On-Road Evaluation of Driver Capability: A Medical Record Review of the Adaptive Driving Program

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1. Introduction
Evaluating Driver Capability
Driving evaluators enumerate driving errors to gauge performance. Driver Rehabilitation Specialists test if medical issues are the cause.

Physician’s Perspective
- Mandatory Physician Report ing Laws place a strain on the physician-physician relationship
- Physicians often feel unprepared to address driving skills

Driver Rehabilitation Perspective
The variability of multiple factors often complicate evaluations
- Driving maneuver
- Posted traffic signals & signs
- Presence of other road users
- Road obstacles
- Road quality

2. Key Objectives
Assess driver capability based on record of assisted-driving events during on-road evaluation, which indicate problems with:
A. Independent Vehicle Operation, and
B. Safe Driving Decisions.

Analyze results of the enumerated driving errors list to show:
1. Tally & Criticality of various driving errors
2. Limit of assisted-driving events to assess driver capability deficits

3. Chart Review

*Medical record review approved by University of Pittsburgh institutional review board.

Inclusion of Medical Records
All clients who completed intake for the Adaptive Driving Program beginning in 2009. Tracked all records until cases were finalized.

Digitization Protocol
Recorded all chart entries in raw form. No personal identifiers were collected. Data entry performed by a single coder.

Content Analysis
Created enumerated list of all driving errors. Flagged all assisted-driving events as: *implied – stated assistance or cues in report
Potential – possible assistance in the absence of explicit statement of occurrence
Secondary analysis compared implied vs. potential errors to the outcome of on-road evaluation (“did pass” or “did not pass”).

4. Study Results

Client Demographics
The Adaptive Driving Program included medical-impaired drivers across the age span:
- Cognitive
- Spinal Cord Injury
- Brain Injury
- Multiple Sclerosis
- Stroke
- Amputee
- Represented Disabilities
- Baseline Outcomes
- Case Conclusions

Enumerated List of Driving Errors
Assisted-driving events were documented in:
- 14% of the 58 cases where clients did pass on-road evaluation
- 18 of 20 cases where clients did not pass on-road evaluation

The outcome of “did not pass” related to a recommendation for training or failure

A. Driving Assistance
- A-Steering & Braking Assistance
- B-Verbal Cues Assistance

Figure 1A&B: A-Independent Vehicle Operation, B-Safe Driving Decisions
Driving errors were grouped by environment (Road Crossing vs. Road Segment) and maneuver (Tracking, Merge, Lane Change, Turn, Intersection).

Table 1. Sample Enumerated List of Road Segment Errors

Criticality of Assistance Related to Outcomes
Assisted-driving events were documented in:
- 14% of the 58 cases where clients did pass on-road evaluation
- 18 of 20 cases where clients did not pass on-road evaluation

The outcome of “did not pass” related to a recommendation for training or failure

5. Discussion
Limitations
Few implied events of assistance related to road crossings. Uncertain whether findings indicate:
- Documentation accuracy declines at road crossings, or driving errors over road segments are more significant.

Criticality vs. Frequency
Given the low rate of documented assisted-driving events, potential assistance could possibly take place with 60-80% of driving errors
- Assisted-driving events have specificity of 93.3%
- Explicit mention of assistance related to very few of the total enumerated list of driving errors

The mapping of assisted-driving events to outcomes of on-road evaluation supports automated documentation of the critical events as proposed in the NAV/Section methodology (Beyene et al, 2011)

Relation to Past Studies
Most errors needing assistance occurred with tracking/lane keeping. This finding supports prior studies linking seniors to errors with remaining “centered” in a lane.
1. On-the-road evaluation (Hoggarth et al, 2011)
2. Driving simulation (Longhitano, 2012)

Key Implications:
- Criticality of assisted-driving events during on-road evaluation (occurred with 90% of clients who did not pass) supports the use of in-vehicle technology to detect & document steering, braking, and verbal cue assistance
- Increased use of evidence to complement client counseling and education may promote greater harmony among health care/driving rehabilitation professionals and current or potential drivers.

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