Driving and Vision; Assessment, Education and Action in the Exam Room

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Disclosure Statement:
Nothing to disclose
A way of life

- Driving is more than getting around!
  - Independence
  - Freedom
  - Control of self
  - Social norm
  - Prevents isolation
  - Personal identity
A way of life

- Loss of license
  - Major fear of patients
  - Resulting anxiety
  - Anger
  - Resentment
  - Social and family issues
  - Psychological burden
  - Isolation
  - Reliance on others
A way of life

- Eye care providers must balance...

  Independence
  Ability to work
  Feeling toward provider

  Safety of patient
  Safety of public
  Duty to report – or not?

Introduction to driving skills

- Cognition
- Motor Skills
- Reaction Time
- Concentration
Influence of visual factors on driving

“I only nag you when you’re lost. The problem is, you’re always lost.”

Secretary of state/public view

Eye care provider view

- VA
- Contrast Sensitivity
- Color Vision
- VF
- Stereopsis

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Visual acuity

• Improper focus on VA
• Research
  – Road signs designed for 20/30\textsuperscript{1,2}
  – Variability state to state\textsuperscript{2,3}
    • 20/40-20/70
    • Restrictions
    • Medical Advisory Board review exceptions
      – Maryland

Visual acuity

• Research
  – Lack of research to support association between VA loss and collision involvement\textsuperscript{2,4,5,6}
  – Maybe weak association with older drivers\textsuperscript{2,7,8}
• Why?
  – VI drivers self limit
    • Miles driven
    • Familiar areas
    • Increased risk may be nixed by driving patterns\textsuperscript{9,10}
Visual acuity

• Research
  – Some performance-based studies show decrease in skills
    • Road sign recognition and hazard avoidance but not vehicle navigation\(^{11}\)
  – AMD drivers = decreased skills?
    • Worse on nearly all on-road testing and with simulator\(^{12}\)
    • Difficulty with lane positioning and left turns across traffic but not any other measures on simulator\(^{13}\)
  – However, decreased skills DO NOT necessarily = higher collision rates

Visual acuity

• Research
  – VA level cut-off?
    • Variance by disease
      – AMD vs. Albinism
    • 20/70 – 20/80?
Visual field

- Impact on driving
  - Severity
  - Location
  - Static vs. kinetic
  - Perception/peripheral processing
    - UFOV

Visual field

- Research
  - Mixed results on impact\textsuperscript{2,14,15,16,17}
  - Age, self-regulation and compensatory mechanisms hinder studies\textsuperscript{2,18,19}
Visual field

– Types of field loss
  • Central scotoma
  • Generalized constriction
  • Hemianopsias
    – 90 degree visual field cut-off in MI for restricted
    – >110 for unrestricted
    – Relationship to scanning
    – Use of prism

Visual field

– Interpretation on driving forms
  – Method of assessment options
    • Confrontations
    • Esterman binocular
    • 81 pt or 120 pt
    • Other screening fields
    • Use of kinetic perimetry
### DI-4V

**SECTION 4: PERIPHERAL VISION**

1. Horizontal fields in degrees for both eyes:
   - Less than 90 degrees
   - 90 degrees to less than 110 degrees
   - 110 degrees or greater

2. Do you suspect a visual field defect?
   - Yes
   - No

If yes, please explain how it may affect the patient’s ability to drive safely:

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### Contrast sensitivity

- **Importance**
  - More important than VA?
  - Functional assessment
  - Impact on dusk/night driving
  - Rainy/snowy conditions
Contrast sensitivity

- Assessment methods
  - Bailey Lovie Hi-Lo Chart
  - Vistech/FACT
Contrast sensitivity

• Assessment methods
  – Peli-Robson
  – MARS

Contrast sensitivity

• Research
  – Not used as a licensing requirement
  – Impairs driving performance but not necessarily crash risk (mixed results)\textsuperscript{20,21,22}
  – Consider cataracts as well as VI
  – In CA, study tested C.S. at driver’s bureau and found increased crash risk if poor C.S.\textsuperscript{23}
  – 2X increase in crash risk if both eyes impaired vs. one\textsuperscript{5}
Contrast sensitivity

• Tints/Filters
  – Contrast enhancement
  – Glare cutting
  – Adjust transmission for time of day
  – Consider brown/amber vs. gray
  – Consider yellow, orange, green

Binocularity/stereopsis

• Impact on safety
  – Trouble judging distances
  – Compensation abilities
  – Monocular cues
  – Driving speed and spacing

• Impact on state forms
Eye tracking/scanning

- Adjunct consideration
  - Palsies
  - Nystagmus
- Compensation for defects
  - Scanning
  - Head movement vs. eye movement

Visual processing speed/abilities

- Relationship to reaction time
- Assessment methods
  - Matching Familiar Figures Test
  - Trail-Making Test
  - Useful Field of View
  - Test of Visual Perceptual Skills
  - Mini Mental State Exam
Trail-making test

Useful field of view

- Central vision and processing speed
- Divided attention
- Selective attention
  - Distractors
- AAA Roadwise Review
  [http://www.visualawareness.com/Pages/C_tour.html](http://www.visualawareness.com/Pages/C_tour.html)
Useful field of view

Central Vision and Processing Speed

1. The participant identifies a target object presented in the center of the computer screen for varying lengths of time.

Divided Attention

2. The participant identifies a target object as before but must also localize a simultaneously presented target object displayed in the periphery of the screen.

Selective Attention

3. Part 3 is similar to part 2, except that the target object displayed in the periphery is embedded in distractors, making the participant’s task more difficult.

Systemic health

- Blood pressure
- Diabetes
  - Blood sugar
  - Neuropathies
Cognition/memory

- Alzheimer's
- Dementia
- General memory loss
- Slow processing speed

Physical reaction time

- Leg movement agility and speed
- Arm/hand movement agility and speed
- Can be evaluated by O.T. or Certified Driving Rehabilitation Instructor/Specialist
Attention and focus

- Distractibility
- Reduction of distractors
- General focus

Dealing with illegal driver

- Initiating conversation
- Use of state standards
- Offer of repeat testing
- Alternative modes of transportation
Dealing with illegal driver

– Education and counseling
– Reporting
  • MCL 333.5139 (and correlating with MCL 257.362 which includes Michigan driver’s license qualifications)- Physicians and optometrists  
    – Reporting permitted but not required  
    – Immunity from legal action for reporting or not reporting  
    – Confidential, HIPAA immune

Dealing with illegal driver

– Ethical considerations
  • Patient advocacy vs. public health
  • Family wishes vs. patient wishes
  • Data reporting
Dealing with a defiant patient

• Tips for calming situation
• Involvement of family
• Reporting
• Chart documentation

Summary and review

• Driving is a privilege that is of great importance to most patients.
• We are gatekeepers to driving and must weigh patient advocacy and independence with the safety of the public.
• Driving safety involves more that just visual acuity in terms of vision and health.
• We must gather data and make informed decisions about patient driving.
• We must communicate our findings and educate patients and families.
• Driving evaluation should be a critical part of our practices in terms of patient care and liability protections.
References


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