Using serial trichotomization with common cognitive tests to screen for fitness to drive - AJOT 3/20/17
First of all I had to look up...

- Trichotomization - division into three parts, elements, or classes
Ability to drive...

- Associated with independence and mobility
- Aging, neurological and medical conditions have been linked to impaired driver safety.
- Need for a balance between public safety & privilege to drive
- Licenses should not be repealed on basis of age or medical conditions alone.
- Consequences of unfit drivers are evident but there are also costs of driving cessation as well.
But it would be safer and efficient if some of the decision making could be done with clinical tests.

Each individual test is not sufficient on its own.

Sensitivity and specificity need to be considered as well for tests and test batteries.
Recognizing concerns with…

- Cut points for paper and pencil tests it has been suggested that clinicians use serial trichotomizations to evaluate fitness to drive.
- As an example, beginning with Trails B test, the clinician should rate the patient with a “Pass”, “Fail” or “Indeterminate” rating. Then onto test two Clock Drawing Test with the same ratings. At the end of the battery of tests, the patient has been funneled either into one of the above categories with the Indeterminate remainders needing additional comprehensive evaluations conducted by a clinician with specialized training.
The hope would be...

- Using upper and lower cut points you could get 100% sensitivity and 100% specificity for five tests of cognition that are commonly used to assess fitness to drive.
Cross sectional research design to analyze the in-clinic assessments and driving tests of people referred to the Driver Assessment Program (DAP) at St. Joseph’s Care Group in Thunder Bay, Ontario Canada
Methods - Participants

- Heterogeneous group but representative of those assessed at DAP
Methods - Measures

- Administered by the OT with DAP
- Included tests of vision, physical strength, coordination and cognition as well as an on-road test.
- Cognitive tests included the Clock Drawing Test, Montreal Cognitive Assessment (MoCA), Motor Free Visual Perception Test (MVPT) and both parts of the Trail Making Test
Clock Drawing Test

- Has been found to have high mean sensitivity and specificity (85% for both) in identifying cognitive impairment in older adults
Montreal Cognitive Assessment

- 10 minute completion time
- Scoring range between 0-30 with scores less than or equal to 25 indicating impairment.
- This cut point was found to have a sensitivity of 84.5% and specificity of 50% in predicting the outcome of an on-road evaluation.
MVPT – 3

- Developed to measure various aspects of visual perceptual skills.
- Raw scores from 0-65. Higher scores indicating fewer deficits.
- Scores of less than 32 (cut point) was able to attain a (low) sensitivity of 60% and specificity of 80%.
Trail Making A & B

- Measures visual motor tracking, divided attention and executive function.
- A score of 106.7 seconds on Trail B was an ideal cut point but 180 seconds is the most supported cut point to identify unfit drivers.
On Road Tests

- Administered by an OT with specialized training and a professional driving evaluator from the Ministry of Transportation of Ontario approved driving school.
- On road evaluators were blinded to the results of the clinical evaluations.
- 45 minute test on a standardized route with a dual brake car with typical driving challenges.
Procedures

- Once both the clinical and on road evaluations were completed a consensus opinion was used for 1) ceasing driving, 2) further training or 3) successful.
- The participant in the further training group could have a second on road evaluation that would be counted for data.
Data Analysis

- Data entered and Receiver Operating Characteristic Curves (ROC) and Area Under the Curve (AUC).
- From this data upper and lower cut points were selected that achieved 100% sensitivity and specificity in predicting on-road driving test.
- Participant test scores were then categorized into Pass (better than 100% sensitivity), Fail (worse than 100% specificity) and Indeterminate (gray area). These (indeterminate) scores were further funneled into the next cognitive test of those remaining (with the smallest gray area) until no further tests remained.
Results

- 83 participants (mean age 60.78 years) 62 men and 21 women with diagnoses of CVA, TBI, Cognitive deficits, amputation, spinal injury, MS. All completed both clinical and on-road

- 20 were successful on road, 17 unsuccessful and 46 needed further training, second on road test was done with a total of 55 drivers as rated fit to drive.
Results, Discussion, Limitations, Future Research

- Using the trichotomization process the authors were able to predict the outcome of the on-road tests for 65 of the 83 participants.
- The authors concluded, no single test can be used to determine fitness to drive and can result in misclassification of drivers.
- Sample size was small and representative only of the author’s region.
- Cognitive tests were given by the same OT who gave the on-road tests but a consensus opinion was made between the OT and the driving evaluator.

- Canadian Driving Research Initiative for Vehicular Safety in the Elderly (Candrive) is a 6 year longitudinal study that is developing an in office risk stratification tool based on paper and pencil tests to help identify unfit drivers or those needing further assessment.