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Addressing the IADL of Driving

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ADDRESSING THE IADL OF DRIVING

by

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of the
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This Scholarly Project Paper, submitted by Brandon Yancey in partial fulfillment of the requirement for the degree of Master's of Occupational Therapy from the University of North Dakota, has been read by the faculty advisor under whom the work has been done and is hereby approved.

Jan Stube
Faculty Advisor
5/3/07
Date
PERMISSION

Title  ADDRESSING THE IADL OF DRIVING

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ABSTRACT

Driving is an integral part of daily life. Discontinuing driving due to decreasing function can have serious effects on a person’s life. Occupational therapists work to enhance or maintain a person’s independence when they are faced with illness, disease or natural declines associated with aging. Driving is listed as an Instrumental Activity of Daily Living (IADL) by the American Occupational Therapy Association (2002). Occupational therapists have special training and skills which assist them to understand the person from a holistic perspective. The decision to discontinue driving should be made after careful consideration of the many aspects of cognitive, visual-perceptual, and physical performance. Using evidence based assessments with proven validity is essential to assisting drivers and the interdisciplinary team to make this important decision.

Reviewing the current professional literature and research was a key element in accomplishing the goal of identifying an evidence based method of assessing driver related skills in the author’s current clinical setting. This literature review clearly identified the need for a battery of assessments to accomplish this task rather than relying upon any single tool. Ball (2006) states “…licensing decisions with far-reaching ramifications for personal autonomy should be based upon a preponderance of the evidence. Impaired performance on more than one measure affords… a greater degree of confidence that its recommendations are grounded in hard evidence (p. 82).”
The need to establish a method to perform driver skills evaluations based upon clinical evidence is growing rapidly as the aging population grows. Lee, Lee, and Cameron (2003) projected that the number of drivers over the age of 65 will increase from 13% in 1990 to 25% in the year 2020. This project was undertaken to produce an assessment battery capable of clearly identifying those individuals who present with skills sets insufficient to safely drive an automobile. The assessment battery produced is supported sufficiently by the evidence presented to accomplish this goal. Successful completion of the assessment battery however, is not able to clearly identify those who will be able to drive safely. This ability needs to be determined through performance of an on-road driving evaluation and successful completion of testing required by the local motor vehicle department.

The assessment battery developed in this project consists of four assessments:

- Assessment of Driver Related Skills (ADReS)
- Motor Free Visual Perception Test (MVPT)
- Dynavision Performance Assessment Battery (DPAB)
- Mini Mental State Examination (MMSE)

Each of these assessments is supported in the literature to be used as a valid measure of driver related skills. This battery of assessment is designed to be performed in the clinic in 2-1 hour sessions. The findings which result from performing this assessment battery can be used to direct occupational therapy aimed at remediation of skills to help patients regain or maintain their independence.
CHAPTER I
INTRODUCTION

Occupational therapy was founded on the idea of caring for people from a holistic perspective. Illness, disease, and life circumstances come in many forms and can affect a person’s physical, cognitive, emotional, perceptual, and social wellbeing. Often these same human senses and abilities are diminished by the aging process. The philosophy of occupational therapy fits well into the larger team of healthcare professionals and compliments the teams’ ability to meet the needs of the whole person. In recent years the need to address driving as an independent activity of daily living has been emphasized and is a growing concern as our population ages.

Lahaie (2007) reports that in 2005 just fewer than 47,000 people were killed in automobile accidents in the United States. This is roughly the same number of people that would be on 100 fully loaded jumbo jets. Ball et al. (2006) stated:

Older drivers are overly represented in crashes and fatalities per mile driven and are more likely to be injured or killed as a result of a collision than most other age groups...older people represent the most rapidly growing segment of the driving population in our society in total number of miles driven on the road and number of miles driven annually per driver. Thus dramatic increases in traffic fatalities due to age-related driving impairments have been projected over the next quarter century. (p. 77)
occupational therapists take the time to understand the role that driving plays in your life, they are able to help individuals make a smoother transition from driving to using other forms of transportation. In doing so, they help people maintain their autonomy, independence, and sense of worth.

According to Dunn, Brown and Youngstrom (2003) "The Ecology of Human Performance framework is built around the major constructs of person, context, task, and performance." (p. 223) The emphasis in this model of care is on the context and its influence on the person as well as the persons influence on it. Driving is a complex task requiring the performance of a variety of subtasks at a high level of proficiency to ensure safety of the driver and those around him or her.

Careful consideration of the complexity of a person’s life experience is important in this model of care. Interests, values, abilities and experience are all variables that influence a person’s interaction with their surroundings. Older drivers may tend to limit their exposure to driving since their primary reasons for driving may simply include going for groceries or to a weekly social outing.

Successfully completing tasks is dependent upon effectively carrying out a sequence of behaviors. For example: when a person needs to drive a car he must safely approach the car, open the door, position himself and the controls of the car, start the car and operate multiple controls while simultaneously monitoring a myriad of sensory inputs from the environment. Skillful and effective performance of these tasks allows successful achievement of the goal of driving a car. A person’s ability to effectively perform these tasks is influenced by their skills and abilities as well as their interests.
Temporal and environmental contexts are identified as primary concerns in the Ecology of Human Performance model. The context of a person's health status and chronological ages are important and require careful consideration. Advanced chronological age and diminished health are both factors identified in the literature as presenting an increased risk of impaired driving ability. Environmental contexts that impact driving include the cultural, social, and physical environments both inside and outside the vehicle. One example could be an older male driver who feels compelled to drive, rather than allowing his wife to do so due to cultural patriarchal influences. Participation in social activities may be limited if driving privileges are lost. Additionally, the abilities of older persons with limited range of motion may make operation of the vehicle controls less than optimum or impossible.

Using a person's available skills and abilities within a context creates performance. Driving requires performance to occur with a high degree of accuracy due to the potential for injury. A person's ability to perform often influences task selection. If an older driver is aware of difficulty performing a task such as driving at night, he may choose not to perform the task of driving in the context of darkness.

The following chapters in this project will cover a review of recent literature and research on the topic of assessing older drivers as well as those with illness and disability. A battery of assessments will be introduced that can be used to assist in determining an older driver's ability to perform specific tasks associated with safe driving. The literature suggests that using the assessments presented has a strong ability to identify those patients who will be successful in on-road driving assessment as well as those who will not succeed. It is also clearly stated that a battery of assessments is a more valid
predictor of performance than is any single assessment. The Ecology of Human Performance model of care which is being presented in this project states that contrived contexts can influence performance. This effect could improve or diminish the person’s ability to perform an actual task, in this case driving. As such, the battery of assessments discussed in the product chapter of this project is used to identify those patients who are appropriate for referral to an on-road driving assessment. The battery cannot be used reliably as the sole determinant of a person’s ability to drive. A review of the activities required to perform the drivers screening battery will be presented as well. This is followed by discussion of the actual project and a summary of the project with discussion of opportunities for development and implementation.
CHAPTER II
A REVIEW OF THE LITERATURE

In today’s society, driving is an integral part of our daily lives. It directly affects an individual’s independence and sense of self efficacy. A study by Anstey et al. (2005) estimated that by the year 2020 there will be 50 million elderly persons eligible to drive. Currently the 65 and over age group is the most rapidly growing segment of the driving population. Furthermore, when adjusted for distance driven, crash rates for elderly persons are higher than the general population and show sharp increases after age 75. The task of driving demands a high degree of efficiency from the senses which must be proficiently processed by cognitive, sensory-perceptual and psychomotor functions. This processing must be quickly acted upon with appropriate motor responses. Driving, unlike many other daily tasks, has a high potential for injury or even death of not only the person driving but those around them as well. A person’s ability to perceive important environmental factors and the ability to react appropriately deteriorate with aging and disease. Anstey et al. (2005) goes on to state:

Even in normal aging there is a decline in many cognitive abilities that are related to performing the complex tasks of driving. Of particular relevance are age related changes in various aspects of visual attention including selective attention, divided attention, sustained attention (i.e., vigilance) and switching attention.

(p.46)
Occupational therapists have unique training which enables them to assess the wide variety of skills and abilities related to this important task. Occupational therapists have long been involved in assessing the human-environment interaction and working with individuals to promote increased independence and an increased sense of empowerment.

According to a study performed by Johnson (1999) of 355 older adults that were within one year of having forfeited their driver license, the decision to stop driving resulted in feelings of loneliness and isolation. Occupational therapy concerns itself with not only the physical and perceptual effects of a person’s action but also with the impact on one’s emotional and psycho social well-being. Patients provided with opportunities to objectively assess key areas of function in a forum which allows for possible remediation of identified deficits are empowered to make decisions with their team of medical providers. In the same study by Johnson (1999) cited above, seventy-five percent of forfeitures were the result of bureaucratic action. Forfeiture of driver’s licenses was stated ultimately to have been influenced by recommendations made by the patient’s physician. Therefore, by assembling an appropriate battery of assessments, physicians can be provided with reliable information for use when counseling patients. This objective information presented with clear intent and patient interaction will assist in making the best decision regarding driving privileges.

According to Stutts (2001), while many adults with cognitive and visual impairments self-limit their driving exposure, assessments of key areas related to driving and counseling should be encouraged. Stutts’ study was a cross-sectional data analysis of 3238 drivers 65 and older. The study was designed to determine whether or not older
drivers were appropriately self-limiting their driving exposure as limitations arose in their function. The findings of the study revealed that drivers with cognitive and visual impairments do not appropriately limit their exposure. This illustrates the need for physicians and other health professionals to evaluate patients with driving in mind.

The objective of performing driving assessments is two fold in my opinion. First, to identify drivers, who due to disease, injury, or natural aging, are no longer able to drive. Patterns and behaviors that may have served them well in the past are no longer sufficient or effective. The second objective is to identify those who may be able to remedy those issues through exercise or adaptation to maximize safety. Maintaining safety and independence is the ultimate goal of this process, not to restrict driving. The purpose of this review is to further explore assessments that could be used for this process.

Key Factors

Anstey et al. (2005) identified three enabling factors associated with safe driving. These factors included cognition, vision, and physical function. Each factor was further divided into more specific areas. Cognition is divided into reaction time, speed of processing, measures of visual attention, short term memory, and executive function. Visual acuity and contrast sensitivity were identified as the key areas of visual function. The key areas physical function measured include neck rotation as well as factors associated with fall risk, arthritis, and heart disease.

Cognition

Declines in cognition can be the result of the natural aging process, injury, or disease. Often the impairment is significant enough to warrant discontinuation of
driving. A study by Whithaar et al. (2000) refers to a comparison of 30 drivers with dementia to 20 healthy drivers. This comparison found that almost 50% of drivers with dementia had been involved in a traffic accident in the 5 to 6 years leading up to the study compared to only 10% of healthy individuals. This study points out that these figures are significant; they also demonstrate the importance of appropriate assessment due to the fact that a full 50% of the drivers with dementia had not been involved in accidents. Withaar et al. (2000) goes on to state, “…the authors conclude that in the early stages of illness, some people can continue to drive safely” (p. 483).

In addition to dementia, a stroke can have devastating effects on a person’s cognitive abilities. Difficulties with attention, problem solving, and memory are all associated with stroke and can have negative effects on driving performance. In a study performed by Klavora et al. (1995), of ten individuals with strokes who had failed on-road driving examinations, it was found that cognitive and perceptual deficits had greater bearing on the outcome of driving success than motor or emotional limitations. In the review of the literature, Klavora et al. concluded that deficits in basic driving skills could be put into five categories: inadequate scanning of the environment, problems with spatial perception and orientation, poor visual tracking, slowness in acting, and confusion when complex actions or action sequences are to be carried out. Many of the tasks listed can be defined, in part, by the functional ability of cognitive processes to appropriately deal with sensory information, which in this case is predominantly visual information.

*Visual Perceptual Processes*

According to Mazer et al. (2003) deficits in visual processing occur with increasing age. It has been estimated that 90% of the input required for driving is visual.
Mazer et al. identifies difficulties in visual processing, visual attention, and spatial awareness in persons having suffered a stroke. Similar impairments can often times be seen in patients with traumatic brain injuries, multiple sclerosis, and many other processes effecting the central nervous system. The decreasing visual processing skills of visual attention, spatial relations, and scanning are known to be major contributing factors in automobile crashes. Visual acuity is critical to safe driving as the operator of a vehicle must be able to correctly identify traffic signs and other environmental stimuli. Decreased acuity can negatively affect reaction time due to the poor recognition of environmental stimuli and potential dangers. Ocular motor skills allow a person to appropriately direct their gaze at a variety of visual targets in order to prioritize their importance. It is also important that the eyes are able to work together for appropriate depth perception in order to correctly judge distances between a vehicle and other cars or obstacles. To effectively process this dynamic and varied array of stimuli, a person must have the ability to focus on one important stimulus. Simultaneously they must maintain an awareness of secondary environmental factors such as anticipating the movement of a pedestrian and keeping a keen focus of oncoming traffic. This skill incorporates the maintaining of spatial relationships for safe maneuvering amongst moving and stationary objects.

Atchley et al. (2004) found that a reduction in spatial attention in older drivers can account for a large proportion of increase in accident risk. All of these skills must be used in an environment where timing is critical and reactions must be quick. The cognitive ability to process this information and make split second decisions is essential to safe driving. One common strategy at-risk drivers report as a coping strategy is not
driving alone. In the Atchley et al. study of healthy graduate students at the University of Kansas, he found that by participating in conversational tasks, reaction times increased four fold when presented with a stimulus as compared to visual tasks in isolation.

**Physical Function**

Physical requirements for safe driving include having adequate neck rotation to be able to check to the sides of the car for safe lane changes and for safe backing. Adequate grip strength and dexterity to control the steering wheel and manipulate essential controls in the car such as turn signals, windshield wipers, and headlights is important for safety. Ainstey et al. (2005) state “Reductions in grip and muscle strength and endurance, flexibility and motor speed as a result of aging or age related disease are other factors that may impair driving ability.” (p.47) They discuss the negative impact of poor neck rotation upon the driver’s ability to successfully use the visual system to sense relevant stimuli in complex driving situations. Anstey et al. cited a study by Maratolli et al. (1998) which concluded that poor neck rotation was associated with twice the risk of crash.

In a separate study by Ball et al. in (2006) of 1,910 participants recruited through Motor Vehicle Administration sites in Maryland, the researchers explored the effectiveness of 4 physical measures in predicting safe driving ability. Some studies have suggested that the Rapid Walk test has high correlation with driving success. This assessment was used along with the Foot Tap, Arm Reach, and Head and Neck rotation in the Ball et al. research. The effectiveness of these assessments was, in general, low. This study was complicated, however, by several factors. The administration of these assessments was subjective as was the interpretation which was performed by MVA
employees with minimal training. The state of Maryland requires all drivers over the age of 85 to renew in person, therefore those with physical limitations that did not permit them to come to the MVA are self-eliminated from driving eligibility. In-person license renewal for persons over 85 has been shown to reduce driver traffic fatalities (Ball et al. 2006).

Assessment

The U.S. Department of Transportation and National Highway Traffic Safety Administration (2003) published a study known as the Maryland Pilot Older Driver Study. In volume 2 of this study, a battery of assessments was chosen for use in identifying gross indicators of driving ability. The battery of assessments developed in this study was referred to as the Gross Impairments Screening (GRIMPS). The battery focused on measures in two domains. Physical measures were assessed using the Rapid Pace Walk, Foot Tap, Head-Neck Rotation, and Arm Reach. Perceptual-cognitive measures were assessed using the Motor-Free Visual Perception Test (Visual Closure subtest), Trail-making test Part B, Cued/Delayed Recall, and a Scan Test. These assessments were chosen based on the scientific validity of the assessments and the practicality of administration in today’s clinical environment. The authors stated that current research lacks the ability to directly identify crash risk. However, this research can be useful in identifying skills and abilities which do show correlations with driver safety. A study performed by Mazer et al. (1998) found that the two most commonly used assessments of perceptual ability were the Motor Free Visual Perception Test (MVPT) and Trail-making test Part B. This study went on to determine how effective these two assessments, as well as seven others, were at predicting clients ability to pass
an on-road evaluation. These two assessments were found to have greater positive and negative predictive values than the other seven assessments. Scoring less than 30 points on the MVPT was shown to increase odds such that a person was 8.7 times more likely to fail on-road evaluations. When combined with use of the Trail making test Part B, the data showed that those who failed both the Trail making test Part B and the MVPT evaluations were 22 times more likely to fail on-road evaluations than those who passed both tests.

In a multi-center study of 269 individuals tested using the MVPT, Korner-Bitensy et al. (2000) determined that while the assessment was useful in pre-driving screening, it is best used as part of a group of assessments and not as a sole predictor of a person's ability to drive safely. This research also determined that scoring below 30 was a useful indicator of poor on-road performance. In addition to the MVPT score, age was factored in and determined to be useful in increasing the predictability of failure in on-road assessments. For every decade of increased age, there was a 16-fold increase in the likelihood of failure. For every five-point decrease in MVPT score, there was a 4.4-fold increase in odds of failure.

Assessment of cognitive ability and its correlation to safe driving performance was also explored in a study by Withaar et al. (2000). This study determined that using the Mini Mental State Examination (MMSE) was useful as it had a high correlation when used to classify those patients who were likely to perform poorly in on-road driving situations. It was, however, determined, that it was not a sufficiently strong relationship to be used independently as the sensitivity was less of a predictor in individuals scoring over 27 points. De Raedt et al. (2001) determined that while MMSE scores showed
positive predictive value, the scores did not add sufficient discriminatory power for
decision making, though they acknowledged studies have been performed with stronger
positive correlations.

The Dynavision™ apparatus was designed for assessment and training in the
areas of visual scanning, peripheral visual awareness, and visuomotor reaction time. The
Dynavision™ is a large wall mounted mechanism with 64 nested rings of illuminating
buttons. In a study performed by Klavora et al. (1995), a group of 102 students were
tested with three tests using the Dynavision™ apparatus rated as simple, moderate, and
complex. Each task required the participant to push a button to extinguish a light when
the light was presented randomly in the visual field. The simple task was a self paced
task with the participants working as quickly as they were able. The moderate and
complex tasks were apparatus paced and required the participants to simultaneously call
out 4-digit numbers which appeared randomly on a screen in front of them. The
moderate and complex tasks were differentiated by the fact that the moderate tasks
illuminated lights for one second, while the complex tasks had only a half-second
illumination time. The reliability of the simple, moderate, and complex tasks was shown
to be extremely high at .88, .92, and .97 respectively.

The Dynavision Performance Assessment Battery (DPAB) was used in a separate
study by Klavora et al. (1995) and was determined to have a high relationship to on-road
driving performance. After analysis, it was determined to be a reasonable predictor of
on-road driving performance. In this study the participants were also assessed using the
Cognitive Behavioral Driver’s Inventory (CBDI) in conjunction with the on-road test. It
was determined that while the DPAB had reliable predictive qualities that the ability to
predict driving success was even higher when used in conjunction with the other assessments. In yet a third study by Klavora et al., published in 2000, they compared the DPAB to the CBDI when used to predict on-road driving fitness for persons with stroke. The study was performed with 56 subjects who participated in both the DPAB and the CBDI as well as on-road driving evaluations. The study found that a 4-minute endurance subtest of the DPAB was superior to the CBDI in determining pass/fail for on-road driving situations (75%). Successful completion of both evaluations had even better results. They concluded that on road driving performance could be reasonably predicted using off-road assessments. Thus, the risk and cost associated with on-road assessments is reduced. Location of lesion, age, and gender had no significant effect on the outcomes. However, the author suggests that the make-up of the test population may not have lent itself entirely to being able to optimally determine these specific facts as indicators for the general population.

Assessing driving skills is important to the safety of the driver and society in general. The implications of the assessments have far reaching ramifications to the person being assessed. When unable to drive, the potential to impact quality of life through social isolation and increased dependence on others is great. In many communities, alternative public transportation is unavailable, or unusable for the very reasons a person may have failed a driving examination. Diminished cognition, route finding, and visual perceptual deficits can complicate any form of mobility. In the study by Johnson (1999) of 285 older adults, it was found that friends and family members were available much less than anticipated to assist with the transportation needs of those who had forfeited their licenses. One-hundred percent of respondents surveyed stated
that family members were available to assist with transportation needs less than 59 percent of the time; not one participant reported more than that number. Friends surprisingly had a slightly better showing; 30 percent reporting availability of family friends to assist between 60 and 90 percent of the time. Providing the appropriate assessments assists licensing agencies and healthcare teams in making decisions with confidence, as findings are less subjective and are based on evidence based research evidence.

Research on the most commonly used assessments, with the greatest aptitude to determine a patient's ability to drive safely seems to indicate that there is no single assessment that can adequately provide sufficient information for this important decision. Sims et al. (2000) determined that examinations typically administered by physicians, such as those for overall eye health, mental status, visual acuity, and chronological age showed correlations with crash rates. However, these assessments were poor identifiers of those who had and had not crashed. In study after study, assessments with seemingly strong correlations to driving skills showed improved ability to identify at-risk drivers when paired with other assessments. Withaar et al. (2000) found the MMSE was most predictive of driving performance when combined with a visual tracking assessment and an examination of short-term memory. Mazer et al. (1998) found that the MVPT and Trail Making B test had high predictive values when used independently. When combined, the ability to predict success in on-road driving was even greater with these two assessments. Klavora et al. (2000) found when drivers were required to pass both the DPAB and the CBDI, all participants who passed were successful. When participants were required to pass one of either examination with similar predictive value only 78% of
participants passed the on-road assessments. Kantor et al. (2004) found that the MMSE and Trail making test Part B were complimentary examinations as their combined use increased the ability to predict pass/fail on on-road driving evaluations. Kantor further stated that her findings underscored the importance of using multidimensional assessments prior to on-road testing. Komer-Bitensky et al. (1998) stated:

Use of reliable and valid measurement tools is as important in driving evaluation as it is in other areas of occupational therapy practice. Use of non-standardized assessment results may not prove valid when clients contest our professional judgment on the basis of the on-road evaluation (p.918).

Summary

The literature reviewed makes clear the need for a battery of assessments to accurately determination of driving ability in the elderly and in those who have been injured or affected by disease processes. Because of the nature of driving cessation and the significant effects that this can have on a person’s social and emotional quality of life, there are many considerations the occupational therapist or other health care professionals should consider when taking on this type of assessment. Advancement in medicine has helped to increase the need for this type of assessment as more people are surviving injury and disease with advanced tertiary care and improved emergent responses to conditions such as stroke and head injuries. The growing elderly population, with an increased ability to remain active late in life has increased the need for consideration of safe driving issues later in life. The burden of performing these important evaluations brings with it legal and ethical considerations. In the Journal of Head Trauma Rehabilitation, Hopwell (2002) relays the fact that recent court cases have
considered whether or not a health care provider can be held liable for negligent
diagnoses, negligent treatment, or failure to warn third parties of potential danger from
patients with psychiatric conditions or with neurological impairments. The use of
standardized, evidence-based assessments lends itself to improved outcomes and ability
to fend off claims of subjective bias; however, no accepted clinical guidelines have been
established to set forth what constitutes the basic elements of safe driving performance.

Operating a motor vehicle is a complex task involving a high level of risk, not only to the
operator but to those in their proximity. Occupational therapists taking on the role of
evaluating driver safety are interested in determining safety and in maintaining the
highest level of independence reasonable for the individual. A common practice in
driving evaluation is to add restrictions to the license of a person with overall ability to
drive safely but who presents with specific risk factors. Common restrictions may
include: no driving after dark, no driving on high speed thoroughfares, no driving without
glasses, or only within a specific radius of one's home. This type of risk management
requires a high degree of confidence and competence on the part of the health care
professional in order to ensure a safe return to driving. Working closely with family
members and others with whom the driver has significant relationships should be
considered as they will have the greatest ability to manage these risks. All occupational
therapists who work with adults should be concerned with driving and community
mobility. Evaluation of driving takes place on many levels. Pierce (2003) outlined three
stages of involvement: the fact finding or informational stage, the pre-driver clinical
screening stage, and the formal evaluation stage. It is not requisite that every therapist be
involved in all stages. Different levels of involvement may be indicated by the patient
needs or the therapist's specific training. Thoughtful consideration of the patient quality of life must be integral to the process. Every effort to maintain the driving privilege should be made for each client.
CHAPTER III

ACTIVITIES/METHODOLOGY

Identifying appropriate assessments to be used with patients that participate in occupational therapy is important. Evidenced-based practice is invaluable in validating the effectiveness of a given assessment or intervention. Driving has been identified as an independent activity of daily living in the occupational therapy literature for years. Recently the topic of driving has moved to the center of attention. In hospital settings working with the older population is common. Occupational therapists work with older adults to regain or maintain function that can be lost to due to aging, illness, or disease. Lee, Lee, and Cameron (2003) stated:

Empirical evidence suggests that driving ability deteriorates with age (Evans 2000). The fact that older drivers also demonstrate a higher rate of accident involvement per mile traveled (Cobb & Coughin, 1998) has prompted concerns about methods of evaluating the driving ability of this population. (p. 324)

How to accurately evaluate a person’s ability to driver after a neurological event, after illness, or the onset of disease is a dilemma. Mazer, Korer-Bitensky and Sofer (1998) found that there were no clear procedures or guidelines to be used by the clinicians charged with making this important decision.

The information included in this project has been compiled through a careful review of the literature describing aspects of evaluation and assessment of persons with
disabilities related to illness, disease and aging. Additional information in this project is
based upon the author’s six and one half years of clinical experience as an occupational
therapist. The exchanges and discussions with peers in the fields of occupational therapy
and physiatry were important in formulating the approach to this project. Articles were
also obtained through the University of North Dakota online library resources searching
*Pub Med* and *OT Search* databases. The American Occupational Therapy Association
website (http://www.aota.org) was useful and informative for information related to
current trends in driver skills assessment. This project was developed due to current
needs in the clinical setting and was identified to address driver skills assessment more
thoroughly. Assessments were identified in various readings and through discussions
with other clinicians. They were then pursued by researching the professional literature
in quest of evidence-based support.

The literature strongly supports the need for an assessment battery for driving related
skills to be used rather than relying on a single tool. In this project product, several
assessment tools were identified as strong predictors of driving ability and are available
at low cost to the department. These assessments included:

- Assessment of Driver Related Skills (ADReS)
- Motor Free Visual Perception Test (MVPT)
- Dynavision Performance Assessment Battery (DPAB)
- Mini Mental State Examination (MMSE)

The ADReS is available free of charge through the National Highway Transportation
and Safety Administration in their publication, *A Physician’s Guide to Assessing and
Counseling Older Drivers* (2003). This is an informative publication done in
collaboration with the American Medical Association. It contains specific information for all fifty states including accepted driving restrictions, vision requirements and reporting procedures. The ADReS is specifically discussed with supporting literature provided.

The MVPT is a widely available assessment of visual perceptual function. Currently several on-line vendors list a complete kit for around $150.00. This assessment was identified in a study by Mazer, Korner-Bitensky, and Sofer (1998) to be the most commonly used assessment in North American driver rehabilitation programs. They also found the MVPT to be the test with both the highest positive and negative predictive values for the participants in their study.

The DPAB is completed using a large wall-mounted board with an array of lights that use specific parameters to assess, “...visual and cognitive abilities (e.g., the use of visual and reasoning skills, visual memory, etc.), visual attention and scanning, simple and complex visual reaction time, and visuomotor coordination” (Klavora, Warren, & Leung, 1996). The apparatus is named the Dynavision 2000™. Information about this useful tool is available at http://www.Dynavision2000.com. In addition to its use as a tool for assessment of driver related skills, it may also be effective as a training mechanism for persons lacking in key areas of driving. In a study by Klavora et al. (1995) six out of ten subjects who had failed on-road driving assessments were rated as “safe to resume driving and/or to receive on-road driving lessons” (p. 537) after participation in a six-week training session using the Dynavision 2000™ apparatus.

The MMSE is a widely used assessment of cognitive function. It is easily administered and “in a study by Fitten and co-workers (1995) on dementia and driving,
the MMSE score was among the variables that correlated best with driving abilities" (as cited by De Raedt & Ponjaert-Kristofferson, 2001 p.333). A study by Withaar, Brouwer, and Van Zomeren (2000) revealed that the MMSE did have difficulty predicting driving ability of those who scored 27 or higher out of a maximum score of 30. This fact reinforces the need for use of a battery of assessments for a more reliable identification of at-risk drivers.

In addition to these assessments a careful review of the medical records and a discussion with the patient regarding their driving history and goals is extremely important. Driving is a privilege that cannot be taken lightly. Driving is closely tied to a person’s independence, sense of autonomy, and self-worth. Occupational therapy practitioners have long been educated and interested in treating the psycho-social needs as well as the physical needs of the people they serve. By clearly communicating the goals of both the patient and the clinician a positive result can be had in what is sometimes an emotionally charged experience.

This project has identified a battery of assessment that can be used to evaluate driving related skills based upon clinical evidence. This battery is to be used after consideration of the surrounding circumstances or contexts of driving for the individual. The following chapter contains a brief description of the product of this project and the theoretical approach used in it’s conception.
CHAPTER IV

THE PRODUCT

Purpose

Historically occupational therapists are interested in working with the human-environment interaction in order to help maintain independence for individuals faced with declining function due to aging, disease, or injury. Driving is an important activity in the lives of many people. It allows them to participate in a wide variety of daily activities on their own terms. Losing one's ability to drive, frequently forces a person to depend on others for participation in leisure activities, work activities, and for necessary tasks as simple as buying groceries. An inability to perform these activities without depending on others can be difficult as it can threaten feelings of independence and self-worth. As occupational therapists work as part of a larger health care team the decision to terminate the driving privileges of our clients cannot be taken lightly. The purpose of this product is to propose a screening battery that will be able to effectively identify deficits, in key driving skills, that rise to the level of creating a safety concern to the client and to other motorists. This screening battery may be used for two primary reasons. First, after a person has stopped driving due to significant illness or injury and wants to return to driving, it can be used to reasonably assess skills related to successful driving. This information will then be used to determine appropriateness for referral to an on-road driving assessment program. Second, as a person's physical, cognitive, or
perceptual abilities decline with aging or disease and driving skills become questionable. This screening battery can be used to provide important information to be used when counseling an older driver to stop driving. A client’s failure to successfully complete this battery of assessments can be used to exclude them from driving; however, successful completion of these assessments alone cannot adequately determine whether a person is able to safely resume driving. When a patient is successful, the findings indicate that the person is appropriate for referral to an on-road driving program for further assessment. The combination of assessments described in this chapter has demonstrated a strong ability to identify those patients who will succeed in on-road driving evaluations. Upon successful completion of the on-road assessment the client is required to retake the Arizona State Motor Vehicle Division (MVD) written examination. The content of on-road assessments and those required by the State of Arizona are beyond the scope of this project but are important for ultimate determination of restoration of driving privileges.

Description

The screening process outlined within this project will be initiated through referrals from physicians within the hospital system. A physician’s order for this service should be written as an assessment of driving related skills. All assessments will be administered by occupational therapists familiar with the assessments and the objectives of the program. After the literature review which was performed and presented in Chapter II, it was made clear that there are a multitude of assessments with the ability to assess skills which have been determined important for safe driving. It was also clear that there are no assessments that can adequately determine one’s ability to drive when used alone. Furthermore, on-road driving assessments are a key part of information
gathering to make this important decision. The occupational therapy assessment will entail a review of the medical record and specific standardized assessments including:

- Assessment of Driver Related Skills (ADReS)
- Motor Free Visual Perception Test (MVPT)
- Dynavision™ Performance Assessment Battery (DPAB)
- Mini Mental State Examination (MMSE)

Mazer, Korner-Bitensky, and Sofer (1998) spoke of the importance of this type of evaluation by stating:

> The use of standardized perceptual-cognitive tools provides important information indicating whether a client has recovered sufficiently to be tested on the road or whether the test should be delayed. Furthermore, perceptual-cognitive test results help guide the therapist as to which skills require specific examination during and on-road driving evaluation. (p. 749)

**Frame of Reference**

The purpose of occupational therapy is to help people maintain independence in all facets of their lives despite the presence of disability or impairment. To maintain independence while making healthy life choices is important to a person’s sense of self-efficacy and happiness. Occupational therapy is a profession with a strong emphasis on problem solving; as we work with the person-environment interaction, people and environments can vary widely. Combining different people with different environments and situations can create a near infinite variety of situations. Driving with visual impairment can be sufficient to stop one person from driving while another with a similar impairment can learn to adapt. Driving in an urban environment can be much different
from driving in a rural community. Adding modifications to a vehicle can accommodate a person’s limitation allowing them to drive. All of these different factors are part of the variable contexts in which driving can occur.

The Ecology of Human Performance model (EHP) is a theoretical model which emphasizes the context’s in which activities occur. The driving experience fits well within this theoretical model. This model is described in *Occupational Therapy in Community Based Practice Settings* (2001) by Reitz and Scaffa. The major components identified in this model include: the person and his or her skills, abilities, tasks and performance range. Selection of tasks by the person is accomplished after consideration of the basic behaviors required to complete the task, and the perception of their skills. This consideration takes place in the setting of the specific context in which the behavior must occur. A person who demonstrates competence making decisions related to daily tasks such as making shopping lists may struggle to make decisions quickly enough when driving due to the required immediacy and complexity of the task. The person first approach of the occupational therapist and the wide view of the human experience is a perfect fit for this model and driving evaluation process. This model describes therapeutic intervention in five areas; first, the establish/restore level which seeks to restore function by improving a person’s skills and abilities. Second, adapting the demands of the tasks and contextual aspects is used to increase success. Third alteration or a complete change of the context to better fit the person’s skill level. Fourth, preventing maladaptive behaviors that could hinder performance is used. Last, creating situations or contexts that promote success with more complex performance is a useful intervention in this model.
Applying the EHP model to driving and assessment of driving skills is appropriate as it works well to support the objective of the screening program and occupational therapy goals: To identify potential threats to independence when different skills, abilities, and contextual issues create a mismatch or inability to perform. These threats are considered in the context of a person's experience and values as well as the expectations of the community. When the skill or ability is identified to be creating a mismatch such as diminished visual reaction time, a poor ability to attend to multiple stimuli, or decreased strength, the objective of occupational therapy is to assist in the decision making process to address the mismatch in the best possible way. Adaptation, alteration, or prevention are all appropriate to the task of driving. Often there are ways to remediate the problem and in other instances alteration of contexts allow the person to maintain independence by helping with community resources such as taxi services, dial-a-ride, or by rallying support from family or friends to assist with transportation. As a continuation of this driver screening product more community based education is appropriate and can be developed to work synergistically with the driver screening product presented here.

Product

Anstey, Wood, Lord, and Walker (2005) outlined three major areas of performance related to driving as cognitive, perceptual, and physical performance. Each area of function is further broken down into specific areas in their paper. Occupational therapists have unique training and skills that lend themselves well to multi-dimensional tasks such as driving. A review of the clients’ medical history is an important initial step when performing an occupational therapy evaluation for any purpose. Identifying risk
factors that have been identified in the literature is an important start to the evaluation. Many medical diagnoses which are considered risk factors can be treated and not interfere with a person’s ability to retain, or regain driving privileges. In this incidence a brief letter from the treating physician stating that the medical condition is treated and under reasonable control will suffice with the MVD. Medical conditions have been identified as important contributors to potential increased risk of crash involvement. The combination of identified medical risk factors and advanced age seem to amplify the negative repercussions in driving performance. In a study performed by Anstey et al. (2005) they stated:

It may be that the effects of physical illness on driving capacity are amplified in older adults because the negative impact of a medical condition may be superimposed on the general decline of neuromuscular, cognitive and perceptual function. (p. 47)

Reviewing the medical record is an important part of performing a driver related skills assessment. McGwinn et al. (as cited in a literature review by Anstey, Wood, Lord, & Walker, 2005) conducted a population based case-controlled study of 901 older drivers with chronic medical conditions and reported an increased crash risk for those with a history of heart disease, stroke, and in women, arthritis. The American Medical Association in partnership with The National Highway Traffic Safety Administration identified twelve medical conditions that may negatively affect a person’s ability to drive.
These are presented in “The Physicians Guide to Counseling Older Drivers”, published in September of 2003. The diagnoses which were identified include:

1. Vision
2. Cardiovascular Disease
3. Cerebrovascular Diseases
4. Neurologic Diseases
5. Medications
6. Psychiatric Diseases
7. Metabolic Diseases
8. Musculoskeletal Disabilities
9. Peripheral Vascular Diseases
10. Renal Disease
11. Respiratory Diseases
12. Effects of Anesthesia and Surgery

Miscellaneous Conditions was an additional category which included cancer and hearing loss. Each of these areas should be considered during the review of the medical record.

For many conditions, treatment falls within the domain of the physician and not the occupational therapist; each condition however, has the potential to affect physical, cognitive and perceptual abilities and must be weighed in the decision to terminate driving privileges.

Occupational therapists have specialized training and medical background which allows appropriate assessment and consideration of medical conditions and their impact on the client’s driving ability. Training in psychosocial issues will also be important
when clients are counseled regarding driving as it has such a large impact upon feeling of independence and self efficacy. Julie E. Johnson (1999) quoted a participant in her study on older adults and the forfeiture of driver's license who stated, “Biggest mistake I ever made. No license, no car, no nothin’ [sic]. You know how there’s all this flap about quality of life? Well, there’s no quality to nothin’ [sic] now. Life’s over.” (1999 p.16). This demonstrates the serious impact on people’s life’s when the driving privilege is revoked. This further pronounces the importance of using a strong battery of assessments based in evidence of their usefulness for this purpose.

Assessment of Driver Related Skills (ADReS)

The ADReS was developed by the American Medical Association in conjunction with The National Highway Transportation and Safety Administration. The assessment is designed to identify difficulty in the three key areas of function related to driving: vision, cognition and motor function. The authors clearly state that the ADReS is not a predictor of crash risk. They state that while a tool does not currently exist that can directly assess crash risk, several have been found reliable in assessing skills that are associated with crash risk allowing valid indirect assessment of driving skills. The ADReS was formed by combining assessment based upon their ease of administration, limited time available in the clinical setting to perform, and the quality of information gleaned from the results.

Vision

Vision is assessed in two general areas in the ADReS: visual fields and visual acuity. The authors state that 95% of driving related input is visual. Vision testing is
required in all fifty states to obtain a license and in many states to renew a driver’s license.

*Visual Acuity.* A Snellen chart is used to assess visual acuity in the ADReS. This is accomplished with a standard 9” X 23” chart hung on the wall with the patient standing 20 feet away. The testing is completed with corrective lenses if they are used by the client. The score is recorded as the lowest line the client is able to read without error. Vision often declines naturally with age. The authors of this manual state that decreasing acuity can begin as early as in the mid-to-late twenties. Loss of acuity can also be the result of disease processes such as glaucoma and macular degeneration.

*Visual Fields.* Loss of visual fields can also be lost during natural aging and diseases such as ptosis, retinitis pigmentosa or stroke. To assess this aspect of vision the ADReS employs confrontation testing which is performed with the clinician sitting approximately three feet in front of the client facing them. The client closes one eye while the clinician closes the opposite. The clinician present random numbers of fingers in 4 visual quadrants, all targets are presented slightly closer to the examiner. Provided the examiners visual fields are intact the client and examiner should be able to see all of the targets presented equally.

Contrast sensitivity was also identified by the authors as an important aspect of vision that related to driving. This area is not specifically addressed by the ADReS as additional research is needed to identify appropriate cut-off points to be used related to driving.
Cognition

Several high-level cognitive tasks are required for safe driving performance as identified by the authors including memory, visual-perception, visual spatial skills, visual processing, selective and divided attention, and executive skills. The ability to use both working memory and crystallized memory allow a person to remember how to actually operate the automobile, and remember where they are going and how to get there. These skills are assessed using the Trail Making Test, Part B, and the Clock Drawing Test.

The Trail Making Test Part B. This assessment, often referred to as the Trails B, is used to test visuoconceptual skills and visuomotor tracking. Aspects of working memory, visual processing, visuospatial skills, divided and selective attention, and psychomotor coordination are also involved. The test requires these skills to be used by alternating between two stimuli and progressing two tasks in numerical and alphabetical fashion simultaneously. They are presented with a paper with the numbers 1-12 and the letters A-L randomly distributed over the page. They are then asked to connect the letters and numbers in the following fashion; A-1-B-2, and so on, without lifting their pencil from the page. The test is timed and typically is completed in 3-4 minutes. Mazer et al. (1998) report the Trail Making Test Part B was found to be the second most common assessment used in driving programs in North America, second only to the MVPT which will be discussed later. Tombaugh (2004) found an association between Trails B scores with age and education level. Increasing age and decreasing education were found to correlate with higher scores on the Trails Part B. The Trail making Test Part B had the best ability to predict driving ability in persons with left hemisphere lesions such that those who did not perform well were 11 times more likely to fail on-road assessments.
than those who did well (Mazer et al., 1998). A study performed by Ball et al. (2006) those participants who completed the Trails B in 147 seconds or more were 2.01 times more likely to have been involved in an at-fault motor vehicle collision than those who completed it is less time.

Clock Drawing Test (CDT). In *A Physician’s Guide to Assessing and Counseling Older Drivers* (2003), the authors report that the CDT has shown significant positive ability to identify older persons with dementia from those without. Specific requirements of the ADReS were determined through a study of 88 driver 65 years of age and older whose performance was compared to performance on a driving simulator. Eight specific areas were identified they are written here as taken from the ADReS:

1. All 12 hours are placed in correct numeric order, starting with 12 on the top.
2. Only the numbers 1-12 are included (no duplicates, omissions, or foreign marks).
3. The numbers are drawn inside the clock circle.
4. The numbers are spaced equally or nearly equally from each other.
5. The numbers are space equally or nearly equally from the edge of the circle.
6. One clock hand directly points to two o’clock.
7. The other hand correctly points to eleven o’clock.
8. There are only two clock hands.

A strong correlation was found by the authors between errors in these specific areas and hazardous driving errors. This finding is reported in the manual to indicate the need to further cognitive testing of possible referral to on-road driving assessment to further assess skills, specified was sustained attention. A study performed by De Raedt and
Ponjert-Kristoffersen (2001) found that the Clock Drawing Test had retest reliability of .78 to .97.

Motor Function

The ADReS addresses assessment of motor function due to the importance of muscle strength and endurance, range of motion throughout the body, and proprioceptive abilities that are all important to the physical task of driving according to the authors of *A Physician's Guide to Assessing and Counseling Older Drivers* (2003). These same areas were identified by Anstey et al. in 2005. The ability to move with sufficient ease is of obvious importance to operate the controls of the car as well as to adequately use one sense of sight adequately for safe driving. The aging process is often associated with decreasing muscle endurance, strength and flexibility. Many health conditions which occur with greater frequency in the elderly also affect these aspects of physical performance. A manual test of motor strength, range of motion and the rapid paced walk test are used on the ADReS to assess these functions.

**Rapid Pace Walk.** Lower limb strength, gross proprioception, endurance, range of motion and balance are all physical skills challenged by this assessment. This assessment is performed with the client using a cane or walker as appropriate. The client is asked to walk 10-feet to a mark on the floor, measured as such, and return to the starting position as quickly as possible. The test is scored by the number of seconds required to perform this task, according to *A Physicians Guide to Assessing and Counseling Older Drivers* (2003).

**Manual Test of Range of Motion.** Five areas are considered using the ADReS for range of motion: neck rotation, finger curl, shoulder and elbow flexion, ankle plantar
flexion, and ankle dorsiflexion. Each area is identified as within normal limits or as not within normal limits. Not within normal limits is further identified as; performed with excessive pain, hesitation, or limited range of motion. Anstey et al. (2005) reported that neck rotation was associated with twice the risk of crashing in one study.

_Motor Strength. This assessment is familiar to occupational therapists working in the field of physical disabilities._ Assessment is completed by the client providing resistance to the therapists’ movements while either flexing or extending the clients limbs. Five areas are tested:

1) Shoulder adduction abduction and flexion.
2) Wrist flexion and extension.
3) Hand grip strength.
4) Hip flexion and extension.
5) Ankle dorsiflexion and plantar flexion.

Strength is graded on a scale from 1-5, five indicating normal strength and zero indicating no palpable contraction of muscle tissue. Plus and minus signs can be used to further clarify findings. Specific directions for this assessment are included with the ADReS (2003).

The ADReS can be administered in any order however; the authors recommend that it be performed as follows:

1) Visual field/confrontation testing.
2) Visual acuity testing using the Snellen chart.
3) Rapid Pace Walk Test.
4) Manual Test of Range of Motion.
5) Manual Test of Motor Strength.

6) Trail Making Test Part B.

7) Clock Drawing Test.

Further discussion of the individual tests within the ADReS and intervention based upon findings is available in chapter 4 of *A Physician’s Guide to Assessing and Counseling Older Drivers* (2004).

**Dynavision™ Performance Assessment Battery (DPAB)**

The Dynavision™ consists of a large wall mounted board covered with illuminating buttons arranged in five nested rings. The DPAB consists of four tasks requiring the examinee to sequentially press the buttons in a random format to a set of programs. There is also a separate display at the center of the board which will display 1-4 digits in 1 second intervals for more complex tasks. Each task is scored as pass/fail.

The following are criterion used for assessment in a study performed by Klavora, Heslegrave, and Young (2000). The four tasks include a 1-minute, simple self paced section where illuminated buttons are presented randomly in the visual field and extinguished by the examinee pressing the button. When a button is pressed another simultaneously illuminates and is pressed this process continues for 1-minute. The criterion for this task is to be able to press 50 buttons in 1-minute. The second task is the same as the first with a single exception: if the button is not pressed by the examinee within 1 second, the light automatically extinguishes and a different light is illuminated. This task requires the examinee to press 40 lights in 1 minute. The third test is the same as the second with the addition of presenting a 1 digit number to the examinee every 5 seconds which they must call out while simultaneously pressing illuminated buttons.
Passing this test requires 30 lights to be pressed in 1 minute, calling out all 20 numbers. The fourth task is the same as the first tasks but requires the examinee to continue the process for four consecutive minutes. One hundred and ninety five buttons are required to pass this portion of the test. Klavora et al. found in their study that tasks 1-3 had a 66% success rate identifying those who would perform successfully in on-road assessments, while task 4 was 78% successful.

Motor Free Visual Perception Test (MVPT)

“The MVPT is a standardized assessment of visual perception skills in five areas: spatial relations, visual discrimination, figure-ground discrimination, visual closure, and visual discrimination. A maximum score of 36 indicates no errors” (Mazer, Korner-Bitensky, & Sofer, 1998. p.744). The authors of the same report found that the MVPT is the most commonly used assessment in driving programs across North America. Their study consisted of 84 individuals with stroke who were assessed using nine perceptual tests including the MVPT. The study found that the MVPT had both the highest positive and negative predictive values (86.1 and 58.3% respectively). It was also determined in this study that a raw score of ≤ 30 on the MVPT could predict with a fair degree of certainty, failure in on-road evaluation. In the same study, 38 individuals with right hemisphere brain lesions were found to have a 15-fold increase in the likelihood of on-road assessment failure when they failed the MVPT than those who did well. This scholarly project is being designed for use in a hospital designated as a primary stoke center by the American Heart Association, therefore this research is particularly relevant. Korner-Bitensky et al. (2000) found that there was a further association between MVPT performance and age. They stated: “For every decade increase in age there was a 16-fold
increase in the probability of failing the on-road test; and for every five-point decrease in MVPT score, there was a 4.4 fold increase in the odds of failing” (p.257). In a separate study Korner-Bitensky et al. (1998) determined, after evaluating eight visual perception examinations, that the highest degree of predictability of failure of on-road evaluation was when a person failed both the MVPT and the Trail Making Test Part B.

*Mini Mental State Examination (MMSE)*

The MMSE is a commonly used assessment of general cognitive ability. This assessment is performed in a simple question and answer format. Areas assessed include orientation, memory, attention, language, and visual perception. In a study by Kantor, Mauger, Richardson, and Unroe (2004), 23 points out of a possible 30 was identified as a cut off identifying those with cognitive impairment. They reported a significant correlation between poor on-road driving performance and MMSE scores 23 and below. MMSE scores were also demonstrated to correlate with delayed reaction time increasing the risk for unsafe driving. Fitten et al. (as cited in a literature review by Withaar, Brower, and VanZomeren, 2000) found positive correlations with study participants scoring as high as 26 on the MMSE.

*Conclusion*

Adequately assessing a person’s ability to drive who is affected by a decline in cognitive, visual, or physical function is an important task. Driving is an integral part of many people’s lives and is closely tied to their feelings of independence and ability to feel predictive in their day to day lives. Identifying assessment tools which provide useful information to health care workers who are counseling older drivers is key to appropriate decision making. Due to limitations in current assessments ability to directly
identify crash risk, assessment of driver related skills are necessary. The literature supports the ability of such assessments to predict a client's ability to perform in an on-road driving situation. Many studies show significant increases in the assessments ability to accurately identify problems when grouped with other assessments. Driving a car is a privilege that should be maintained whenever possible for those who wish to continue. Susan Pierce OTR/L, made the following statement regarding driver evaluation programs, "The goal is to keep elder drivers on the road if possible, and to assist those who can no longer drive with finding viable alternative means of transportation in their own community" (2003, p. 2)
CHAPTER V

SUMMARY

Occupational therapy addresses the physical and psycho-social needs of individuals throughout the lifespan. With aging comes the struggle to maintain our independence and sense of autonomy. The ability to move freely through the community, to participate in social events, or to perform essential tasks such as shopping for food are often tied to one's ability to drive an automobile. Mazer et al. (2003) states that "...individuals who stop driving exhibit symptoms of depression, report feelings of loneliness and immobility, and show an increased level of frustration and anger as a result of vocational, leisure, and personal role change." Driving privileges are often lost as a result of declining physical function, sensory ability, or cognitive processing. These changes are brought about by the natural aging process, illness or disease. Anstey et al. (2005) found that: "Although the majority of older drivers operate their vehicles safely, individuals with impairments that are due to age-related physiologic changes, functional limitations, chronic diseases, and medications appear to be more crash prone". As occupational therapists assist clients in making the best decisions about this important task, it is imperative that our findings be based upon current evidence.

This project was undertaken to identify a valid and reliable battery of assessments needed to evaluate the driving ability of older drivers. The battery identified in this project consists of four assessments including:
• The Assessment of Driver Related Skills (ADReS)
• Motor-Free Visual Perception Test (MVPT)
• Dynavision Performance Assessment Battery
• Mini Mental State Examination (MMSE).

Each of these assessments were found to have a favorable correlation with predicting a person’s ability to successfully perform during an on-the-road driving evaluation. Other assessments identified in the literature, which were not included in this battery also demonstrated favorable abilities to identify at-risk drivers. They included the Useful Field of View (UFOV), The Trail Making Test A and B (portions of the Trail Making B Test are included in the ADReS), the Cognitive Behavioral Drivers Inventory (CBDI), the Gross Impairment Screening (GRIMPS), and the use of a driving simulator. This project was designed to suit the current practices of the clinic using valid, low cost assessments or equipment already available in the clinic. It was also designed to provide an assessment battery that could be completed in two-one hour sessions.

The ADReS is available free of charge from the National Highway Transportation Safety Administration. The MVPT is economical at $150 for a kit with 25 test forms. Additional test forms cost $1.44 each. This assessment was already available in the clinic. The Dynavision 2000™, is relatively expensive (just under $10,000) but was in the clinic being used as part of a vision program already underway. The MMSE is also inexpensive at $125 for a kit including 50 test forms. Additional test forms for the MMSE are only $1.16 each. The MMSE was also available in the clinic. Several other assessments
which were not included required additional expensive computer programs and
equipment such as the driving simulator.

This project will be pursued for implementation in the clinic where the author is
employed. Additional research has been completed or is on-going by colleagues in the
same clinic which reveal similar conclusions supporting the use of the identified battery
of assessments. The battery is being promoted within the facility to Physiatrists,
Neurologists and Family Practice Physicians. Some preliminary referrals have begun to
emerge as patients have been evaluated in outpatient settings by other occupational
therapists.

As the population ages and more and more drivers with age-related impairments
are on the road continued education and marketing will be important to further develop
this project. With increased experience and continued research the driver skills
assessment program in the clinic will certainly evolve. Addition or subtraction of
assessments is possible as is the expansion of intervention possibilities to train patients
with identified deficits in specific skill sets.

The assessments identified in this battery have been shown capable of predicting a
persons ability to succeed in an on the road driving evaluation. The ability to perform
this important evaluation with confidence is essential for occupational therapists who
work with patients in making important decisions related to driving ability. Driving is an
important privilege in our society. Making the decision to discontinue driving has a great
impact upon the life of the patient and their family and friends. Careful consideration of
the many contexts surrounding driving is critical to appropriate decision making.
Occupational therapists are the professionals with the education, training, and skills to make it happen.
REFERENCES


