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Pilot Study of Driving Safety Counseling at the Memory Aging and Resiliency Clinic (MARC)

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June 2018

UNIVERSITY
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TREDS
TRAINING, RESEARCH AND EDUCATION
FOR DRIVING SAFETY

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16. Abstract
The UC San Diego Training Research and Education for Driving Safety (TREDs) program worked with the Memory Aging and Resiliency Clinic (MARC) at the UC San Diego (UCSD) Department of Psychiatry to assess the feasibility, acceptability and efficacy of driving safety counseling for patients with memory concerns. Patients who presented for care to the MARC were given a battery of cognitive testing, for the purposes of assessing and diagnosing their memory issues, and this project supported additional testing during these visits, including vision and frailty testing as well as testing using a driving simulator where participant permission and time permitted. Counseling was provided to the patients at the MARC clinic exit interview, including cognitive diagnosis. A post recommendation assessment was provided to the patient or family within 1-2 months via phone. In total, 25 clients were seen: 6 were advised to stop driving, 2 to limit their driving; the others were given advice on how to continue to driver safety. The pilot informed the generation of protocols on driving screening for other geriatric clinics, and these protocols have been posted at the TREDS website treds.ucsd.edu. The feasibility and acceptability of driving safety counseling has not been well studied to date in memory clinics, and this report provides guidance for implementing similar programs across the state.

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Pilot Study of Driving Safety Counseling at the Memory Aging and Resiliency Clinic (MARC)

UNIVERSITY OF CALIFORNIA INSTITUTE OF TRANSPORTATION STUDIES

June 2018

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Executive Summary

The aging of the American population presents many public health challenges. While age alone does not necessitate disease and infirmity, many older adults begin to experience declines in health and functional ability as they age. These infirmities can also influence driving abilities, especially cognitive declines. However, most health care providers are generally ill-equipped to screen and counsel potentially impaired older adults.

The UC San Diego Training Research and Education for Driving Safety (TREDs) program worked with the Memory Aging and Resiliency Clinic (MARC) at the UC San Diego (UCSD) Department of Psychiatry to assess the feasibility, acceptability and efficacy of driving safety counseling for patients with memory concerns. Patients who presented for care to the MARC were given a battery of cognitive testing, for the purposes of assessing and diagnosing their memory issues. Additional testing was done during these visits to enhance the ability of TREDS and MARC staff to provide driving counseling, including vision and frailty testing. Patients were given additional testing in a driving simulator where participant permission and time permitted. Counseling was provided to the patients at the MARC clinic exit interview, including cognitive diagnosis. Based on recommendations by the National Highway Traffic Safety Administration, counseling was provided by TREDS staff in conjunction with the MARC staff. These driving recommendations included a summary of the assessment and advice on continuation of current driving status vs. cessation. A post recommendation assessment was provided to the patient or family within 1-2 months via phone.

In total, 25 clients were seen: 6 were advised to stop driving, 2 to limit their driving; the others were given advice on how to continue to driver safety. The advice was generally well received, and participants reported that having family members present to hear the recommendations was helpful. The driving recommendations, which included advice to stop driving (either permanently or until more testing), limit driving, or continue driving, was generally being followed, as reported by participants and their families on one month follow up calls. Though the simulator was used for only 8 individuals, there was overall congruence between the simulator and the other testing, especially the cognitive testing. The simulator was helpful in counseling those individuals advised to stop driving, giving concrete examples which could be used to aid in their understanding of their limitations. The pilot informed the generation of protocols on driving screening for other geriatric clinics, and these protocols have been posted at the TREDS website treds.ucsd.edu. The feasibility and acceptability of driving safety counseling, by both patients and staff, has not been well studied to date in memory clinics, and this report provides guidance for implementing similar programs across the state.

Background

Older adults who are 65 and older are the fastest growing population group in the United States. Their numbers are expected to reach 83.7 million by 2050, nearly double the estimate for this same group in 2012 (Ortman, Velkoff, & Hogan, 2014). It is estimated that two out of every three older adults live with multiple chronic conditions, their treatment accounting for 66% of the United States' healthcare budget (Centers for Disease Control and Prevention, 2013). Approximately 2.2 million adults over 80 have permanent visual impairment (Congdon et al., 2004), 50% of adults over 75 have disabling hearing loss (National Institute on Deafness and Other Communication Disorders, 2015), and 34.5% of adults over 85 have clinically diagnosed dementia (Lindsay, Sykes, McDowell, Verreault, & Laurin, 2004). In addition to declines in function, medication usage and frailty also increase with age.

Driving is an important, and often primary, means of transportation for older adults, helping to maintain mobility and independence. In 2014, there were 24.4 million licensed drivers in the United States age 70 and older, comprising 11% of all drivers (Federal Highway Administration, 2015). This number is expected to grow rapidly over the next four decades. Age alone does not necessarily increase driving safety risk for older drivers, however, declines in function and other age-related changes in health and cognition contribute to changes in driving ability and can result in age-related driving disorders (ARDD), such as neuropathy contributing to pedal misapplication, cognitive impairment and associated lapses in judgment (left turn errors, for example (Baird et al., 2010). In 2013, there were 5,671 motor vehicle fatalities and 222,000 injuries in the United States among adults 65 and older (National Highway Traffic Safety Administration, 2015). This population group was second only to young adults age 25-34 in which there were 5,738 motor vehicle fatalities and 440,000 injuries (Ibid). Drivers over age 70 are at significantly greater risk of causing fatal crashes that kill themselves compared to younger drivers who are at greater risk of causing fatal crashes that kill others (Tefft, 2008). Older drivers and their elderly passengers are at a higher risk of disabling or life-threatening injury when compared to younger drivers and passengers in auto accidents of similar force, due to reduced muscle mass, osteoporosis, and underlying health problems.

Cognitive impairment, including dementia and other cognitive decline resulting from neurodegenerative conditions, is a growing driving safety concern. Dementia has multiple etiologies and each type presents different clinical expressions. Alzheimer's disease is one of the leading causes of dementia and death among older adults (Centers for Disease Control and Prevention, 2013; National Institutue on Aging, 2015a) and in 2010 it was estimated that 4.7 million older adults have dementia due to Alzheimer's disease (Hebert, Weuve, Scherr, & Evans, 2013). Older adults with cognitive impairment perform worse in assessments of instrumental activities of daily living (IADLs) than cognitively-normal adults (Bangen et al., 2010). There is a growing body of research detailing the effect of cognitive impairment on motor vehicle crash risk. One landmark study found that drivers with dementia had a 2.5 times higher rate of motor

vehicle crashes than expected in the general driving population and were more often found at-fault for these crashes (Cooper, Tallman, Tuokko, & Beattie, 1993). A later study found that the odds of a crash were 10.7 times greater for drivers with dementia compared to cognitively-healthy drivers (Zuin, Ortiz, Boromei, & Lopez, 2002).

Driving is a major element of older adult mobility and independence. It is important to support driving continuity in older adults for as long as safely possible and not disqualify individuals from driving due to age alone or early cognitive decline. There is some research that suggests that older adults with mild cognitive impairment, including early-stage dementia, remain fit to drive (Frittelli et al., 2009; Lincoln, Radford, Lee, & Reay, 2006; Uc, Rizzo, Anderson, Shi, & Dawson, 2004; Wadley et al., 2009). Even healthy older adults with no cognitive impairment that failed a research-based on-road assessment were not found to be involved in subsequent motor vehicle crashes or traffic citations (Hoggarth, Innes, Dalrymple-Alford, & Jones, 2013). As dementia progresses and driving ability declines, however, affected individuals lose their ability to recognize their own impairment and will continue to drive even through it is unsafe (Carr, Schwartzberg, Manning, & Sempek, 2010). The major public health challenge of the next few decades will be to promote older adult mobility and independence while simultaneously addressing impairments that compromise roadway safety for older drivers and others sharing the roadway.

In addition to cognitive function, the physical limitations associated with frailty and changes in vision have been studied. Decreased range of motion has been shown in two studies to interfere with changing lanes and making left turns (Preusser, 1998). It has been more difficult to demonstrate a direct correlation between crashes and visual acuity or visual fields. Some studies indicate that crashes are highly correlated with useful field of view (UFOV) r=.36,(Shinar 1991), however a recent Cochrane review stated that "No prospective study has demonstrated correlation between vision test use and crashes" (Subzwari).

To provide direction for physicians in this area, the American Medical Association (AMA) and the American Occupational Therapy Association (AOTA) organized a task force in 2003 to develop guidelines for ARDD screening and intervention for health care providers. The second edition of the guidelines was released in 2010. In 2016, the American Geriatric Society came out with the third edition. The group recommended that ARDD screening include nine exam tasks, addressing vision, frailty and cognitive function. These recommendations were geared for the general primary care physician, not for memory specialists, where a 'cognitive diagnosis' is made with more extensive testing. The vision and frailty testing include tests for visual acuity, visual fields, rapid pace walk, get up and go, and range of motion.

Preliminary Studies

TREDS has been working for 15 years to improve driving safety, with several studies focusing on the older driver. Health professional training and the development of screening and counseling protocols has been an important component of this work, as well as conducting research on the contributors to driving crashes in older adults. This work has been crucial in the development and implementation of the study described in this report.

Health Professional Training on Older Drivers

TREDS has been training health professionals for nearly 15 years on issues related to medical conditions and driving, with an emphasis on the older driver. As the elderly population increases in proportion with respect to the rest of society, age-related driving impairments are increasing in importance as a public health concern. In this context, health professionals play an important role in identifying impaired drivers. This situation is complicated for two reasons: discussion of driving cessation is a sensitive topic for both health professionals and the elderly, and physicians have limited familiarity with the current National Highway Traffic Safety Administration (NHTSA) screening guidelines or mandated reporting laws. TREDS first developed curriculum for health professionals in 2004, and has modified and enhanced the training tools since. The training curriculum is divided into four sections: introduction and background; screening and interpretation; managing outcomes and reporting; and referrals and resources. Videos address broaching the topic with patients and counseling on driving cessation. Pocket guides provide easy to access screening criteria, and recommendations for limiting medications that interfere with driving. The curriculum was delivered by physicians with the support of public health-trained program staff. Evaluation of the curriculum was performed in 2011, using data from 47 trainings delivered to 1,202 health professionals. The majority of trainings were seminars or lectures lasting 1 hour; all were conducted in southern California. Pre- and post-testing was completed with 641 of the participants; the majority were physicians. Post-training, participants' confidence in ability to screen increased to 72% and intent to screen increased to 55%. In addition, 92% stated they had developed a better understanding of California's mandated reporting laws, and 92% said they had developed a better understanding of the medical conditions and medications that may impair older adults' ability to drive safely. Furthermore, 91% said mandated-reporting laws helped protect the safety of patients and others, and 59% said it was easier to discuss and justify driving cessation with patients. Ongoing feedback has been positive, including beneficial longer-term effects of the training on driving safety counseling.

LongROAD: Prospective Study of Older Driver

TREDS is a participant in the five-city prospective study of 3,000 older adult drivers. Sites include San Diego, Ann Arbor, Denver, Cooperstown and Baltimore. This study has recruited adults 65-79 years old, obtaining baseline data on medical conditions, medications and health

care utilization, with measures of mental health, physical fitness, cognitive function, gait, balance, vision, and car (type, technology, condition). Driving and crash records are being obtained, and driving patterns are being collected from a GPS-accelerometer device placed in the car. Women comprise 52% of the sample, with 85% White, 6.9% Black, 2.2% Asian, 2.9% Hispanic and 2.5% Other. Baseline data collection has been completed as of March, 2017. Analysis is in progress. This study will provide important assessments of the relationship between multiple risk factors and driving outcomes, including self-regulation, cessation, crashes, injuries, fatalities.

Depression and Antidepressants and Driving

TREDS conducted a meta-analysis of anti-depressants and depressants on driving outcomes. The purpose of this study was to review the reported associations of depression and antidepressants with motor vehicle crashes. Nineteen epidemiological studies (17 case-control and 2 cohort studies) fulfilled the inclusion criteria by estimating the crash risk associated with depression and/or psychotropic medications in naturalistic settings. The estimates of the odds ratio (OR) of crash involvement associated with depression ranged from 1.78 to 3.99. All classes of antidepressants were reported to have side effects with the potential to affect driving safety. The majority of studies of the effects of antidepressants on driving reported an elevated crash risk, with ORs ranged from 1.19 to 2.03 for all crashes, and 3.19 for fatal crashes. In meta-analysis, depression was associated with approximately 2-fold increased crash risk (summary OR=1.90; 95% CI, 1.06 to 3.39), and antidepressants were associated with approximately 40% increased crash risk (summary OR=1.40; 95%CI, 1.18 to 1.66). The main challenge to understanding the effects on driving was the lack of inclusion of depression control in the studies of antidepressants, and the lack of inclusion of anti-depressants in the studies of depression. Prospective trials assessing both at baseline may shed light on these relationships.

Associations Between Health and Driving in an Older Adult Cohort in Rancho Bernardo

The purpose of this study was to identify the associations between health and health care utilization with driving patterns in a cohort of older adults. This study used data from the Rancho Bernardo cohort, a group of adults followed for 40 years by UCSD epidemiologists. In 2012, a total of 1,826 surviving participants in the Rancho Bernardo cohort were sent a health and driving pattern survey; 1,277 were returned. The majority of the respondents (1,151, 91%) were still driving. Older age, female sex, hospitalizations, emergency department (ED) visits and physical therapy visits, neurological disease, depression, limited vision, and limited hearing were associated with non-driving status. A total of 809 (71%) of drivers reported no citations or crashes in the last 5 years. The vast majority of older drivers in this cohort continued to drive, and did so safely. Health care utilization, medications, medical conditions, and self-assessment of health were associated with non-driving status. Prospective studies are needed to clarify the temporal relationships between these factors.

Screening for Age Related Driving Disorders

The purpose of this study was to: (1) evaluate the feasibility and acceptability of screening inpatients and outpatients over the age of 60 for age related driving disorders, (2) determine the patient characteristics associated with screening outcomes, (3) evaluate the acceptance of the screening exam and screening recommendations among older adults, and (4) determine outcomes of participants reported to the Department of Motor Vehicles (DMV).

A convenience sample of 837 participants completed age related driving disorders screening at UCSD inpatient and outpatient settings. Eligibility criteria included California-licensed drivers over the age of 60 who were English or Spanish speaking. Baseline screening included driving habits, restrictions, history of crashes, and medical history, including medications. Screening included three strength frailty tests, two vision tests (acuity and fields), and two cognitive tests. The average age of participants was 72; 59% were male and 95% English-speaking. Sixteen percent of older adults failed at least one aspect of screening and were labeled 'high risk' for age related driving disorders. In multivariate analysis, significant predictors of high-risk status were age, male sex, self-restrictions of driving, and the use of larger amounts of prescription drugs. Screening took approximately 15 minutes and participant satisfaction was high. The DMV effectively evaluated the participants who were reported; this group was more likely to have their license suspended, be issued citations or be involved with motor vehicle crashes than paired passing participants.

This brief screening evaluation identified one in six adults to be 'high-risk' for age related driving disorders. Screening was effective in both outpatient and inpatient settings, was well received and simple to administer.

Methods

Development of Protocols

TREDS worked with MARC staff to develop the goals of the project, the appropriate screening tests, and the protocols. Modifications were made as needed.

1) The Goals of driving safety program were defined as follows:
   a. Assess feasibility of adding driving safety to MARC services
   b. Assess acceptability by clients
   c. Assess implementation of recommendations by clients

2) Identification of screening tests. Tests were chosen based on recommendations by NHTSA/AGS 2016 (see refs)
   a) Cognitive: done by MARC
   b) Visual Screening

     Visual Acuity

     Visual Fields

     Contrast Sensitivity

   c) Frailty:

     Rapid Pace Walk

     Get up and Go

     Grip Strength

     Range of Motion

   d) Simulator

3) Client Eligibility
   a. MARC patients are still driving and wish to continue, and are willing to including driving screening and counseling in their MARC services
4) Protocols for screening are included as Appendix A
5) Protocols for counseling are included as Appendix B, with the algorithms listed below
6) Protocols for follow up phone calls are included as Appendix C.
7) Protocols for referrals to outside agencies are included as Appendix D.

Based on these goals protocols, TREDS Director Linda Hill spoke with the Institutional Review Board at UCSD on the best way to approach the program. After review of the protocols, and with the knowledge that the American Geriatric Society has recommended routine screening, the IRB decided to consider this program as 'program implementation and evaluation', and did not want clients consented for a research study.

Algorithms for Counseling Based on Testing

The possible outcomes from screening for vision, cognitive function and frailty are listed below, with guidance for counseling based on outcomes.

Figure 1. Potential Outcomes of Screening for Conditions Affecting Driving

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                              │  Assessment  │
                              └──────┬───────┘
         ┌───────────────────────────┼───────────────────────────┐
   ┌───────────┐               ┌───────────┐               ┌───────────┐
   │ Cognitive │               │  Vision   │               │  Frailty  │
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   ┌─────┼─────┐            ┌─────────┴─────┐            ┌─────────┴─────┐
┌────────┐┌──────┐┌──────────┐┌────────┐┌──────────┐┌────────┐┌──────────┐
│ Normal ││ MCI  ││ Dementia ││ Normal ││ Abnormal ││ Normal ││ Abnormal │
└────────┘└──────┘└──────────┘└────────┘└──────────┘└────────┘└──────────┘
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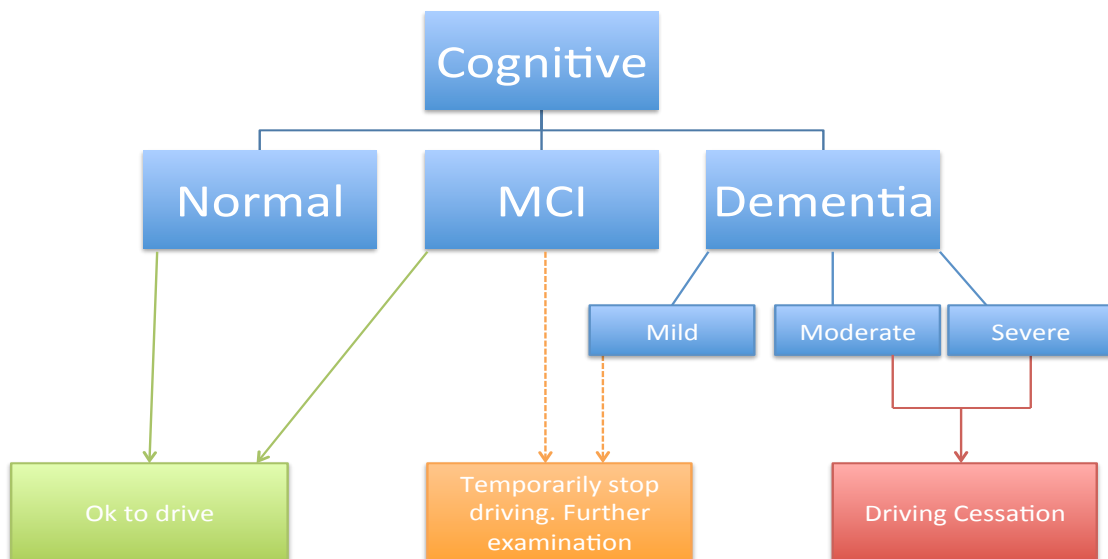| Ok to drive | Temporarily stop driving. Further examination | Driving Cessation |
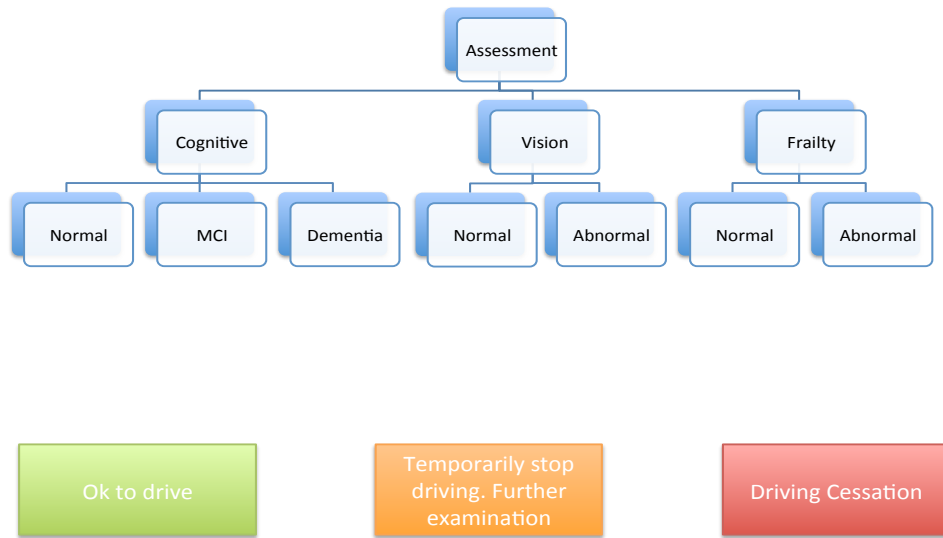
A) Cognitive Function

Cognitive screening is done by MARC as part of their services, and their summary given to the driving counselor prior to feedback.

1. If the patient passes cognitive tests, and other tests (see below) then ok to drive:

   - Share preventive measures: blood pressure control, diabetes management, alcohol moderation, exercise routine.
   - Share how to prevent frailty: exercise, physical therapy, strengthening and aerobic exercises

2. If the patient has mild cognitive impairment (MCI) and received a good/passing score on simulator, and other tests (see below) then ok to drive.

   - See preventative measures above #1

3. If patient has MCI and received a bad/failing score on simulator, then advise to temporarily stop driving.
   - Further examination needed.
   - Refer patient to occupational therapy driving specialist (OTDS) for on the road testing
   - Only Sharp, Scripps, or Tricare has OTDS evaluation , not UCSD

4. If patient has mild dementia, but received a good/passing score on simulator, and wants to drive, then advise to temporarily stop driving.
   - See #3 for protocol.

5. If patient has moderate or severe dementia, then advise to stop driving.
   - MARC staff will report to DMV if the diagnosis of dementia is make OR if the patient reports a 'loss of consciousness' due to medical conditions
   - Discuss with patient, family, and caregiver.
   - Discuss alternative transportation options.
   - Share information regarding driving retirement and cost ($8,500/year). Cost of driving consists of insurance, depreciation, maintenance, and gas.

Figure 2. Potential Outcomes from Screening for Cognitive Ability

B). Vision Screening

1. If patient passes vision tests then ok to drive, if other testing passed.
2. If patient fails vision test, then advise to temporarily stop driving.
   - Failed vision score is < 20/70
   - Failed visual fields
   - Refer patient to see ophthalmologist for further examination
   - Have patient follow up with their ophthalmologist or primary care physician after evaluation.
   - Give them the option of seeing at OTDS once that work up is done, if they are someone who wants to continue driving

Figure 3. Potential Outcomes from Screening for Visual Conditions
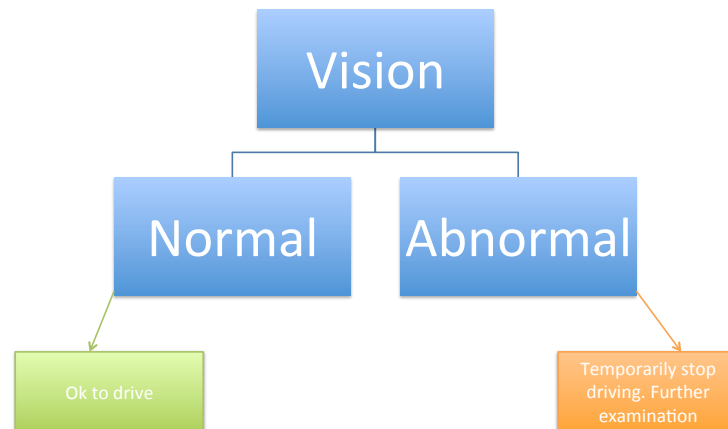
C). Frailty screening

Patient can score 0, -1, -2, -3, -4

Tests: Rapid pace walk, Get up and go, Range of motion, Grip Strength

1. If patient failed 0 or 1 test, then ok to drive, if other tests passed.
2. If patient failed 2 or more tests, then advise to temporarily stop driving.
- Refer patient to their primary care physician.
- If the primary care physician feels that there is a reversible component, they have options like PT, exercise classes
- OTDS might help to decide if driving is safe

Figure 4. Potential Outcomes from Screening for Frailty
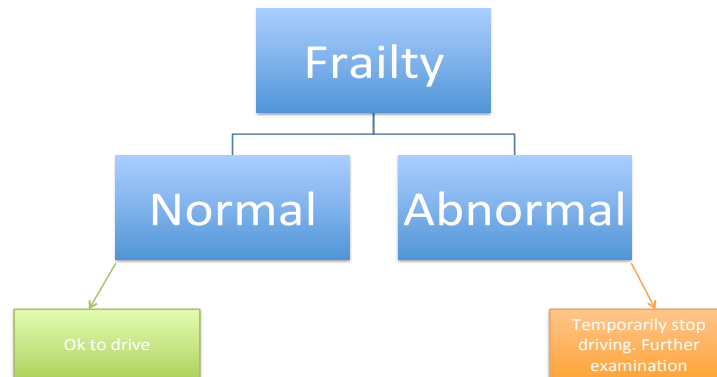
Results

Feedback from MARC

The MARC staff provided feedback on the program. Prior to the study, the staff had found it challenging to give news about driving status/decision to patients. Staff thought it was extremely helpful to have these objective results for driving decisions. Vision and physical strength tests were evidence to back up driving decision. Staff thought many of the patients were receptive to the explanations of the tests. Lastly, the driving assessment portion made the driving decision less judgmental, had testing results and simulator to back up driving decision.

Participant results

Table 1. Results of screening tests and recommendations

MEASURE	RESULT	NUMBER OF PATIENTS RECOMMENDED TO CONTINUE DRIVING	NUMBER OF PATIENTS RECOMMENDED TO STOP DRIVING OR RESTRICT DRIVING
Visual acuity	Pass ≤20/40: 20	14	6
	Fail: 3	1	2
Visual fields	Pass: 24	16	8
	Fail:1		1
Contrast sensitivity	Pass: 0		
	Intermediate: 23	16	7
	Fail:2		2
Frailty	Pass:18	16	2
	Fail one or more: 7		7
Simulator	Pass: 4	4	
	Fail: 5		5
Cognitive	Normal: 13	13	1
	Mild (MCI): 9	4	5
	Moderate-severe: 3		3

Conclusions

This pilot demonstrated that patients presenting for care to memory clinic have a high prevalence of conditions known to interfere with driving safety, including visual, cognitive and physical impairments. Nine of the 25 participants were told to stop or restrict driving based on testing. Twenty-three participants were tested for visual acuity; three failed and two of those three were in the group told to stop driving. All participants had reduced contrast sensitivity, resulting in restrictions in driving at dusk or at night; two were severe, and both were in the group told not to drive. Seven of the 25 failed frailty testing; all seven were in the group told not to driver. Twelve had mild- severe cognitive diagnoses. Of those 12, eight were in the group told not to drive; the other four all had mild impairment.

There were three major lessons from this study: 1) Of the nine subjects took the simulator; all five who failed were in the group told not to drive; 2) The most predictable indicators of being unable to drive were simulator performance, frailty assessment and the cognitive testing; and 3) The incorporation of driving testing and advice into the MARC clinic was well received by faculty, staff and clients overall.

We recommend institutionalizing this assessment in MARC and similar geriatric clinics, with the use of a trained and dedicated staff person. Ideally, simulator testing would be conducted, as the simulator was highly associated with advice to not drive.

The protocols for implementation of this program at other geriatric clinics around the state will be posted at treds.ucsd.edu.

TREDS provides training for physicians and medical groups across the state to implement driving safety screening and counseling, and trainings can be coordinated by reaching out to staff at the TREDS website.

Further studies are being conducted by TREDS through the AAA LongROAD study to improve the specificity of the prediction of motor vehicle crashes based on in-office testing.

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Appendix A: Protocols for screening

Visual Screening

      Visual Acuity

      Visual Fields

      Contrast Sensitivity

Frailty:

      Rapid Pace Walk

      Get up and Go

      Grip Strength

Simulator

Visual Acuity
Tumbling E Chart

Objective: To measure the participant's far visual acuity.

Materials: Tumbling E Chart, eye occluder, tape, tape measure.

Background info: This test assesses distance visual acuity. Patient's vision will be measured each eye separately then both eyes together. Use prescription glasses and contact lenses if necessary. Stand to the side of the chart.

Instructions: Place a piece of tape 10 feet from the chart. Chart should be at eye level.

Script: "Now we're going to do a vision test.

It is called the 'Tumbling E Chart.' I want you to tell me which direction the prongs of the "E" are facing. You can say 'Up, Down, Left, Right.' You can also use your finger to point in the direction as you speak.

Please stand behind this line.
You may use your distance glasses for this activity."

Give patient the eye occluder.

Script: (Test left eye first)
"Please cover your right eye. We will be testing your left eye first.
Please start at the top, reading from left to right, and work your way down the chart."

Script: (test right eye)
"Now we are going to switch and test the right eye. Please cover your left eye. Please start at the top, reading from left to right, and work your way down the chart."

Script: (test both eyes)
"Now we are going to test eyes. No need for the eye occluder.
Please start at the top, reading from left to right, and work your way down the chart."

Patient: _____   Date: _____

Scoring: The level of visual acuity achieved in this test will be determined by the last line of the cart wherein the patient identified majority (>50%) of the symbols correctly.

Left Eye	Right Eye	Both Eyes
20/	20/	20/

Please indicate whether any of the following apply:

☐ Patient could not read the first line
    ☐ Left Eye
    ☐ Right Eye
    ☐ Both Eyes
☐ Left eye could not be tested. Specify reason _____
☐ Right eye could not be tested. Specify reason _____

Visual Fields

Materials: None

Background info: This test will assess peripheral vision. Visual field testing is performed one eye at a time, with the opposite eye completely covered. In all testing, patient must look straight ahead (at provider's nose) at all times. The provider will present stationary or moving targets in patient's side vision. While maintaining a straight-ahead gaze, patient will tell the provider

know if he/she can see the target in the peripheral vision. In most cases, provider will use fingers as targets.

Script: "The next vision activity is called 'Visual Fields' and it will assess your peripheral vision.

We will test both eyes separately. We will test your left eye first, so please use your right hand to completely cover your right eye. I want you to maintain your gaze at my nose at all times."

Provider will cover left eye with left hand (mirror patient) and use right hand as "target." Place right hand with index finger pointed-out, directly between self and patient at eye-level.

Script: "I want you to tell me if you see my finger and also tell me when my finger is moving."

Provider will repeat activity. 1 ft. to the right, up, and below.
Perform same activity, testing opposite eye.

Script: "Now, we will test your right eye, so please use your left hand to completely cover your left eye. I want you to maintain your gaze at my nose at all times."

Emphasize: maintain straight ahead gaze at provider's nose.

Scoring

PASS/FAIL

Contrast Sensitivity
Pelli-Robson

Objective: To measure the participant's contrast sensitivity.

Materials: Pelli-Robson Chart, eye occluder, tape, score sheet.

Background info: The patient will be standing, or seated if necessary, 40 inches in front of the chart. Test each eye separately, then both eyes together. Patient should use prescription glasses and contact lenses if necessary. Stand near the chart while providing instructions. Point to letters as you explain. If the patient begins to struggle, you may point to an area on the chart and provide tips to continue. Do not touch the chart while doing so. Should be tested 3 times total (separate then together).

Script: "The final vision test is the Pelli-Robson test. Contrast sensitivity is a more realistic assessment of how well we see large faint objects all around us. This chart is a little different from most eye charts. All letters are the same size. On the top, letters are bold and black, and begin to fade out towards the bottom of the chart. The letters on the bottom are gray and difficult to read, so do not be discouraged."

Give patient the eye occluder.

Script: "We will test the left eye first, so please cover your right eye. Try to read as many letters starting at the top, from left to right, then continue to the next line and so on."

If the patient begins to struggle, provide tips.
Script: "Try blinking or moving your head from side to side. You may be able to see the letter better. Do you see anything against the white background? Is it round? Does it have corners? Keep trying and guess."

Scoring: Must correctly identify 2/3 letters to receive that score. The score of (0-2.0) is a measure of the patient's log contrast sensitivity. A score of 2 means the patient was able to read at least 2 of the 3 letters with a contrast of 1% (contrast sensitivity= 100% of log 2). Pelli-Robson score of 2.0 means normal contrast sensitivity of 100%. Score between 1.0-1.5 means visual impairment.

Score less than 1.0 is considered a visual disability.

Rapid Pace Walk

Overview: Rapid Pace Walk is used to measure walking speed.

Materials: Tape, stopwatch
Tape measure at 10 ft. length on the floor. At both ends of the tape path, strips of tape should be placed perpendicular. Total length walked is 20 ft.

Background info: This test is used to measure walking speed.

Script: "We will move on to the physical portion of your assessment. I want you to walk along the side of this tape line to the end, turn around, and walk back here as quickly as you can."

Provider will demonstrate walking along one side of the tape and back.

Script: "I will time you. Please walk carefully & safely.
If you use a cane or walker, you may use it for this activity.
Please do not run or skip. Walk at a brisk pace, as if you're walking to pick up the phone.
Are you ready? Begin."

Notes: Timing starts when patient picks up first foot.
Stop timing when last foot reaches start/finish point.
If the patient runs, then stop and restart the test.

Get Up and Go

Objective: Get Up and Go is used to test mobility.

Materials: Tape, stable chair with straight-back

Background info: Have the patient sit comfortably in a stable, straight-backed chair. Ask him to stand up then walk along the 10 ft. length tape, turn around, walk back, and sit back down in the chair.

Script: "The next test is called 'Get Up and Go.' I will have you sit in this chair in a moment. I will tell you to stand up, and then I want you to walk down this tape path. Once you reach the end, turn around, walk back, and sit down in the chair."

Provider will demonstrate.

Scoring: Results will be based on clinical judgment.
Observe the patient's movements for any deviation from a confident, normal performance.
Patient with 3 or more is at risk of falling.
Use the following scale.
1 = Normal (no evidence of being at risk of falling)
2 = Very slightly abnormal
3 = Mildly abnormal
4 = Moderately abnormal
5 = Severely abnormal (appeared at risk of falling during the test)

Intermediate grades may reflect presence of any of the following as indicators of possibility of falling:
- Undue slowness
- Hesitancy
- Abnormal movements of trunk or upper limbs
- Staggering
- Stumbling

Some examples:
1. confident, steady, normal stride, sits down with control
2. may have trouble to get up, has to use arms, or may sit down with a 'flop'- not completely controlled
3. may take shorter steps than normal, may stagger with first step after standing
4. may stagger 1-2 times during the test and trouble to both get up and sit down
5. staggering throughout, couldn't get up from chair without help, needs spotting

Grip Strength

Objective: Grip Strength is used to measure upper body skeletal muscle function.

Materials: Grip strength dynamometer, stable chair

Background info: Test is widely used as a general indicator of frailty. Test may cause temporary discomfort, but there are no known risks for the user. If the participant reports current flare-up of pain in the wrist or hand, or has undergone surgery of the hand or wrist in the past 3 months, the affected side should not be tested.

Test the dominant hand twice. Clean dynamometer after use. Set the handgrip at position 2 and check that the arrow is set at zero.

Script: "For the final activity, I will record your grip strength. I'd like you to place your dominant arm on the table, as if you're arm wrestling."

Adjust if needed.

"Hold this tool and slowly squeeze as hard as you can.
Relax and let go. It feels like you're not doing anything, but it's actually recording your grip strength."

Take the tool and show patient the meter.

"We'll do this activity twice on your dominant hand. When I say 'Squeeze,' squeeze as hard as you can. Ready? Squeeze x3 now, stop."

Range

A grip strength of < 16 kg for men or < 14 kg for women may reflect decreased ability to manipulate the steering wheel[3].

Healthy Normative Range[4]

Right Hand   Left Hand

Men 30-40 kg   Men 25-35 kg

Women 19-25 kg   Women 17-21 kg

Patient: Date:

Screening questions

1. Has any pain or arthritis in your hands gotten worse recently?
　　　__ Yes __ No
　　　If yes, which hand?
　　　__ Right __ Left __ Both

- Do not test that hand.
- If both hands, do not test either hand.

2. Have you had surgery on your hand or wrists in the past 3 months?
　　　__ Yes __ No
　　　If yes, which hand?
　　　__ Right __ Left __ Both

- Do not test that hand.
- If both hands, do not test either hand.

3. Are you right or left-handed?
　　　__ Right __ Left __ Don't know (test right hand)

Scoring

	Right	Left	Result
Trial 1			
Trial 2			

If dominant hand was not tested, provide reason:

Simulator

Although the driving simulator is not a full representation of one's driving ability/skills, it does reflect strengths, weaknesses, and behaviors that translate in real life situations. The participant first engages in a 5-minute training course that allows him/her to adapt to the virtual program and gaming equipment such as the steering wheel, turn signals, and gas and brake pedals. The participant then partakes in a 20-minute challenge course that assesses various driving elements such as speeding incidents, lane change accuracy, and avoiding collisions with other vehicles and pedestrians. The instructor is able to observe participant's reaction time, physical and motor awareness, and ability to correct mistakes and avoid collisions and speeding incidents. The program also provides objective results of attention, performance, and mistakes.

Appendix B: Counseling

Driving Counseling Script

VISIT 1

1. Greetings and Introduction:
   Hello, I'm {name}; I am an assessment assistant working with the {name of clinic}.
2. Explanation of what tests will be done
   As part of your {name of clinic} evaluation, we will be checking your vision and doing some measures of your strength and balance, as well as having you do a 15-20 minute road course on a driving simulator, using a computer screen.
3. Explanation of when they will get the results and advice
   These tests will take about 30 minutes total. I will be seeing you in 1-2 weeks, when you come to the {name of clinic} for your final results. At that time, we will give you the results of your testing, explain what those results mean, and provide you some counseling regarding driving safety.
4. Start the testing.
   a. First we are going to check your vision.
   b. Next, we are going to test your walking abilities, ETC,
5. Finish
   Thanks the participant for the effort, and tell them you are looking forward to seeing them in 1-2 weeks.

VISIT 2- comes AFTER the {name of clinic} gives their advice.

1. Before this visit begins, review all three parameters. Get group consensus if necessary. Know whether ANY of the three domains will result in advice to stop driving, temporary or permanent.
2. Explain the results of the vision and frailty testing. Tell them 'I understand the {name of clinic} has just given you the results of your memory testing. I have been told they said XXXX. Given all of these results, we recommend the following:
A. YOU HAVE PASSED ALL THREE DOMAINS.
- The testing of your vision, strength and cognitive function did not reveal any conditions, which would make us, think that your driving is less safe than other persons your age. However, there are a number of things that you can do to stay driving longer:
   I. General driving safety
      a. Speeding, seat belts, drinking, and distraction (HANDOUTS?)
      b. Consider taking a driving skill class (REFERENCES)
   II. Stay healthy

    a. Share preventative measures: blood pressure control, diabetes management, alcohol moderation, and exercise routine.

    b. Share how to prevent frailty: exercise, physical therapy, strengthening and aerobic exercises

B. THERE WERE SOME CONCERNS WITH THE FOLLOWING TESTS, AND WE CAN'T TELL YOU TODAY THAT YOU ARE SAFE TO DRIVE UNTIL YOU RECEIVE MORE TESTING.
FIRST, ARE YOU INTERESTED IN CONTINUING TO DRIVE? IF YES:

    I.   cognitive impairment/mild dementia:

- Refer patient to occupational therapy driving specialist (OTDS) for on the road testing
- Only Sharp, Scripps, or Tricare has OTDS evaluation, not UCSD

    II.   Vision
- Refer patient to see ophthalmologist for further examination
- Have patient follow up with their ophthalmologist or primary care physician after evaluation.
- Give them the option of seeing at OTDS once that work up is done, if they are someone who wants to continue driving.

    III.   Frailty

- Refer patient to their primary care physician.
- If the primary care physician feels that there is a reversible component, they have options like PT, exercise classes
- OTDS might help to decide if driving is safe

C. THERE ARE SOME SERIOUS CONCERNS ABOUT YOUR ABILITY TO DRIVE BASED ON:
    a. DIAGNOSIS OF DEMENTIA
    b. VISION WORSE THAN 20/100
    c. OTHER OBVIOUS CONDITION THAT MAY HAVE COME UP?

(Tell patient how much we all care about safety, but our best advice given their assessment is that they retire from driving)

- {name of clinic} staff will report to DMV if the diagnosis of dementia is make OR if the patient reports a 'loss of consciousness' due to medical conditions
- Discuss with patient, family, and caregiver.
- Discuss alternative transportation options.
- Share information regarding driving retirement and cost ($8,500/year). Cost of driving consists of insurance, depreciation, maintenance, and gas.

Physician Referral

Sharp's Fax #:

Scripps's Fax #:

Tri-City's Fax #:

Patient Name: _____

Patient Phone: _____

Diagnosis: _____

Precautions: _____

Referral for: <u>Occupational Therapy Driving Specialist/ Driving Evaluation Program</u>

Physician Name (Please Print): _____

Signature: _____   Date: _____

Physician Phone: <u>858-534-8730</u>

Physician Fax:

Physician Address: <u>8950 Villa La Jolla Drive Suite C207</u>

<u>La Jolla, CA 92037</u>

Sample letter

DATE

Dear SHARP,

I am {name, etc.}. I would like to refer (PATIENT NAME) to Sharp Rehabilitation Services Driving Program. After a series of cognitive, visual and frailty assessments, we found areas of concerns in (DOMAIN OF CONCERN). A summary of test results is listed below.

1.   Montreal Cognitive Assessment (MOCA): (SCORE)
2.   Visual Acuity/Tumbling E: (SCORE)
3.   Visual Fields: PASS/FAIL
4.   Contrast Sensitivity: (SCORE)
5.   Rapid Pace Walk: (TIME)
6.   Get Up and Go: (SCORE)
7.   Functional Range of Motion: PASS/FAIL
8.   Grip Strength Test: (SCORE)
9.   Simulator: PASS/FAIL + SCORE

We advised the patient to temporarily stop driving to receive further examination. We believe the patient would benefit from the driver evaluation program at Sharp. If you have any questions or concerns, please contact the MARC Clinic.

Sincerely,