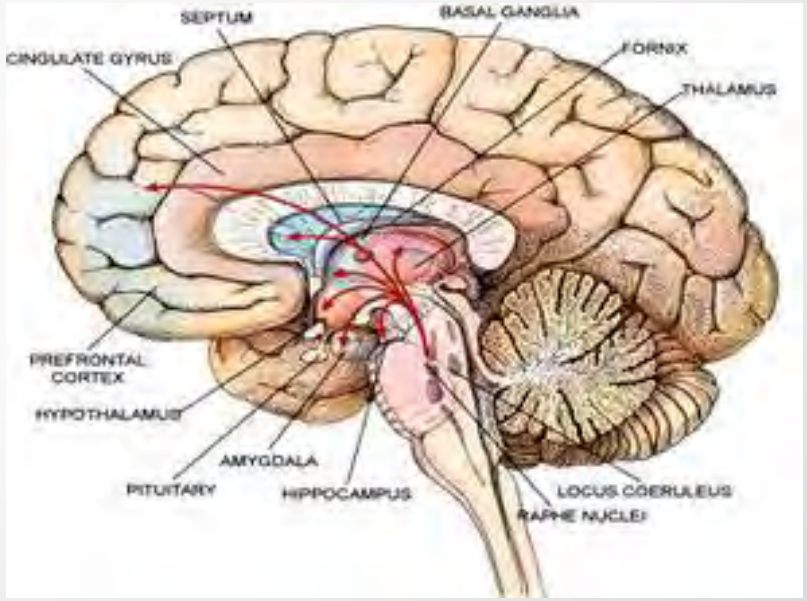
The Brain and Driving





Conscious

"Cognitive Brain" = Association Cortex

Planning, information processing, decision-making, conscious memory

Unconscious

"Automatic Brain" and "Emotional Brain"

Procedural, skill memory

Driving is Both Complex and Automatic

- Driving requires efficient memory, divided attention, decision-making, judgment and speed of information processing
  - For example: Changing lanes in traffic
- With age, all those cognitive functions become less efficient
- Driving is also an automatic skill, potentially giving a false sense of competence

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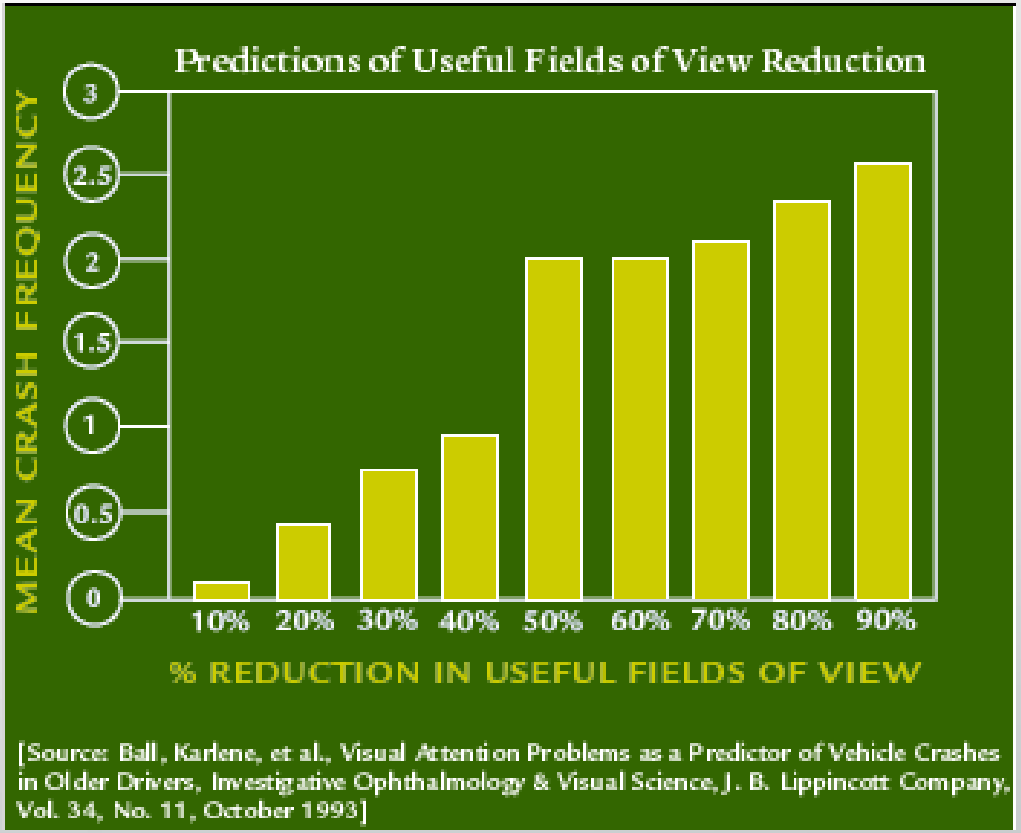
Age Changes in Visual Information Processing

- Visual Information processing is also called Useful field of View" (UFOV)
- It is not a vision problem (in eye) but a visual attention problem (in brain)
- UFOV limitations include problems with divided attention
- Visual information processing limitations increase with age
- Worsening UFOV linked to MVC risk
- Information processing training results in reduction in MVC (Ball et al 2010)



http://www.visualawareness.com/Pages/C_meancrash.html

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Normal Brain Aging and Driving

Driving Changes

- Greater need to concentrate and focus on task at hand while driving.
- May take longer to make decisions and react to unexpected situations on the road.
- Older drivers are generally good at compensating for age changes in cognitive abilities by adjusting where and how they drive (Andrews and Westerman)

Maintaining Driving Safety

- Self Assessments:
  - Roadwise Online
  - SAFER Driver Decision Workbook online
- Adopt brain healthy lifestyle
- Speed of processing training (UFOV) i.e. DriveSharp, racket sports etc
- Driver safety classes (classroom)
- Refresher lessons (BTW)
- Multimodal community mobility

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Minor Neurocognitive Disorders and Driving

Driving Safety Unclear

- Includes Mild Cognitive Impairment (MCI) and early stage dementia (old term) – (slide)
- No clear consensus on MVC risk
- Important to weigh risk of driving with risk of not driving
- Drivers with MCI could be stable or even improve
- Drivers with Alzheimer's (AD) may drive in early stages but will be progressively worse

Maintaining Safe Mobility

- Functions may be maintained with training and practicing if MCI.
- Essential to assess and reassess (slide)
- Resources aota.org/olderdriver
- Proxy assessments: i.e. Fitness to Drive Screening for caregivers http://fitnesstodrive.phhp.ufl.edu/
- Caregivers play key role in process: At the Crossroads (Hardford)
- If AD: Driving Advanced Directives
- Practice transportation alternatives

Classifications of Cognitive Disorders and Link to Function

New Term	Normal Age changes	Minor Neurocognitive Disorder		Major Neurocognitive Disorder	
Old Term		Mild cognitive impairment	Early stage Dementia	Mid stage Dementia	Late stage Dementia
Functional Level	Normal ADL and IADL	Greater effort with IADL	Impaired IADL	Impaired IADL and ADL	Dependent
Implications		Driving safety worsens Educate, retrain, reassess		Unsafe to drive Use alternatives	

IADL: Instrumental, complex activities of daily living including driving

ADL: Activities of daily living such as self-care

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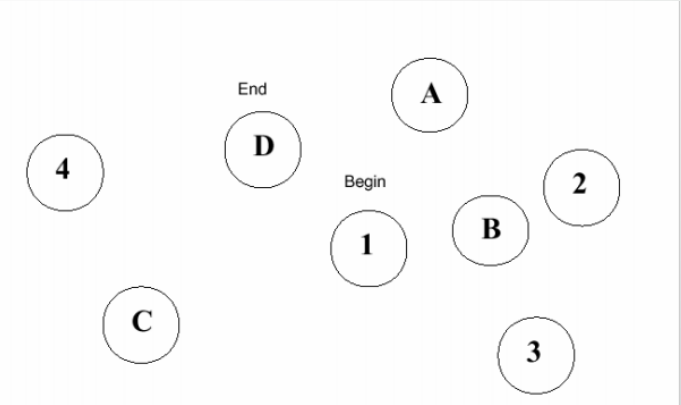
Assessments

- Screening tools are available to determine need for further testing
- Cognitive screening tools that predict risk of crash include:
  - Trails Making B (picture)
  - Clock drawing
  - Maze
  - UFOV (esp. divided attention subtest)



- No single tool should be used to determine driving cessation.
- Several batteries of tools exist for professionals. i.e. ADRs, OTDORA
- On-road assessment in traffic is best way to determine driving safety

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Major Neurocognitive Disorder and Driving

Driving Risks

- Corresponds to mid-stage to late stage dementia in old terminology
- Huge increase of people with Alzheimer's disease (AD) (slide).
- 1/3 of drivers with AD will have an MVC in the mid-stage of the disease
- Consensus that should not be driving
- Often little insight about limitations.
- Skill memory may hide true deficits

Not "if" should stop, but "when"

- Caregivers should discuss warning signs
- Dementia and driving resource center from the Alzheimer's association
- Communicate with MD
- Professional driving assessment
- May need to hide key or car
- Honor Driving Advanced Directives
- Arrange alternative transportation appropriate to cognitive level
- DVS, law enforcement and MD roles

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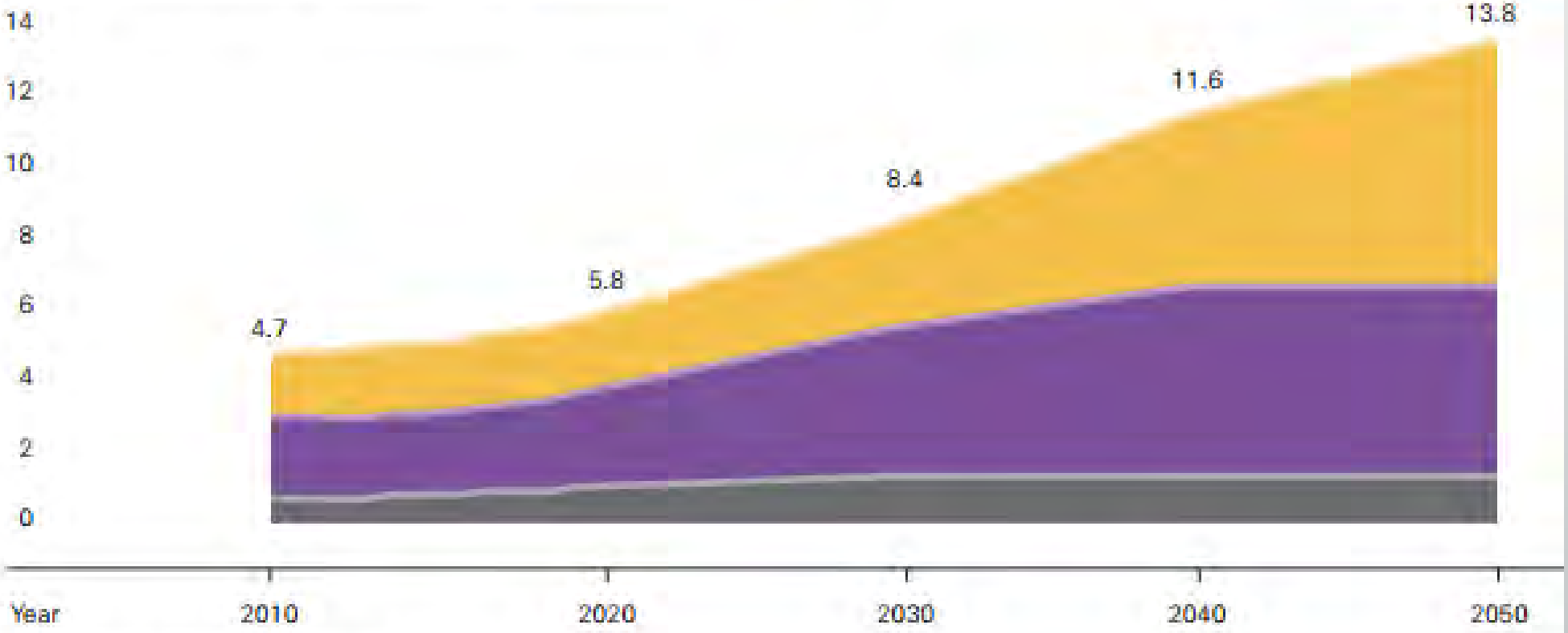
figure 5

Projected Number of People Age 65 and Older (Total and by Age Group) in the U.S. Population With Alzheimer's Disease, 2010 to 2050



Created from data from Hebert et al.[11M], A11

Neurocognitive Disorders and Licensing Laws

- Mandatory reporting laws for health professionals helps identify drivers at risk
  - In California health professional has to report to DVS if they have MCI
  - In the UK, if MCI diagnosis affects driving, MD needs to notify DVS. License is then renewed only for limited time (6 -36 months) so can reassess
- States and countries vary in use of cognitive screens in DVS. In the US, DVS in many states require vision screen but not cognitive screen
- DVS in some countries use computerized cognitive tests. i.e. DriveAble (in Alberta, BC), and Clock Drawing test in (Ontario). Controversial if only criteria.
- Many states, encourage families to report drivers they consider unsafe to DVS
- Law enforcement role in screening for cognitive problems varies. (next slide)

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California Initiative: Law Enforcement Screening for Cognition

Figure 8. Law enforcement screening driver for cognitive impairment with DOSCI tool
Source: TREDS – Training, Research and Education for Driving Safety, University of California, San Diego

DOCI screen Types of questions and scoring:

- What is your date of birth? (Month, day, and year must match documents, 1 pt)

- What is your full home address? (Address must match documents, 1 pt)

- What state are we in now? (1 pt)

http://safety.fhwa.dot.gov/older_users/noteworthy/ch2.cfm

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Conclusions

- Since many neurocognitive disorders are progressive, screening, testing, and periodic reassessments are essential in determining continued driving safety.
- Best options for implementing cognitive screens and reassessments should be discussed and adopted (DVS? Rehab? MD? other?)
- Awareness of the current assessment and referral process would be enhanced by a decision tree. (slide: UK).
- MMAP is in the process of developing such a decision tree for Minnesota drivers.

THANK YOU!

For references and ppt handout: Catherine Sullivan.

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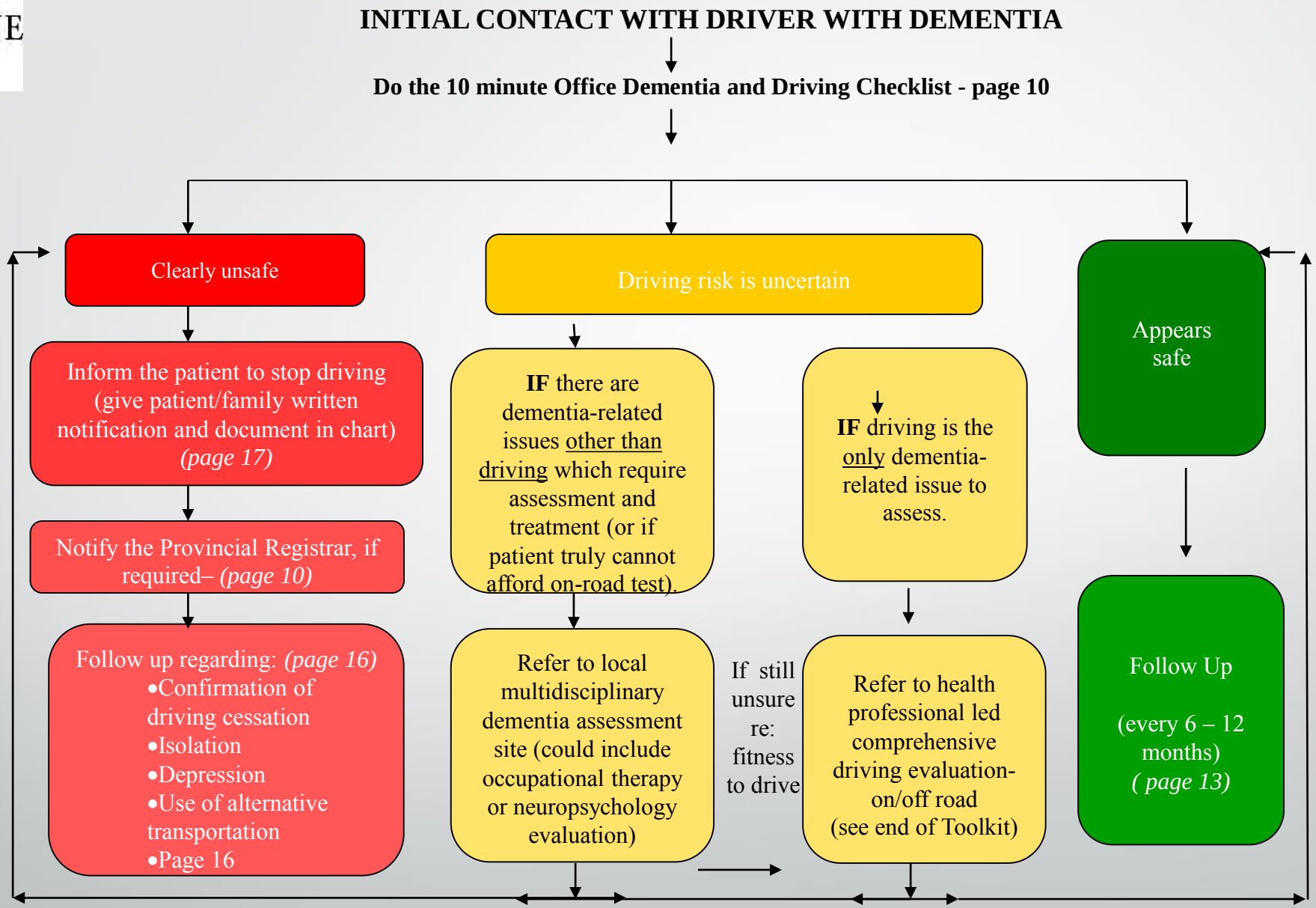

https://www.alz.co.uk/sites/default/files/conf2011/2816-anna-byszewski-driving-and-dementia-toolkit.ppt.