Exploring the Needs of Aging Drivers in the Transportation System

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Turning Over the Keys? Medical Fitness and Aging Drivers
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Older Driver Facts
Older Driver Facts

- Approximately 13 percent of the population is 65 years old or older, yet accounted for 16 percent of traffic fatalities.

- Majority of older population fatalities were occupants of motor vehicles while ~12-15 percent were pedestrians, and one percent were bicyclists.

Source: WisDOT and Wisconsin Department of Administration
Older Driver Facts

- Transportation Research
  - More than 20 years of focus
  - Older drivers over-represented in injury safety statistics
  - Identifying the “sunset”

- What can be done to address the issue?
Older Driver Research
Objectives

Need
- Develop a dynamic environment for exploring older driver behavior under numerous driving scenarios

Methodology
- Create a full-scale driving simulator laboratory to accommodate this need
Driving Simulator Applications

- Traffic Control Device Evaluation
  - Operations and Safety
    - Protected/Permissive Left-Turn (PPLT) Phasing

- Virtual Road Safety Audits
  - Safety

- Preconstruction Design Evaluation
  - Operations and Safety

- Driver Distraction
  - Safety
Example 1 - Traffic Control Devices

- Protected/Permissive Left-Turn (PPLT) Phasing

- Developed to increase operational efficiency
  - Exclusive phase for left-turns
  - Permissive phase for left-turns
  - All within the same signal cycle
  - Increase capacity / reduce delay
Variety of PPLT Displays

- Delaware
- Michigan
- Washington
- Maryland

- Seattle, WA
- Cupertino, CA
- Reno, NV
- Sparks, NV
Cupertino, California
Flashing Red Arrow
Detroit, Michigan
Flashing Circular Red
Seattle, Washington
Flashing Circular Yellow
Dallas, Texas
Dallas Display
Dover, Delaware
Flashing Red Arrow
MUTCD Circular Green
Driving Simulator Study

- 464 Drivers
- 228 males; 204 females completed the study
- 4,613 Scenarios evaluated
- Ages 21 to 79
Project Results

- Flashing yellow arrow permissive left-turn indication was found to have a number of advantages:
  - Well understood
  - Significantly reduces left-turn confusion
  - No supplemental signs
  - Accommodate all phasing schemes
  - Operational

- Add to the MUTCD
FYA Display Alternatives

1

2

3

4
Field Installations
Example 2 – Virtual Road Safety Audits

- A road safety audit is a formal safety performance examination of an existing or future road or intersection by an independent audit team.
- Adds the human dynamic into the audit evaluation
Milwaukee, WI

Marquette Interchange
39 Crashes In One Spot Of Marquette Interchange Prompts Changes

**DOT Lowers Speed Limit, Says There's No Design Flaw**

**MILWAUKEE --** There have been 39 crashes in one spot of the Marquette Interchange since May, and now changes are on the way.

"At some point, talk has to turn into action before we have the major pileup, before we have a high number of fatalities," Milwaukee County Sheriff David Clarke said.

Clarke said the engineers messed up in their redesign of the off-ramp from Interstate 94 eastbound to the on ramp to Interstate 43 north in the Marquette Interchange.

He argued that people are driving too fast for the lane change, which comes too quick and accidents are mounting up. The sheriff said look at the evidence from the number of crashes and listen to evidence of living proof.

"I was going with traffic and just must have hit a spot, and my car spun around and hit the opposite wall, and my front left hit so I was facing the wrong way with traffic and then someone else did it right after me, too," crash victim Jessica Quinnan said.

The Wisconsin Department of Transportation said it has already lowered the speed limit from 45 to 40 mph on approach to the ramp, but the sheriff said that's not good enough.

"I can tell you right now when it snows in the winter, 40 mph on that ramp is way too fast. When it rains, 40 miles an hour is way too fast when there's heavy traffic conditions," Clarke said.

The DOT said there is no design flaw, but the department has already started to make changes to reduce the hazards.

"We're going to add some warning plaques for 40 mph speed warning plaques on the overhead signs. You know, like the big ones that are up there you have to look up to see -- like going to Green Bay or Chicago, those ones," said Dennis Shook of the Department of Transportation. "And advance exit signs on the ramp itself so people really know what's coming up," Shook said.

The DOT said it's also going to add two flashing beacons next to the existing overhead 40 mph yellow signs, so it really draws attention. This still may not make the sheriff happy because he still thinks 40 mph is too fast to negotiate the turn.
Visual World Development
Example 3 - Design
Example 4 – Driver Distraction
Medically Impaired Drivers

- One of the most significant causes of severer traffic accidents
  - A person who has a medical condition or conditions that could affect driving performance.

- Traditional prevention strategy
  - By reporting a driver to DOT or DMV.
  - Driver’s conditions are described in the report.
  - DOT will determine whether to cancel the license of the reported driver by judging from the results of driving and vision tests.
  - Drawback: complicated to implement.

Source: Wisconsin DOT, Driver Condition or Behavior Report, MV3141
An Improved Solution for the Issue of Medically Impaired Drivers

- A new screening tool for the identification of medically impaired drivers (SIMARD MD)
  - Developed by Medically At-Risk Driver (MARD) Centre at University of Alberta, Canada
  - Objective and science based assessment to determine those who are medically impaired and unsafe to drive.
  - Questionnaire and scoring system based; no need of field tests.

- Provision of support for medically impaired drivers
  - assist the drivers and their families with the ‘driving to non-driving’ transition.
SIMARD MD

The screening tool for the Identification of cognitively impaired Medically At-Risk Drivers

- a paper and pencil test requiring less than 7 minutes to administer.
- can be scored in a minute or two, with no special training or clinical expertise required. Hence, it can be administered by any persons.

SIMARD MD is scored based on five subtests of the DemTect.

- The DemTect is a brief and sensitive screening test for detecting mild cognitive impairment and dementia.
Five subtests included in DemTect:

- 10-word list with immediate recall (Word list)
- number transcoding, which consists of Arabic number to word conversion and vice versa (Number conversion)
- a semantic word fluency task (Supermarket task)
- digit span backward (Series of numbers in reverse)
- delayed recall of the word list (Repeat of the word list)

Cut-points of SIMARD MD:

- $\leq 30$: Unfit to drive
- 31-70: Indeterminate, needs further driving evaluation or tests
- $> 71$: Fit to drive
SIMARD MD

- SIMARD MD is validated through on-road driving evaluations
  - 244 drivers are evolved in the driving evaluation as the sample.
  - 80% of those predicted to fail did subsequently fail;
  - 87% of those predicted to pass did subsequently pass;
  - Has been proved to be an effective and easy-to-use tool for identifying the medically impaired drivers through non-field tests.

- SIMARD MD is free for access by health care professionals and driver licensing agency personnel
  - Contact Medically At-Risk Driver (MARD) Centre at University of Alberta for Login info [http://www.mard.ualberta.ca/Home/SIMARD/tool.cfm](http://www.mard.ualberta.ca/Home/SIMARD/tool.cfm)
SIMARD MD

- Video for introduction of SIMARD
Evaluation of Drivers Who Got An Indeterminate Score from SIMARD MD

- Further driving evaluation
  - DriveABLE™ Assessment Tool (Source: http://www.driveable.com)
    - Motor speed/control
    - Attentional field
    - Spatial judgment
    - Decision making
    - Speed of attentional shifting
    - Coordination
    - Identifying driving situations
Provision of support for medically impaired drivers

- Improve the availability of alternate transportation service for seniors
- Provide guidance of alternative transportation to medically impaired drivers and their families.

Source: [http://www.mard.ualberta.ca/db/](http://www.mard.ualberta.ca/db/)
Other Related Research Topics

- Investigating the relationship between targeted illness and impairments in driving performance.

- Assessing availability of alternate transportation as a means of enhancing safety and mobility.
QUESTIONS?