A Team Approach Risk of Falling Assessment and Remediation Program for Community Dwelling Older Adults with a Fear of Falling and Balance Disorders

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ABSTRACT

Common balance disorders causing symptoms of vertigo and unsteadiness can place an individual at risk of falling. Falls are a serious health concern that can greatly impact quality of life. Older individuals who have experienced a fall or near fall often develop a fear of falling. Appropriate intervention programs designed to reduce fear of falling are lacking. The present study determined the effectiveness of a team approach risk of falling program that included fall prevention and counseling, home hazard assessment, and physical therapy at reducing fear of falling for older independent living adults with a diagnosed balance disorder. Participants included twenty-eight subjects, fourteen older patients (X = 69.1 years of age) with a history of falls, fear of falling and a balance disorder and fourteen family members or spouses of each patient. Comprehensive risk of falling assessment from an audiologist, physical therapist and neurotologist were administered and responses to the Activities Specific Balance Confidence Scale, Geriatric Depression Scale, and Beck Anxiety Inventory were ascertained pre and post intervention for each patient. A statistically significant reduction in fear of falling, depression and anxiety as identified by the Wilcoxon Signed Ranks Test were reported for participants after involvement in the program. Family members and spouses also demonstrated statistically significant decrease in fear of falling concerns for their family member post intervention. The research explored through open-ended questions the impact of fear of falling on the individual and the selected family member or spouse of the individual. Content analysis of the participant interviews revealed themes summarizing the process of developing a fear of falling, the emotional reaction to fear of falling, lifestyle changes for the participants and the selected caregiver due to fear of falling, and the benefits and limitations of the risk of falling program. The qualitative interview themes in combination with the quantitative data analysis recommend
solutions to the fear of falling problems experienced by older balance disorder patients.
Furthermore, the team-approach risk of falling program appears to be effective in reducing falling concerns and improving quality of life in a small sample of older persons with balance disorders.
DEDICATION

To my father:

This is in your memory.
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There are so many people I would like to take the time to thank for their support, patience, and faith in me that I could complete my Ph.D.

To my family and friends
You believed in my dream and gave me the freedom to fulfill it.

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Thank you for keeping me sane during this chapter of my life

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CHAPTER 1

1.0. Introduction

As a greater proportion of the United States population ages, there is a concern about the impact that falls have on the health of senior citizens. Falls are the number one reason for injury-related visits to the emergency room and one of the most common reasons for accidental deaths of the elderly in the United States (Fuller, 2000). Balance disorders are one of numerous risk factors that contribute to falls in the elderly. Injuries sustained from falls can be treated, but the fear of a repeated fall or near fall often persists leading to self or caregiver imposed restrictions on activities as well as increased dependence on significant others particularly in those older adults with a diagnosed balance disorder.

There have been several approaches for the evaluation and treatment of the risk of falling patient. Balance retraining, group exercise and education programs have been the focus of a considerable amount of recent research most of which has focused on a general sample of older adults. A team approach that incorporates home hazard assessment and education on fall prevention is presumed to offer the benefits of various professionals being involved in evaluating and reducing the rate of falling in at-risk older adults, however this approach may not always decrease fear of falling (Maki, Holliday, & Topper, 1991).

1.1. Statement of Purpose

The present study examined whether intervention with a team approach for risk of falling assessment and remediation program reduces the fear of falling (FoF) in a particularly vulnerable population, older independent living individuals with diagnosed balance disorders. One
objective of this proposal was to evaluate the impact of FoF due to a balance disorder on a patient’s activities of daily living. A second objective was to determine the impact of FoF on the patient’s family members, significant others or spouse of the patient. A third objective was to determine whether an intervention program that includes physical therapy and counseling decreased the fear of falling and therefore increased the quality of life for the patient and the patient’s family. The basis for these objectives was to determine whether understanding the impact of FoF on the patient with balance disorders and on their family members, significant others or spouses and treating their balance disorders directly might lead to recommendations for better intervention techniques to help overcome the FoF.
CHAPTER 2
Review of the Literature

2.0 Background

By the year 2010 there will be an estimated 40 million Americans over the age of 65 years, and by 2040, 80 million Americans will be over 65 years of age (Giardi, Konrad, Amin, & Hughes, 2001). The U.S. Bureau of the Census projected that from the year 2000 to 2040 the number of people age 65 years and older will rise from 34.8 million to 77.2 million. Estimates of population for the United States and Puerto Rico obtained in July 2005 stated that there are 36,790,113 adults currently 65 years and over, and 5,095,938 adults 85 years and older (U.S. Census Bureau, 2002). Ohio census included 1,529,430 adults 65 years and older and 217,462 adults 85 years and older (U.S. Census Bureau, 2006). Greater Cincinnati metropolitan has a population of 1,672,109 (SOCDS Census Data, 2005). It is estimated that approximately 14% of residents in Hamilton County of Cincinnati, Ohio are 65 years and older (U.S. Census Bureau, 2004).

It is projected that 30% to 50% of individuals 60 years and older will fall and of those individuals 10% to 20% will fall repeatedly (Rubenstein and Josephson, 2002). The Center for Disease control reported in 2003 “approximately 1.8 million older adults were treated in emergency room departments and over 421,000 were hospitalized for fall-related injuries” (CDC 2005). Approximately 20-30% of the population of adults over the age of 65 years sustains a fall with moderate injuries (Alexander, Rivara, & Wolf, 1992). In 2002, the number of deaths due to fall-related injuries was approximately 13,000 for older adults (>65 years) (CDC 2005). The Center for Disease Control also reported that Caucasian men and women have the highest fall-related death rates (CDC 2005).
Hip fractures are a major cause of morbidity and mortality and almost all occur after a fall. Popovic (2001) reported that in 1999, hip fractures resulted in nearly 338,000 admissions to U.S. hospitals and that the average hospital stay was one week. By the year 2050, the number of hip fractures will exceed 600,000 (American Academy of Orthopaedic Surgeons, 2006). Efforts to contain rising health costs and provide quality care for our aging population is a vast public concern. American Academy of Orthopedic Surgeons report that the cost of treating falls in the U.S. reaches approximately 20 billion dollars annually (American Academy of Orthopaedic Surgeons, 2006). It is estimated that by the year 2040, the cost will exceed $47 billion (Braitwaite, Nanada, & Wong, 2003). The individual cost of a fall related hip fracture has been reported in the range of $16,000 to $18,000 (Brainsky et al. 1997). Aside from the monetary cost of fall injuries there are additional costs when older adults are not able to return home or live independently after an injury. Adults aged 75 years and older who fall are five times more likely to be admitted to a nursing home or long term care facility (Donald & Bulpit, 1999).

Over the past two decades, there has been a substantial rise in publications on fall prevention. Prevalence of falls was the focus of early research. As the awareness of the prevalence of falls became more frequent, researchers began to investigate falling risk factors. Although some falls are due to a single cause, most appear to result from several factors. The literature has identified a broad range of potential falling risk factors (between 130 and 400) (McMurdo, 2001; Masud & Morris 2001). Nevitt, Cummings, Kidd, & Black (1989) indicating that the likelihood of falling increases as the number of risk factors increases above four or more. Falling risks can be classified as extrinsic or intrinsic. Extrinsic factors include home and environmental hazards such as poor lighting or loose rugs. Extrinsic risk factors are estimated to contribute to approximately 40% of falls and tend to affect more mobile elders (Dunne, Bergman, Rogers,
Inglin, and Rivara, 1993; Rubenstein, Robbins, Schulman, Rosado, Osterweil, and Josephson 1998; Tinetti, Speechley, and Ginter, 1988; Tideiksaar, 1996; Rubenstein and Josephson 2002). The high percentage of falls due to extrinsic factors is directly related to the amount of time older adults spend in the home (Nevitt et al., 1989). It would seem important to address home hazards to reduce falling risks; however researchers believe that these modifications alone cannot reduce all falls.

While many falls result from accidental trips, approximately 50% may be the result of a medical condition (Steinweg, 1997). Intrinsic factors are more involved with older adults including frail elderly (Rubenstein et al., 1988; Tinetti et al. 1988). Age, vision, flexibility, decline in motor strength, coordination and endurance, impaired balance and gait, cognitive impairment, slow walking speed, history of falls, postural hypotension and number and type of medications are all potential intrinsic factors that can lead to falls in the elderly (Tinetti, 1986; Tinetti, Baker, McAvay, Claus, Garrett, & Gottschalk, 1994, Francis, 2001) Rubenstein and Josephson (2002) identified muscle weakness, use of an assistive device for walking, history of falls and gait and balance disorders as the five highest ranked risk factors for falls in older adults. The use of four or more medications has been identified as a risk factor for falls as well (Leipzig, Cumming, & Tinetti, 1999)

Balance impairments are common complaints in the general population, but they are more frequent and potentially dangerous in the older population. Balance-related problems are prominent risk factors for falls that result in considerable health and social services costs. Balance disorders that are left untreated can cause loss of confidence, injury, and disrupt or limit performance of daily activities such as reaching for an item in the kitchen, going on a walk, or even playing cards. The individual with such disorders may decrease their level of mobility in
fear of provoking unwanted dizzy symptoms or unsteadiness that may lead to an injurious fall. As a consequence of their decreased mobility, the person is more likely to lose core muscle tone and strength needed to help with balance. This downward spiral of events can put the person at increased risk for falling.

The aging process can have great effect on one or all of the balance sensory (vision, inner ear vestibular system, and somatosensory/proprioception) and motor output modalities that enable us to maintain balance as well as postural control. The term presbystasis is used to describe older individuals with balance disturbances unrelated to a particular contributing pathology (Furman and Case 2003). Within the peripheral vestibular system, hair cell and ganglion cell function deteriorate with age. Our ability to combine vestibular and visual cues (vestibular ocular reflex) and stabilize body movements also decline. Elderly gait abnormalities may include reduced gait stride length and speed (Woo, Ho, Lau, Chan, and Yuen, 1995).

Inappropriate and less frequently used ankle and hip strategies are chosen to maintain upright stance following a sudden balance disturbance. Older adults may choose a step strategy in attempt to maintain their base of support, which often results in a fall or near-fall experience (Girardi et al., 2001).

2.1 Fear of Falling

Most falls do not result in serious injury but can cause: loss of confidence, decreased mobility, social isolation, depression and dependence on others. Unfortunately some older adults fail to seek help for falls as they attribute these to the normal aging process. Many older adults fear falling and do not realize that the many falls they associate with aging can be prevented. The fear of repeated falls can lead to decreased quality of life, avoidance of activities of daily living, and increased dependence on others.
Early investigators believed that FoF might be an unusual variation of agoraphobia (Marks & Bebbington, 1976). Several researchers in the early eighties challenged the original theory outline by Marks & Bebbington 1976, and suggested the use of such terms as “ptophobia” (the phobic reaction to standing or walking) and “post-fall syndrome” to describe FoF (Bhala, O'Donnel, & Thoppil, 1982; Murphy & Isaacs, 1982). Research from the past two decades has used the term fear of falling which can be defined “as a lasting concern about falling that leads to individuals avoiding activities that he/she remains capable of performing” (Tinetti & Powell, 1993).

Previous studies have suggested that fear of falling is common among older adults, both those who have and have not experienced a fall (Tinetti, Mendes de Leon, Doucette, & Baker, 1994; Lachman, Howland, Tennstedt, Jette, Assmann, & Peterson, 1998; Legters 2002). Falling fears are prevalent in healthy community-dwelling older adults (Howland, Peterson, Levin, Fried, Pordon, & Bak, 1993; Tinetti et al., 1994; Tennstedt, Howland, Lachman, Peterson, Kasten, & Jette, 1998; Brouwer, Musselman, & Culman, 2004), in nursing home residents (Fransoni, Rozzini, Boffelli, Erisoni, & Trabucchi, 1994; Kressig et al., 2001) and especially in older individuals with balance disorders (Burker, Wong, Sloane, Mattingly, Preisser, & Mitchell, 1995; Steinweg, 1997; Scott, 1998) and chronic dizziness (Murphy, Dubin, & Gill, 2003). Fear of falling is a risk factor for future falls when the fear restricts an individual’s amount and type of physical activities, which can lead to, decreased muscle strength and tone (Baloh et al. 1998, Tennstedt et al., 1998, Jorstad, Hauer, Becker, & Lamb, 2005). Therefore, the negative affects of fear of falling can significantly influence the individual’s physical, psychological, and social quality of life (Tennstedt et al., 1998). The psychological consequences are most often
conceptualized as fear, reduced self-efficacy (perception of his or her own capability to perform activities without falling), activity avoidance, and more recently identified loss of confidence.

Vellas, Wayne and Romero (1997), designed a study to determine social, emotional, and physical characteristics of individuals who present a fear of falling. The study identified that individuals who have a fear of falling socially limit their activity level; often times will present characteristics consistent with panic disorders, and agoraphobic individuals. Vellas and colleagues concluded that fear of falling is a lifetime issue for the individual and may be attributed to the amount of anxiety from the individual.

Walker and Howland (1991) interviewed a random sample of 115 persons 62 years and older. From that sample, 41% reported limiting activities due to their fear of falling. Fear of falling was the greatest fear among the respondents (25%) when compared with other common fears such as fear of robbery, fear of forgetting an important appointment, fear of experiencing financial difficulties, and fear of losing a cherished item. Like other authors, Walker and Howard established that having a previous fall lead to a fear of falling, however it was noted that some older adults have a fear of falling without a history of falls.

2.1.1. Fear of Falling Assessment Methods

Methods to study the phenomenon of the FoF have been the focus of research over the past two decades using questionnaires and a quantitative approach to evaluating the concerns of older adults (Table 1). A yes/no question, “Are you afraid of falling”, was originally used to measure fear of falling. The limitations with this approach is that it does not determine which specific activities an individual avoids or is afraid to perform because of the reported fear of falling. While this initial approach may still be useful for frail elderly subjects (Legters, 2002), researchers have developed more reliable scales to determine the amount of fear of falling (Evitt
The Falls Efficacy Scale (FES) was one of the first developed and most frequently used measures of fear of falling reported in the literature (Evitt & Quigly, 2004; Tinetti, Richman, & Powell, 1990). This original scale examined the degree of self-efficacy or self-perception an individual has for completing ten activities of daily living without falling (uses a 10 point confidence rating, 0 = no confidence, 10 = completely confident). A modified version of the FES (Hill, Schwarz, Kalogeropoulos, & Gibson, 1996) was generated to include activities performed outside of the home.

In addition to the Falls Efficacy Scale, researchers have developed questionnaires with the aim of examining the degree of confidence an individual has while performing activities of daily living. The Activities Specific Balance Confidence Scale (ABC scale) examines the confidence a person has of performing a broad range of activities of daily living without losing his/her balance or becoming unsteady on a scale of 0-100% complete confidence (Powell & Myers 1995). The ABC scale was originally developed for use with the elderly; however the study by Whitney et al. (1999) concluded that the ABC scale appears to be valid for use with any individuals with vestibular dysfunction.

Numerous quantitative measures have been replicated based on the original Falls Efficacy Scale to examine activity reduction due to FoF. Lachman et al., (1998) outlined limitations with the Falls Efficacy Scale in determining activity restriction or decline in quality of life and then proposed an additional quantitative scale known as the Survey of Activities and Fear of Falling in the Elderly (SAFFE). Considerable effort has been made to evaluate the effectiveness of these scales (Tinetti et al. 1994; Burker et al., 1995; Myers, Powell, & Maki, 1996; Hill et al., 1996; McAuley, Mihalko, & Rosengren, 1997; Lachman et al., 1998; Tennstedt et al., 1998; Cumming, Salkeld, Thomas, & Szonyi, 2000; Li, McAuley, Fisher, Harmer,
Chaumeton, & Wilson, 2002; Li, Fisher, Harmer, McAuley, & Wilson, 2003; Brouwer et al., 2004). While research has yielded instruments that estimate the extent of activity restrictions and fears of falling in elderly subjects, qualitative descriptions of alterations in quality of life have been lacking.

### Table 1: Fear of Falling Assessment Scales*

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Authors</th>
<th>Number of Items</th>
<th>Item Responses Scale</th>
<th>Strengths/Limitations</th>
</tr>
</thead>
</table>
| Yes/No Question                                      | Tinetti et al. 1988      | 1               | 1= yes, 2 = no                                                                       | 1. Easy to administer  
2. Unable to determine level of FoF                                                                                                                          |
| Falls Efficacy Scale (FES)                           | Tinetti et al. 1990      | 10              | 10 point confidence rating (10 activities of daily living): 0 = no confidence, 10 = completely confident scores < 70 = FoF | 1. Valid and reliable scale  
2. Used most frequently in the literature  
3. Study populations have included: highly functioning adults and frail elderly  
4. Basic activities (no outdoor activities)  
5. Ceiling effect                                                                                                                                     |
| Activities Specific Balance Confidence Scale (ABC) Scale | Powell & Myers 1995     | 16              | scale of 0-100%  
0 = no balance confidence  
100 = complete balance confidence  
scores > 80 = high functioning/physically active                                                                 | 1. Good test-retest reliability  
2. Valid for vestibular dysfunction individuals  
3. Includes activities individuals may not perform/encounter daily                                                                                   |
| Survey of Activities and Fear of Falling in the Elderly (SAFFE) | Lachman et al. 1998 | 22              | For each activity: 1. Dichotomous yes/no, 2. If you do the activity, are you worried that you might fall (0 = not at all) to (3 = very worried) | 1. Adequate evidence as a valid scale/however weak reliability  
2. Broader range of activities                                                                                                                               |

* Some information obtained from: Jorstad, Hauer, Becker, & Lamb (2005).
### 2.2. Falls Prevention Programs

Within the literature available today, there have been several approaches for the evaluation and treatment of the risk of falling patient. Identification of risk factors provides a framework on which to structure an intervention program (Close, 2001). Multidisciplinary care, exercise intervention and home environment education programs have been the focus of considerable fall prevention research. The studies incorporating fall prevention programs have established that falls and fall related injuries can be prevented, however the studies cannot easily be replicated in most clinical settings as the methods, study populations and interventions varied considerably, and it is uncertain which are beneficial and cost effective (Puisieux, Pollez, Deplanque, Di Pompeo, Thevenon, & Dewailly, 2001; Close, 2001).

#### 2.2.1. Multidisciplinary Medical Programs (Falls Clinics):

It has been stated in the literature that the most effective strategy for fall prevention is a multidisciplinary evaluation including intervention for falling risk factors (Close, Ellis, Hopper, Glucksman, Jackson, & Swift, 1999; Tinetti et al., 1994; Wagner, LaCroix, Grothaus, Leveille, Hecht, & Artz, 1994).

Wolf-Klein, Pascaru, and Pi-Huai (1988) designed a falls clinic staffed by a geriatrician, neurologist, cardiologist and physiatrist with a home assessment component performed by an occupational therapist. The specialized team focused on determining the risk factors of falls and based individualized medical management on the factors. The researchers’ evaluated 36 patients over a one-year period and demonstrated that the team approach evaluation and treatment method reduced the number of recurrent falls (77% of the participants did not experience an additional fall) however, a small percentage continued to fall due to additional medical problems such as Parkinson’s Disease and osteoarthritis (Wolf-Klein et al. 1988).
Cohen, Rubin, & Gombash (1992) suggested the use of a rehabilitation team, which would include a physician, audiologist, physical therapist, and an occupational therapist. A team approach would offer the benefits of various scopes of practice for evaluating the risk of falling patient. However, the use of a multidisciplinary falls clinic assessment with an audiologist, physical therapist and neurotologist has not been rigorously evaluated.

Hill, Dwyer, Schwarz, and Helme (1994) developed a falls clinic at North West Hospital in Victoria Australia. The clinic was staffed with geriatricians, physiotherapists, an occupational therapist and a research nurse all of whom targeted elderly individuals with a history of falls in addition to those with gait disturbances and/or complaints of dizziness without a history of falls. The staff assessed 149 patients during a 2-hour period during one clinic day. A small percentage (27%) of the patients received an individualized daily home exercise program and (28%) of the patients received home visit assessments when the home environment was considered a hazard (Hill et al. 1994). The researchers identified reduction in gait disturbances (velocity and stride length) after proposed interventions however; they also reported staffing limitations to properly execute the interventions.

A multidisciplinary falls consultation (formed in Lille France, 1996) was developed to provide outpatient falls management services that included examination by a geriatrician, neurologist, and physiatrist and home hazard assessment visits (Puisieux et al., 2001). Team members met to determine causes of falls and to define appropriate intervention strategies for 135 patients between January 1996 and April 1999. Recommendations included physical therapy (81%), environmental changes (66%), and medication changes (47%) (Puisieux et al., 2001). Fall reduction outcomes were not favorable as the sample included a significant number of frail elderly patients and those confined to a nursing home.
Close, Ellis, Hooper, Glucksman, Jackson and Swift (1999) executed a randomized controlled medical and occupational therapy assessment program examining community dwelling older adults who were admitted to the emergency room for a fall. A hospital assessment, home visit by the occupational therapist, and referral for appropriate individualize treatment were performed for the 184 treatment group participants, the 213 control group participants did not receive the occupational therapy assessment program. During a twelve-month follow-up, there was a 50% reduction in fractures reported for the intervention group as compared to the control group.

Despite the number of falls clinics reported in the literature, there are vast differences in the methods and outcomes obtained from the intervention strategies. Successful fall prevention programs have included gait and balance training, review of medical and medication history, removal of environmental hazards through a home visit, individualized medical treatments, and counseling and education (Roa, 2005).

2.2.2. Exercise Programs:

It has been stated elsewhere that exercise can reduce falling risk and number of falls by increasing overall body strength and balance (Barnett et al., 2003, Judge et al., 1993, Lord et al., 1993, Campbell et al., 1999, Schoenfelder & Rubenstein, 2004). U.S. Preventive Services Task Force (1996) recommended the role of counseling and exercise as a means of reducing falls in older persons. Many studies have used a single exercise intervention strategy such as Tai Chi as the sole means of preventing/reducing falls (Rao, 2005).

performed a meta-analysis of the seven independent randomized controlled fall reduction exercise programs that comprised the FICSIT. Province and associates determined that each clinical trial varied in: duration of intervention (10 weeks to 9 months), subject inclusion criteria (community-dwelling to institutionalized subjects) age of subjects (60 to 85 years) and exercise intervention techniques (low-level endurance, flexibility, resistance, balance training, Tai chi and combinations of exercise techniques) (Ory et al. 1993, Province 1995). “Assignment to intervention exercise groups that included balance training were significantly effective (incidence ratio of .83, p = .03)” (Province et al., 1995).

Campbell, Robertson, Gardner, Norton, Tllyard, & Buchner, (1997) initiated a randomized controlled home based exercise program targeting 233 elderly women (80 years and older). The intervention program included tailored strength and balance training in the home and sessions with a physiotherapist during the first two months of the study. The researchers performed a one-year follow-up evaluation and found the intervention group to have significantly fewer falls and improved balance assessment scores (Campbell et al 1997). The researchers observed the women’s progress two years post initial intervention and that reported fall reduction was sustained over the course of the two year follow-up period (Campbell, Robertson, Gardner, Norton, & Buchner, 1999).

Tai Chi has been shown to be very effective in reducing falls (Wolf et al., 1996; Li, 2005). Barnett, Smith, Lord, Williams, & Baumand (2003) conducted a randomized controlled trial of supervised group exercise involving 163 older people. The yearlong exercise intervention program included modified Tai Chi exercises, counseling on fall prevention, strengthening and balance agility such as dance steps and stepping practice and ancillary home exercises. Study conclusions stated that participation in the weekly in-house and home exercise program
improved overall balance and reduced the rate of falling by 40%, however it did not improve overall strength.

Data collected from Gillespie, Gillespie, Robertson, Lamb, Cumming and Rowe (2005), identified that exercise programs that included muscle strengthening, balance training and a walking curriculum significantly reduced the number falls over one year. These findings support the recommendation that fall prevention programs should include balance retraining and strengthening, education on environmental and home safety, and monitoring medications (Close, 2001). However, few have been designed with reduction of fear of falling as the primary endpoint.

2.2.3. Studies Incorporating a Home/Environmental Assessment:

Research has identified the profound number of falls that occur inside and around a person’s home. A home environment evaluation should be considered a necessary component of any falls intervention program. Cumming, Thomas and Szonyi (1999) initiated a randomized controlled home hazard intervention program for 530 older adults (≥ 65 years). The occupational therapist run program consisted of home visits and environment safety modifications. A one-year follow-up identified a significant reduction in the number of falls for the intervention group subjects. Nikolaus and Bach (2003) also examined the effectiveness of a home assessment and intervention program in reducing falls for community dwelling older persons. Subjects were recruited while inpatients in a large German hospital. One hundred and eighty-one participants were selected for the intervention program known as the home intervention team (HIT) that consisted of three nurses, a physiotherapist, an occupational therapist, a social worker, and a secretary. Two home visits were performed to inform the participants about the possible fall risks in there home and to give advice on how to reduce
further falls. The intervention reduced falls by 31% (Nikolaus and Bach 2003). Gillespie et al (2005) also found that in patients with a history of falling, home hazard modification by a trained health professional reduced falls.

2.2.4. Vestibular/Balance Rehabilitation:

To date, the association between disorders of the inner ear, falls, and reports of dizziness remains unclear. Australian study by Murray, Hill, Phillips, and Waterson (2005) compared fall risk in a group of older fallers and age/gender-matched non-fallers with an emphasis on reports of dizziness and signs of vestibular dysfunction. Inclusion criteria included subjects who were recruited from emergency room departments (admitted due to fall) who were discharged directly home. Researchers performed home assessments balance tests (CTSIB, functional reach, step test) and falls-efficacy questionnaires (modified falls efficacy scale, assessment of quality of life). Ironically there was not a significant difference between fallers and non-fallers for dizziness complaints. However, the fallers performed significantly poorer on static and dynamic tests of balance, had reduced gait speed, and some required the use of an assistive ambulating device such as a cane (Murray et al. 2005). The researchers concluded that dizziness and impaired balance might be risk factor for falls, however the connection between vestibular disorders and falls remain uncertain. Assessment and identification of vestibular pathologies is reasonable to include in a falls prevention program and a vestibular/balance rehabilitation program may help to prevent falls (Murray et al., 2005).

Many older adults with balance disorders benefit from referral to a physical therapist for balance disorder remediation (Cowand, Wrisley, Walker, Strasnick, & Jacobson, 1998; Brown, Whitney, Wrisley, & Furman, 2001; Jacob, Whitney, Detweiler-Shostak, & Furman, 2001; Murray, Carroll, & Hill, 2001). Although there is a lack of controlled studies of the elderly
population in the literature (Johansson, Akerlund, Larsen, Anderson, 2001; Salles, Kressig, & Michel, 2003), vestibular/balance rehabilitation is a form of treatment for the balance disorder and persistent dizziness patient (Telian and Shepard 1996). Outcome measures of the effectiveness of vestibular/balance rehabilitation treatment are difficult to obtain. However, Salles and colleagues (2005) suggested that subjective measures (i.e. questionnaires) are the most valid and reliable outcome measures to use.

Vestibular/balance rehabilitation (VR) is designed to incorporate concerns and goals agreed upon by the patient and the physical therapist. The general purpose of vestibular/balance rehabilitation therapy is to expose the patient to the stimuli that provoked their symptoms through a series of habituation exercises. VR also assesses functional problems with gait and most importantly helps to strengthen and condition the individual with strengthening exercises. The strengthening exercises are of great importance for elderly patients. Elderly patients who have a fear of falling will often limit their activities and become immobile to prevent a fall. This can cause serious problems for the person’s overall strength and muscle tone, which can put the person at even greater risk of falling.

Yardley, Donovan-Hall, Smith, Walsh, Mullee, & Bronstein (1998) made the statement that any delay in providing vestibular/balance rehabilitation can allow a vicious cycle to develop where the patient restricts their physical activities of daily living and develops a fear of falling. This fear of falling can be detrimental for the patient and also greatly impact the lives of their family members. The results from this summarized research suggest potential solutions to the problems that having a fear of falling presents. The most prominent solution would be the implementation of education on fear of falling and vestibular/balance rehabilitation in a team approach.
2.2.5. Fear of falling Programs:

Multidisciplinary care (Falls Clinics), exercise intervention programs, and home hazard assessment/environmental modification methods can reduce the rate of falls in older adults; however, few fall prevention programs have included fear of falling as an outcome of interest. This emotional effect of falling is an important outcome in fall-prevention programs (Jorstad et al., 2005). Evidence suggests that exercise can significantly improve balance confidence, as measured by falls-related self-efficacy or confidence scales (Liu-Ambrose, 2004). Fall prevention programs with the intent to decrease fear of falling could positively impact the individual and their families; however not all intervention techniques reduce the participants’ fear of falling (see Table 2, Appendix A).
<table>
<thead>
<tr>
<th>Article</th>
<th>Design/Methods</th>
<th>Sample</th>
<th>FoF assessment</th>
<th>FoF Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wolf-Klein et al. (1988)</td>
<td>prospective study multidisciplinary falls clinic</td>
<td>n = 36 avg. age = 77 years</td>
<td>yes/no question</td>
<td>no outcomes on reduction of FoF</td>
</tr>
<tr>
<td>Reinsch et al. (1992)</td>
<td>prospective study 4 programs (exercise, cognitive-beh., exercise-cog., &amp; discussion)</td>
<td>n= 230 avg. age = 74 years</td>
<td>rating system (1-5) 1 = not worried/ 5 = very worried</td>
<td>no change in FoF among treatment group</td>
</tr>
<tr>
<td>Tinetti et al. (1994)</td>
<td>randomized-controlled multidisciplinary falls clinic</td>
<td>n=301 avg. age = 78 years</td>
<td>FES</td>
<td>significant decrease in FoF relative to controls</td>
</tr>
<tr>
<td>Wolf et al. (1996)</td>
<td>randomized-controlled 2 exercise programs + education)</td>
<td>n = 200 avg. age = 76 years</td>
<td>FES</td>
<td>significant decrease in FoF for Tai Chi group/Control and balance training groups had increased FoF</td>
</tr>
<tr>
<td>*Tennstedt et al. (1998)</td>
<td>randomized-controlled &quot;A matter of balance&quot; 1st trial aimed at reducing FoF</td>
<td>n = 434 60- 100 years of age</td>
<td>Modified FES</td>
<td>8-session intervention = reduction in FoF/this decayed by 6-month f/u</td>
</tr>
<tr>
<td>Wolf et al. (2001)</td>
<td>single-blinded randomized controlled individualized PT program &quot;Systems Approach&quot;</td>
<td>n = 77 &gt; 75 years of age</td>
<td>Visual Analog Scale</td>
<td>no change in FoF among groups</td>
</tr>
<tr>
<td>*Taggart (2002)</td>
<td>single-factor trial Tai Chi exercise program</td>
<td>n = 45 &gt; 65 years of age</td>
<td>FES</td>
<td>significant decrease in FoF</td>
</tr>
<tr>
<td>*Brouwer et al. (2003)</td>
<td>randomized-controlled education/activity based programs</td>
<td>n = 34 67-87 years of age</td>
<td>ABC scale</td>
<td>significant decrease in FoF for activity program only</td>
</tr>
<tr>
<td>Balard et al. (2004)</td>
<td>randomized-controlled fall prevention exercise program</td>
<td>n= 40 65-89 years of age</td>
<td>ABC scale</td>
<td>No outcomes on reduction of FoF</td>
</tr>
<tr>
<td>Clemson et al. (2004)</td>
<td>randomized-controlled &quot;Stepping On&quot; group program</td>
<td>n = 310 70 + years of age</td>
<td>Modified FES Mobility Efficacy Scale (MES)</td>
<td>program did not improve confidence in activities of daily living</td>
</tr>
<tr>
<td>Article</td>
<td>Design/Methods</td>
<td>Sample</td>
<td>FoF assessment</td>
<td>FoF Outcomes</td>
</tr>
<tr>
<td>-------------------------------</td>
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</tr>
<tr>
<td>Houghton et al. (2004)</td>
<td>prospective study multidisciplinary falls clinic qualitative results only on patient satisfaction of program</td>
<td>n = 386 75-84 years of age</td>
<td>FEMBAF Fast Evaluation of Mobility, Balance, and Fear</td>
<td>significant improvement on fear scores for exercise program subjects</td>
</tr>
<tr>
<td>*Liu-Ambrose et al. (2004)</td>
<td>prospective study exercise programs (resistance, stretching, agility) for women</td>
<td>n = 98 75-85 years of age</td>
<td>ABC scale</td>
<td>improved balance confidence for resistance and agility groups no improved confidence for stretching group</td>
</tr>
<tr>
<td>*Sattin et al. (2005)</td>
<td>single-blinded cluster-randomization tai chi and wellness programs</td>
<td>n = 311 70-97 years of age</td>
<td>ABC scale FES</td>
<td>significant decrease in FoF for Tai Chi group</td>
</tr>
</tbody>
</table>

* Study design aimed specifically at reducing fear of falling
Wolf-Klein, Pascaru, and Ma (1988) conducted a prospective study on a multidisciplinary falls clinic that included a geriatrician, neurologist, cardiologist, and physiatrist and occupational therapist. Thirty-six participants were recruited for the falls clinic (24 women and 12 men). Each participant received a thorough falls assessment from all team members that included intrinsic and extrinsic risk of falling factors and evaluation for functional and psychiatric problems. In addition to the fall prevention assessment, the team members obtained a fall history that identified the total number of falls, injuries associated with the falls, location of fall experiences, and existence of fear of falling. The presence of FoF was obtained by a yes/no question to the participants on whether they were afraid of falling. The team identified specific causes of falls such as medication or visual impairment and initiated medical management to correct the risk factor. The occupational therapist executed home visits to access fall hazards and educate patients and family members on fall prevention. Results from the prospective study identified that most patients had three to four reasons for falls (i.e. Parkinson’s Disease, hypertension, muscle weakness depression etc…). At the one-year follow-up appointment, 77% of the sample reported no additional falls. The researchers stressed the importance of education as a necessary component for all fall clinics; however education on fear of falling and outcome measures on reduction of fear of falling was not reported. The study also only identified the importance of medical intervention and home hazard assessment for older adults at risk for falling; the researchers did not include discussion of an exercise program for the participants.

Reinsch, MacRae, Lachenbruch, and Tobis (1992) developed a prospective group risk of falling program called the “Senior Body Program”. The program consisted of four intervention groups (exercise, cognitive-behavioral, exercise and cognitive-behavioral, and discussion control group). Two hundred and thirty participants (X = 74 years of age) were randomly divided into
the four groups. The exercise program consisted of low-intensity exercises. The cognitive-behavioral program discussed health and safety topics on fall prevention and worked on improving reaction time through video game training. The discuss group talked about health related issues, not specifically related to fall prevention. Fear of falling was assessed to all participants through a five point rating system (1 = not at all worried about falling to 5 = extremely worried about falls). Outcomes from the study indicated that all participants reported low levels of fear of falling (mean rating of 1.4 out of 5) suggesting minimal fear of falling for the sample. There was no significant change in the number of falls or fear of falling among the treatment groups. The study limitations identified that the low-intensity exercises did not produce significant changes in the participants overall strength or balance. The risk of falling program also did not provide an extrinsic falls prevention assessment, as an in-home hazard evaluation was not included in the methods.

Tinetti, Baker, McAvay, Claus, Garrett, and Gottschalk, 1994, executed the first well-defined randomized controlled study to demonstrate the benefits of an interdisciplinary falls prevention assessment and home exercise intervention aimed at reducing existing risk factors (medications, gait impairments). Risk of falling assessment was performed for all subjects (n=301) in the subjects’ homes by a nurse practitioner and physical therapist. The assessment included: fall history, near vision screening, medication review, depression screening, hearing assessment, home hazard identification, and balance/strength evaluation. Fear of falling was measured with the Falls Efficacy Scale. Subjects were randomly assigned to either a structured intervention exercise program based on assessment results or the control group who received home visits and fall history interviews. The study showed a significant reduction in falls in the intervention group and a significant decrease in FoF for the treatment subjects. The significant
findings suggest that a multidisciplinary fall prevention program with elements of exercise intervention can reduce the incidence of falls and fear of falling. However, this approach may not have been beneficial for all participants, as the researchers did not report on individual outcomes or personal descriptions of improvement from the participants.

Wolf et al. (1996) developed a randomized controlled intervention aimed at reducing falls in older (>70 years of age) retirement community residents. A sample of 200 subjects was randomly assigned to one of three groups: a Tai Chi group exercise program, a computerized balance training program, and an education control group. A secondary outcome measure of the study was reduction of fear of falling, which was evaluated with the Falls Efficacy Scale pre and post-intervention. After participation in the fifteen week intervention programs, the balance training group indicated greater improvement in overall balance function however the balance training group and the control group had increased fear of falling post-intervention. There was a significant reduction in fall risk for the Tai Chi group and a significant decrease in fear of falling scores. The significant results suggest the use of Tai Chi exercises as a means of improving overall well-being and functional ability for older adults; however the lack of an in-home hazard assessment component and an individualized balance training program may have been the reason for the increased falling concerns post-intervention.

Tennstedt and associates (1998) were the first to propose an intervention strategy specifically designed to reduce fear of falling in older adults (60-100 years of age). The researchers developed a cognitive behavior program with the aim of improving self-efficacy and sense of control over falling through a structured group intervention program called “A Matter of Balance”. The intervention program promoted functional, physical and social activity while the control group consisted of a group session fall education program. Fear of falling was assessed
through the Modified Falls Efficacy Scale, a four-item scale identifying perceived control over falling and a five-item scale establishing perceived ability to manage risk of falling. The eight-session intervention program showed immediate reduction in fear of falling however this decayed by the six-month follow-up. The “Matter of Balance” program was successful in short-term reduction in fear of falling and gains in participant mobility; overall change in participant activity level or physical performance was not explored.

Wolf et al., (2001) were the first to study the effects of fear of falling after intervention with an individualized physical therapy program. Thirty-seven participants were assigned to the exercise intervention program that included bi-weekly, thirty -minute balance-training sessions while control subjects participated in an individualized activity program that included painting, writing, or woodworking. At the end of the six- week intervention, the experimental group demonstrated a significant improvement in balance function as identified on the Berg balance scale and the Dynamic Gait Index. However no significant improvement in fear of falling, depression or anxiety scores were observed between the two groups post-intervention. The authors suggested that a six- week intervention program might be too short to reduce fear of falling.

Taggart, (2002) designed a single-factor, with-in subject trial of a Tai-Chi exercise program aimed at improving balance function and fear of falling in retirement community older women. Subjects were excluded if complaints of vertigo, lightheadedness or motion sickness were indicated. Forty-five subjects received thirty minutes of Tai Chi group exercise, twice a week for three months. The researcher administered the Berg Balance Scale, Timed “Up and Go” test and the Falls Efficacy Scale pre and post intervention. The results indicated a
significant improvement in balance scores, functional mobility and fear of falling scores post-intervention however long term effects of the program were not identified.

Brouwer et al., (2003) compared the effectiveness of reducing fear of falling in an education and an activity-based program for seniors (ages 67 to 87 years). Subjects with a coexisting condition affecting balance (i.e. vestibular deficits or neurological conditions) were excluded. Fear of falling and avoidance of activities of daily living were assessed via the ABC scale and the Human Activity Profile (HAP). After a fourteen-month intervention period, participants showed improved balance confidence after participation in the programs. However, the authors stressed that education interventions alone do not improve balance performance.

Ballard, McFarland, Wallace, Holiday, and Roberson (2004) initiated a fall prevention exercise-training program for forty community dwelling older (65-89 years of age) women. Subjects were assigned to the study groups based on fear of falling scores that were assessed by the Activities Specific Balance Confidence Scale. The intervention group participated in a fifteen-week balance and leg strengthening exercise program and the control group was exposed to the exercise program for only two weeks. Significant improvements in risk of falling scores were identified for the intervention group however outcome results on change in fear of falling was not identified post-intervention.

Houghton et al., (2004) developed an Australian falls clinic staffed by geriatrician, rehab specialist, physiotherapist and a nurse. Participants were referred to the falls clinic by their general practitioner if they fell in the past or were considered at risk of falling. The clinic included extrinsic and intrinsic assessment plans and offered eight twice a week exercise and falls education classes. Of the subjects who completed the exercise program (133 out of 251), a significant improvement in balance, mobility and fear scores, as identified on the “Fast
Evaluation of Mobility, Balance and Fear” test was reported (Houghton et al. 2004). Patient satisfaction with the program was indicated with some qualitative comments; however the qualitative reports did include personal descriptions of fall experiences or the emotional reaction to fear of falling. Houghton et al. (2004) also indicated a long wait period for assessment in the falls clinic and home visits were not recommended to all subjects.

Clemson, et al., (2004) enrolled community-dwelling individuals (70 + years) who had fallen in the previous year into a comprehensive community based program called the “Stepping on Program”. The intervention used small-group learning settings to improve fall self-efficacy, encourage behavioral change, and reduce falls. The subjects consisted of 153 controls and 157 program subjects. The program subjects were divided into groups of twelve and participated in the “Stepping on Program” for seven weeks. The study used a number of falls efficacy scales including the Modified Falls-Efficacy Scale (MFES) and the Mobility Efficacy Scale. Both scales evaluated confidence in avoiding falls while performing activities of daily living, the latter having more challenging activities. The researchers reported a 31% reduction of falls for the intervention group and that these participants were able to maintain balance confidence over the follow-up period. However, the program did not improve confidence in performing basic self-care activities as identified on the Mobility Efficacy Scale.

In 2004, Liu-Ambrose and colleagues designed a group exercise program to improve balance confidence for older women (75-85 years of age) as measured by the ABC scale. Ninety-eight participants were assigned to one of three exercise programs (resistance training, agility training, or stretching) and asked to participate in the program for thirteen weeks. Results of the study indicated that the resistance training and agility training groups had significantly
higher balance confidence after the thirteen-week intervention. However, this did not directly correlate with change in fall risk.

Sattin and colleagues (2005) also initiated a Tai Chi exercise program. The randomized controlled trial included a forty-eight week Tai Chi based exercise program compared with a wellness education program. Researchers administered the FES and ABC scales at four-month intervals during the first twelve months of the study. Significant reductions in falling fears were reported for the Tai Chi intervention group at eight and twelve months, which suggested that Tai Chi intervention reduces fear of falling in older adults, however no long-term follow-up was reported beyond the intervention period.

2.3. Summary of Literature Review:

The review of literature demonstrates that the use of intervention groups, community based exercise and activities programs with a focus on home hazard and fall prevention education can reduce the rate of falls in older adults. However, not all intervention techniques reduced participants’ fear of falling.

In review of the intervention programs that explored fear of falling, there were significant differences in the methods used for the intervention programs. However, all studies with the exception of Wolf et al. (2001) and Tinetti et al. (1994) conducted group exercise programs and a majority of the studies included frail elderly (>75 years was the average age of inclusion). Wolf-Klein et al., (1988), Tinetti et al., (1994), Clemson et al., (2004) and Houghton et al. (2004) were the only studies to include home hazard assessments and Houghton et al. (2004) did not recommend this assessment for all subjects. Two studies, Taggart (2002) and Brouwer et al., (2003) excluded patients with complaints of vertigo, lightheadedness, or vestibular deficits. Only one study, Houghton et al. (2004), provided qualitative descriptions from the subject;
however this was limited to only patient satisfaction of the program. Outcome measures on the effectiveness of these programs did not include personal accounts from the participants or caregivers. It is likely that patient satisfaction and program efficacy is best addressed using qualitative interview techniques (Steadman, Donaldson, & Kalra, 2003).

In the review of the literature, only three studies, Wolf-Klein et al. (1988), Tinetti et al. (1994), and Houghton et al. (2004) were multidisciplinary fall prevention clinics. Of these three fall prevention clinics, the team members did not include an audiologist, physical therapist or neurotologist for the initial evaluation visits. Largely unexplored is whether fear-related avoidance of activities is reduced in older community-dwelling adults with a diagnosed balance disorder after involvement in a team approach (audiology, physical therapy, and neurotology) fall prevention program.

The present investigation was designed to determine if a team approach risk of falling program reduced fear of falling for older independent living individuals with a diagnosed balance disorder, and decreased their anxiety and depression. Changes in fear of their older family members falling with regard to the older subject’s family member, spouse, or significant other was also explored using both qualitative and quantitative methods.

2.4. Research Questions:

2.4.1. Research Hypotheses:

*Research Hypothesis #1:* The patients’ fear of falling as expressed by the Activities Specific Balance Confidence (ABC) scale and qualitative open-ended interview questions will be reduced as a result of diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.
**Research Hypothesis #2:** The patients perceived depression and anxiety as expressed by the Geriatric Depression Scale and the Beck Anxiety Inventory will be reduced as a result of diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

**Research Hypothesis #3:** The impact of patients’ fear of falling as expressed by the Activities Specific Balance Confidence (ABC) scale and qualitative open-ended questions on family members, significant others or spouse of the patient will be reduced after receiving an appropriate diagnosis and after receiving intervention that included fall prevention education and counseling, home hazard assessment and physical therapy.

**Research Hypothesis #4:** There will be a significant correlation between the patient’s change in fear of falling ascertained by the ABC scale and change in geriatric depression scores after participation in a team approach to diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

**Research Hypothesis #5:** There will be a significant association between the patients’ change in fear of falling expressed by the ABC scale and change in anxiety scores obtained by the Beck Anxiety Inventory after a team approach to diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.
**Research Hypothesis #6:** There will be a significant correlation between the patient’s change in fear of falling determined by the ABC scale and patients’ age after participation in a team approach to diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

**Research Hypothesis #7:** There will be a significant association between the patient’s change in fear of falling determined by the ABC scale and the number of additional medical conditions (co-morbidities) afflicting the patients after a team approach to diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

2.4.2. Null Hypotheses:

**Null hypothesis #1:** There will be no difference in patients’ fear of falling before and after a team approach to diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

**Null hypothesis #2:** The patients perceived depression and anxiety as expressed by the Geriatric Depression Scale and the Beck Anxiety Inventory will not be reduced as a result of diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

**Null Hypothesis #3:** There will be no difference from the impact of the patients fear of falling on family members, significant others or spouse of the patient before and
after a team approach to diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

*Null Hypothesis #4:* There will not be a significant correlation between the patient’s change in fear of falling ascertained by the ABC scale and change in geriatric depression scores after participation in a team approach to diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

*Null Hypothesis #5:* There will not be a significant association between the patients’ change in fear of falling expressed by the ABC scale and change in anxiety scores obtained by the Beck Anxiety Inventory after a team approach to diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

*Null Hypothesis #6:* There will not be a significant correlation between the patient’s change in fear of falling determined by the ABC scale and patients’ age before and after a team approach to diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

*Null Hypothesis #7:* There will not be a significant association between the patient’s change in fear of falling determined by the ABC scale and the number of additional medical conditions (co-morbidities) afflicting the patients after a team
approach to diagnosis and intervention that includes fall prevention education and
counseling, home hazard assessment and physical therapy.

2.5. Research Specific Aims:

Specific Aim #1: To determine the effectiveness of a risk of falling intervention
program designed to reduce FoF in older independent living adults with dizziness and
balance disorders.

Specific Aim #2: To determine via the Activities Specific Balance Confidence
Scale (ABC) administered before and after a Risk of Falling Assessment and
Remediation Program would show reduction in the FoF.

Specific Aim #3: To examine through the Beck Anxiety Inventory and the
Geriatric Depression Scale the level of anxiety and depression in the patient, due to the
FoF when administered before and after a Risk of Falling Assessment and Remediation
Program.

Specific Aim #4: To establish and to evaluate the impact of a FoF in older adults
with balance problems on everyday living for the family member, significant other or
spouse of the patient as measured through the ABC scale administered before and after a
remediation program.
Specific Aim #5: To reveal the patient’s present attitudes toward their balance problem through a qualitative interview, including sessions to understand activity level before and after a fall or FoF.

Specific Aim #6: To determine through a qualitative interview, the impact that FoF has placed on the spouse, family member or significant other and what information or support they would have liked to have available to them to help cope with the FoF.

Specific Aim #7: To determine through qualitative interviews with the adult with balance problems and FoF, their opinions about the remediation program after its completion.

Specific Aim #8: To determine through a qualitative interview conducted with the adult with FoF and their family member any changes in attitude after completion of the remediation program regarding mobility, level of confidence.
3.0. Subjects

The final sample consisted of 28 subjects (14 selected patients with a history of balance disorders and 14 family members, significant others or spouses of each patient was recruited for this study. Two participants and their spouses dropped out before entering the remediation phase. All subjects were between 55 and 85 years of age and lived independently in the research community in their own homes, apartments, or condos. Participants with a known history of balance disorders included male and female patients recruited from individuals referred to the Balance Disorders Center, Department of Otolaryngology- Head and Neck Surgery, they were asked to complete a balance disorder questionnaire (see appendix B). The principal investigator selected individuals who presented a chief compliant of dizziness (i.e. vertigo), lightheadedness, unsteadiness and or imbalance, a reported FoF, and a stated an ability to walk 10-20 meters without rest or assistance as checked on the balance disorder questionnaire.

In addition, one male or female family member, significant other, or spouse of the participant with a known history of a balance disorder was recruited for the study. In situations where there was more than one available family member the researcher choose for study the persons most interested, most willing, and most available to participate who also meet the exclusion criteria described elsewhere.

Subjects with a history of balance disorders were excluded from the study if they met any of the following exclusion criteria:

- *Unable to read or write (which would prevent reliable completion of the research questionnaires)*
• Were wheelchair dependent (which would preclude completion of the assessment tests and the remediation program)
• Were incapable of completing all phases of the study
• Had poor cognitive status (i.e. have a score <23 on the Mini-Mental State Examination), which would prevent adequate comprehension of the assessment and remediation portions of the program.
• Were in a permanent residence such as a long term care setting (i.e. nursing home or assisted living facility)
• Were unable to walk 10-20 meters without rest or assistance
• Had severe respiratory or cardiac disease (in which mild physical activity during the assessment or remediation portion could cause potential medical risk)
• Were currently on anti-coagulant therapies.

Exclusion criteria were verified by review of the Balance Disorder Questionnaire results and medical records. Finally, the presence of exclusion criterion was verified through the verbal interview taken during the initial assessment appointment with the audiologist. The Mini Mental State Examination results were also obtained during the initial assessment appointment. The patients who were excluded from the study received standard medical care for their dizziness or balance disorder complaints as recommended by the neurotologist.

Family members, significant others or spouses were excluded from the study if they met any of the following exclusion criteria:

• Were unable to read or write (which would prevent reliable completion of the questionnaires)
• Were incapable of completing all phases of the proposed study
• Had poor cognitive status (i.e. have a score <23 on the Mini-Mental State Examination) which would prevent adequate comprehension of the questionnaire and interview portion of the program
• Had a family member who was incapable of completing all phases of the study.

Exclusion criteria of family members, significant others or spouses were confirmed by verbal questioning during the initial assessment with the audiologist, and review of the Mini-Mental State Examination results for the family member.
3.1. PROCEDURES:

3.1.1. Assessment Protocol:

The selected patients (Group 1) and the family members, significant others or spouses of the selected patients (Group 2) who fit the recruitment criteria were asked to participate in a risk of falling assessment and remediation program. Group 1 participants included five male and nine female patients recruited from individuals referred to the Balance Disorders Center, Department of Otolaryngology- Head and Neck Surgery who completed a balance disorder questionnaire.

The subjects were made aware of all rights in participating in this study and were asked to sign a formal consent form during the first appointment visit after completion of the Mini-Mental State Examination. The patients (Group 1) were be scheduled for 2 half days (approximately 6 total hours) of risk of falling assessment testing conducted by a licensed audiologist and a licensed physical therapist and were asked to bring a family member, spouse, or significant other (Group 2) with them to these appointments. Risk of falling assessment testing was performed in two clinical settings. The licensed physical therapist conducted assessment testing at Advanced Physical Therapy of Cincinnati in Blue Ash, Ohio. Assessment by the licensed audiologist was performed at the Balance Disorders Center, Department of Otolaryngology- Head and Neck Surgery, Medical Arts Building in Cincinnati, Ohio.

After all assessment tests were completed, patients were scheduled for a medical evaluation by a neurotologist affiliated with the Balance Disorder Center, Department of Otolaryngology-Head and Neck Surgery. The physician reviewed all risk of falling assessment results, established a diagnosis, and made the appropriate referral for balance remediation, performed by the physical therapist. The audiologist also observed and interviewed the patient and family
3.1.2. Assessment by the Audiologist (Day 1 Assessment Testing)

Prior to the 1st risk of falling assessment appointment, Group 1 subjects were advised to not take any vestibular suppressant medications such as antivert, meclizine, central nervous system (CNS) suppressants, stimulants, sedatives, tranquilizers, or alcohol for at least 48 hours before their appointment. The purpose for discontinuing the use of vestibular suppressants prior to videonystagmography (VNG) testing during the first appointment was that nystagmus (involuntary movements of the eye that results from caloric stimulation) are suppressed by medications. It was necessary to be able to observe the nystagmus because observation of pathologic and physiologic nystagmus during vestibular testing is necessary to identify lesions of the peripheral or central vestibular system or other CNS pathways involved in the control of eye movements. The type of nystagmus (vertical or horizontal, velocity and direction) was used to identify the site of lesion in the vestibular system. All other medications required for sustaining life or reducing seizures were maintained. The neurotologist involved in the study, made decisions regarding the use or discontinuing of medications.

Patients were asked to not eat any food or drink for four hours before the appointment to reduce possible visceral activities such as nausea and vomiting that may have been brought on during portions of the VNG test. Patients were instructed to avoid wearing make-up so that mascara or other makeup products would not contaminate the VNG. The patient’s family member, significant other or spouse was asked to accompany them to the appointment, and to drive them to and from their appointments because they were off anti-dizziness medications and
may have had some residual fatigue or light headedness after testing. Appointments were made for a four-hour time block.

The audiologist reviewed the balance disorder questionnaire answers and asked a directed case history regarding onset, duration, and frequency of symptoms related to their balance complaints. A history of falls was reviewed. Patients and the family member, significant other or spouse were asked to complete the Mini Mental State Examination (MMSE) to assess cognitive ability to follow simple verbal and written commands which was necessary for the completion all questionnaires, interviews, and intervention techniques of the risk of falling program (see appendix C).

*The Mini Mental State Examination (MMSE)* evaluated orientation, attention, immediate and short-term recall, the ability to follow simple verbal and written commands through a series of twelve questions (Anthony, LeResche, Niaz, Von Korff, & Folstein, 1982; Crum, Anthony, Bassett, & Folstein, 1993). A point was assigned for each item of the MMSE, with a total of 30 possible points. Using a cutoff score of 23, the sensitivity and specificity of the MMSE has been reported to be 87% and 82% respectively (Anthony et al., 1982).

Group 1 subjects completed a series of questionnaires administered by the audiologist that included the Geriatric Depression Scale (see appendix D), the Beck Anxiety Inventory (see appendix E), the Home Safety Checklist for Detection of Fall Hazards (see appendix F) and The Activities-Specific Balance Confidence (ABC) Scale (see appendix G). Subjects read each questionnaire along with the audiologist who verbally read the instructions, questions, and repeated the responses.

*The Geriatric Depression Scale:* Older adults with balance disorders and reported FoF may also experience clinical depression. This scale was used as a valid and reliable measure of
depression in all test subjects. The scale consists of thirty yes/no items that ask the subject to answer how they felt over the past week (Yesavage et al., 1983). One point was given for each depressive response for a total of 30 possible points. A score of 11 or greater may be an indication of depression and the 11 points cut off rate has a sensitivity of 84% and specificity of 95% (Yesavage et al., 1983).

The Beck Anxiety Inventory (BAI) Copyright(C) 1987, 1990, 1993 by Aaron T. Beck reproduced with permission of the publisher NCS Pearson, Inc. all rights reserved, that took approximately five minutes to complete is a screening tool consisting of 21 items describing a common symptom of anxiety. All subjects were asked to rate how he or she has been bothered by the symptoms. The responses range from 0 (not bothered at all) to 3 (severely, it bothered me a lot). There was a total of 63 possible points for this scale. The Beck Anxiety Inventory is considered a reliable and valid measure to discriminate anxiety from depression in adults (Beck, Epstein, Brown, & Steer, 1988).

The Home Safety Checklist for Detection of Falls Hazards: A number of fall incidences result from slips or trips in the home that do not pertain to an individual’s balance (Balah, Spain, Scocotch, Jacobson, & Bell, 1995). The Home Safety Checklist for Detection of Falls Hazards developed by the U.S. National Safety Council, (1982), was used to determine safety hazards in the home. The checklist was used to help identify areas of potential fall hazard in the subjects’ homes. Such an assessment can identify modifiable risk factors, such as rugs, floor mats, or poor lighting that can contribute to falls in older adults. All ‘no’ responses were given one point for a total of 63 points. Scores of 15 or higher suggest that the home environment is considered hazardous, at risk for falling. For this study, the checklist results were subsequently explained to
the subjects by the audiologist at places the occupant lived at the time of the home environment visit to properly counsel on reducing home hazards.

The Activities-Specific Balance Confidence (ABC) Scale is a 16-item scale that determines an individual’s confidence in maintaining his or her balance while performing activities of daily living inside and outside of the home (Powell & Myers, 1995). Responses range from 0% (no confidence) to 100% (completely confident). Each subject’s score is averaged over the 16 items to provide a score out of 100. The maximum score attainable is 100, which represents no FoF and a minimum score of 0 indicates a total lack of balance confidence or complete fear of falling. The ABC scale has good test-retest reliability (Powell & Myers 1995). ABC scores of 80 and above are indicative of highly functioning, physically active older adults (Myers, Fletcher, Myers, & Sherk, 1998).

Vision Testing

All Group 1 subjects had near vision acuity testing determined at 14 inches away from the patient’s face and the patient was asked to cover an eye and read out loud the smallest line of letters that were legible on the card. The process was completed with and without corrective lenses. In addition, the examiner determined the date of the patient’s last eye examination and whether visual field defects were assessed by an eye specialist.

Audiometric Testing

Group 1 subjects participated in an audiometric examination. Otoscopy was performed to identify any abnormalities, perforations, or occlusions of both external ears. All pure tone and speech audiometry was performed on GSI-61 standard audiometer via Ear Tone 3A insert earphones. Speech audiometry testing included a speech reception test and word recognition test. The speech reception test determined the lowest decibel level (i.e. speech reception
threshold, SRT) at which the patient was able to hear and repeat familiar two syllable words at least 50% of the time. Once the SRT was established for both ears, the examiner asked the patient to repeat phonetically balanced monosyllabic words at a comfortable sensation level (i.e. 35 to 40 dB HL above the SRT). The patient’s response to each word was scored as either correct or incorrect and a percentage of correct responses were calculated to determine the patient’s word recognition score (WRS). AUDiTEC® auditory tests CD were used for all speech audiometry testing including the spondee word list A & B and the W-22 monosyllabic word lists.

Air conduction thresholds were evaluated at octave frequencies 250-8KHz. The patient was asked to press a button whenever he or she heard a tone. The lowest intensity level at which the patient heard the tone at least 50% of the time was recorded on an audiogram. A bone oscillator was placed on the patient’s mastoid bone and the patient was instructed to press the button again when they heard a tone. Bone conduction thresholds were evaluated at octave frequencies 500-4KHz and were also recorded on the audiogram.

Tympanometry and acoustic reflex thresholds were performed on GSI-33, middle ear analyzer. During tympanometry testing, a probe tone of 226 Hz was introduced into a hermetically sealed ear while ear canal pressure was varied from +200 daPa to -200 daPa. The test provided an objective indication of the overall mobility of the patient’s tympanic membrane and ossicular chain. Contralateral acoustic reflex testing was performed by presenting a high intensity tone at varying frequencies (500, 1000, and 2000 Hz) via a probe in one ear and a headphone on the opposite ear. Acoustic reflex testing provided an indication of the integrity of the auditory pathway known to cause contraction of the stapedius muscle in response to a loud sound.

Balance Testing
Balance assessment was conducted for all Group 1 subjects. Overall balance system integration was assessed with Equitest Platform Posturography System, version 5.08b, Neurocom® International. The testing was carried out according to the manufacturer’s recommendations. Height of the subjects was calculated in inches and age of the subject was entered for analysis based on age/height normative data. All patients were asked to remove their shoes and socks prior to placement in the platform device. Each subject was fitted in a harness prior to testing, which helped support the patient in the event of a fall. The patient was asked to step up onto a forceplate facing into the machine. The subject’s harness was loosely attached to straps connected to the machine. The loose attachment provides support if the subject should fall, but does not provide aid in maintaining an upright stance during the balance testing. Once the subject is securely strapped into the platform machine, the patient was instructed to keep his/her hands at their sides and look straight ahead. The patients completed all portions of the sensory organization test component and motor control test component of the platform posturography exam. The sensory organization test (SOT) assesses the patient’s balance performance during a sequence of six, increasingly difficult, sub-tests. The subtests are designed to evaluate the patient’s ability to effectively use visual, vestibular, and somatosensory inputs to maintain balance. The subtests will include combinations of eyes open, eyes closed, and conditions with a moving sway reference (i.e. movement of visual background and movement of forceplate). The subjects completed three trials of each of the six subtests. Each trial lasted for twenty seconds. During the motor control test (MCT), posterior and anterior surface perturbations were performed. The patient was instructed to keep his/her eyes open during all portions of this test. The forceplate moved forward and backward in short, medium, and large perturbations. There were three trials of each translation, all at a fixed velocity. Due an
equipment malfunction during the data collection phase of this study, overall balance system integration was assessed with the modified clinical test of sensory interaction of balance (CTSIB). Based on the original work by Horak and Shumway-Cook (1986), patients were asked to keep their hands at their side and stand on the floor with eyes open (for 30 seconds), stand on the floor with eyes closed (for thirty seconds), and stand on a 5” thick, 18” square foam pad (density of 3.75 lbs/cubic feet) with eyes opened and closed (for thirty seconds). Modified CTSIB results have a high sensitivity and specificity of detecting vestibular dysfunction patterns when compared with the Equitest Platform Posturography results on sensory organization test subtests 4 & 5. (Weber & Case 1993; Shepard & Telian, 1996)

Balance function assessment was performed for all Group 1 patients. Assessment of the extent of impaired balance function was determined with videonystagmography (VNG) testing. VNG testing was completed with ICS Medical Charter VNG for Windows. The irrigator used for this study was ICS Medical Charter Water Caloric Stimulator NCI-480. Subjects were set up for the VNG by placing goggles with a video camera system to project images of eye movements on a video monitor and to record these specific eye movements. Once the goggles were placed on the subject, the examiner asked the subject to follow a pen with their eyes to check for conjugate eye movement. In the event that the subject did not display conjugate eye movement, monocular recordings were obtained. Subjects were calibrated for the VNG test. This included; sitting 4 feet from a light bar (plus or minus 2 inches), and watching the light move on the light bar horizontally and vertically with their eyes only. The measurement of interest with the VNG test was the slow-component eye velocity of nystagmus, which is generated from the vestibular-ocular reflex. The VNG test battery included evaluation of the central vestibular system, through the ocular-motor tests (lateral and vertical gaze stability tests, smooth pursuit tracking, and
saccade testing). Smooth pursuit tracking evaluated the patient’s ability to track a moving object (red light) that moved back and forth on a light bar with smooth eye movements only. The patient was instructed to follow the red light with their eyes only, not their head as it moved back and forth across the light bar. The red light increased in velocity and moved in a back and forth fashion for fifty seconds. Saccade testing was used to evaluate rapid movements of the eye to keep an object of interest (red light) on the fovea. The red light jumped to random points of interest on the light bar during the saccade test. The instructions for the saccade test asks the patient to follow the light with their eyes only as it moves to different positions on the light bar for approximately thirty seconds. Lateral and vertical gaze stability testing evaluated the patient’s ability to fixate on a still target (red light) as it moves from a center position. The red light jumps to the top, bottom, left and right positions on the light bar. The patients were asked to follow the light with their eyes only and keep their eyes fixed on the light for twenty seconds. Spontaneous nystagmus was evaluated by recording eye movements with fixation removed. The examiner asked the patient to keep his or her eyes open (mentally fixating on a target) while a shield was placed over the patient’s goggles creating darkness.

Positional and positioning tests were included in the test battery. Dix-Hallpike maneuvers were performed to the right and left sides provided that the patient did not have a positive vertebral artery test that could have indicated a compromise to the vertebral artery. To properly perform a vertebral artery test, patients were asked to sit at the end of the examination table, lean forward, and put their elbows on their knees. The examiner asked the patient to extend their neck by sticking their chin out. Once the patient was placed in this position, the patient was asked to rotate their neck as far as they could to the right and left. Any indications of
disorientation, problems with speech production, or complaints of near-syncope or syncope were recorded as positive and Dix-Hallpike maneuvers were not executed.

The Dix-Hallpike maneuvers rapidly moves the patient from a seated position into a head hanging position with eyes open and head turned to either the right or the left. The examiner looks for any objective indications of nystagmus or subjective complaints of dizziness while in the head hanging position. After approximately thirty seconds, the examiner brings the patient back to the original sitting position. Positional testing investigates the effect of different head positions within gravitational field. The examiner gently places the patient in a head hanging, supine, head right, head left, body right, and body left position with fixation removed. The examiner records any indications of nystagmus (i.e. horizontal or vertical).

Caloric testing was the last subtest in the VNG test battery. During the caloric subtest, water was placed in the subject’s ears. The order of irrigation was right warm, left warm, right cool, and left cool water. The water was used to irrigate the external auditory canal, which stimulates the horizontal semicircular canal (part of the peripheral vestibular system) in the inner ear. The subject is in the supine position, and the head was elevated 30° so the horizontal semicircular canals are parallel with the horizon. A towel and basin was placed under the subject’s ear to catch water that came out of the ear after irrigation. The subject is instructed that they could have their eyes open for the test, with a cover placed over the goggles to create darkness. The subject feels 250 ml of warm water (44° C) enter their ear (one ear at a time) for thirty seconds. Once the irrigation was completed the subject is asked to perform an alerting task (such as naming animals etc…). The procedure was then repeated using cool water (30° C). Nystagmus is recorded for both warm and cool water irrigations. The testing lasts for approximately two
minutes per ear for both warm and cool water. There is a five-minute rest in between each of the irrigations.

Group 2 (Family member/Spouse) Assessment

The investigator administered questionnaires to the family member, spouse, or significant other (Group 2), which included the Home Safety Checklist for Detection of Fall Hazards, and a modified version of The Activities-Specific Balance Confidence (ABC) Scale (see appendix H). The modified ABC scale asks the family member or spouse to answer questions about how confident they are that their family member is able to perform activities of daily living in and around the home without losing his or her balance.

3.1.3. Assessment by the Physical Therapist (Day 2 Assessment Testing):

Group 1 physical therapy assessment began with a thorough review of present symptoms and complaints from the patient. The therapist asked questions targeting type and number of current medications, current assistive devices used by the patient, and a comprehensive fall and imbalance history. Patients were asked to rate their current dizziness symptoms on a scale of 0 to 10 (0 = none; 10 = severe symptoms). The therapist asked the patient to complete the Dizziness Handicap Inventory (see appendix I).

The Dizziness Handicap Inventory (DHI) is a scale consisting of 25 questions used to determine a patient’s self-perceived handicap from their dizziness and/or balance disorder complaints (Jacobson & Newman, 1990). The DHI is divided into three subdivisions; emotional, physical, and functional. Patients answer yes, no, or sometimes to each of the twenty-five questions. Each ‘yes’ answer receives four points; ‘sometimes’ receives two points, and ‘no’ answers receive a score of zero. There is a total of 100 possible points for this scale. Jacobson
and Newman, 1990, established that the scale has good validity and test-retest reliability (Pearson’s r = .97; p < 0.0001) as a tool to determine overall perceived handicap from dizziness and/or balance problems.

The physical therapist’s risk of falling assessment for Group 1 subjects included evaluation of all intrinsic factors that may contribute to falls in older adults. These factors include a history of balance disorders, decreased muscle strength and flexibility, abnormal gait speed or gait patterns, and somatosensory and coordination problems (Baloh, Jacobson, Enrietto, Corona, & Honrubia, 1998). The physical therapist also performed a musculoskeletal examination including lower extremity strength testing, flexibility testing, reflex testing and sensation testing. Lower extremity strength with manual muscle testing was graded based on a scale from 0-5. A score of 5/5 was considered normal and 0/5 indicated no muscle contraction. All strength testing included flexion and extension of the muscles. Flexibility testing was completed to assess flexibility of the leg muscles to determine if the muscles were tight, preventing the joint from accomplishing full motion. Flexibility of the hamstrings, gastrocnemius, and soleus muscles in addition to hip flexors was examined. Evaluation of reflexes was conducted by asking the patient to relax while the therapist tapped different areas of the quads and Achilles heels to determine if there was a reflex response. Sensation was assessed with light touch to the anterior thigh, distal anterior thigh, medium lower leg, and dorsum of the foot and lateral foot. The therapist also screened for cerebellar coordination to rule out any central nervous system dysfunctions. This included finger to nose testing, heel to shin testing, and rapid alternating movements of the hands.

During the initial assessment session, each Group 1 subject performed oculomotor and vestibular-ocular reflex function tests as well. Oculomotor assessment includes saccade and
smooth pursuit testing. The examiner asks the patient to follow a finger with their eyes only as it moves back and forth or to random places. The Halmagyi Head Thrust test was used to evaluate function of the vestibular-ocular reflex (VOR). To properly administer the head thrust test, the patient is asked to stare at the examiner’s nose while their head is quickly rotated in an arc to the right or left side. Any indications of a corrective saccade after the movement of the head may indicate reduced VOR gain (Shepard & Telian, 1996).

Postural hypotension screening, Functional Reach Test and the Timed Up and Go test was administered to Group 1 subjects during the physical therapy evaluation. Individuals with postural hypotension often report dizziness or lightheadedness when changing positions (i.e. moving from a sitting position to a standing position) which can put the individual at risk for falling (Herdman, 2000). Blood pressure was taken while the patient was in a supine position and after the patient was moved to a standing position. “A drop of 20 or more mm Hg is indicative of postural hypotension”(Herdman, 2000). The Timed Up and Go test (TUG) consisted of asking the patient to stand from a chair with armrests, walk three meters, turn around and sit back in the chair (Podsiadlo & Richardson 1991). A stopwatch was used to time the patient while they complete the test. Scores of < 10 seconds were considered within normal limits and scores ≥14 seconds may put the individual at risk for falling (Shumway-Cook, Brauer, & Woollacott, 2000). The functional reach test examines how far a patient is able to extend their arm and reach without losing their balance and taking a step (Duncan, Studenski, Chandler, & Prescott, 1992). The distance the individual is able to reach is recorded in inches. Those individuals who could not extend their arm greater than six inches were considered to be at risk for falling (Duncan et al. 1992).
Changes in gait speed and gait stride length are common in elderly individuals and can put the individual at risk for falling (Woo et al., 1995). The therapist administered examination of gait length and velocity. Group 1 subjects wore a safety belt during all portions of gait testing. This belt enabled the physical therapist to safely catch the patient in the event of a fall. Gait speed was measured by asking the subject to walk 9 to 10 meters. A stopwatch was used to record the gait speed of the middle 6 meters. The number of meters completed per second determined velocity. The patient was also asked to walk within lines for 20 feet. Any gait deviations such as veering to the right or left and the overall movement strategy of the patient were noted (Herdman, 2000).

Static and dynamic balance tests were administered to assess the patient’s balance, as there is a high correlation between impaired balance and risk of falling in elderly individuals. Patients continued to wear a gait belt during all static and dynamic tests. The Berg Balance Test is a 14 item static balance scale that includes sitting, standing and reaching activities aimed to measure the patient’s ability to maintain their balance while performing the tasks (see appendix J). The scores ranged from 0 (inability to perform), to 4 (able to perform task safely). There is a total of 56 possible points for this scale. A score of $\leq 45$ points indicated that the patient is at risk for falling. The cutoff score has a specificity of 91% and sensitivity of 82% (Berg, Wood-Dauphinee, Williams, & Maki, 1992; Bogle Thorbahn & Newton, 1996). The Dynamic Gait Index (DGI) was used to examine dynamic balance. The DGI includes eight gait exercises (see appendix K). Scoring ranged from 3 (normal gait function) to 0 (severe gait dysfunction) with a total possible score of 24. Shumway-Cook et al. (1997) identified that a score of 19 or less indicates increased risk of falling in older adults.
3.1.4. Medical Evaluation by the Neurotologist (Medical Evaluation Appointment):

The neurotologic evaluation began with a careful review of all risk of falling assessment test results. The neurotologist evaluated the patient’s complete clinical history including the chief complaint, duration and severity of the present illness, thorough review of systems and current medications to establish a diagnosis. Case history was used to identify medical conditions such as elevated or decreased blood pressure; respiratory disorders, metabolic problems and obesity that could impact balance function. A complete head and neck examination including assessment of the cranial nerve function and comprehensive neurologic exam was preformed. Several office tests of balance system function may have been used during the evaluation including: Halmagyi head thrust, head shake, Dix-Hallpike Maneuver, evaluation of spontaneous nystagmus and positional nystagmus with Frenzel lenses and ocular-motor tests. Certain vestibular-spinal tests and postural control tests such as the Romberg test; gait evaluation, musculoskeletal assessment, and cerebellar tests were also included in the comprehensive neurotology test battery. The information obtained from the office evaluation was integrated with results from balance testing and the risk of falling assessment tests to determine a diagnosis. Further diagnostic evaluations and referrals for other medical evaluations (i.e. ophthalmology, cardiology), medication modifications, and or therapeutic measures that may have been appropriate for the patient were also made. The neurotologist referred all patients who meet the inclusion criteria for the study to the licensed physical therapist. Those patients received the standard physical therapy administered to patients with balance disorders described elsewhere in this protocol. All of those patients excluded from the study received the standard of care for patients with balance disorders as recommended by the neurotologist.

3.1.5. Qualitative Assessment (in home interview and observation)
After obtaining appropriate permission, the researcher scheduled a time to observe and interview the Group 1 subjects and a family member, spouse, or significant other in their home before they began the remediation portion of the risk of falling program. The patients were also informed of a follow-up interview that would be scheduled at a later time after they participated in the remediation portion of the program. The researcher separately interviewed the participant and the family member, significant other or spouse (see appendix L for a copy of the interview guide). An audiotape recorder was used to record all the interviews. The researcher counseled the patient and the family member or spouse on the results of the Home Safety Checklist for Detection of Fall Hazards to reduce the risk of falling in their home environment. The researcher also mailed a letter with fall prevention tips to the patient’s home after completion of the first in-home visit (see appendix M) and called the participants to check on progress/answer any concerns about the program.

3.1.6. Description of the Balance Disorders Remediation Program

Length of participation in the program depended on individual objectives. On average the participants of this research study participated in the physical therapy program for six to ten weeks. Therapy sessions were planned based on the results of the patient’s risk of falling assessment results. The therapist constructed a therapy plan outlining the objectives of the current therapy session, exercises introduced for the session, and plans for the next session. The sessions included components of habituation, gaze stability, balance mobility and strength and endurance training that were recommended by Shepard, Telian, & Smith-Wheelock (1990). Habituation exercises were designed to repeatedly expose the patient to stimuli that may have provoked their dizziness sensation, such as performing certain head movements. (Shepard & Telian, 1996) Hand-eye coordination exercises were incorporated into the remediation program
for individuals with visual-vestibular interaction disorders to improve gaze stability (Shepard & Telian, 1996). Walking exercises such as walking with head turned to the right or left and walking in-between cones were prescribed to improve dynamic balance. Strengthening and endurance exercises were part of the remediation program. These exercises are of great importance for elderly patients, in particular for those who have become immobile due to a FoF. Environmental recommendations and counseling on safety in and out of the home was another aspect of the remediation program.

During the initial vestibular/balance rehabilitation evaluation, the physical therapist reviewed all assessment test results, medical history and results of questionnaires such as the Dizziness Handicap Inventory. The physical therapist designed a specific program and targeted the program to the patient’s main complaints. The physical therapist asked the patient to perform exercises that targeted the chief complaint and functional deficit at home. The exercises might have included, but were not limited to: instructing the patient to walk around or over an object, walk with head turns, and move from a seated to standing position, walk in a circle, catch a beach ball, and look quickly from one index card to another with eyes only.

The subsequent vestibular/balance rehabilitation visits consisted of observing the patient performing the prescribed exercises and determining if modifications were needed. Additional exercises that were specific to the target goals were taught. Frequency and duration of the exercises were modified according to the patient’s progress. The Timed Up and Go Test, Berg Balance Test, Functional Reach Test, and the Dynamic Gait Index were re-administered prior to discharge from the program.

3.1.7. Completion of Risk of Falling Program Assessment
After participation in the balance disorder remediation program, the audiologist scheduled the follow-up appointment to observe and interview the Group 1 subjects and their family member, significant other or spouse in their home. The researcher interviewed each participant separately (see Appendix N for a copy of the interview guide). The Group 1 participants’ also completed another series of questionnaires administered by the audiologist that included: The Geriatric Depression Scale, Beck Anxiety Inventory, and the Activities-Specific Balance Confidence Scale. The family member, spouse or significant other completed the Activities-Specific Balance Confidence Scale after completion of the physical therapy intervention.

3.2. Data Analysis and Data Monitoring:

Questionnaire responses were entered into SAS (Statistical Analysis System) database, where all statistical analysis was performed. Descriptive statistics (means, medians, and standard deviations) evaluating pre and post-intervention test results, pre and post – intervention scores on the ABC scale, Geriatric Depression scale and the Beck Anxiety Inventory were obtained. The Wilcoxon Signed Ranks Test for paired data was used for comparison of baseline and post-intervention ABC, Geriatric Depression and Beck Anxiety Inventory raw score results. The Spearman’s $r$ correlation coefficient was used to determine the extent to which change in fear of falling (ABC scores post intervention) was associated with changes in scores of depression and anxiety post intervention. Spearman’s $r$ correlation coefficient was also used to analyze change in fear of falling (ABC scores post intervention) and other factors (age and co-morbidities).

All audiotape recordings were transcribed using microethnographic procedures. Data analyses of all observation field notes were analyzed according to Bogdan & Biklen (1998). Transcripts and observational field notes were reviewed and coded to establish themes for the
study. Collection of data was designed so that no confidentiality or privileged information was breached or utilized inappropriately for this research. The risks to individual subjects and families were minimized and privacy rights protected through: (1) personal identifiers such as name, address, medical record number or social security number was excluded from all data collected. (2) Only the primary investigator and study advisor had access to collected data.
CHAPTER 4
Results

4.0. SUBJECT CHARACTERISTICS

A total of 32 subjects (16 from Group 1) and (16 from Group 2) initially entered the study. Of these, two participants and their spouses dropped out before entering the remediation phase of the study. Table 3 lists the Group 1 sample characteristics. Sixty-four percent of the patients were women, the mean age was 69.1 years (range 58-82 years), seventy-nine percent lived in their own home, and mean years of education was (12.2). The presence of co-morbidities ranged from 5-12, with a mean of (8.2) and seventy-nine percent of the patients were on more than four medications (6.2 mean # of medications).

<table>
<thead>
<tr>
<th>Table 3: Group 1 Sample Characteristics</th>
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<tbody>
<tr>
<td>Characteristic:</td>
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<tr>
<td>Age 69.1 9.02 (56-82)</td>
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<tr>
<td>Education in # of years 12.2 2.19 (9-16)</td>
</tr>
<tr>
<td># of co-morbid conditions 8.2 2.39 (5-12)</td>
</tr>
<tr>
<td># of medications 6.2 4.47 (2-19)</td>
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<tr>
<td>Gender Percentage of Sample</td>
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<tr>
<td>Female 9</td>
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<td>Condominium 3</td>
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Key: SD = Standard Deviation, * Co-morbidities included: hearing loss, diabetes, arthritis, vision loss, memory loss, fatigue, Parkinson’s disease, multiple sclerosis, hypertension, thyroid disease, tumor or cancer, circulation problems, stroke, heart disease, depression, osteoporosis, headaches, pulmonary/respiratory problems, hip/leg problems, neck or back problems, psychiatric problems, seizures, and indication of a recent surgery.
4.1.

ORIENTING SUBJECT DESCRIPTIONS

A participant description of balance disorder history was produced for all fourteen (Group 1) participants. These descriptions were derived from medical chart notes and interviews with the participants. A summary of the orienting descriptions is found in Table 4.

**Subject 1**: 58-year-old female reported symptoms of motion-provoked dizziness with associated unsteadiness. She was diagnosed with a Meniere’s like syndrome in the early 1980’s, and underwent endolymphatic mastoid shunt surgery. Over the following twenty years she has been symptom free. In June 2005 she described a vertigo attack with associated symptoms of nausea, headache, and blurred vision. Since that episode, she stated that she “stagger” and “walks as if she was drunk”. Overall balance symptoms were described as a mild disability and average symptom intensity is rated as a 5 on a 10 point scale, with 1 = no symptoms and 10 = severe symptoms. Other relevant medical history included arthritis, diabetes, depression, memory loss, and allergies.

**Subject 2**: 79-year-old male presented with a chief complaint of imbalance and a history of falls and near falls. He reported a gradual onset of symptoms over the past few years with an increase in unsteadiness in the past 6-9 months. He was sent to the emergency room in May 2005 for a severe fall outside his condo. Overall balance symptoms were described as a long-term disability and average symptom intensity scale score of 9 out of 10. He indicated that he was unable to perform activities of daily living inside and outside of his home. Other relevant medical history included hypertension and minor back pain.
Subject 3: 64-year-old female complained of an acute history of unsteadiness, falls, and fear of falling. She reported feeling unsteady while standing and walking and disoriented during certain changes in positions such as lying down from sitting and sudden movements of her body. Relevant medical history revealed back and neck problems and headaches. Balance symptoms were described as moderately disabling, disrupting usual duties of everyday living and average symptom intensity scale score of 5 out of 10.

Subject 4: 65-year-old female presented with a chief complaint of unsteadiness, history of four serious falls, and memory problems (initial onset Spring 2005). She reported that she tended to fall to the left. Other medical history indicated hydrocephalus, hypertension, headaches, sinusitis, asthma, arthritis, hip bursitis, and high-frequency sensorineural hearing loss. Balance symptoms were described as moderately disabling and disrupting usual duties of everyday living and a score of 8 out of 10 on the average symptom intensity scale.

Subject 5: 82-year-old-male indicated a gradual onset of imbalance when standing and walking. He reported one severe fall (4 months prior to balance assessment), and near-falling experiences. He also described mild episodes of lightheadedness when moving from a sitting to standing position. He explained that his balance symptoms started six months prior to assessment and that he did not use any medications for his complaints. Other relevant medical history included: hypertension, coronary artery disease, circulation problems, respiratory problems, and family history of migraines. Symptoms were described as mildly disabling,
disrupting social and exercise activities. Average symptom intensity was rated as a 6 on a 10 point scale, with 1 = no symptoms and 10 = severe symptoms.

**Subject 6:** 67-year-old-male reported a gradual onset of unsteadiness when standing or walking. He reported that he veered to the right when walking. He also indicated six near-falling episodes and a fear of falling. Other relevant medical history indicated a previous neck injury, migraines, asymmetric hearing loss, hypertension, and congestive heart failure. Balance symptoms were described as a moderate disability, disrupting usual duties of everyday living for a scale score of 8 out of 10.

**Subject 7:** 74-year-old-female presented a chief complaint of vertigo and history of falls. Initial onset of symptoms was in 2004 after a brain concussion. Symptoms were described as spinning sensations followed by imbalance. She described an inability to walk without holding onto something to keep from falling. She has a history of diabetes, stroke, hypothyroidism, sensorineural hearing loss, and family history of Meniere’s disease. Overall balance symptoms are described as a slight disability with a score of 5 out of 10 on the symptom intensity scale.

**Subject 8:** 72-year-old female presented a chief complaint of imbalance and intermittent lightheadedness, for the past year. She described her symptoms gradually worsening and states it was 9 out of 10 in severities. She has had a substantial history of falls and near-fall episodes. She used a cane. Past medical history includes type II diabetes mellitus, osteoarthritis, anxiety disorder, Parkinson’s, hypertension, arthritis, fatigue and some memory loss. Her balance
symptoms were described as a severe disability, disrupting usual duties of everyday living. She rated her average symptom intensity as a 10 out 10.

Subject 9: 78-year-old man presented with a chief complaint of hearing loss and imbalance. In 1998, he was diagnosed with non-Hodgkin’s lymphoma and received chemotherapy. Other relevant medical history includes: arthritis, depression, and back and neck problems (he described decreased range of motion in the neck). He reported one fall experience and three near-fall episodes. His overall balance symptoms were described as mildly disabling, allowing for completion of usual work duties, but disrupting social and/or exercise activities. He had a score of 4 out of 10 on the symptom intensity scale.

Subject 10: 56-year-old man described his balance history as vertigo attacks that occurred several times a day and lasted minutes to an hour in duration. He had no warning that the attacks were about to start. He described the vertigo occurring when standing, lying down, going from a sitting to standing position, when looking up, when bending over, when turning his head to the right or left and after physical exertion. During the dizzy spells he experienced lightheadedness, unsteadiness when walking or standing and a tendency to fall in all directions. He was seen by his family physician six times and was given an antibiotic for his symptoms. Average symptom intensity is rated as a 10 on a 10-point scale and overall balance symptoms were described as a long-term disability.

Subject 11: 70-year-old female presented a chief complaint of “shaking” all over when standing and sometimes when walking. She described the initial onset of gait and postural
instability after motor vehicle accident in 1967. Her symptoms increased during the early part of 2000. She reported one serious fall with associated injuries. Overall symptoms are described as a long-term disability and her symptom intensity score was 9 out of 10 points. Her medical history included headaches, anxiety, and profound sensorineural hearing loss in the right ear.

Subject 12: 57-year-old female with chief complaint of dizziness described as true vertigo, with associated visual disturbances and presyncopal episodes. She also reported tinnitus and fluctuating bilateral hearing loss. She felt her symptoms started after a motor vehicle accident in 2003 where she suffered a whiplash injury. She has had multiple falls, as often as once a day. Other relevant history included: headaches, problems sleeping, fatigue, and not wanting to get up in the morning. Average symptom intensity was rated as a 10 on a 10-point scale, and her balance symptoms were reported as a severe disability.

Subject 13: 82-year-old female presented a chief complaint of positional vertigo (brief attacks of vertigo following positional changes such as sitting up from laying, standing up from sitting, bending down, and leaning forward. She also reported significant unsteadiness while standing or walking and a history of falls with injuries. She uses a cane for stability. Her symptom intensity score was 8 out of 10 and balance disorder symptoms were described as a moderate disability.

Subject 14: 64-year-old female, referred by her primary care physician to the balance disorder center, presented with a chief complaint of unsteadiness while walking or standing, a history of falls and fear of falling. Her symptoms were described as a moderate disability, interrupting activities of daily living with a score of 8 out of 10 on the symptom intensity scale. Relevant
medical history included a benign rightward anterior clinoid meningioma. Subject 14 described daily occurrences of near-fall experiences. She stated that she felt like a rubber ball bouncing into walls as she walked from the kitchen through a hallway into the bedroom.

Table 4: Summary of Subject Orienting Descriptions for Group 1 Subjects

<table>
<thead>
<tr>
<th>Subject No.</th>
<th>Age (years)</th>
<th>Gender</th>
<th>Duration of Symptoms</th>
<th>No. of Falls</th>
<th>Description of Balance Problem</th>
<th>Diagnosis</th>
<th>Selected Family Member Spouse, or Significant Other for Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>58</td>
<td>F</td>
<td>1 year</td>
<td>1</td>
<td>Motion-provoked dizziness &amp; unsteadiness</td>
<td>Vertigo, peripheral origin &amp; recurrent vertigo</td>
<td>Husband</td>
</tr>
<tr>
<td>2</td>
<td>79</td>
<td>M</td>
<td>1 year</td>
<td>4</td>
<td>Unsteadiness when standing/walking</td>
<td>presbystatis</td>
<td>Wife</td>
</tr>
<tr>
<td>3</td>
<td>64</td>
<td>F</td>
<td>3 years</td>
<td>2</td>
<td>Unsteadiness when standing/walking</td>
<td>Vertigo, peripheral origin</td>
<td>Husband</td>
</tr>
<tr>
<td>4</td>
<td>65</td>
<td>F</td>
<td>1 year</td>
<td>4</td>
<td>Unsteadiness when standing/walking</td>
<td>Recurrent vertigo</td>
<td>Husband</td>
</tr>
<tr>
<td>5</td>
<td>82</td>
<td>M</td>
<td>6 months</td>
<td>1</td>
<td>Unsteadiness when standing/walking</td>
<td>Vertigo, central origin</td>
<td>Wife</td>
</tr>
<tr>
<td>6</td>
<td>67</td>
<td>M</td>
<td>1 year</td>
<td>1</td>
<td>Unsteadiness when standing/walking</td>
<td>presbystatis</td>
<td>Wife</td>
</tr>
<tr>
<td>7</td>
<td>74</td>
<td>F</td>
<td>2 years</td>
<td>2</td>
<td>Vertigo attacks &amp; unsteadiness when standing/walking</td>
<td>Recurrent vertigo</td>
<td>Daughter</td>
</tr>
<tr>
<td>8</td>
<td>72</td>
<td>F</td>
<td>1 year</td>
<td>&gt;10</td>
<td>Unsteadiness when standing/walking &amp; lightheadedness</td>
<td>Vertigo, peripheral origin</td>
<td>Daughter</td>
</tr>
<tr>
<td>9</td>
<td>78</td>
<td>M</td>
<td>8 years</td>
<td>1</td>
<td>Unsteadiness when standing/walking &amp; hearing loss</td>
<td>Recurrent vertigo</td>
<td>Wife</td>
</tr>
<tr>
<td>10</td>
<td>56</td>
<td>M</td>
<td>3 months</td>
<td>1</td>
<td>Vertigo attacks &amp; unsteadiness when standing/walking</td>
<td>vestibular neurontitis</td>
<td>Wife</td>
</tr>
<tr>
<td>11</td>
<td>70</td>
<td>F</td>
<td>30 years (increase since 2000)</td>
<td>1</td>
<td>Shaking sensation when standing/walking</td>
<td>Vertigo, peripheral origin</td>
<td>Husband</td>
</tr>
<tr>
<td>12</td>
<td>57</td>
<td>F</td>
<td>3 years</td>
<td>&gt;10</td>
<td>Episodic vertigo spells, unsteadiness, presyncopal episodes</td>
<td>Recurrent vertigo</td>
<td>Husband</td>
</tr>
<tr>
<td>13</td>
<td>82</td>
<td>F</td>
<td>2 years</td>
<td>3</td>
<td>Episodic vertigo spells &amp; unsteadiness when standing/walking</td>
<td>Vertigo, peripheral origin</td>
<td>Daughter</td>
</tr>
<tr>
<td>14</td>
<td>64</td>
<td>F</td>
<td>3 years</td>
<td>3</td>
<td>Unsteadiness when standing/walking</td>
<td>Vertigo, central origin</td>
<td>Husband</td>
</tr>
</tbody>
</table>
4.2. QUANTITATIVE RESULTS

Fall history and description of balance disorders were obtained from the balance disorder questionnaire for all (Group 1) subjects. For clarification, in this study a fall was defined as “an event, which resulted in the person coming to rest unintentionally on the ground or other lower level” (Tinetti et al. 1988). Balance disorder history (see Table 5) suggests that unsteadiness (while standing or walking) was the primary balance disorder symptom, with less than half the participants reporting vertigo as a reason for the balance disturbance. The majority of the subjects suffered from constant symptoms (57%) and described their overall balance severity as a moderate disability (35%).

<table>
<thead>
<tr>
<th>Table 5: Description of Balance Problems for Group 1 Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group 1</strong> (n = 14)</td>
</tr>
<tr>
<td><strong>Balance Disorder Symptom</strong></td>
</tr>
<tr>
<td>Lightheaded</td>
</tr>
<tr>
<td>Unsteady when standing</td>
</tr>
<tr>
<td>Unsteady when walking</td>
</tr>
<tr>
<td>Vertigo (spinning sensation)</td>
</tr>
<tr>
<td>I tend to fall</td>
</tr>
<tr>
<td>I get nervous/panic when walking</td>
</tr>
<tr>
<td><strong>Symptom duration</strong></td>
</tr>
<tr>
<td>Intermittent</td>
</tr>
<tr>
<td>Constant</td>
</tr>
<tr>
<td><strong>Overall Balance Severity</strong></td>
</tr>
<tr>
<td>No disability</td>
</tr>
<tr>
<td>Slight disability</td>
</tr>
<tr>
<td>Mild disability</td>
</tr>
<tr>
<td>Moderate disability</td>
</tr>
<tr>
<td>Severe disability</td>
</tr>
<tr>
<td>Long term disability</td>
</tr>
</tbody>
</table>
Fall history of the Group 1 subjects is displayed in Table 6. One hundred percent of the subjects indicated a fear of falling, a fall and a near fall experience. The overall percentage of subjects reporting a fall with injury was (57%) with (28%) of those being hospitalized due to the fall. Only (21%) of the participants reported using an assistive ambulating device (such as a cane or walker). Conflicting data were observed for patients needing assistance while walking (28%) and those who held onto a spouse or family member while walking (57%). The large difference in responses to the following questions, “Do you need assistance to walk” and “do you hold onto a spouse or family member while walking” may be an indication that the question was not clear as to what type of assistance the individual needed while walking (i.e. cane, walker, or holding onto someone).

Results shown in Table 6 suggest an avoidance of activities due to fear of falling, with 78% of the participants avoiding activities inside the house and 92% avoiding activities outside of the house. The results also touch on the impact fear of falling has on the family and friends, with >80 % of the participants indicating that their spouses, family members or friends were afraid they might fall. Qualitative reports from Group 1 and Group 2 participants expand on these issues.
<table>
<thead>
<tr>
<th>Fall History Answers</th>
<th>Group 1 (n = 14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you need assistance to walk?</td>
<td>28.6</td>
</tr>
<tr>
<td>Can you easily walk up stairs?</td>
<td>85.7</td>
</tr>
<tr>
<td>Can you walk 10-20 meters without assistance?</td>
<td>100</td>
</tr>
<tr>
<td>Do you use a walker, cane, or roller walker?</td>
<td>21.4</td>
</tr>
<tr>
<td>Do you hold onto a spouse or family member while walking?</td>
<td>57.1</td>
</tr>
<tr>
<td>Do you engage in regular physical activity?</td>
<td>7.1</td>
</tr>
<tr>
<td>Have you ever had a near fall experience?</td>
<td>100</td>
</tr>
<tr>
<td>Have you ever fallen?</td>
<td>100</td>
</tr>
<tr>
<td>Did you have an injury from the fall?</td>
<td>57.1</td>
</tr>
<tr>
<td>Were you hospitalized due to a fall?</td>
<td>28.6</td>
</tr>
<tr>
<td>Are you afraid of falling?</td>
<td>100</td>
</tr>
<tr>
<td>Do you think your spouse is afraid that you might fall?</td>
<td>83.3</td>
</tr>
<tr>
<td>Do you think family members or friends are afraid that you might fall?</td>
<td>92.9</td>
</tr>
<tr>
<td>Does your fear of falling prevent you from doing activities around the house?</td>
<td>78.6</td>
</tr>
<tr>
<td>Does your fear of falling prevent you from doing activities outside of the house?</td>
<td>92.9</td>
</tr>
</tbody>
</table>
Physical Therapy Results:

Physical therapy assessment was performed to determine overall falling risk of the Group 1 subjects. Subjects were asked to perform the Dynamic Gait Index, Berg Balance Test, Timed “Up & Go” test, and the Functional Reach Test pre and post intervention. Subjects were also asked to complete the Dizziness Handicap Inventory during the pre-intervention assessment visit. Individual pre-intervention outcomes of each Group 1 subject are included in Table 7. All participants received scores of 14 seconds or greater on the Timed “Up & Go” test indicating a high risk of falling. Eleven out of fourteen participants demonstrated severe at “risk for falling” scores for the Dynamic Gait index, with the remaining three receiving moderate at risk for falling scores. Thirty-seven percent of the sample population received severe risk of falling scores on the Berg Balance Test with 57% receiving moderate risk of falling scores. Overall mean value (8.9 inches) on the Functional Reach for all Group 1 subjects indicated a moderate limitation to functional balance.
Table 7: Descriptive information, Pre-Intervention Physical Therapy Assessment Information for Group 1 Subjects

<table>
<thead>
<tr>
<th>Subject No.</th>
<th>BERG SCORE</th>
<th>BERG Description</th>
<th>DGI SCORE</th>
<th>DGI Description</th>
<th>FR (inches) SCORE</th>
<th>FR Description</th>
<th>TUG (sec) SCORE</th>
<th>TUG Description</th>
<th>DHI SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>22</td>
<td>Severe</td>
<td>3</td>
<td>Severe</td>
<td>7</td>
<td>Severe</td>
<td>14</td>
<td>High risk</td>
<td>88</td>
</tr>
<tr>
<td>2</td>
<td>40</td>
<td>Moderate</td>
<td>12</td>
<td>Severe</td>
<td>7</td>
<td>Severe</td>
<td>20</td>
<td>High risk</td>
<td>54</td>
</tr>
<tr>
<td>3</td>
<td>35</td>
<td>Severe</td>
<td>13</td>
<td>Severe</td>
<td>8</td>
<td>Moderate</td>
<td>17</td>
<td>High risk</td>
<td>84</td>
</tr>
<tr>
<td>4</td>
<td>44</td>
<td>Moderate</td>
<td>13</td>
<td>Severe</td>
<td>11</td>
<td>WNL</td>
<td>19</td>
<td>High risk</td>
<td>84</td>
</tr>
<tr>
<td>5</td>
<td>38</td>
<td>Moderate</td>
<td>13</td>
<td>Severe</td>
<td>8</td>
<td>Moderate</td>
<td>16</td>
<td>High risk</td>
<td>76</td>
</tr>
<tr>
<td>6</td>
<td>40</td>
<td>Moderate</td>
<td>13</td>
<td>Severe</td>
<td>11</td>
<td>WNL</td>
<td>15</td>
<td>High risk</td>
<td>60</td>
</tr>
<tr>
<td>7</td>
<td>33</td>
<td>Moderate</td>
<td>10</td>
<td>Severe</td>
<td>11</td>
<td>WNL</td>
<td>23</td>
<td>High risk</td>
<td>78</td>
</tr>
<tr>
<td>8</td>
<td>35</td>
<td>Severe</td>
<td>10</td>
<td>Severe</td>
<td>8</td>
<td>Moderate</td>
<td>Unable</td>
<td>High risk</td>
<td>56</td>
</tr>
<tr>
<td>9</td>
<td>40</td>
<td>Moderate</td>
<td>17</td>
<td>Moderate</td>
<td>7</td>
<td>Severe</td>
<td>15</td>
<td>High risk</td>
<td>28</td>
</tr>
<tr>
<td>10</td>
<td>40</td>
<td>Moderate</td>
<td>15</td>
<td>Moderate</td>
<td>11</td>
<td>WNL</td>
<td>15</td>
<td>High risk</td>
<td>64</td>
</tr>
<tr>
<td>11</td>
<td>48</td>
<td>Mild</td>
<td>14</td>
<td>Moderate</td>
<td>11</td>
<td>WNL</td>
<td>14</td>
<td>High risk</td>
<td>64</td>
</tr>
<tr>
<td>12</td>
<td>28</td>
<td>Severe</td>
<td>8</td>
<td>Severe</td>
<td>*</td>
<td>*</td>
<td>33</td>
<td>High risk</td>
<td>84</td>
</tr>
<tr>
<td>13</td>
<td>40</td>
<td>Moderate</td>
<td>11</td>
<td>Severe</td>
<td>6</td>
<td>Severe</td>
<td>17</td>
<td>High risk</td>
<td>56</td>
</tr>
<tr>
<td>14</td>
<td>42</td>
<td>Moderate</td>
<td>12</td>
<td>Severe</td>
<td>10</td>
<td>WNL</td>
<td>14</td>
<td>High risk</td>
<td>50</td>
</tr>
</tbody>
</table>

Mean: 37.5 Moderate 11.7143 Severe 8.9230769 Moderate 17.84615 High risk 66.142857
SD: 6.60711 3.36106 1.9348358 5.289079 16.448435

Key: * Missing Data
BERG = Berg Balance Test; DGI = Dynamic Gait Index; FR = Functional Reach; TUG = Timed "Up & Go"
DHI = Dizziness Handicap Inventory; WNL = Within Normal Limits; SD = Standard Deviation

Explanation of Descriptive Remarks:

BERG
0-36/56 = Severe Risk of Falling
36-45/56 = Moderate Risk of Falling
45-56/56 = WNL/Mild Risk of Falling

DGI
0-13/24 = Severe Risk of Falling
14-19/24 = Moderate Risk of Falling
19-24/24 = Mild Risk to WNL

FR
0-7" = Severe limitations to functional balance
7-9" = Moderate limitations to functional balance
10” or greater = WNL

TUG
14 sec. or more = High risk of Falling
13-11 sec. = Moderate to Mild Risk of Falling
10 sec. or less = WNL
Post-intervention physical therapy outcomes for each Group 1 subjects are included in table 8. Overall mean values for the Timed “Up & Go” test, Functional Reach test, and Berg Balance test indicated mild risk of falling to within normal limit scores. Dynamic Gait Index scores improved from an overall mean score of 11.7 out of 24 points, indicating a severe risk of falling to a mean score of 18 out of 24 points, indicating a moderate risk of falling.
Table 8: Descriptive information, Post-Intervention Physical Therapy Assessment Information for Group 1 Subjects

<table>
<thead>
<tr>
<th>Subject No.</th>
<th>BERG SCORE</th>
<th>BERG Description</th>
<th>DGI SCORE</th>
<th>DGI Description</th>
<th>FR (inches)</th>
<th>FR Description</th>
<th>TUG (sec)</th>
<th>TUG Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>*</td>
<td>n/a</td>
<td>17</td>
<td>Moderate</td>
<td>*</td>
<td>n/a</td>
<td>*</td>
<td>WNL</td>
</tr>
<tr>
<td>2</td>
<td>52</td>
<td>Mild to WNL</td>
<td>16</td>
<td>Moderate</td>
<td>&gt;10&quot;</td>
<td>WNL</td>
<td>10</td>
<td>WNL</td>
</tr>
<tr>
<td>3</td>
<td>56</td>
<td>Mild to WNL</td>
<td>22</td>
<td>Mild to WNL</td>
<td>&gt;10&quot;</td>
<td>WNL</td>
<td>9</td>
<td>WNL</td>
</tr>
<tr>
<td>4</td>
<td>52</td>
<td>Mild to WNL</td>
<td>18</td>
<td>Moderate</td>
<td>&gt;10&quot;</td>
<td>WNL</td>
<td>12</td>
<td>Mild</td>
</tr>
<tr>
<td>5</td>
<td>48</td>
<td>Mild to WNL</td>
<td>18</td>
<td>Moderate</td>
<td>8&quot;</td>
<td>Moderate</td>
<td>12</td>
<td>Mild</td>
</tr>
<tr>
<td>6</td>
<td>51</td>
<td>Mild to WNL</td>
<td>22</td>
<td>Mild to WNL</td>
<td>&gt;10&quot;</td>
<td>WNL</td>
<td>10</td>
<td>WNL</td>
</tr>
<tr>
<td>7</td>
<td>49</td>
<td>Mild to WNL</td>
<td>15</td>
<td>Moderate</td>
<td>&gt;10&quot;</td>
<td>WNL</td>
<td>10</td>
<td>WNL</td>
</tr>
<tr>
<td>8</td>
<td>47</td>
<td>Mild to WNL</td>
<td>16</td>
<td>Moderate</td>
<td>8&quot;</td>
<td>Moderate</td>
<td>10</td>
<td>WNL</td>
</tr>
<tr>
<td>9</td>
<td>*</td>
<td>n/a</td>
<td>17</td>
<td>Moderate</td>
<td>*</td>
<td>n/a</td>
<td>10</td>
<td>WNL</td>
</tr>
<tr>
<td>10</td>
<td>52</td>
<td>Mild to WNL</td>
<td>20</td>
<td>Mild to WNL</td>
<td>&gt;10&quot;</td>
<td>WNL</td>
<td>10</td>
<td>WNL</td>
</tr>
<tr>
<td>11</td>
<td>51</td>
<td>Mild to WNL</td>
<td>20</td>
<td>Mild to WNL</td>
<td>&gt;10&quot;</td>
<td>WNL</td>
<td>10</td>
<td>WNL</td>
</tr>
<tr>
<td>12</td>
<td>*</td>
<td>n/a</td>
<td>16</td>
<td>Moderate</td>
<td>8&quot;</td>
<td>Moderate</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>52</td>
<td>Mild to WNL</td>
<td>21</td>
<td>Mild to WNL</td>
<td>&gt;10&quot;</td>
<td>WNL</td>
<td>10</td>
<td>WNL</td>
</tr>
<tr>
<td>14</td>
<td>52</td>
<td>Mild to WNL</td>
<td>15</td>
<td>Moderate</td>
<td>&gt;10&quot;</td>
<td>WNL</td>
<td>11</td>
<td>WNL</td>
</tr>
</tbody>
</table>

Mean BERG = 51.09091 Mild to WNL, Mean DGI = 18.07143 Moderate, Mean FR = 9.5 Mild to WNL, Mean TUG = 10.33333 WNL

SD BERG = 6.607106, SD DGI = 3.361057, SD FR = 1.934836, SD TUG = 5.289079

Key: * Missing Data

BERG = Berg Balance Test; DGI = Dynamic Gait Index; FR= Functional Reach; TUG = Timed “Up & Go”; WNL = Within Normal Limits; SD = Standard Deviation

Explanation of Descriptive Remarks:

**BERG**
- 0-36/56 = Severe Risk of Falling
- 36-45/56 = Moderate Risk of Falling
- 45-56/56 = WNL/Mild Risk of Falling

**DGI**
- 0-13/24 = Severe Risk of Falling
- 14-19/24 = Moderate Risk of Falling
- 19-24/24 = Mild Risk to WNL

**FR**
- 0-7" = Severe limitations to functional balance
- 7-9" = Moderate limitations to functional balance
- 10" or greater = WNL

**TUG**
- 14 sec. or more = High Risk of Falling
- 13-11 sec. = Moderate to Mild Risk of Falling
- 10 sec. or less = WNL
Near Vision Screening Results:

During the audiology assessment visit, Group 1 participants completed a comprehensive battery of tests and questionnaires including assessment of near vision, impaired balance function, overall balance integration, anxiety, depression, fear of falling, balance confidence, and home safety. Results from the near vision visual screening evaluation are found in Table 9. The results suggest that participants do not receive annual visual examinations; with 64% indicating the date of their last visual examination was over one year ago. All subjects reported wearing prescription lenses, with the largest proportion of the sample wearing bifocals (42%) followed by reading glasses (21%), and trifocals (14%) (See Table 10).

Audiologic Results:

Individual outcomes for the audiology assessment tests are found in Table 11. In terms of documented hearing loss, the majority (93%) had a sensorineural hearing loss in both ears; (29%) had an asymmetric hearing loss, and one subject had a mixed hearing loss in both ears. In respect to impaired balance function as reported from the videonystagmography test, (29%) demonstrated both peripheral and central vestibular system abnormalities; (29%) exhibited only peripheral vestibular findings; (21%) displayed only central vestibular system findings and (21%) had normal test results. Overall balance integration evaluated with the Platform Posturography test or CTSIB exam revealed a vestibular balance dysfunction pattern in eight out of fourteen subjects. Two subjects demonstrated a severe balance dysfunction pattern (abnormal SOT scores on subtests 1-6 of the Platform Posturography test or abnormal CTSIB results on subtests 1-4). One subject showed a visual and vestibular balance dysfunction pattern on the platform posturography test (abnormal three trial average results on subtests 3, 4, 5, & 6). Three subjects were unable to complete the CTSIB or Platform Posturography test.
Table 9: Descriptive Information, Near Vision Acuity Testing for Group 1 Subjects

<table>
<thead>
<tr>
<th>Subject No.</th>
<th>Right eye with corrective lens</th>
<th>Left eye with corrective lens</th>
<th>Right eye without corrective lens</th>
<th>Left eye without corrective lens</th>
<th>Date of Last Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20/30</td>
<td>20/25</td>
<td>20/400</td>
<td>20/200</td>
<td>2004</td>
</tr>
<tr>
<td>2</td>
<td>20/100</td>
<td>20/70</td>
<td>20/400</td>
<td>20/400</td>
<td>Apr-05</td>
</tr>
<tr>
<td>3</td>
<td>20/50</td>
<td>20/50</td>
<td>20/70</td>
<td>20/70</td>
<td>2003</td>
</tr>
<tr>
<td>4</td>
<td>20/40</td>
<td>20/30</td>
<td>20/400</td>
<td>20/400</td>
<td>2004</td>
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<tr>
<td>5</td>
<td>20/25</td>
<td>20/25</td>
<td>20/400</td>
<td>20/400</td>
<td>Nov-05</td>
</tr>
<tr>
<td>6</td>
<td>20/40</td>
<td>20/40</td>
<td>20/400</td>
<td>20/400</td>
<td>2002</td>
</tr>
<tr>
<td>7</td>
<td>20/30</td>
<td>20/40</td>
<td>20/70</td>
<td>20/70</td>
<td>Mar-06</td>
</tr>
<tr>
<td>8</td>
<td>20/50</td>
<td>20/40</td>
<td>20/200</td>
<td>20/70</td>
<td>Aug-05</td>
</tr>
<tr>
<td>9</td>
<td>20/200</td>
<td>20/200</td>
<td>20/400</td>
<td>20/400</td>
<td>Apr-05</td>
</tr>
<tr>
<td>10</td>
<td>*</td>
<td>*</td>
<td>20/400</td>
<td>20/40</td>
<td>Apr-05</td>
</tr>
<tr>
<td>11</td>
<td>20/40</td>
<td>20/30</td>
<td>20/100</td>
<td>20/70</td>
<td>Jan-05</td>
</tr>
<tr>
<td>12</td>
<td>20/30</td>
<td>20/40</td>
<td>20/40</td>
<td>20/50</td>
<td>Sep-05</td>
</tr>
<tr>
<td>13</td>
<td>20/70</td>
<td>20/100</td>
<td>20/200</td>
<td>20/200</td>
<td>Jun-05</td>
</tr>
<tr>
<td>14</td>
<td>20/40</td>
<td>20/40</td>
<td>20/400</td>
<td>20/400</td>
<td>Nov-05</td>
</tr>
</tbody>
</table>

* Missing data, subject forgot to bring reading glasses.

Table 10: Descriptive Information, Type of Corrective Lenses for Group 1 Subjects

<table>
<thead>
<tr>
<th>Type of Corrective Lenses:</th>
<th>Percentage of Sample (n= 14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bifocals</td>
<td>42.9</td>
</tr>
<tr>
<td>Trifocals</td>
<td>14.3</td>
</tr>
<tr>
<td>Contacts</td>
<td>7.1</td>
</tr>
<tr>
<td>Reading Glasses</td>
<td>21.4</td>
</tr>
<tr>
<td>Bifocals + reading</td>
<td>7.1</td>
</tr>
<tr>
<td>Bifocals + prism</td>
<td>7.1</td>
</tr>
<tr>
<td>Subject No.</td>
<td>Hearing Test Results</td>
</tr>
<tr>
<td>------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>1</td>
<td>Mild high freq. SNHL (AD), Moderate to Severe SNHL (AS)</td>
</tr>
<tr>
<td>2</td>
<td>Mild high freq. SNHL (AU)</td>
</tr>
<tr>
<td>3</td>
<td>Mild SNHL (AU)</td>
</tr>
<tr>
<td>4</td>
<td>WNL (AS) Mild to severe high freq. SNHL (AD)</td>
</tr>
<tr>
<td>5</td>
<td>Mild to severe SNHL (AU)</td>
</tr>
<tr>
<td>6</td>
<td>Mild to severe SNHL (AD) Moderate to severe SNHL (AS)</td>
</tr>
<tr>
<td>7</td>
<td>Mild to severe SNHL (AU)</td>
</tr>
<tr>
<td>8</td>
<td>Severe High freq. SNHL (AU)</td>
</tr>
<tr>
<td>9</td>
<td>Severe High freq. SNHL (AU)</td>
</tr>
<tr>
<td>10</td>
<td>Profound SNHL (AS) Mild high freq. SNHL (AD)</td>
</tr>
<tr>
<td>Subject No.</td>
<td>Hearing Test Results</td>
</tr>
<tr>
<td>------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>11</td>
<td>Profound SNHL (AD)</td>
</tr>
<tr>
<td></td>
<td>Mild high freq. SNHL</td>
</tr>
<tr>
<td></td>
<td>(AS)</td>
</tr>
<tr>
<td>12</td>
<td>Mild to severe mixed loss (AU)</td>
</tr>
<tr>
<td></td>
<td>SNHL (AU)</td>
</tr>
<tr>
<td>13</td>
<td>Mild to severe SNHL (AU)</td>
</tr>
<tr>
<td></td>
<td>SNHL (AU)</td>
</tr>
<tr>
<td>14</td>
<td>Mild high freq. SNHL (AS)</td>
</tr>
<tr>
<td></td>
<td>SNHL (AS)</td>
</tr>
</tbody>
</table>

Key: RVR = reduced vestibular response, AD = Auris Dextra (right ear), AS = Auris Sinistra (left ear), AU= both ears DP = directional preponderance, VNG = videoystagmography, CNT = could not test, freq. = frequency, NR = no response, SNHL = sensorineural hearing loss, CTSIB = clinical test of sensory interaction and balance, SRT = speech reception threshold, WRS = word recognition score, Tymps = Tympanograms
Group 1 and Group 2 participants were asked to complete the Mini-Mental State Examination to ensure that all participants were cognitively able to complete the study questionnaires. All subjects (Group 1 and 2) scored at or above 23 points, which was the cut-off score used for inclusion in the study (See Table 12).

<table>
<thead>
<tr>
<th>Subject No.</th>
<th>Group 1 Score</th>
<th>Group 2 Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>27</td>
<td>28</td>
</tr>
<tr>
<td>2</td>
<td>24</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>28</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>30</td>
<td>23</td>
</tr>
<tr>
<td>6</td>
<td>29</td>
<td>24</td>
</tr>
<tr>
<td>7</td>
<td>28</td>
<td>25</td>
</tr>
<tr>
<td>8</td>
<td>24</td>
<td>29</td>
</tr>
<tr>
<td>9</td>
<td>24</td>
<td>30</td>
</tr>
<tr>
<td>10</td>
<td>27</td>
<td>26</td>
</tr>
<tr>
<td>11</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>12</td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td>13</td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td>14</td>
<td>29</td>
<td>29</td>
</tr>
</tbody>
</table>

Mean: 27.6 28.1
SD: 2.21 2.50

Table 12: Mini Mental Scores for Groups 1 and 2

Key: SD = Standard Deviation

Data collected regarding the participants (Group 1 and 2) responses to the Home Safety Checklist for Detection of Falls Hazards is summarized in Table 13. The results shown in Table 10 suggest that family members and spouses view home hazards differently with extreme scores (good versus hazardous) seen in 4 out of 14 families and (excellent versus hazardous scores) seen in 1 out of 14 families. Only 3 out of 14 families (Group 1 and Group 2 subjects) scored
within the same range (i.e. both groups’ scores fell within the range of good home safety or hazardous home safety).

<table>
<thead>
<tr>
<th>Subject No.</th>
<th>HOME SAFETY SCORE (Group 1)</th>
<th>DESCRIPTION (Group 1)</th>
<th>HOME SAFETY SCORE (Group 2)</th>
<th>DESCRIPTION (Group 2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11</td>
<td>Good</td>
<td>8</td>
<td>Good</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
<td>Excellent</td>
<td>12</td>
<td>Good</td>
</tr>
<tr>
<td>3</td>
<td>12</td>
<td>Good</td>
<td>17</td>
<td>Hazardous</td>
</tr>
<tr>
<td>4</td>
<td>14</td>
<td>Good</td>
<td>11</td>
<td>Good</td>
</tr>
<tr>
<td>5</td>
<td>18</td>
<td>Hazardous</td>
<td>3</td>
<td>Excellent</td>
</tr>
<tr>
<td>6</td>
<td>19</td>
<td>Hazardous</td>
<td>9</td>
<td>Good</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>Good</td>
<td>11</td>
<td>Good</td>
</tr>
<tr>
<td>8</td>
<td>5</td>
<td>Excellent</td>
<td>6</td>
<td>Excellent</td>
</tr>
<tr>
<td>9</td>
<td>35</td>
<td>Hazardous</td>
<td>15</td>
<td>Hazardous</td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td>Excellent</td>
<td>12</td>
<td>Good</td>
</tr>
<tr>
<td>11</td>
<td>4</td>
<td>Excellent</td>
<td>9</td>
<td>Good</td>
</tr>
<tr>
<td>12</td>
<td>15</td>
<td>Hazardous</td>
<td>13</td>
<td>Good</td>
</tr>
<tr>
<td>13</td>
<td>7</td>
<td>Excellent</td>
<td>12</td>
<td>Good</td>
</tr>
<tr>
<td>14</td>
<td>9</td>
<td>Good</td>
<td>19</td>
<td>Hazardous</td>
</tr>
<tr>
<td>Mean</td>
<td>12</td>
<td></td>
<td>11.2</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>8.23</td>
<td></td>
<td>4.19</td>
<td></td>
</tr>
</tbody>
</table>

**Key:** SD = standard deviation

4.2.1 Research Hypothesis 1 Results: The patients’ fear of falling as expressed by the Activities Specific Balance Confidence (ABC) scale will be reduced as a result of diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

The corresponding Null Hypothesis is that there will be no difference in patients fear of falling before and after a team approach to diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.
Specific Aim #1 Results: To determine the effectiveness of a risk of falling intervention program designed to reduce FoF in older independent living adults with dizziness and balance disorders.

Specific Aim #2 Results: To determine via the Activities Specific Balance Confidence Scale (ABC) administered before and after a risk of falling assessment and remediation program would show reduction in the FoF.

Group 1 participants completed the Geriatric Depression Scale, the Beck Anxiety Inventory, and the Activities-Specific Balance Confidence (ABC) Scale. The scores obtained from these scales were compared before and after participation in the remediation program using the Wilcoxon Signed Ranks Test for nonparametric data to determine whether statistically significant differences were seen following an intervention program that included fall prevention education and counseling, home hazard assessment and physical therapy. Individual (Group 1) questionnaire scores, descriptions of Geriatric Depression Scale and Beck Anxiety Inventory results, mean, median, maximum, minimum, and standard deviation values for ABC scale, Geriatric Depression Scale and Beck Anxiety Inventory are found in Table 14.
### Table 14: Descriptive Information, Pre- and Post Questionnaire Responses Group 1 Subjects

<table>
<thead>
<tr>
<th>Subject No.</th>
<th>ABC PRE SCORE</th>
<th>ABC POST SCORE</th>
<th>GD PRE SCORE</th>
<th>GD POST SCORE</th>
<th>GD DESCRIPTION</th>
<th>GD POST SCORE*</th>
<th>GD DESCRIPTION</th>
<th>BECK PRE SCORE</th>
<th>BECK DESCRIPTION</th>
<th>BECK POST SCORE</th>
<th>BECK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>57.5</td>
<td>100</td>
<td>25</td>
<td>5</td>
<td>Normal</td>
<td>39</td>
<td>Severe</td>
<td>0</td>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>83.1</td>
<td>81.3</td>
<td>8</td>
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<td>15</td>
<td>Low</td>
<td>4</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>20</td>
<td>97</td>
<td>12</td>
<td>6</td>
<td>Normal</td>
<td>16</td>
<td>Low</td>
<td>1</td>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>58.8</td>
<td>33.8</td>
<td>18</td>
<td>14</td>
<td>Mild</td>
<td>19</td>
<td>Low</td>
<td>25</td>
<td>Moderate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>74</td>
<td>69.4</td>
<td>3</td>
<td>2</td>
<td>Normal</td>
<td>8</td>
<td>Low</td>
<td>9</td>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>55</td>
<td>95</td>
<td>10</td>
<td>6</td>
<td>Normal</td>
<td>27</td>
<td>Moderate</td>
<td>9</td>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>82</td>
<td>83.7</td>
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<td></td>
</tr>
<tr>
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<td>40.6</td>
<td>74.4</td>
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<td>12</td>
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<td>29</td>
<td>Moderate</td>
<td>13</td>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>91.3</td>
<td>80</td>
<td>14</td>
<td>10</td>
<td>Mild</td>
<td>13</td>
<td>Low</td>
<td>10</td>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>14.5</td>
<td>92.2</td>
<td>15</td>
<td>2</td>
<td>Mild</td>
<td>37</td>
<td>Severe</td>
<td>1</td>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>65</td>
<td>83.3</td>
<td>6</td>
<td>7</td>
<td>Normal</td>
<td>17</td>
<td>Low</td>
<td>7</td>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>8.1</td>
<td>51.53</td>
<td>28</td>
<td>28</td>
<td>Severe</td>
<td>57</td>
<td>Severe</td>
<td>23</td>
<td>Moderate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>25.6</td>
<td>80.6</td>
<td>14</td>
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<td>Mild</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>31.3</td>
<td>68.75</td>
<td>13</td>
<td>17</td>
<td>Mild</td>
<td>24</td>
<td>Moderate</td>
<td>10</td>
<td>Low</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Mean**

- ABC PRE SCORE: 50.5
- ABC POST SCORE: 77.9
- GD PRE SCORE: 13.1
- GD POST SCORE: 12.6
- BECK PRE SCORE: 23.5
- BECK POST SCORE: 9.7

**Median**

- ABC PRE SCORE: 56.3
- ABC POST SCORE: 81
- GD PRE SCORE: 12.5
- GD POST SCORE: 6.5
- BECK PRE SCORE: 18
- BECK POST SCORE: 9

**Max**

- ABC PRE SCORE: 91.3
- ABC POST SCORE: 100
- GD PRE SCORE: 28
- GD POST SCORE: 28
- BECK PRE SCORE: 57
- BECK POST SCORE: 25

**Min**

- ABC PRE SCORE: 8.1
- ABC POST SCORE: 33.8
- GD PRE SCORE: 3
- GD POST SCORE: 2
- BECK PRE SCORE: 8
- BECK POST SCORE: 0

**SD**

- ABC PRE SCORE: 27.36
- ABC POST SCORE: 18.07
- GD PRE SCORE: 6.89
- GD POST SCORE: 7.00
- BECK PRE SCORE: 13.38
- BECK POST SCORE: 7.51

**Frequency, % of Total Subjects**

- (29%) = Normal
- (50%) = Normal
- (57%) = Low
- (86%) = Low

**GD & BECK Descriptions**

- (57%) = Mild
- (43%) = Mild
- (21%) = Moderate
- (14%) = Moderate
- (7%) = Severe
- (21%) = Severe
- (0) = Severe

*Geriatric Depression Scores and Beck Anxiety Inventory Scores decrease with improvements in emotional reactions of depression and anxiety.

**Explanation of Descriptive Remarks:**

**Beck Anxiety**

- 0-21 = low anxiety
- 22-35 = moderate anxiety
- >36 = severe anxiety

**Geriatric Depression**

- 0-9 = normal
- 10-19 = mild depressive
- 20-30 = severe depressive
Research hypothesis #1 predicted that (Group 1) subjects’ fear of falling would be reduced as a result of diagnosis and intervention that included fall prevention education and counseling, home hazard assessment and physical therapy. Group 1 subjects had a mean ABC score of 50.5 at pre-intervention and after intervention the mean score increased to 77.9. The improvement was significant ($p = 0.02$, Wilcoxon Signed Ranks Test)(See Table 15). Research Hypothesis 1 is accepted and Null Hypothesis 1 is rejected, as there was a significant post intervention reduction in falling fears as measured by scores on the ABC.

4.2.2 Research Hypothesis # 2 Results: The patients perceived depression and anxiety as expressed by the Geriatric Depression Scale and the Beck Anxiety Inventory will be reduced as a result of diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

The corresponding Null Hypothesis states that the patients perceived depression and anxiety as expressed by the Geriatric Depression Scale and the Beck Anxiety Inventory will not be reduced as a result of diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

Specific Aim # 3 results: To examine through the Beck Anxiety Inventory and the Geriatric Depression Scale the level of anxiety and depression in the patient, due to the FoF when administered before and after a Risk of Falling Assessment and Remediation Program.
Table 15 describes the overall mean and standard deviation scores on the Geriatric Depression Scale and Beck Anxiety Inventory Scale pre and post-intervention. The Wilcoxon Signed Ranks Test was used to evaluate within-subject changes (post-pre) using raw scores on the Geriatric Depression Scale and the Beck Anxiety Inventory. A significant difference post versus pre intervention was seen for the Geriatric Depression Scale scores (p <0.03, α = .05), and Beck Anxiety Inventory scores (p = <0.01, α = .05) for Group 1 subjects (see Table 12), indicating that the levels of anxiety and depression decreased after participation in the risk of falling program. Research Hypothesis 2 is accepted and Null Hypothesis 2 is rejected, as there was a significant post intervention reduction in depression and anxiety scores as measured by the Geriatric Depression Scale and the Beck Anxiety Inventory.

**Table 15: Change in ABC, Geriatric Depression, and Beck Anxiety mean scores for (Group 1) subjects.**

<table>
<thead>
<tr>
<th></th>
<th>Pre-Remediation Mean &amp; (SD)</th>
<th>Post-Remediation Mean &amp; (SD)</th>
<th>p value* for difference (Wilcoxon signed ranks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC</td>
<td>50.5, (27.36)</td>
<td>77.9, (18.07)</td>
<td>p = 0.02</td>
</tr>
<tr>
<td>GD</td>
<td>13.1, (6.89)</td>
<td>12.6, (7.0)</td>
<td>p = 0.03</td>
</tr>
<tr>
<td>BECK</td>
<td>23.5, (13.38)</td>
<td>9.7, (7.51)</td>
<td>p = &lt; 0.01</td>
</tr>
</tbody>
</table>

* α = .05

**Key:** ABC= Activities Specific Balance Confidence Scale, GD = Geriatric Depression Scale, BECK = Beck Anxiety Inventory, SD = Standard Deviation.

**4.2.3. Research Hypothesis #3 Results:** The impact of patients fear of falling as expressed by the Activities Specific Balance Confidence (ABC) scale completed by family members, significant others or spouse of the patient will be reduced after receiving an appropriate diagnosis and after receiving intervention that included fall prevention education and counseling, home hazard assessment and physical therapy.
The corresponding Null Hypothesis states there will be no difference from the impact of the patients fear of falling on family members, significant others or spouse of the patient before and after a team approach to diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

**Specific Aim # 4 results:** To establish and to evaluate the impact of a FoF in older adults with balance problems on everyday living for the family member, significant other or spouse of the patient as measured through the ABC scale administered before and after a remediation program.

Group 2 subjects completed the ABC scale before and after their family member participated in the remediation program. Table 16 describes the individual ABC scores and mean, median, minimum, maximum and standard deviation values for Group 2 participants. Group 2 scores on the ABC scale (post versus pre) were also analyzed with the Wilcoxon Signed Ranks Test to determine whether a statistically significant differences in impact of fear of falling was seen following their family member’s participation in the intervention program. The results of the Signed Ranks Test indicated a significant difference post versus pre intervention for Group 2 ABC scores (p = <0.01, α = .05) (see Table 17) suggesting that the impact of Group 1 subjects’ fear of falling on family members or spouses was reduced after receiving an appropriate diagnosis and after receiving intervention that included fall prevention education and counseling, home hazard assessment and physical therapy. In summary, Research Hypothesis 3 is accepted and Null Hypothesis 3 is rejected based on the significant reduction in falling concerns for the family members and spouses post-intervention as expressed by pre and post-intervention scores on the ABC.
Table 16: Descriptive Information
Pre- and Post Questionnaire Responses
(Group 2)

<table>
<thead>
<tr>
<th>Subject No.</th>
<th>ABC PRE SCORE</th>
<th>ABC POST SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>61.3</td>
<td>68</td>
</tr>
<tr>
<td>2</td>
<td>69.3</td>
<td>93.3</td>
</tr>
<tr>
<td>3</td>
<td>84.4</td>
<td>92.5</td>
</tr>
<tr>
<td>4</td>
<td>37.5</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>62</td>
<td>86.3</td>
</tr>
<tr>
<td>7</td>
<td>46.3</td>
<td>57.5</td>
</tr>
<tr>
<td>8</td>
<td>9.4</td>
<td>53.1</td>
</tr>
<tr>
<td>9</td>
<td>74.4</td>
<td>74.4</td>
</tr>
<tr>
<td>10</td>
<td>25</td>
<td>80.6</td>
</tr>
<tr>
<td>11</td>
<td>59.4</td>
<td>67</td>
</tr>
<tr>
<td>12</td>
<td>25</td>
<td>55</td>
</tr>
<tr>
<td>13</td>
<td>57.5</td>
<td>75.6</td>
</tr>
<tr>
<td>14</td>
<td>55</td>
<td>61.25</td>
</tr>
</tbody>
</table>

Mean: 54.8 | 66.7
Median: 58.5 | 71.2
Max: 100 | 100
Min: 9.4 | 50
SD: 24.56 | 16.29

Key: SD = standard deviation

Table 17: Change in ABC mean scores for (Group 2) subjects.

<table>
<thead>
<tr>
<th>n = 14</th>
<th>Pre- Remediation Mean &amp; (SD)</th>
<th>Post- Remediation Mean &amp; (SD)</th>
<th>p value* for difference (Wilcoxon signed ranks)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC</td>
<td>54.8, (24.56)</td>
<td>66.7, (16.29)</td>
<td>p &lt; 0.01</td>
</tr>
</tbody>
</table>

* α = .05

Key: ABC = Activities Specific Balance Confidence Scale, SD = Standard Deviation
4.2.4. Research Hypothesis #4 Results: There will be a significant correlation between the patient’s change in fear of falling ascertained by the ABC scale and change in geriatric depression scores after participation in a team approach to diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

The corresponding Null Hypothesis states there will not be a significant correlation between change in fear of falling ascertained by the ABC scale and change in depression scores obtained by the Geriatric Depression Scale after participation in a team approach to diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

Murphy, Williams, & Gill (2002) stated that in order to properly conduct intervention strategies to reduce fear of falling one must take into consideration other conditions afflicting the individual. The Spearman’s $r$ correlation coefficient was used to determine the extent to which change in fear of falling (ABC scores post intervention) was associated with changes in scores of depression and anxiety post intervention (see Table 18). Change in fear of falling and change in geriatric depression scores was significantly correlated (Spearman’s $r = -0.64$; $p= 0.01$). Research Hypothesis 4 is accepted and Null Hypothesis 4 is rejected based on the significant correlation between change in fear of falling and depression scores post-intervention.
4.2.5. Research Hypothesis #5 Results: There will be a significant association between patients’ change in fear of falling expressed by the ABC scale and change in anxiety scores obtained by the Beck Anxiety Inventory after a team approach to diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

The corresponding Null Hypothesis states there would not be a significant association between patient’s change in fear of falling expressed by the ABC scale and change in anxiety scores obtained by the Beck Anxiety Inventory post intervention.

There was a significant negative correlation between change in ABC score and change in Beck Anxiety Inventory Score post intervention (Spearman’s $r = -0.81; p = < 0.001$). Research Hypothesis 5 is accepted and Null Hypothesis 5 is rejected based on the significant association.

4.2.6. Research Hypothesis #6 Results: There will be a significant correlation between the patients’ change in fear of falling determined by the ABC scale and the patients’ age after participation in a team approach to diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

The corresponding Null Hypothesis states that there will not be a significant correlation between change in fear of falling determined by the ABC scale and the patients’ age post intervention.
The Spearman’s $r$ correlation coefficient was also performed to investigate the relationship between the change in fear of falling (ABC score post intervention) and other factors (age and co-morbidities) affecting Group 1 subjects (see Table 19). These additional analyses determined that there was a significant negative correlation between change in ABC scores (Post- Pre) and age indicating that improvements on ABC scores decreased with increase in age (Spearman’s $r = -0.55; p = 0.04$). Research Hypothesis 6 is accepted and Null Hypothesis 6 is rejected based on the significant association between change in fear of falling and age post-intervention.

4.2.7. Research Hypothesis #7 Results: There will be a significant association between the patient’s change in fear of falling determined by the ABC scale and number of additional medical conditions (co-morbidities) afflicting the patients after a team approach to diagnosis and intervention that includes fall prevention education and counseling, home hazard assessment and physical therapy.

The corresponding Null Hypothesis states that there will not be a significant association between change in fear of falling determined by the ABC scale and number of additional medical conditions (co-morbidities) afflicting the patients post-intervention.

There was, however, no significant association found between the number of co-morbidities and (post) ABC scores (Spearman’s $r = 0.13; p = 0.65$) indicating that the number of additional medical conditions afflicting the subjects did not significantly affect change in fear of
falling scores. Due to this finding, Research Hypothesis 7 is rejected and Null Hypothesis 7 is accepted.

Table 18: Spearman $r$ Correlation Coefficients between ABC Scale, Geriatric Depression Scale, and Beck Anxiety Inventory for Group 1.

<table>
<thead>
<tr>
<th>(n = 14)</th>
<th>ABC Post correlations</th>
<th>*p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC- GD</td>
<td>-0.64</td>
<td>0.01</td>
</tr>
<tr>
<td>ABC- Beck</td>
<td>-0.81</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

* $\alpha = .05$

Table 19: Spearman $r$ Correlation Coefficients between ABC (Post) Scores and Age and Co-Morbidities for Group 1.

<table>
<thead>
<tr>
<th>(n = 14)</th>
<th>ABC Post correlations</th>
<th>*p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>-0.55</td>
<td>0.04</td>
</tr>
<tr>
<td>Co-morbidities</td>
<td>0.13</td>
<td>0.65</td>
</tr>
</tbody>
</table>

* $\alpha = .05$
4.3. Qualitative Results:

4.3.1. Data Narrative:

The research techniques for this study included more than one method of data collection. The qualitative techniques included open-ended question interviews and observation. This study used a phenomenological approach aimed at capturing how people experience a phenomenon through the use of in-depth, open-ended interview questions (Patton, 2002). A participant account of each fear of falling experience was produced for all fourteen subjects, including a description of each participant’s experience of a fall or near fall and living with a fear of falling/balance disorder. In the subject’s home environment the investigator performed interviews with participants and one family member, spouse, or significant other of each participant. The interviews lasted on average thirty to forty minutes and each interview was audiotaped for later transcription.

Audiotapes were transcribed and reviewed twice for accuracy and then coded to reveal the themes or patterns. The coding process involved naming the actions of the data and comparing them to decide on data categories. For example, the following quote “No, I can walk through the house. Then sometimes I can’t. It just depends on my day or if I’m overly tired” was analyzed and generated the following codes: description of balance problems, fatigue, limiting activities. The codes were written directly on the participant transcripts and identified as the initial codes (see appendix O). The initial codes were then combined to yield the coding categories (see appendix P). This approach led to a structural description of the participants’ experiences (Bogdan and Biklen, 1998). These descriptions were derived and condensed from the transcripts with the aim of reducing the entire story to the important themes of their experiences. Several themes emerged from responses to the interview questions. The themes
were classified into broad categories: impact of a fear of falling and role of the risk of falling intervention program. Below each main theme are subcategory themes. The phenomenon of fear of falling is complex as shown by the interconnecting categories (see Table 20 for qualitative data categories for Groups 1 and 2).

The following is a list of codes for events that were identified but were not incorporated into the combined codes: Description of team approach, description of assessment tests, family history of balance problems, assessment results, participants daily routines, description of balance therapy, family member description of daily routine, description of home exercises, self-motivation to overcome fear of falling/balance problems, and compensating for balance problem.
TABLE 20
Qualitative Data Analysis Categories for Groups 1 and 2 Interviews

1. Impact of a Fear of Falling/Balance disorder on Daily Living

   Description of Fall/Near Fall Experience

   Limiting activities/lack of confidence

   Emotional Reaction Of Participant Since FoF/Disorder Began

   Anxiety & Depression Since FoF/Balance Problem

   Embarrassment due to FoF/Balance Problem

   Limiting activities/lack of confidence

   Dependence on Family Members

   Emotion Reaction

   Limiting Activities/Dependence on Family Members

   Family Stress Due to FoF/Balance

   Problems with Medical care

   Problems with Assistive Devices

   Discussion of Assistive Devices

   Problems with Family Members

   Increased Confidence Post Program

   Emotional Reaction Post Program

   Plans to keep up with Program

2. Role of Risk of Falling Program

   Overall Impression of Risk of Falling Program

   Change in Activity Level Post Program

   Increased Confidence Post Program

   Limitations of the Remediation Program

   Limiting Activities/Falls + Balance Problems not eliminated

   Education on Falls/Risk of Falling and Balance Problems

   Education on Falls/Risk of Falling and Balance Problems

   Education on Falls/Risk of Falling and Balance Problems

   Other Medical Concerns Post Program

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4.3.2. Category 1: Impact of fear of falling/balance disorder

Description of Fall/Near Fall Experience:

Falling fears are often the result of a near fall or fall experience. As reported on the balance disorder questionnaire, all Group 1 participants reported a fall and one or more near fall experiences. The contributing factors to developing a fear of falling were discussed during the first interview. All participants were asked to describe a situation where they fell or almost fell. The responses to this open ended question allowed the participants to open up on the painful circumstances that led to developing a fear of falling and it provided the foundation for the researcher to truly understand the impact of their past falling or near falling experience that led to developing a fear of falling.

*I was taking some empty coolers up to our garage, which is detached. I was using this two-wheeler cart to take them up and when I got there, there is a very slight grade going down to the garage and I lost my balance and got away and that’s when I went into the corner of the garage and I broke off about seven inches of the facial board. And, I jammed my head and neck right into the corner. I had seven stitches put into my nose and we spent the day in the hospital.*

*I guess uh recently it was at a cemetery, oh I was at church. I kind of kneeled and just went off to my right and I put my hand on the casket to support me. Then I almost fell walking on unleveled ground from the road to the gravesite. Then last summer I fell on the golf course.*

*Well, there are two of them. The one where I was coming up from the basement. I think it was like three months ago or something and uh I wasn’t holding onto anything. I have railing on both sides but I had my hands full of folded clothes and uh so I was coming up the steps and in some way I tripped or I lost my balance because I wasn’t holding on and my left leg twisted my foot and my whole weight fell onto it so I had a sprained ankle and foot for weeks. And my fall was back before Christmas and I didn’t know if I would be able to spend Christmas with my daughter. So, that was one really bad one. I was hurrying because I wanted to show my granddaughter something and she was looking for it and couldn’t find it. So, what I used to do I would jump up fast and go running*
(well, that’s another time, I finished about the basement steps). The other time I’m describing is when my granddaughter was with me and I jumped out of my chair and went rushing around to hurry up the steps. I don’t know what I was hurrying so fast for but I started up the steps and I started to hold onto the banister but I lost, I missed it. And then I fell and hit my head. But since then though it has taught me a lesson to really try not to jump up quick but to get up slowly and hold on all the time. These were the two worse ones.

Okay, the one and only time it happened I took a shower and I was in the bathroom toweling myself off and I put my foot up on the toilet to bend over and to dry my foot and I felt myself just going to the left and I couldn’t stop. I didn’t really fall hard but she (referring to his wife) got very upset, very worried. But I didn’t really hit the floor I more or less slid down to the floor. And it wasn’t really an injury type fall. But this brought to mind that it could happen. And that made me more concerned; more cautious.

I fell out in the driveway I hurt my arm pretty bad and I couldn’t get up, my husband couldn’t get me up so he was still sitting out in the driveway and he called our neighbor across the street and this was like at ten o’clock at night and um he came over him and his wife came over and they got me up and got me back in the house and took care of my arm b/c it made a really bad place on it. Um, so, and then I’ve had some other pretty good falls to.

I was walking up the stairs and I fell forward into the living room which was good, I didn’t fall back down the stairwell but um I hit all fours, both knees, both shoulders and my face and he was asleep downstairs but he woke up pretty quick because it was pretty loud. And it hurt this shoulder and the left knee for about 3 weeks.

Well, about not too long after that you know I started falling and I fell a couple of times and didn’t really think about it being from that. I fell down the stairs and broke my toes and I just got dizzy, it’s almost like my legs goes out from under me and then I can’t... I’m not in control enough so that I can grab something and then um I fell a couple of times in the hallway and a couple of times up in the bedroom.

I was at my grandson’s house and uh I was on the front porch and they were playing with the kids in the front and there’s just step that’s not a short one and I wanted to go down in the yard to watch the kids and as I got to the step to go down I don’t know if I just got dizzy but I went but I just went forward onto his lawn.
I come out of the bank and went to get in my car and I don’t know if I got dizzy or lightheaded or what but instead of going to my car I bumped into the back of another parked car and it knocked me down and I couldn’t get up. Two men had to pick me up.

**Limiting activities/lack of confidence:**

**Specific Aim # 5 Results:** To reveal the patient’s present attitudes toward their balance problem through a qualitative interview, including sessions to understand activity level before and after a fall or FoF.

The participants’ accounts of life with a fear of falling showed that the situation was emotional for them and hard to endure. Over 80% of the Group 1 subjects reported on the balance disorder questionnaire activities inside and outside of their home they avoided performing. During the interview process the subjects elaborated on the activities they could once perform with ease, but were now unable to do or less confident to perform because of fear such as driving a car, cleaning their house, or shopping. Often times the participants will remain homebound and avoid activities of daily living to avoid a future fall. Several participants vocalized the activities they avoid performing.

*You know if I’m walking somewhere and I have to go up six or eight steps to get into a place I just won’t go in it. I’ll go somewhere else.*

*Uh, I’ve changed a lot since all of this started. It used to be that I would just never really give it a thought if I wanted to go somewhere I would just go and uh so it’s really limited me in a lot of ways.*

*I don’t shop for more than fifteen minutes anymore.*

*I just don’t walk.*

*I’m afraid to drive so I hardly drive unless someone’s with me.*
Since the falling and unsteadiness started, I don’t like to go to the store by myself um just a lot of things I don’t like to do by myself.

We used to go to the levee about every other night. Have dinner, walk around on the river. We kind of did cut that out last year. Cause there’s a lot of steps going up to that levee if you park on the street.

Well alright uh anything like on a ladder. Like we have a cabinet here in the kitchen we want to hang and I can’t do that myself. I have to wait to get one of my sons or son-in-laws that has the time to give me a hand. 90% of them do it for me. And I can help them and hold it there but I can’t really do the job. I would have normally been able to do that myself.

Uh, well driving for one thing, I would not drive if I was even the least bit dizzy. So, it really limits me a lot to being in the house. So, I’m kind of like Martha Stewart, committed to the house.

The activity of changing light bulbs, I’ve asked others to help me with that. I’ve even asked the neighbor to help me with it. I’ve always been old fashioned about asking people to help me. I kind of hesitate to do that. So, rather than \going out if I’m concerned about falling I just stay in.

We have several grandchildren so we were very active we did a lot. So, a lot of our stuff has changed. We used to go to dances and stuff like that. We’re going to one this weekend but all we’ll do is just sit and eat. Maybe get up and walk a slow one.

Well, I won’t hardly go anywhere unless someone’s with me one of Charlie’s sister’s you know she’ll take me to a lot of places but if she doesn’t go then I don’t go and if he doesn’t go then I don’t go.

Yah concerns, I can’t ... I’m not as active and can’t be as active as I would like to be. Well uh I can’t do the things that I would normally do. I don’t do the walking that I should because my guts showing it. Uh, other than that I guess the biggest thing uh that and the exercise I would normally get on the golf course usually a couple times a week especially in Florida we play. But uh, I haven’t uh had a golf club in my hand now since uh back in May so. The last time I had was back in April (’05) before we left Florida. I mean we’re getting older, I realize that but I would say that there is as marked decline.

I used to do a lot of work at the computer, my job required that and I can’t do any of that. I just sit there for like 10 minutes and everything hurts and I feel dizzy and I can’t do dishes I can’t stand up at the sink and do dishes and running the sweeper makes me feel bad and I feel horrible that I just sit here all day and I can’t do anything. I don’t get anything done. And then another day comes and I don’t do anything.
I can’t believe I’ve gotten so helpless. It just exhausts me to walk that much anymore. And, also I haven’t been doing much for the past year or so, I’m just weak. Now, I’m very hesitant to do a lot of things. Because I’m a little bit off balance and I feel like I could fall.

I can’t, yeah I shopped the other day, but not like I usually do. I don’t run over, I can’t just drive over, I can’t drive the car anymore. I haven’t drove it since I got this and it’s been almost 4 months now. I was always, I’d just do it. If I needed something I went to get it. If I needed something for the house to fix or pick-up things I just did it. Now I can’t. That aggravates me because I can’t do that. If I want to, I have to have him, I have to keep calling him... well you’ll have to go do it or he’s got to let the dog out all the time. I don’t do that because I can’t bend over to hook her and stuff that long if she jerks around. When she jerks around it makes me wobbly and stuff.

Some participants indicated that they are not limiting activities but are performing them with less confidence.

Nothing really that I’ve stopped doing is just that um I do everything with 100% less confidence and I’m more careful.

It’s not that I’m afraid to perform anything it’s just that I can’t keep my house clean like I used to. I just can’t do things the way I used to, I can’t keep it in as good a shape as I used to. I do want to and uh what I can’t do my daughter does for me because I can’t do a lot of the housework.

One participant described that the inconvenience of medical visits has limited the activities he once enjoyed.

Most of our time now is spent going from one doctor, one therapist after another. Couple times of week so we don’t have a whole lot of time to do what we normally do.

Several family members described activities that their family members were afraid to perform.
She doesn’t get in the shower anymore because of the fear of falling. Physically though she doesn’t do some things, which just kills her.

Yah, she gets exhausted faster. A three or four hour shopping spree might have been typical; we’ve cut that down quite a bit.

I mean if we have shopping to do most of the time he’ll sit in the car. He’s gone to the grocery for short trips. But, I can see it in his eyes; I could see it that he was afraid that he was going to fall or something was happening that he couldn’t control. And, that’s a terrible feeling. Now, he won’t go in the stores.

I try to make things happen, you know, because I’m a people person really and to stay in all the time drives me nuts. And he likes activity, he always did, if we went to, um, on vacation, he wants to be where the action is, you know, like at Myrtle Beach, theirs theatres and we like to go maybe see a show or something like that. Now we haven’t been to a movie, well we will go in Florida, but we haven’t been to one since we’ve been home. So it has restricted us in that way. And like the children went to a Halloween thing last week, they said they had a party wagon, they had a big band and some of the grandkids and great grand kids went and they said well you can go and take a chair why we walk through the maze or whatever, I said well that’s not going to be any fun besides were going to freeze sitting there it was cold that day so we didn’t go, now you know a few years back we would have gone, walk with them, but you know, we don’t do that, it’s restricted us, but me too though, if you sit around, the more you sit around, the less active you get it’s not good for you so we will be. I mean he loves to go out put around in the yard, up in, down in

We just don’t do the things we used to do. I mean we used to be very active. We used to go to the park and ride bikes together and stuff.

She can’t go shopping anymore because of the dizziness. Her independence is gone. She can’t go to the grocery store. Down she goes you know and that cart has wheels on it, so if she went to grab the cart she would go down, so she thinks about that when she’s out. She really tries her best not to put herself in those positions that she’s gonna hurt herself and other people so she’s really, unless I’m here to do something with her, she’s really stuck.

Even though we have a wheelchair if I can talk her into sitting in it but she hasn’t yet so she’s really become a hermit? And she used to be so active.

Uh, um, if we go to the mall which I can very rarely get her out to the mall it has to be something she’s really wanting um we’ll go I’ll drop her off at the door and then I’ll go park the car and she’ll hold onto me and we’ll normally just go to whatever she wants to get and then we leave. We don’t get to go around the mall and shop like we used to or just window shop.
She used to go to a lot of, she used to belong to a lot of organizations, woman’s organizations and in the last year I don’t she’s been to maybe two meetings if anything. And I think that’s one of the big things is that she’s afraid to drive. And, she don’t drive at night at all. Anymore she seldom drives at all. And I think it’s a fear.

**Emotional Reaction of participant since FoF/balance disorder began:**

**Specific Aim # 5 Results:** To reveal the patient’s present attitudes toward their balance problem through a qualitative interview, including sessions to understand activity level before and after a fall or FoF.

One of the most common responses from the participants was a feeling of frustration due to the fear of falling and balance problem. Participants expressed frustration that they have a new or additional medical problem, aggravated that they are afraid of falling, frustrated that they cannot perform activities of daily living, and upset that their quality of life has been altered. Participants will often focus on the activities they could once perform in the past and become extremely frustrated even to the point of depressed that they cannot perform them as they did before.

*I tried this room to paint. I can draw and everything too, well art. And I can make a straight line and paint without getting it wavy or anything and now I can’t. That was aggravating and then I get real dizzy. The paint went all over the carpet. At least I caught myself that time. But, the paint didn’t. So I quit, I gave up. And that makes me mad. I’m the type I don’t like to give up. If I see a challenge I do it. I get aggravated.*

*How in the hell did I let this happen? That the only thing that irritate me. How did I let this happen? Then I came to the conclusion, oh shit I’m not getting any younger I’m getting old, getting older. Maybe that come with the ballgame, I don’t know?*

*I have to ask for help. I’m not used to that all the time (crying). I’m the one who gets stuff started. I’m the one who says, it’s time to get this done outside or let’s go. I get aggravated now.*
Several family members described a change in their family member’s mood since their fear of falling began.

*She’s a little more irritable, a lot more.*

*Oh yah, he’s been very mean. Irritable, he gets upset very easily. Um but he hasn’t been able to do anything but you know he’s just been stuck in the house. Cooped-up in the house so we pretty much drive each other crazy. You know he’s completely different from how he used to be. He has no energy to do anything or he doesn’t do anything so you know that kind of gets to me too.*

One family member reported a positive change in his wife’s mood since she developed her balance problem and fear of falling.

*Uh, actually she’s got a lot nicer, really I mean seriously she used to really be a big crab and now that she’s got this uh vertigo, she’s a, I think her personality has changed to the better.*

Several participants indicated a positive outlook on life, in the midst of their fear of falling.

*I still feel terrific. We reached the age where all our problems are behind. You know? We don’t have children to rise anymore, we now have grandchildren to worry about, but life has just gotten better. We have more income; money is easier to come by.*

*I haven’t stopped singing yet. I’m trying to hang in there. I don’t want to quit because I enjoy it.*

Some participants reported a sense of hope; hope that perhaps this program would increase their quality of life.

*That’s the fear, which I won’t be able to walk and then I won’t be able to work. In the next two years I’ll retire, but I want to be able to work until that time. Or perhaps as short as this summer depending on how this program goes. I want to make sure that I have pretty good quality of life when I do retire. I don’t want to be sitting here in the chair all the time*
Well, since I’m going to be 82 years old in July I want to continue being active. I don’t want any limitation on what I can do. And, if this thing continues to worsen, I’m going to be limited. And, that’s my greatest fear; I don’t want to be limited. I want to do what I want to do... what I’ve always done. That’s why I sought help.

Yah, I would like to get better because I don’t want to think that the rest of my life is going to be like this, because I don’t feel that old. I feel young in my mind. 65 is not that old. I didn’t think it was.

Emotional Reaction - Anxiety and depression since FoF/balance problem:

Specific Aim # 5 Results: To reveal the patient’s present attitudes toward their balance problem through a qualitative interview, including sessions to understand activity level before and after a fall or FoF.

Fear of falling restricts an individual’s activity level and surrenders their independence. These individual live a more sedentary life due to the reported fear of falling and the thoughts of an injury due to a fall consume their day.

I’m quite fearful of it, of falling during that time. I’m so afraid. My grandmother had broken her hip at least two or three times. So, there’s that in the back of my mind.

I’m certainly concerned of an injury when you fall and uh I try my best not to. That’s the main concern I have.

Breaking a bone, you know I have that. I’m afraid you know if I fall I’ll break a bone and I very well could.

Depression and anxiety almost always occur with a fear of falling.

I think I have some depression. Um, I’m not sure but I think I have some depression.

Um, quite a bit I think (referring to depression). I don’t go out anymore; I don’t drive, maybe if it’s real short. And, that’s a big change because I used to go all over the place. I did a lot of shopping. I have really come down from the place
that I was. And that’s why I answered one of those questions... I’m kind of depressed. Maybe because I just don’t do much anymore.

Depression and anxiety due to fear of falling can impact the quality of life for the participant which can be hard for family members to accept. Family member emotions are illustrated by the following quotes.

With her you know the biggest thing is the fact that you know she is just isn’t as independent anymore and she used to be independent. And she’s dependent now and she used to be so independent. I think that the hardest thing for me to swallow.

And, that’s kind of demoralizing you know. I mean when he was always active and like had his own business and worked hard you know to ah, yah I think he got kind of depressed about it.

And the other concern is that we were so active and now we’re not active and it’s just really hard to accept. It’s like a depression.

I think it’s, she is a little depressed about it, because of the fact that she’s not able to just come and go as she wanted to go. And I think she’s, she’s been always real alert, she’s 82 and she’s always been, you know, very alert, a lot of people will say I can’t believe your mothers that old, and everything, and I can see it has, it’s kind of um, affected her in some, you know, you feel like she’s aged a little because of it.

Because of just the standing and being around the store like that; this is the kind of thing she will have difficulty with. In the crowds of people or social occasions or church. We made a trip to Mexico recently with our grandchildren that was a real hard trip for her because the airports going through security and taking your shoes off and all this stuff in here and the walking that you’re going to be doing all and so, so that was real hard. So that’s anxiety.

Three of the research subjects described a sense of embarrassment due to their balance problem and reported fear of falling.

Well um you know at my work we go into churches a lot and genuflect and I can’t even get close to that you know if I get one leg down I’ve got to hold onto
something. At the cemeteries we walk on uneven ground and I just don’t want to fall and embarrass myself or anyone else.

It’s embarrassing. Some people think I’m drunk.

This is my concern at work I keep saying one of these days somebody is going to report me because I stagger and when I get to the hallway that leads to my office there’s a handrail the entire way down and once I clock in I feel very comfortable because I have something to hold onto.

**Dependence on family members:**

The family members who were interviewed separately discussed their role as a supporter and provider for their family member with a fear of falling; family members who were experiencing increased dependence on these same family members to perform activities of everyday living.

He practically does all the housework and everything and before I did, I mean he still helped me um and then I mean I worked all the time and I never I just don’t think I could work, I don’t think I could do a job.

He just has a tendency a lot of times he doesn’t realizes it to he will unconsciously he will grab my shoulder we’ll be walking along and he’ll grab my shoulder as if he were a little bit a feeling of falling and um but he doesn’t fall it’s just a feeling that he has and I think he does that a lot more than he realizes.

He does all the carrying and climbing and everything like that. We just went out to Seattle for my grandson’s spring break and you know so between him and my son they have to carry everything for me, even my purse. Even if we’re shopping most of the time he ends up carrying my purse. Because I just can’t carry it. And then my coat and my clothes whatever I have to pull off. So, he has to do that and basically take care of everything like that.

If we go out to eat I just have to hold onto her the whole time. She used to get out of the car by herself, now I have to go around and help her. Sometimes I forget and then I have to remember because that is a new experience for me. We used to
be pretty independent, not that I wasn’t trying to be a gentleman but now I do it most of the time. But I help her. We have gotten a handicap sticker to help her. So that when we go to a shopping center or something we can park right out front. So she doesn’t have to walk far and trip over something. And then I’m around here most of the afternoon unless I’m outside. I don’t go very far.

Well he can’t cut the grass anymore in the back. My son comes over every week to cut the grass. He only lives to a street over which is wonderful. And, we have a steep yard and he worries about falling with the lawn mower

Um... yes, there are a lot of things that he used to always take care of the grass and the yard we both kind of did together and um it is an effort anymore to get him to cut the grass so we have a grandson who comes over to cut the grass or sometimes I’ll get out there to cut the grass um it’s too much of an effort for him.

**Family stress:**

**Specific Aim # 6 Results:** To determine through a qualitative interview, the impact that FoF has placed on the spouse, family member or significant other and what information or support they would have liked to have available to help them cope with the FoF.

Studies devoted to the impact of a fear of falling have focused on responses from the participant, with little mention of family member stress and burden due to falling fears. In this study, the data showed that over half of the family members experienced increased concern and stress, which was connected to their new responsibilities as supporter in their respective household.

*Today I did have a meeting but I wasn’t gone long. Actually she talked to me twice actually three times. She called me right before I left for the meeting, and when I was having coffee with the guys and then she called me right before the meeting started and then I called her on my way home to make sure that everything was fine. I always check to see if she needs anything. Or at least I always try to.*
I used to travel quite a bit because as a safety coordinator I trained a lot and uh I don’t do that anymore and when I do have to go out of town or something it’s always just a fear you know don’t want to leave; afraid something’s going to happen. Pretty well end up being a homebody I guess

Going to dinner everythings fine except she’ll say ooh I have the dizzies and then I know I got to stay real close to her in case she starts to take off one way or the other. And if we’re sitting somewhere I’m always trying to be on the alert and if I see her move like to go to a breakfast bar or something like a salad bar or something like that when she gets up I’m trying to be on the alert incase she starts to get one of them bad ones. And, yes it does it put a cramp in your style but I mean it worries the hell out of me you know I just worry about her really taking a nasty fall sometime and nobodies there and that’s a typical day. Its more worry about her falling and hurting herself that’s the main thing of the day, really.

She has always been such a strong person and to see her in a weak condition it just shouldn’t be that way. And it’s affected my kids. (Family member crying) My kids are the only grandkids so their scared to death that she’s gonna fall. It’s changed our lives drastically, um, like I’m going to Chicago in a couple of weeks and I’m scared to death to go. I really am scared to death to go, and this is something that my husband and I have looked forward to, but the fear of something happening to her, so I will go to Chicago and my husband will stay home or vice versa.

I have quite a bit of concerns with leaving her, to the point where I don’t want to leave myself. She is alone for a good portion of the time. We live in a fairly large house with steps down in the basement where the laundry room is and steps upstairs to her upper bedroom and my biggest concern is that she will fall and injury herself while I am away. It’s just so hard to leave her anymore.

Many of the participants’ stress stemmed from a feeling of emotional worthlessness and burden on the family.

He’s trying to keep a lot of pressure off of me and he does small things around the house and if he doesn’t do it then I would have to do it and he doesn’t want me too. I just feel bad that I can’t help more.

I have to get him sometimes to help me make the bed. And, if I’m having a really bad morning where my head is really bothering me that means I’m more off balance and I need help doing things. So, I feel like I’m burdening everybody.

He’s semi-retired, so I hate for him to have to do everything for me.
They look at me like I’m a burden to their dad. But no one was ever there for him, I’ve always stayed by him. Surgeries, heart attacks, bi-passes, all that stuff, always. I’ve been the one to take care of their father, but everyone thinks I’m a burden now because I’m sick. I like, I just can’t deal with it, that’s why I’m aggravated. I can’t keep up. I’ve got to realize that I’m getting older too; it’s harder to keep up.

Family members stress also came from problems with participants accepting that they have a balance problem (age related etc…)

You know she has to accept it. Sometimes she doesn’t want to do this. She thinks that I tell stories and then she fights back a little.

Uh the other is that I have been begging him to change from those shoes that he says hurt him so badly and it’s just trying to I guess its men in general from what I hear it’s just hard to get them to do something to help themselves and that’s the way Don is, Don should have been here a year ago to have this you know uh vertigo you know whatever you call it looked at he should have gotten those shoes a year ago I mean and I hate to nag. I hate to be the nagging wife so you, you know try to encourage him for a couple of days and then he just finally says are you ever going to shut up about that and then you give up.

Sorry Don, but it’s true. That he is getting older and I mean I think that’s something that women definitely accept. Oh, I’m getting older, I shouldn’t be doing this. And, men don’t, men think that they can do everything today that he did when he was fifty years old and I just tell him don’t do that, don’t climb on that, don’t try to push that or pick that up, let somebody help you with it. He is very um against uh asking somebody for help. He wants to try it himself and then he gets discouraged when he can’t do it. And that is something that I wish I could get through to him you know nobody expects you to do that anymore. You just need to accept the fact that age is playing a terrible game with both of us and I’ve accepted it and I wish he would but he just doesn’t want to. It put so much stress on me.

The idea of pushing her that can be aggravating and she doesn’t want to you know, what I’m saying is the only person who can help her, she’s got to help herself. To a certain extent there are some things that we can’t do for her, and that’s aggravating.
Assistive devices:

Stress of a family member falling or repeating a fall was the source for family decisions and tension on appropriate assistive devices to help their family members ambulate and to ensure family member peace of mind. While many family members encouraged their family members to use assistive devices such as cane, the participants refused due to vanity issues and the stigma of “being old” attached to using such devices. The following quotes best represent this theme:

*You know I’ve asked her if she would feel more secure with a walker or a rolling walker or cane and we would probably be better at evaluating whether that would be a help or hindrance to her. You know, but she doesn’t want to use one and it just makes me so nervous.*

*I guess I am too vain to use a cane.*

*Got a lot of canes there (laughing) but he doesn’t want to use it. He says that’s for old people. And I can’t convince him otherwise.*

*No, I’ve tried, um, my sister’s got a walker and one day I was real bad and we was cleaning the barn out there, well I couldn’t really help him (referring to her husband), and I seen that out there and I was like, huh, and I opened it up and I could walk easier when I had that. But then I put it down because it looked silly.*

Problems with family members:

Family support can contribute to the success of a risk of falling program, however it can also be a hindrance to individuals with a fear of falling when family members and spouses, in efforts to reduce future falls, tend to be over supportive and take away any remaining independence from their family member. The following excerpts from the data support this statement:

*Everywhere we go the kids are right there to help him... there would be on in front and one behind him helping him along. They don’t want him to break a hip or become immobile or something serious that would take a long time to get over*
like a broken rib or something. He’s just gotten to the point where they treat him like an old man, so he acts like an old man.

In my opinion I would like her to sit on this couch and not move until we get back.

The interview data of this study also emphasized negative support from the participant’s family members. This negative support stemmed from a lack of understanding the individuals balance problem and the remediation portion of this study as a solution to the balance problem. This was reflected in the words of the participants who struggled with aggravation and depression from lack of family support.

He doesn’t understand that I can’t, I can’t play with them (grandchildren) he just doesn’t understand and it bothers me and he thinks I don’t want them around Like I’m being mean, but I can’t. They want to romp and play around and jump on me and they want me to do all that stuff and it bothers me and then we argue about that because I can’t play with them. .

It’s aggravating you know when you listen to it, her calling me bobble head. They tell me not to do it (referring to therapy) because it cost too much money. They make me feel like I’m not worth spending the time or money on. And they get mad, or she’s always commenting on that I’m always sick. “Why are you always sick? I’m glad I’m not you! You’ll probably be the first one to die”, stuff like that. That makes me feel like (pointing to her fingers) that tall. I didn’t want this, you know and some of the other things that have happened to me. I didn’t ask for it.

My grandson’s a pitcher and he wants a catcher and I’m afraid that I’ll lose the ball and it will hit me in the face because that movement of the ball and watching the ball with my eye movement in watching it might cause me to lose it. And, it might hit me right in the face and he doesn’t understand that, he just thinks that I’m lazy and that I don’t want to go out there and throw with him. And that doesn’t have anything to do with it. Half the problem with this... his problem is that it’s not anything he can really see so he’s not seeing anything that’s wrong with his granddad all he can see is that his granddad won’t... now I know he’s only 14 but he still don’t understand why he can’t get up off the couch and throw the ball with him or hit balls.
Problems with previous medical care:

In this study, within the category of family stress due to fear of falling and balance disorders, subjects and caregivers described their struggles with previous medical care prior to enrollment in this study. The data corresponded with the literature emphasizing that participants with balance disorders and a history of falls are often not properly referred for treatment of their balance disorder complaint (American Geriatrics Society, 2001). This delay could cause unnecessary stress for the participant and family members and could serve to decrease their confidence in programs aimed at reducing balance disorders and falls.

The other doctors I went to took all these CT scans and MRIs and we never got anywhere. They just said well, it could be this, it could be that. The neurologist blamed it on the heart doctor and the heart doctor blamed it on the neurologist. And the other guy blamed it on the stroke doctor. So you know there were no answers, they just shuffled me on to one of the other doctors.

Well, he has been seeing a lot of doctors and everything this summer. He went to the chiropractor and the spine specialists and well our family doctor and he had about 5 MRIs and one doctor would say I don’t like the MRI so this doctor or that would send him for another one. So, I think we’ve had a lot of stress. I guess as long as we can keep checking off that it isn’t this, it’s not a brain tumor, and it’s not a stroke... I guess it’s a good thing.

My big problem with the whole thing is how long it takes you to get from your family doctor to a program like this one. I mean we fooled around for about two and ½ months before I saw a specialist.

For a number of the families’ interviewed, prescription medications were sources of their frustration with previous medical care. One family member said the following about the relationship between her mother’s balance problems and her medications.

In my opinion I think a lot of it is medically induced. I think a lot of her medications have got a lot to do with her dizziness. I really do think that they are the biggest part of her problems and I just want some doctor out there to really pay attention to the medications. You know she goes to her regular M.D., she goes to a neurologist, um she goes to a pain doctor, and so on and so on. You’ve
got different doctors giving different medications and in my opinion not paying
attention to what’s she’s already on.

In the data, the majority of the participants expressed a negative experience with previous
treatment. However, they also spoke of hopefulness that the risk of falling program would be
a solution to their problems.

I’ve still got hope that something will work. I mean I’ll do my part, which is when
they give me stuff to do, I’ll do it. I can’t take much more of this.

Well, the process that we’re in hopefully she’s not going to fall anymore. I am
hoping that in the next thirty days we will have uh a clearer understanding of
what it is and she is going to work really hard at what she needs to do and the
dizziness is going to go away.

You guys have a good reputation and I’m hopeful that between the three of you
that uh we can come to some resolve.

My mother lived to be 98 and his mother lived to be 88. Um, I feel like we still
should have some decent time left and we can stay active. And, with all the
medical aids and like your study, I am hopeful about our future. You are coming
up with answers.

4.3.3. Category 2: Role of the risk of falling program

The following themes were derived from the post program interviews.

Overall impression of the risk of falling program:

Specific Aim # 7 Results: To determine through qualitative interviews with the adult
with balance problems and FoF, their opinions about the remediation program after its
completion.

The results of the qualitative data pinpointed some achievements and limitations with the
risk of falling program. By the end of the remediation portion, the subjects and family members
developed considerable insights about the benefits and limitations of participating in this study. Some also recognized that while they thought the program, as a whole was not a success, it did provide certain counseling tips that reduced fear of falling for the participant and alleviated caregiver burden and concern. The overall impression of the program was mixed. The following quotes summarize the positive responses of the program:

I thought it was great for me. That’s the only thing I can base it on. It really helped me a lot.

Yah, I think it’s been great. One of the best things he ever did was your program.

I just think it was great. I’m just really glad he got into this study. I think this was one of the best things he’s ever done.

I appreciate all you have done for us. I really do. The doctors, the therapists... It’s helped a lot.

I thought it was extremely helpful and everybody was good and nobody more or less said you dummy. No, I would say that it was extremely helpful.

I think that based upon what she tells me I think it’s pretty good from the kinds of things that uh they are doing to help her regain whatever confidence she may have lost over a period of time.

I’d say that everything we’ve done has helped in some way. It’s mainly drawn our attention on how to handle some of the problems such as the shoes she wears and the nightlights.

The program helped with her balance and dizziness. The program really helped her because it gave her tips. For instance like if she feels she is going to fall if she would just touch something solid like if she is walking down the hall if she would just touch the wall as she’s walking down the hall it would help steady her a little quicker. So, I think because of all of it and because at the beginning with you and all of it, it just helped tremendously.
Change in activity level post program:

As the participants completed the remediation exercises they began to venture out and perform more activities of daily living on their own. One subject described her ability to help in redecorating their house. She stated,

Since the last time you was up here we have redone the whole house except for this area that we have to touch up. We don’t agree on the colors but I just slap it on there.

Another subject described the activities she plans to perform this year.

Yep, I am going to have a yard sale this year. I’ll probably have a couple of them.

Many subjects indicated how they are now able to engage in activities with their grandchildren. One subject described how his life is now back to the way it was.

I’m tossing ball with my grandson again and I went to his ballgame yesterday.

Family members also reported on the significant increase in their family member’s activity level post participation in the program.

Well, he was out sweeping off the patio and moving the furniture because we’re showing the house and he ran the sweeper through all the rooms. And, when he was feeling real bad I didn’t get on him at all about doing things like that because I knew that it bothered him.

Well, getting down the steps or getting up and down to wherever, a chair or the couch she does pretty good and she does it all on her own now.

Uh, she’s probably able to do any activity that she so desired to do its just a matter; she’s told me that she has felt better than she’s felt in years about not getting up and being dizzy.
**Improvement/increased confidence post program:**

**Specific Aim #8 Results:** To determine through a qualitative interview conducted with the adult with FoF and their family member any changes in attitude after completion of the remediation program regarding mobility, level of confidence.

A feeling of self-confidence was the most commonly reported change in the participant’s attitude after completing the risk of falling program. One subject reported still being cautious while performing some activities of daily living, but she is now confident to venture out and work in her garden and she stated that she would not have attempted to do that prior to entering the risk of falling program. The following quotes are from subjects reporting their increased confidence level:

*Yah, I feel confident, I got my confidence back. I could go anywhere without stumbling over and getting dizzy.*

*Yes, it definitely made me more confident with all the things that we had gone through now because I’m not near as wobbly. I can walk a straight line pretty much on my own now without having to catch myself. I think I can definitely see a big improvement from what I was in the beginning.*

Family members also indicated increased confidence that their family member could perform activities of daily living.

*We both can’t climb a 30-foot ladder, but we feel real confident to do just about anything.*

*He seems more confident in himself more to go up and down the steps here. And, it doesn’t seem like he’s staggering anymore.*

*Well, she’s driving again so and she had quit doing that for a long time so yah, I think her independence is coming back. Um her confidence is coming back. She*
seems to be having more energy then she did and I really think that it’s everything combined.

I think she’s feeling better about um like I mentioned I was really pleased when she said she could tell that these exercises were helping and I think that that in itself give her confidence to be able to try more and do more.

Another participant’s wife reported how her confidence level in her husband’s ability to perform common activities like going to the store on his own increased after his participation in the program.

I feel more confident. I would never let him go to the store by himself if I didn’t feel confident that he could do it on his own because he was always afraid he was going to fall you know I mean it was happening too much after his fall. Like I said before you know when he takes a short trip to the store, he’s on his own. I’m not there to make sure he’s okay and take the basket and take a hold of him. No, I think he’s done a lot better and I have more confidence.

Emotional Reaction of Participants Post Program:

Specific Aim # 8 Results: To determine through a qualitative interview conducted with the adult with FoF and their family member any changes in attitude after completion of the remediation program regarding mobility, level of confidence.

The theme of depression was placed within the breadth of emotional problems experienced by the participants with falling fears. The data showed that many participants experienced improvement in their overall mood after completing the program. This is shown by the following quotes:

Yah, I think she’s been in fairly good spirits and she doesn’t talk about dizziness or balance issues like she use to talk about it all the time.

Oh yah, she’s in a lot better mood. She’s never been one that’s been depressed or um sulky. She’s always been an upbeat personality until this all started. And now that she’s feeling better she’s more up beat.
**Plans to keep up with the program:**

A key strategy for reducing fear of falling and falling risks is to counsel and educate the participant and family members on fall prevention. Subjects were introduced to techniques to modify falling risk factors such as improving their balance through therapy exercises, engaging in physical activity such as taking walks or using an exercise bike, and reducing home hazards such as removing tripping hazards and eliminating poor lighting. During the exit interview for the program, participants and family members were asked how they plan to keep up with the risk of falling program. The following are some of their responses:

*Well, I have the exercises that the physical therapists gave me and I plan to still do them. I do them at work and I do a few here. They did a really good job, they really did.*

*They got me on the (stationary) bicycle twice a day. Oh, and I have some of the exercises he gave me and I use them at home.*

*It’s (the program) mainly drawn our attention on how to handle some of the problems such as the shoes she wears and the nightlight. We always did have a nightlight but we placed it in a different position until now.*

*I’ve learned some things that I didn’t know really, like safety stuff. So, I think I’ll continue to keep an eye on that stuff now.*

**Limitations of the remediation program:**

**Specific Aim # 7 Results:** To determine through qualitative interviews with the adult with balance problems and FoF, their opinion about the remediation program after its completion.

In summary of the above results, a majority of the participants, after completion of the risk of falling program, began to venture out and perform more activities of daily living on their
own. A feeling of self-confidence was the most commonly reported change in the participant’s attitude after completing the program. However, a few subjects reported various limitations with the program that had a negative effect on some of the subjects’ progress through the program.

1. The length of time it took to complete the two assessment appointments at two different locations and the additional appointment to see the physician to obtain a diagnosis/clarify assessment results before receiving treatment for the balance problem:

   Well uh from a standpoint of our issue is appeasement. We spent a half a day and what we got from that half a day it would have been nice if we would have gotten some x, y, and z here is the problem. At some point in time I think we would have felt a lot better if we would have gotten some kind of feedback that says uh the doctor will give you some answers but in the mean time this is what we think it (the problem) is. I understand what the process of the program is trying to do. And, it’s about continuous improvement and how we can better diagnosis and do what the participant needs and the family needs etc, etc... Uh, I think that’s important and then on the other hand I think it’s important that you guys know that people call us and say well, what did the doctors say and variably when you come from the doctor people want to know what did they say. Well, hey, I don’t know they didn’t say anything. It creates a lot of anxiety on a lot of people’s part from the standpoint of making inquires on how she’s doing.

2. The location of the physical therapy facility:

   It’s just a long way out there. I hate to get him to drive me over there.

   The overall program, other than the drive to the experience on Creek road (physical therapy location) was very good. I’m a little disappointed in that phase of the program.

   We could only go twice a week. He (the physical therapist) wanted us to go three, but it’s kind of far over there so we’re only doing it twice a week.

   I wish they were closer because it’s such a drive.

3. Interpersonal issues with the physical therapists:

   Well, I feel like they, they do the same things and they really don’t tell you what I’m supposed to get by doing that. Uh, I hate to say this but some of the people in
the program, some of the therapists don’t pay a lot of attention to what you’re
doing although they work with you. A couple of them if I’m sitting in a chair you
know some of the stuff is done while sitting in a chair and they would suddenly
strike up a conversation with the next therapist a couple of chairs down and they
would talk for ten minutes while I’m sitting there like a dummy. I didn’t like that.
Other than that, I think that they’re competent in doing what they do if they would
only apply themselves to do it.

You want me to be honest? They had two girls over there, I can’t remember their
names but they were real easy to work with. They were really good with what
they did. They took there time with you, um very sympathetic, tried to build up
your confidence. I wasn’t really impressed with P. So...I think it was, that’s his
business and he had his mind a lot more on running the business and he was more
in a hurry like assembly line medicine. But, all in all it helped me a lot.

4. Simplicity of therapy exercises:

To me, I’m not doubting it, but it’s all so basic all the therapy that in the
beginning you wonder because I don’t know what you think you’re going to go
through and then it turns out to be pretty simple. In the beginning you wonder, is
this going to help? Is it worth it? Basically when we live out here in the sticks
and we have to go all the way out there for something basic, it almost made me
quit the program.

At first I thought, you’ve got to be kidding me, this is a waste of my time, you
know, that’s what I felt like at first.

Limiting activities/dependence on others post program:

Two of the most anxious participants, as indicated on the Beck Anxiety Scale described
problems performing activities of daily living on their own post-therapy. The following family
member described an activity his wife is afraid to perform.

We have a rail going down to our basement and there’s about ten or twelve steps.
She just doesn’t go down there. She has trouble going up and down. Now, If I go
down with her she doesn’t have too much of a problem.
Falls and balance problems not eliminated by the remediation program:

The research participants who had a fear of falling before they sought help indicated an improvement in overall mobility and decrease in falling fears after they completed counseling and therapy. However, three Group 1 individuals and three family members indicated continued concerns about falling, near falling episodes, and balance problems post participation in the program.

If I get on unleveled ground or gravel or something like that, there is still uneasiness there, it’s still in the back of my mind.

Mostly when I get on an escalator or off an escalator I just have to be really careful. Any place where there are ridges that I have to step over, I try to be really careful. I haven’t fallen, but I’m usually holding on to him or the railing. And, that’s what makes me feel the most secure is if I can hold onto the railing.

I still am concerned with her on stairs because she will have a habit of going out and I yell at her all the time. She’ll stand at the top of the stairs and waive and carry one and not hold onto the railing when the steps are right there. And, her balance just isn’t 100%. My biggest fear is that she is going to break a hip. You know it’s not because I don’t want her to do something, I’m really worried about her falling and physically hurting herself. I don’t know what I would do if she fell and broke a hip. I don’t know how I would manage.

Out in the yard I have concerns. If I’m not on cement or level, that is a concern. Especially trying to get up to the flower beds is another big problem. I have a cement goose out there and I was hanging onto the goose’s head you know. And, if I didn’t have a hold of the goose, I think I would have fallen.

Need for education on risk of falling/ falls + balance problems:

Specific Aim # 6 Results: To determine through a qualitative interview, the impact that FoF has placed on the spouse, family member or significant other and what information or support they would have liked to have available to them to help cope with FoF.
The researcher asked participants before beginning the remediation portion of the program, “What information do you wish would be available to you and your family member/spouse to help with overcoming a fear of falling and understanding the problems with his/her balance”. In reviewing the interviews with the family members and fear of falling participants, there was a reoccurring theme of wishing that information on balance problems, falls and risk of falling had been made available when they were first looking into what to do about their frequent falls or balance problems.

*Well, I guess I was really oblivious to the kind of work that the therapist does and when the doctor suggested her seeing him, well of course she’s been to physical therapists to help her rotator cuff, but this seems to be a whole different ball game.*

*It would have been nice to have had a little information right at the beginning when she saw Dr. P. (primary care physician) about balance problems and stuff around our house that can cause a fall.*

*Um, we happened to get information from a friend uh about your program and I am so thankful that we did. It has been a tremendous help. So, um he was just disgusted with the doctors before because everything came out oh this is okay, that was okay, you didn’t have a stroke, you don’t have a tumor, he had four or five MRIs and I mean when you keep hearing all this is okay, it’s aggravating. You think I know there is something wrong with him, why can’t they find it. And, until we found out about your program he was very down and he’s not a person that gets down in the dumps.*

**Medical Concerns Post Program:**

For the majority of participants, the risk of falling program was a success at increasing confidence in their ability to perform activities of daily living. However several participants and family members indicated that there were still additional medical conditions that could not be solved by the remediation program that prevented them from doing certain activities.
I can do more stuff; I just can’t do a lot of stuff because of my back. It’s not because I don’t have the confidence to do it or anything like that, it’s just that I can’t do it anymore. We can go out to dinner, that doesn’t bother me a bit; the shopping is simply because I can’t walk on the count of my back not because I don’t have confidence to do it.

Well, actually it has made me better because I am better and I think that going over to the therapy has helped me a lot and I am still doing my exercises. But, my feet are numb and that is because of the neuropathy and I think that plays a big part in why I still have balance problems.

Basically her handicap now is her hip and her back. She’s actually tried to walk the mall but couldn’t because of the pain.
5.0. Summary of the Study:

Awareness on fall prevention has increased in the past few decades yielding programs to prevent and reduce falling risk factors such as balance disorders. The psychological impact of falling or fear of falling has been reported in individuals who have and have not experienced a fall. The fear of a repeated fall experience often leads to activity restriction and decreased quality of life. Although research is emerging, the question still remains regarding what are the most appropriate intervention programs to reduce fear of falling. The current research evaluated through a mixed method design (quantitative and qualitative research) the effectiveness of reducing fear of falling in older adults with a diagnosed balance disorder after participation in a team approach risk of falling program that included fall prevention education and counseling, home hazard assessment, and physical therapy. The research also explored the impact of fear of falling for the patient on a family member or spouse of the individual. Quantitative data were analyzed to determine the effectiveness of the risk of falling intervention program designed to reduce FoF in older persons with dizziness and balance problems, to verify the level of anxiety and depression pre and post intervention in the patient due to the FoF, and to determine via the Activities Specific Balance Confidence Scale (ABC) if the risk of falling assessment and remediation program reduced the fear of falling.

Group 1 subject characteristics included the fact that the majority of the subjects were women, had a high percentage of other co-morbidities in addition to their balance disorder, and were currently taking more than four medications. In terms of falls, all subjects regardless of
gender reported a fear of falling, history of falls and near fall experiences. Unsteadiness while walking or standing was the predominant balance disorder complaint. Physical therapy assessment results indicated that all subjects were at high risk of falling, and auditory and vestibular test results identified the origin of their balance disorder (i.e. central or peripheral vestibular system pathology).

Statistically significant reduction in fear of falling, depression, and anxiety was observed for Group 1 participants after involvement in the intervention program. Family members and spouses also demonstrated a statistically significant decrease in fear of falling concerns after their family member participated in the program. A significant negative correlation was found to exist between the variables of fear of falling and change in anxiety and depression. These findings indicate that decrease in fear of falling was related to corresponding improvement in subjective reports of anxiety and depression (i.e. as the subject with fear of falling became less fearful of falling, their sense of anxiety and depression lessened after involvement in the study intervention). The significant correlation found between change in ABC scores after the intervention program and age indicated that improvements on ABC scores decreased with increase in age; findings that are consistent with reports by Myers, Flecter, Myers, and Sherk (1998); Whitney, Hudak, and Marchetti, (1999).

Although there was a statistically significant reduction in fear of falling for subjects in Group 1 as shown on the ABC scale, it should be noted that the post-therapy mean score was below what Myers et al. (1998) recommend as the cut-off score for highly functioning, physically active older adults. Myers et al. (1998) stated that participants scoring below 80 on the ABC scale indicate areas of needed improvement on balance confidence. In particular, five subjects (4, 5, 8, 12, and 14) indicated lower balance confidence after participation in the remediation
program. Post-program interviews revealed that subjects 4, 8, 12, and 14 had mixed reviews of the program; suggesting that concerns about falling and future falls and the contribution of additional medical conditions for falling risk could not be solved by the remediation program.

It should also be mentioned that three out of the four Group 1 subjects (Subjects 2, 5, and 9) whose ABC scores decreased after participation in the intervention program felt that the program was a success by praising the emotional support and therapeutic benefits of the intervention program in the interview format post intervention. Without the qualitative approach (open-ended interviews) used in this study, the positive responses would not have been revealed and the quantitative findings (i.e. decreased ABC scores) may have been viewed as a negative finding.

In connection with the last statement, The ABC scale addressed the amount of confidence the subject had to perform sixteen activities inside and outside of their home without falling, but it did not capture a descriptive portrait of all activities the individual was afraid to perform. A potential drawback from solely using this scale to assess fear of falling would be whether or not patients actually experienced or performed the activities listed on the quantitative scale (i.e. stepping onto or off of an escalator while holding onto parcels). Also, the scale does not incorporate social activities such as going to a restaurant (Steadman et al 2003). Limitations of the ABC scale were the main reason for incorporating personal interviews and subject observation into the study.

Qualitative reports from the subjects and their family members or spouses helped to provide a description of the activities Group 1 subjects were afraid to perform due to their fear of falling. The qualitative data were analyzed to investigate the impact of fear of falling due to a balance problem on everyday living for the patient, and for the family member, significant other or spouse of the patient. The main themes resulting from the data summarized the process of
developing a fear of falling, the emotional reaction to FoF, lifestyle changes for the participants and their family member or spouse due to FoF, and the benefits and limitations of the overall risk of falling program at reducing FoF.

There are many factors that may have contributed to the positive statistical results of this study. According to Crombie et al (2004), healthcare providers that lend positive support to older individuals may help them overcome falling fears and become more active. The principal investigator for this study acted as the patients’ advocate. The researcher built rapport with the patient and their family member or spouse in their own home during the interview process, followed up on their progress through phone calls and a letter on safety tips, all of which may have contributed to the significant reduction in fear of falling. The qualitative interviews also provided an opportunity for the subjects (both Groups 1 and 2) to discuss their falling concerns and other issues surrounding their balance disorder. For the first time for many of the participants, the interviews were an opportunity to openly talk to a healthcare professional, in a safe environment about their balance and falling concerns without the pressures of running over their appointment time.

Another reason the intervention program may have been successful at reducing falling fears was due to the vestibular/balance rehabilitation component. The main goal of vestibular/balance rehabilitation is to address the functional balance problem through a series of individualized strengthening, endurance, and habituation exercises. Although minimal data exists on vestibular/balance rehabilitation (Salles et al. 2003), reports on this therapy approach for individuals with balance disorders including vertigo and unsteadiness have shown significant improvement in overall balance, self-confidence, and increased independence (Telian & Shepard, 1996; Johansson, Akerlund, Larsen, Andersson, 2001; Cohen, 1994; Cowand, Wrisley,
Walker, Stransnick, Jacobson, 1998). This was observed for Group 1 participants during their post-intervention physical therapy assessment results that indicated mild risk of falling to within normal limits scores on three out of the four assessment tests (Timed “Up and Go” Test, Functional Reach Test and the Berg Balance Test) suggesting minimal risk of falling post-intervention.

In connection with the above, the methods of this study linked meaningfully with Tinetti et al. (1994) and Ray et al. (1997) suggesting that the most effective fall intervention programs for at risk individuals should include exercise, medication modifications, counseling and education on intrinsic and extrinsic risk factors that can contribute to falls. By incorporating these factors, this study and those performed by others (Sattin et al., 2005; Houghton et al., 2004; Liu-Ambrose et al., 2004; Tennstedt et al., 1998) have shown that programs with elements of exercise, counseling, education, and/or home assessment led to reduction in falling concerns.

5.1. Study Limitations:

There were a number of methodological issues that may have limited the results of this study. First, the sample size used for this study was small. Another issue was the length of time it took to complete the two assessment appointments at two different locations and the additional appointment to see the physician to obtain a diagnosis/clarify assessment results before receiving treatment for the balance problem. A solution to this problem would be to schedule all assessment appointments and physician visits at the same facility and on the same day. This would provide faster diagnosis and treatment for the patient.

As with the study proposed by Wolf-Klein et al, 1988, due to the fact that three specialists evaluated each patient, the cost of the risk of falling program appears expensive.
However, one is reminded of the extremely high costs that falls and fall related fractures place on our society. This comparison indicates that the risk of falling program can be justified as a cost-effective approach to reducing falling concerns for older at risk individuals.

Another drawback of this study was the short follow-up period for subjects to rate overall fear of falling concerns after participation in the remediation program. It was not determined if their falling fears continued to be reduced months to a year after participation. Research by Tennstedt et al. (1998) indicated the need for a “booster session” a few months after the intervention program to maintain the decrease concerns of falling. To ensure the patients’ positive progress, a follow-up program would need to be designed to track their improvement and re-educate and counsel on falling concerns.

The study presented a number of biases that may have influenced the outcomes. First, the subjects were not randomly selected. The principal investigator personally selected all participants for the study based on the balance disorder questionnaire responses. Second, it is uncertain if asking the subjects to think about fear of falling during the interviews and completion of the Activities Specific Balance Confidence Scale increased their awareness of fear of falling and promoted the favorable outcomes of reduction of fear of falling post-intervention. Third, the coding methods used to develop the qualitative data themes did not include triangulation of the data. Triangulation provides a “cross-data validity check” (Patton, 2002). A solution for future research would be to allow a researcher, blind to the study, to code the data and confirm the qualitative themes or to use a computer software system such as NVivo to confirm the data themes.

According to Murray, Carrol, & Hill (2001), addressing and understanding psychological issues cannot be omitted when developing programs that assess vestibular
pathologies. Although a significant correlation was found to exist between the variables of fear of falling and change in depression, it would seem that this intervention program was unable to address the psychological issue of depression for all of the subjects. The Geriatric Depression Scale results confirmed that three Group 1 subjects (subject 8, 12 and 14) scored the same or worse on the scale after participation in the program. The qualitative results revealed reasons for this increase in depression such as one subject losing her son while participating in the study, and the other two subjects being extremely concerned with additional medical problems. Due to this finding, it may be warranted for future studies to address psychological problems with a referral to a mental health professional to assess the emotional state of the patient in addition to providing counseling and education on falls and fear of falling.

The family members and spouses from this study tended to have more falling concerns for their family member after participation in the program than the Group 1 subjects, which was evident by the ABC scale post program mean scores (overall mean of 66.7 for Group 2 and 77.9 for Group 1). This finding may be an indication that the intervention program did not properly address fear of falling concerns with spouses or family members. A solution would be to better engage the family member or spouse in the remediation portion of the program. Often the family members or spouses were asked to wait while their family member received vestibular/balance rehabilitation. By better engaging the caregivers in the therapy program they would gain an understanding of how their family member was improving which may have alleviated falling concerns. Also, it is important to mention that the family members and spouses were not asked to rate their own fear of falling (i.e. how concerned they were that they might fall), only falling concerns for their family member with the diagnosed balance disorder was addressed. If the spouse or family member has fear they might fall this may have impacted how they scored their
family members progress with overcoming fear of falling. Future research should target intervention strategies to reduce falling concerns for the patient and the family member, spouse, or significant other.

5.2. Future Direction:

Falls continue to be considered a natural progression of the aging process. Due to this, many patients and family members are reluctant to report falls. A move towards greater public awareness and education of falls, balance and gait problems, and detecting balance disorders might serve as a means of reducing falls and the fear that accompanies them. The current research emphasizes the need to involve participants, their family members and primary care physicians in strategies to reduce falls and the impact of fear of falling. The American Geriatrics Society (Society 2001) made the statement that primary care physicians are in the best position to identify, assess and/or refer participants who may be at risk for falling. Over 90% of older adults seek help from their primary care physician each year for health related matters (Barnett, Smith, Lord, Williams, & Baumand, 2003). Rao, (2005) suggests that primary care physicians integrate fall assessment into the annual history and physical examination for older adults entering their practices.

Medical professionals need to shift their focus to encourage community-dwelling older adults to identify balance problems as a risk factor for falls. Further, older adults should be evaluated by their primary care physicians on their balance. Simple screening tests can identify older adults who are at risk for falling (Shumway-Cook et al., 1997; Studenski et al., 1994). Health fairs, balance screenings, and community out reach programs are just a few examples of
places where information on how to manage the impact of a fear of falling for older community-dwelling individuals with or without a balance disorder should occur.

5.3. Conclusion:

Fear of falling can be detrimental for the participant and greatly impact both their lives and the lives of their family members. The results from the open-ended questions administered in this study in conjunction with the quantitative data analysis suggest potential solutions to the fear of falling problems experienced by older balance disordered participants. Coupling a team-approach risk of falling program with vestibular/balance rehabilitation, counseling and education about balance disorders and falls appears to be a very efficacious way to deal with fears about falling and improving quality of life in older persons with a diagnosed balance disorder. Some components of this program should be recommended for any older adult, particularly those at risk for falling.
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## APPENDIX A

### SUMMARY OF RESEARCH FINDINGS IN THE REDUCTION OF FALLING CONCERNS IN OLDER ADULTS

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<tr>
<th>Article</th>
<th>Design/Methods</th>
<th>Sample</th>
<th>FoF assessment</th>
<th>Outcomes</th>
<th>Study Limitations</th>
</tr>
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</table>
| Wolf-Klein et al. (1988) | Prospective study: falls clinic (geriatrician, neurologist, cardiologist, physiatrist) - examined patient - extrinsic and intrinsic factors, functional problems, psychiatric - single visit and/or weekly follow-up visits that may have included PT/other team members - home visit by OT/education on fall prevention | 1. n = 36  
   a. 24 women/12 men  
   2. Average age = 77 years of age | 1. Yes/no question on the existence of FoF | 1. Most patients had 3-4 reasons for falls (i.e. Parkinson’s, hypertension, muscle weakness, depression etc…)  
   2. 77% reported no additional falls  
   3. Education on falls identified as important component of fall clinics for patients and family members  
   4. No outcomes on reduction of FoF | 1. FoF was not identified as a risk factor of falling  
   2. Medical intervention/lack of exercise program  
   3. No personal descriptions of improvement from the subjects |
| Reinsch et al. (1992) | Prospective study: Group program "Senior Body Program"  
   4 intervention groups (exercise, cognitive-behavioral, exercise-cognitive, and discussion controls) - exercise program- consisted of stand-up/step-up procedure; low intensity-exercise program).  
   1-hour sessions/3 times per week, for 1 year = exercise groups  
   1-hour session/once a week, for 1 year = cognitive-behavioral & discussion groups | 1. N = 230  
   a. 57 = exercise  
   b. 51 = cognitive-behavioral  
   c. 72 = exercise-cog.-behav.  
   d. 50 = discussion control  
   2. Mean age = 74 years of age | 1. Rating system: 1 = not at all worried to 5 = extremely worried about falls. | 1. All participants indicated low levels of FoF (mean rating of 1.4 suggesting minimal FoF)  
   2. No change in FoF among the treatment group  
   3. No significant change in number of fallers among the four groups | 1. Stand-up/step-up exercises did not produce changes in strength and balance  
   2. Lack of in-home hazard assessment  
   3. No individual intervention strategies  
   4. A participant description of impressions of the program/impact of falling was not indicated  
   5. No change in FoF among treatment group |
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| Tinetti et al.  | Randomized, controlled study: multidisciplinary program to reduce risk of falling among elderly persons  
                  - baseline assessment performed in patients' homes (by nurse pract./PT)  
                  - assessed fall history, medication modifications, near vision, depression, hearing, home hazard, balance/strength screening  
                  - structured intervention based on base-line assessment results (i.e. patients participated in no more than 3 interventions out of 8).  
                  - Exercises performed twice a day for 2 (15-20 minutes) for 3 months  
                  - control group - home visit and interview of fall history | 1. N = 301  
                  a. 153 = intervention group  
                  b. 148 = control group  
                  2. a. 78.3 ± 5.3 years of age  
                  b. 77.5 ± 5.3 years of age | 1. Falls Efficacy Scale | 1. Primary outcome = reduction in the incidence of falls (35% intervention group & 45% control group)  
                  1 year post program  
                  2. Significant decrease in FoF for treatment subjects relative to controls | 1. Presence of risk factors for intervention group and control group at reassessment  
                  2. Structured intervention strategies/no modification to individualized intervention  
                  3. No personal descriptions of improvement from the subjects |
| Wolf et al.     | Randomized controlled intervention: aimed at reducing falls in older retirement community residents  
                  -3 groups: Tai Chi exercise program, Computerized balance training program, Control  
                  15 week interventions (twice a week for 1 hour) | 1. N = 200  
                  2. Mean age = 76 years | 1. Falls Efficacy Scale | 1. Balance training group had greater improvement in balance (p < .001)  
                  2. Significant decrease FoF for Tai Chi subjects (p < .05)  
                  3. Control and balance training groups had increased fear of falling  
                  4. Significant reduction in fall risk for Tai Chi group | 1. Control and balance training groups had increased FoF  
                  2. No in-home hazard assessment  
                  3. No individual intervention |
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| *Tennstedt et al.* (1998) | Randomized, single-blind controlled trial: structured group program "A Matter of Balance" functional/physical/social activity eight 2-hour sessions/twice a week for 4 weeks | 1. n = 434  
a. 216 = intervention group  
b. 218 = control group  
2. 60-100 years of age | 1. Modified Falls Efficacy Scale  
2. 4-item scale (perceived control over falling)  
3. 5-item scale (perceived ability to manage risk of falls) | 1. 71% reported no falls  
2. No qualitative reports  
3. 1st trial aimed at reducing fear of falling  
4. 8-session intervention showed immediate reduction in FoF, however this decayed by 6-month f/u | 1. Only slight short-term gains in mobility were detected  
2. Changes in activity level or improved physical performance were not explored  
3. No in-home hazard assessment  
4. No individual intervention  
5. Intervention not designed to reduce falls or risk of falling  
6. No personal descriptions of improvement from the participants with FoF |
| Wolf et al. (2001) | Single-blinded randomized controlled trial: PT assessment determined inclusion criteria (>17 on Mini Mental State Exam, BBS < 52 out of 56) Treatment group = individualized balance program based on "Systems Approach" 12 sessions/ 2-3 times per week (30 minutes) for 4-6 weeks in-home or PT department Control group= individualized activity program (based on subject's interest) | 1. N = 77 subjects (completed intervention and 4 week f/u)  
2. N = 49 subjects (completed 1 year f/u)  
3. Mean age of subjects (control and treatment) = 84 years, all subjects >75 years | 1. Visual Analog Scale (VAS) - marked line between "No FoF" and "Very Afraid of Falling". | 1. Significant improvement in DGI and BBS test results for experimental group compared to controls (p <0.001)  
2. 1st study to investigate effects of individualized PT program on fear of falling  
3. No significant difference in FoF was observed for the groups  
4. No significant difference in depression or anxiety scores for the two groups  
5. Decreased scores on BBS at the 1-year f/u. | 1. No personal descriptions of improvement/description of FoF from the participants  
2. Only short-term gains in balance function were detected  
3. No in-home hazard assessment  
4. No inclusion of community-dwelling older adults |
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<td>Taggart (2002)</td>
<td>Single factor, with-in subject trial: Tai Chi exercise program aimed at improving balance function and fear of falling in retirement community older women subjects excluded if complaints of vertigo, lightheadedness or motion sickness indicated BBS and TUG test administered pre and post intervention 30 minute Tai Chi (twice a week) for 3 months</td>
<td>1. N = 45 (no control group) 2. &gt;65 years</td>
<td>1. Falls Efficacy Scale (administered pre and post intervention)</td>
<td>1. Significant improvement for Berg balance scores (p &lt; .001), functional mobility (TUG, p &lt; .05), and FoF (p &lt; .001)</td>
<td>1. Sample consisted of women only 2. No individual intervention 3. No extrinsic/intrinsic risk of falling assessment 4. No inclusion of community-dwelling older adults 5. No personal descriptions of improvement/description of FoF from the participants</td>
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<td>Ballard et al. (2004)</td>
<td>Randomized controlled trial: 15 week fall-prevention exercise training (balance and leg strength) 1-hour sessions, 3 times per week (PT based program)</td>
<td>1. n = 40 (20/group) 2. 65-89 years of age 3. ABC scale used to classify FoF and place subjects into study groups</td>
<td>1. Activities Specific Balance Confidence Scale</td>
<td>1. Significant improvement in risk of falling scores as identified by the Berg Balance Test for exercise group 2. No significant difference on the get-up and go test between groups 3. Exercise group did not report any new falls at 1-year follow-up</td>
<td>1. No in-home individual intervention 2. No personal descriptions of improvement from the subjects 3. No outcomes on change in FoF post intervention 4. No individualized exercise program</td>
</tr>
<tr>
<td>Houghton, et al. (2004)</td>
<td>Prospective study: multidisciplinary falls clinic assessment of both intrinsic and extrinsic risk factors referral for 8 twice-weekly exercise sessions and education sessions</td>
<td>1. N = 386 a. 251 = exercise program 2. 75-84 years of age</td>
<td>1. Fust Evaluation of Mobility, Balance, and Fear (FEMBAF)</td>
<td>1. Significant improvement in balance, mobility and fear scores for the 133 subjects who completed the exercise program 2. Patient satisfaction with the program indicated with some qualitative comments</td>
<td>1. Home visits were not recommended to all subjects 2. Authors indicated long wait period for assessment in the falls program (up to 5 months) 3. Limited qualitative reports</td>
</tr>
<tr>
<td>Clemson, et al. (2004)</td>
<td>Randomized trial: structured small group program &quot;Stepping On&quot; designed to improve fall self-efficacy and reduce falls 8-week education program (fall prevention/education on strengthening exercises) 1 follow-up home visit booster session 3 months post intervention</td>
<td>1. n = 310 a. 157 = intervention group b. 153 = control group 2. 70 + years of age</td>
<td>1. Modified Falls Efficacy Scale 2. Mobility Efficacy Scale (MES)</td>
<td>1. 31% reduction of falls for intervention group 2. Program improved falling concerns about performing functional tasks 3. Program did not improve confidence in performing basic self-care activities (as identified on the MES scale).</td>
<td>1. Cognitive behavioral group learning program - no individual intervention 2. No personal descriptions of improvement from the subjects</td>
</tr>
</tbody>
</table>
## APPENDIX A

### SUMMARY OF RESEARCH FINDINGS IN THE REDUCTION OF FALLING CONCERNS IN OLDER ADULTS

<table>
<thead>
<tr>
<th>Article</th>
<th>Design/Methods</th>
<th>Sample</th>
<th>FoF assessment</th>
<th>Outcomes</th>
<th>Study Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Liu-Ambrose, T. et al. (2004)</em></td>
<td>Prospective study: 13 week exercise study to examine relationship between change in balance confidence and changes in fall risk/physical activities (3 exercise programs) for women with low bone mass</td>
<td>1. n= 98 (total participants) a. 32 (resistance training) b. 34 (agility training) c. 34 (stretching) 2. 75-85 years of age</td>
<td>1. Activities Specific Balance Confidence Scale 2. Human Activity Profile (HAP)</td>
<td>1. Resistance training + agility training groups = improved balance confidence after the 13 week intervention (p &lt; 0.031) 2. No improvement for stretching group (p = 0.729) 3. Change in balance confidence did not correlate with changes in fall risk and physical abilities only general physical function</td>
<td>1. Population of high-risk women only with a greater risk of sustaining fall-related fractures (low bone mass) 2. Lack of education component 3. No in-home/individual intervention 4. No personal descriptions of improvement from participants with FoF</td>
</tr>
<tr>
<td><em>Sattin, et al. (2005)</em></td>
<td>Single-blinded cluster-randomization controlled trial: 2 sessions/week (48 total weeks) tai chi or wellness program to determine extent tai chi affects FoF</td>
<td>1. n = 311 a. 158 = tai chi intervention b. 153 = wellness program 2. 70-97 years of age</td>
<td>1. Falls Efficacy Scale 2. Activities Specific Balance Scale *assessed at baseline, 4-month, 8-month, 12-month intervals</td>
<td>1. Reduction in FoF for tai chi group (sedentary or active at baseline) (continued improvement at subsequent time periods) 2. Wellness group had slower reduction (greatest at 12 month period)</td>
<td>1. No qualitative results 2. No long-term follow-up beyond 48-week intervention 3. Targeted transitional older adults (not all community dwelling older individuals) 4. Lack of personal reports of improvement from participants with FoF</td>
</tr>
</tbody>
</table>

* Study design aimed specifically at reducing fear of falling
APPENDIX B

BALANCE DISORDER QUESTIONNAIRE

Balance Disorders Center
University ENT Specialists, Inc.
222 Piedmont Avenue, Suite 5200
Cincinnati, OH 45219-2276
(513) 475-8400  FAX (513) 475-8410

Name:_______________________________Birthdate:________________Date:___________

Phone Numbers:  Home______________________Work_________________________

Address:_______________________________________S.S. # ___________________

Referring Physician: __________________________Their Phone # _________________

Gender:_______ Education: (total years completed) _________Marital Status:_________

Current Place of Residence (check appropriate response)

   a.  house   ______  d.  assistive living facility   ______
   b.  apartment    ______ e.  nursing home   ______
   c.  condo    ______ f.  other (describe) ____________________

Which University ENT Physician were you referred to: ___________________________

Please describe your balance disorder (please include [if applicable] the date your disorder started, indicate whether it was sudden or gradual, how often it occurs, and how debilitating it is:

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

Do you know of any possible cause for your balance disorder? __________________
__________________________________________________________________________

Please circle the response number that would best describe your current overall balance disorder (0 to 5)* Questions obtained from the Hospital of the University of Pennsylvania Balance Disorder Center, Department of Otorhinolaryngology Case History Form.
0  No disability, no symptoms
1  Slight disability, bothersome symptoms
2  Mild disability, performs usual duties, but symptoms interfere with social activities
3  Moderate disability, disrupts usual duties of everyday living
4  Recent severe disability, on medical leave or had to change job
5  Long term severe disability, unable to work for past year or longer

**Description of Balance Disorders: (Check all that apply)**

<table>
<thead>
<tr>
<th>I feel:</th>
<th>My symptoms are:</th>
</tr>
</thead>
<tbody>
<tr>
<td>_____ lightheaded</td>
<td>_____ severe</td>
</tr>
<tr>
<td>_____ unsteady</td>
<td>_____ moderate</td>
</tr>
<tr>
<td>_____ when standing</td>
<td>_____ mild</td>
</tr>
<tr>
<td>_____ when walking</td>
<td></td>
</tr>
<tr>
<td>_____ as if I were spinning (vertigo)</td>
<td>_____ My symptoms are intermittent,</td>
</tr>
<tr>
<td>_____ things around me move</td>
<td>they last:</td>
</tr>
<tr>
<td>_____ I tend to fall:</td>
<td>_____ second</td>
</tr>
<tr>
<td>which direction</td>
<td>_____ minutes</td>
</tr>
<tr>
<td>_____ I get nervous/panic when walking</td>
<td>_____ hours</td>
</tr>
<tr>
<td>which direction</td>
<td>_____ days</td>
</tr>
<tr>
<td>_____ other (describe)</td>
<td>_____ My symptoms are constant</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Description of symptoms associated with my balance problem:**
(Check all that apply)

| _____ nausea or vomiting         | _____ fainting                    |
| _____ loss of consciousness      | _____ headaches/migraines         |
| _____ memory loss                | _____ difficulty concentrating    |
| _____ blurred or double vision  | _____ pain or stiffness in neck   |
| _____ weakness/numbness in arms, legs, face | _____ slurring of speech |
| _____ difficulty walking in the dark | _____ heart rate increases/decreases |
| _____ hot/cold sweats            | _____ other (describe)            |

|                                  |                                  |

**The following activities make my balance disorder worse:** (Check all that apply)

| _____ lay down from sitting      | _____ loud sounds/noises          |
| _____ sit up from laying         | _____ bright lights               |
| _____ stand up from sitting      | _____ riding in a car             |
| _____ sudden movement            | _____ riding in elevators or escalators |
| _____ turning head: right or left | _____ walking down a store aisle   |
| _____ turning body: right or left | _____ stress/anxiety              |
| _____ bending down/leaning forward | _____ coughing/sneezing          |
| _____ looking up or down         | _____ rolling over in bed: right or left |
| _____ physical exertion          | _____ other (describe)            |

|                                  |                                  |
My ear symptoms include: (Circle which ear it affects)

_____ hearing difficulty   Both  Right  Left
_____ noises in ear   Both  Right  Left
_____ ear pressure/fullness   Both  Right  Left
_____ ear drainage   Both  Right  Left
_____ ear pain    Both  Right  Left
_____ history of noise exposure   Both  Right  Left

Medical History: (Check all that apply)

_____ Parkinson’s Disease   ____ Depression
_____ Fatigue   ____ Loss of limb (arm, leg)
_____ Multiple Sclerosis   ____ Osteoporosis
_____ Migraines   ____ Headaches
_____ Ulcer   ____ Memory Loss
_____ High Blood Pressure   ____ Anemia
_____ Thyroid Disease   ____ Sinusitis
_____ Tumor or Cancer   ____ Asthma/Allergies
_____ Circulation Problems   ____ Head or neck injury
_____ Diabetes   ____ Visual problems/eye disorders
_____ Stroke   ____ Seizures/Convulsions
_____ Heart attack/disease   ____ Pulmonary/Respiratory problems
_____ Arthritis   ____ Hip or leg problems
_____ Glaucoma   ____ Cataracts
_____ Macular Degeneration   ____ Neck or back problems
_____ Tobacco use;   ____ Alcohol use;
   how much ___________   how much __________
_____ Other substance abuse (describe ________________________________

Did you have the flu, cold or respiratory infection prior to the onset of your balance problem?
___________________________________________________________________

Did you fly or deep water dive shortly before the onset of your balance disorder?
___________________________________________________________________

Do you have a family history of balance problems? If so, who in relation to you had it?
___________________________________________________________________

List the number and name of current medications you take and why:
___________________________________________________________________
___________________________________________________________________
___________________________________________________________________
Ever taken streptomycin, kanamycin, other “mycin” antibiotics, quinine, or antimalaria medications?

List the type of surgeries you have had and why they were performed: ______________

List any previous balance tests, x-rays, MRI, CT scans, etc… you have already had, when you had these tests, and the name of the physician who requested these tests:

Fall Related History: (Circle Yes or No)

1. Do you live alone?      YES  NO
2. Do you need assistance to walk?    YES  NO
3. Can you easily walk up stairs? YES  NO
4. Can you walk 10-20 meters without assistance?  YES  NO
5. Do you use a walker, cane or roller walker?   YES  NO
6. Do you hold onto a spouse or loved one while walking? YES  NO
7. Do you engage in regular physical exercise?   YES  NO
8. Have you ever had a near fall experience?   YES  NO
9. Have you ever fallen?      YES  NO
10. Did you have an injury from the fall?   YES  NO
11. Were you hospitalized due to a fall?      YES  NO
12. Are you afraid of falling?    YES  NO
13. Do you think your spouse is afraid that you might fall?  YES  NO
14. Do you think your family members or friends are afraid that you might fall?   YES  NO
15. Does your fear of falling prevent you from doing activities around the house?   YES  NO
16. Does your fear of falling prevent you from doing activities outside of the house? YES  NO
APPENDIX C

Mini-Mental State Examination

Orientation:

1. What is the Year? ______
   Season? ______
   Date? ______
   Day? ______
   Month? ______

2. Where are we
   State? ______
   County? ______
   Town/City? ______
   Floor ______
   Address/Name of Building? ______

Registration:

3. Name three objects, taking one second to say each.
   Then ask the patient to say each. Then ask the patient all three after you have said them. Repeat the answers until the patient learns all three. ______

Attention and Calculation:

4. Serial 7’s – asked to subtract by sevens from 100.
   Give one point for each correct answer. Stop after five answers. Or, alternatively spell “world” backward. ______

Recall:

5. Ask for the names of three objects learned in question 3.
   Give one point for each correct answer. ______

Language:

6. Point to a pencil and a watch.
   have the patient name them as you point. ______
7. Have the patient repeat “No ifs, ands, or buts.”

8. Have the patient follow a three-stage command.
   “Take the paper in your right hand. Fold the paper in half. Put the paper on the floor.”

9. Have the patient read and obey the following:
   “Close your eyes.”

10. Have the patient write a sentence of his or her own choice. (The sentence should contain a subject and an object and should make sense. Ignore spelling errors when scoring.)

11. Enlarge the design printed below to 1 to 5cm per side and have the patient copy it.
    (Give one point if all the sides and angles are preserved and if the intersecting sides form a quadrangle.)

Total Score _______/30
APPENDIX D

The Geriatric Depression Scale

Circle the best answer for how you felt over the past week

1. Are you basically satisfied with your life?    Yes No
2. Have you dropped many of your activities and interests?    Yes No
3. Do you feel that your life is empty?    Yes No
4. Do you often get bored?    Yes No
5. Are you hopeful about the future?    Yes No
6. Are you bothered by thoughts you can’t get out of your head?    Yes No
7. Are you still in good spirits most of the time?    Yes No
8. Are you afraid that something bad is going to happen to you?    Yes No
9. Do you feel happy most of the time?    Yes No
10. Do you often feel helpless?    Yes No
11. Do you often get restless and fidgety?    Yes No
12. Do you prefer to stay at home, rather than going out and doing new things?    Yes No
13. Do you frequently worry about the future?    Yes No
14. Do you feel you have more problems with memory than most?    Yes No
15. Do you think it is wonderful to be alive now?    Yes No
16. Do you often feel downhearted and blue?    Yes No
17. Do you feel pretty worthless the way you are now?    Yes No
18. Do you worry a lot about the past?    Yes No
19. Do you find life very exciting?    Yes No
20. Is it hard for you to get started on a new project?    Yes No
21. Do you feel full of energy?    Yes No
22. Do you feel that your situation is hopeless?    Yes No
23. Do you think that most people are better off than you?    Yes No
24. Do you frequently get upset over little things?    Yes No
25. Do you frequently feel like crying?    Yes No
26. Do you have trouble concentrating?    Yes No
27. Do you enjoy getting up in the morning?    Yes No
28. Do you prefer to avoid social gatherings?    Yes No
29. Is it easy for you to make decisions?    Yes No
30. Is your mind as clear as it used to be?    Yes No
Beck Anxiety Inventory not shown.

Please contact the author.
APPENDIX F

Home Safety Checklist for Detection of Fall Hazards

Checklist was developed by the U.S. National Safety Council in Cooperation with AARP, Itasca, IL, 1982.

Housekeeping

1. Do you clean up spills as soon as they occur?  
Yes  No
2. Do you keep floors and stairways clean and free of clutter?  
Yes  No
3. Do you put away books, magazines, sewing supplies, and other objects as soon as you’re through with them and never leave them on floors or stairways?  
Yes  No
4. Do you store frequently used items on shelves that are within easy reach?  
Yes  No

Floors

5. Do you keep everyone from walking on freshly washed floors before they’re dry?  
Yes  No
6. If you wax floors, do you apply 2 thin coats and buff each thoroughly or else use self-polishing, nonskid wax?  
Yes  No
7. Do all small rugs have nonskid backings?  
Yes  No
8. Have you eliminated small rugs at the tops and bottoms of stairways?  
Yes  No
9. Are all carpet edges tacked down?  
Yes  No
10. Are rugs and carpets free of curled edges, worn spots, and rips?  
Yes  No
11. Have you chosen rugs and carpets with short, dense pile?  
Yes  No
12. Are rugs and carpets installed over good-quality, medium thick pads?  
Yes  No

Bathroom

13. Do you use rubber mat or nonslip decals in the tub or shower?  
Yes  No
14. Do you have a grab bar securely anchored over the tub or on the shower wall?  
Yes  No
15. Do you have a nonskid rug on the bathroom floor?  
Yes  No
16. Do you keep soap in an easy-to-reach receptacle?  
Yes  No

Traffic Lanes

17. Can you walk across every room in your home, and from one room to another, without detouring around furniture?  
Yes  No
18. Is the traffic lane from your bedroom to the bathroom free of obstacles?  
Yes  No
19. Are telephone and appliance cords kept away from areas where people walk?  
Yes  No
Lighting

20. Do you have light switches near every doorway? Yes No
21. Do you have enough good lighting to eliminate shadowy areas? Yes No
22. Do you have a lamp or light switch within easy reach from your bed? Yes No
23. Do you have nightlights in your bathroom and in the hallway leading from your bedroom to the bathroom? Yes No
24. Are all stairways well lighted? Yes No
25. Do you have light switches at both the tops and bottoms of stairways? Yes No

Stairways

26. Do securely fastened handrails extend the full length of the stairs on each side of stairways? Yes No
27. Do rails stand out from the walls so you can get a good grip? Yes No
28. Are rails distinctly shaped so you’re alerted when you reach the end of a stairway? Yes No
29. Are all stairways in good condition, with no broken, sagging, or sloping steps? Yes No
30. Are all stairway carpeting and metal edges securely fastened and in good condition? Yes No
31. Have you replaced any single-level steps with gradually rising ramps or made sure such steps are well lighted? Yes No

Ladders and Stepstools

32. Do you have a sturdy stepstool that you use to reach high cupboard and closet shelves? Yes No
33. Are ladders and stepstools in good condition? Yes No
34. Do you always use a stepstool or ladder that’s tall enough for the job? Yes No
35. Do you always set up your ladder or stepstool on a firm, level base that’s free of clutter? Yes No
36. Before you climb a ladder or stepstool, do you always make sure it’s fully open and that the stepladder spreaders are locked? Yes No
37. When you use a ladder or stepstool, do you face the steps and keep your body between the side rails? Yes No
38. Do you avoid standing on top of a stepstool or climbing beyond the second step from the top on a stepladder? Yes No

Outdoor Areas

39. Are walks and driveways in your yard and other areas free of breaks? Yes No
40. Are lawns and gardens free of holes?  Yes  No
41. Do you put away garden tools and hoses when they’re not in use?  Yes  No
42. Are outdoor areas kept free of rocks, loose boards, and other tripping hazards?  Yes  No
43. Do you keep outdoor walkways, steps, and porches free of wet leaves and snow?  Yes  No
44. Do you sprinkle icy outdoor areas with de-icers as soon as possible after a snowfall or freeze?  Yes  No
45. Do you have mats at doorways for people to wipe their feet on?  Yes  No
46. Do you know the safest way of walking when you can’t avoid walking on a slippery surface?  Yes  No
47. Do your shoes have soles and heels that provide good traction?  Yes  No
48. Do you wear house slippers that fit well and don’t fall off?  Yes  No
49. Do you avoid walking in stocking feet?  Yes  No
50. Do you wear low-heeled oxfords, loafers, or good-quality sneakers when you work in your house or yard?  Yes  No
51. Do you replace boots or galoshes when their soles or heels are worn too smooth to keep you from slipping on wet or icy surfaces?  Yes  No

**Personal Precautions**

52. Are you always alert for unexpected hazards, such as out-of-place furniture?  Yes  No
53. If young grandchildren visit, are you alert for children playing on the floor and toys left in your path?  Yes  No
54. If you have pets, are you alert for sudden movements across your path and pets getting underfoot?  Yes  No
55. When you carry bulky packages, do you make sure they don’t obstruct your vision?  Yes  No
56. Do you divide large loads into smaller loads whenever possible?  Yes  No
57. When you reach or bend, do you hold onto a firm support and avoid throwing your head back or turning it too far?  Yes  No
58. Do you always use a ladder or stepstool to reach high places and never stand on a chair?  Yes  No
59. Do you always move deliberately and avoid rushing to answer the phone or doorbell?  Yes  No
60. Do you take time to get your balance when you change position from lying down to sitting and from sitting to standing?  Yes  No
61. Do you hold onto grab bars when you change position in the tub or shower?  Yes  No
62. Do you keep yourself in good condition with moderate exercise, good diet, adequate rest, and regular medical checkups?  Yes  No
63. If you wear glasses, is your prescription up to date?  Yes  No
64. Do you know how to reduce the injury of a fall?  Yes  No
65. If you live alone, do you have daily contact with a friend, neighbor, or family member?  Yes  No
APPENDIX G

The Activities-Specific Balance Confidence (ABC) Scale

For each of the following activities, please indicate your level of self-confidence by choosing a corresponding number from the following rating scale:

0% 10 20 30 40 50 60 70 80 90 100%

no confidence completely confident

“How confident are you that you will not lose your balance or become unsteady when you…

1. …walk around the house? __________ %
2. …walk up or down stairs? __________ %
3. …bend over and pick up a slipper from the front of a closet floor? _______%
4. …reach for a small can off a shelf at eye level? __________ %
5. …stand on your tip toes and reach for something above your head ________ %
6. …stand on a chair and reach for something? __________ %
7. …sweep the floor? __________ %
8. …walk outside the house to a car parked in the driveway? __________ %
9. …get into or out of a car? __________ %
10. …walk across a parking lot to the mall? __________ %
11. …walk up or down a ramp? __________ 
12. …walk in a crowded mall where people rapidly walk past you? __________ %
13. …are bumped into by people as you walk through the mall? __________ %
14. …step onto or off of an escalator while you are holding onto a railing __________ %
15. …step onto or off of an escalator while holding onto parcels such that you cannot hold onto the railing? __________ %
16. …walk outside on icy sidewalks? __________ %
APPENDIX H

Modified Activities-Specific Balance Confidence (ABC) Scale

For each of the following activities, please indicate your level of confidence by choosing a corresponding number from the following rating scale:

0%  10  20  30  40  50  60  70  80  90  100%
no confidence       completely confident

“How confident are you that your (spouse or family member) will not lose his/her balance or become unsteady when he/she…

1… walk around the house? ___________%
2… walk up or down stairs? ___________%
3… bend over and pick up a slipper from the front of a closet floor? ___________%
4… reach for a small can off a shelf at eye level? ___________%
5… stand on tip toes and reach for something above his/her head ___________%
6… stand on a chair and reach for something? ___________%
7… sweep the floor? ___________%
8… walk outside the house to a car parked in the driveway? ___________%
9… get into or out of a car? ___________%
10…walk across a parking lot to the mall? ___________%
11…walk up or down a ramp? ___________%
12…walk in a crowded mall where people rapidly walk past him/her? ___________%
13…are bumped into by people as he/she walks through the mall? ___________%
14…step onto or off of an escalator while he/she is holding onto a railing ___________%
15…step onto or off of an escalator while holding onto parcels such that he/she cannot hold onto the railing? ___________%
16…walk outside on icy sidewalks? ___________%
APPENDIX I

Dizziness Handicap Inventory

Instructions: Circle “yes,” “no,” or “sometimes,” for each question. Answer each item only as it pertains to your dizziness or unsteadiness. Please answer every item.

P1. Does looking up increase your problem? YES NO SOMETIMES

E2. Because of your problem, do you feel frustrated? YES NO SOMETIMES

F3. Because of your problem, do you restrict your travel for business or recreation? YES NO SOMETIMES

P4. Does walking down the isle of a supermarket increase your problem? YES NO SOMETIMES

F5. Because of your problem, do you have trouble getting into or out of bed? YES NO SOMETIMES

F6. Because of your problem, do you restrict your participation in social activities such as going out to dinner, movies, dancing, or parties? YES NO SOMETIMES

F7. Because of your problem, do you have difficulty reading? YES NO SOMETIMES

P8. Does performing more ambitious activities like sports, dancing, and household chores such as sweeping or putting dishes away increase your problem? YES NO SOMETIMES

E9. Because of your problem, are you afraid to leave your home without having someone accompany you. YES NO SOMETIMES

E10. Because of your problem, have you been embarrassed in front of others? YES NO SOMETIMES

P11. Do quick movements of your head increase your problem? YES NO SOMETIMES

F12. Because of your problem, do you avoid heights? YES NO SOMETIMES

P13. Does turning over in bed increase your problem? YES NO SOMETIMES
F14. Because of your problem, is it difficult for you to do strenuous housework or yard work?  

YES  NO  SOMETIMES

E15. Because of your problem, are you afraid people may think you are intoxicated?  

YES  NO  SOMETIMES

F16. Because of your problem, is it difficult for you to go for a walk by yourself?  

YES  NO  SOMETIMES

P17. Does walking down a sidewalk increase your problem?  

YES  NO  SOMETIMES

E18. Because of your problem, is it difficult for you to concentrate?  

YES  NO  SOMETIMES

F19. Because of your problem, is it difficult for you to walk around your house in the dark?  

YES  NO  SOMETIMES

E20. Because of your problem, are you afraid to stay home alone?  

YES  NO  SOMETIMES

E21. Because of your problem, do you feel handicapped?  

YES  NO  SOMETIMES

E22. Has your problem placed stress on relationships with members of your family or friends?  

YES  NO  SOMETIMES

E23. Because of your problem, are you depressed?  

YES  NO  SOMETIMES

F24. Does your problem interfere with your job or household responsibilities?  

YES  NO  SOMETIMES

P25. Does bending over increase your problem?  

YES  NO  SOMETIMES
APPENDIX J

BERG BALANCE TEST

STATIC BALANCE ASSESSMENT

BERG BALANCE TEST _______/56

1. Sitting to standing
Instruction: Please stand up. Try not to use your hands for support.
_______(4) able to stand, no hands and stabilize independently
(3) able to stand independently using hands
(2) able to stand using hands after several tries
(1) needs minimal assistance to stand or stabilize
(0) needs moderate or maximal assistance to stand

2. Standing unsupported
Instruction: Stand for two (2) minutes without holding.
_______(4) able to stand sagely for 2 minutes
(3) able to stand for 2 minutes with supervision
(2) able to stand for 30 seconds unsupported
(1) needs several tries to stand for 30 seconds unsupported
(0) unable to stand for 30 seconds unassisted

3. Sitting unsupported, feet on floor
Instruction: Sit with arms folded for two minutes
_______(4) able to sit safely and securely for 2 minutes
(3) able to sit for 2 minutes under supervision
(2) able to sit for 30 seconds
(1) able to sit for 10 seconds
(0) unable to sit without support for 10 seconds

4. Standing to sitting
Instruction: Please sit down.
_______(4)sits safely with minimal use of hands
(3)controls descent by using hands
(2)uses back of legs against chair to control descent
(1)sits independently but has uncontrolled descent
(0)needs assistance to sit

5. Transfers
Instruction: Please move from chair to bed and back again, one way toward a seat with armrests and one way toward a seat without armrests.
_______(4) able to transfer safely with only minor use of hands
(3) able to transfer safely with definite need of hands
(2) able to transfer with verbal cueing and/or supervision
(1) needs one person to assist
(0) needs two people to assist of supervise to be safe

6. Standing unsupported with eyes closed
Instruction: Close your eyes and stand still for 10 seconds.
_______(4) able to stand for 10 seconds safely
(3) able to stand for 10 seconds with supervision
(2) able to stand for 3 seconds
(1) unable to keep eyes closed for 3 seconds but stays steady
(0) needs help to keep from falling

7. Standing unsupported with feet together
Instruction: Place your feet together and stand without holding.
_______(4) able to place feet together indep and stand for 1 minute safely
(3) able to place feet together indep and stand for 1 minute with supervision
(2) able to place feet together indep but unable to hold for 30 seconds
(1) needs help to attain position but able to stand or 15 seconds with feet together
(0) needs help to attain position and unable to hold for 15 seconds

8. Reaching forward with outstretched arm
Instruction: Lift arm 90 degrees. Stretch out your fingers and reach forward as far as you can.
(Examiner places a ruler at end of fingertips when arm is at 90 degrees. Fingers should not touch
the ruler while reaching forward. The recorded measure is the
distance forward that the fingers reach while the subject is in the most forward lean position.)
_______ Inches
_______(4) can reach forward confidently >10 inches
(3) can reach forward>5 inches
(2) can reach forward>2 inches
(1) reaches forward but needs supervision
(0) needs help to keep from falling

9. Pick up object from the floor
Instruction Pick up the shoe/slipper which is placed in front of your feet.
_______(4) able to pick up slipper safely and easily
(3) able to pick up slipper but needs supervision
(2) unable to pick up but reaches 1-2 inches from slipper and keeps balance indep
(1) unable to pick up and needs supervision while trying
(0) unable to try/needs assistance to keep from falling

10. Turning to look behind, over left and right shoulders
Instruction: Turn to look behind you over toward left shoulder, repeat to the right.
_______(4) looks behind from both sides and weight shifts well
(3) looks behind one side only other side shows less weight shift
(2) turns sideways only but maintains balance
(1) needs supervision when turning
(0) needs assistance to keep from falling

11. Turn 360 degrees
Instruction: Turn completely around in a full circle. Pause. Then turn a full circle in the other direction.
(4) able to turn 360 degrees safely in <4 seconds, each side
(3) able to turn 360 degrees safely one side only in <4 seconds
(2) able to turn 360 degrees safely but slowly
(1) needs close supervision or verbal cueing
(0) needs assistance while turning

12. Count number of times step stool is touched
Instruction: Place each foot alternately on the stool. Continue until each foot has touched the stool four times.
(4) able to stand independ and safely and complete 8 steps in 20 seconds
(3) able to stand independ and complete 8 steps in > 20 seconds
(2) able to complete 4 steps without aid with supervision
(1) able to complete >2 steps, needs minimal assistance
(0) needs assistance to keep from falling, unable to try

13. Standing unsupported, one foot in front
Instruction: (Demonstrate to subject) Place one foot directly in front of the other. If you feel that you cannot place your foot directly in front, try to step far enough ahead that the heel of your forward foot is ahead of the toes of the other foot.
(4) able to place foot tandem independ and hold for 30 seconds
(3) able to place foot ahead of other independ and hold for 30 seconds
(2) able to take small step independ and hold for 30 seconds
(1) needs help to step but can hold for 15 seconds
(0) loses balance while stepping or standing

14. Standing on one leg
Instruction: Stand on one leg as long as you can without holding.
(4) able to lift leg independ and hold > 10 seconds
(3) able to lift leg independ and hold 5-10 seconds
(2) able to lift leg independ and hold =/> 3 seconds
(1) tries to lift leg, unable to hold 3 seconds but remains standing independ
(0) unable to try or needs assistance to prevent fall
APPENDIX K

DYNAMIC GAIT INDEX

DYNAMIC BALANCE ASSESSMENT

DYNAMIC GAIT INDEX ____/24

1. Gait Level Surface ______
   Instructions: Walk at your normal speed from hear to the next mark (20’ away)
   ____ (3) NORMAL: ‘Walks 20’, no assistive devices, good speed, no evidence for imbalance, normal gait pattern.
   (2) MILD IMPAIRMENT: Walks 20’, no assistive devices, slower speed, mild gait deviations.
   (1) MODERATE IMPAIRMENT: Walks 20’, slow speed, abnormal gait Pattern, evidence for imbalance.
   (0) SEVERE IMPAIRMENT: Cannot walk 20’ without assistance, severe Gait deviations or imbalance.

2. Change in Gait Speed______
   Instructions: Begin walking at your normal pace (for 5’), when I tell you “go, walk as fast as you can (for 5’). When I tell you “slow, walk as slowly as you can (for 5’).
   ____ (3) NORMAL: Able to smoothly change walking speed without loss of balance or gait deviation. Shows a significant difference in walking speeds between normal, fast and slow speeds.
   (2) MILD IMPAIRMENT: Is able to change speed but demonstrates Mild gait deviations, or no gait deviations but unable to achieve a significant change in velocity, or uses an assistive device.
   (3) MODERATE IMPAIRMENT: Makes only minor adjustments to Walking speed, or accomplishes a change in speed with significant gait Deviations, or changes speed but loses balance but is able to recover and Continue walking.
   (1) SEVERE IMPAIRMENT: Cannot change speeds, or loses balance And has to reach for wall or be caught.

3. Gait with Horizontal Head Turns _____
   Instructions: Begin walking at your normal pace, when I tell you to “look right” keep walking straight but turn your head to the right, Keep looking to the right until I tell you to “look left”, then keep walking straight and turn your head to the left, until I tell you to “look straight”, then keep walking straight, but return your head to the center.
   ____ (3) NORMAL: Performs head turns smoothly with no change in gait
   (2) MILD IMPAIRMENT: Performs head turns smoothly with slight in gait velocity, (i.e. minor disruption to smooth gait path or uses walking aid).
4. Gait with Vertical Head Turns
Instructions: Begin walking at your normal pace, when I tell you to “look up” keep walking straight but look up toward the ceiling. Keep looking up until I tell you to “look down”, then keep walking straight and look down towards the floor. Keep looking down until I tell you “look straight”, then keep walking straight but return your head to center.

(3) NORMAL: Performs head turns with no change in gait
(2) MILD IMPAIRMENT: Performs task with slight in gait velocity, (i.e. minor disruption to smooth gait path or uses walking aid).
(1) MODERATE IMPAIRMENT: Performs head turns with moderate change in velocity, slows down, stagers but recovers, can continue to walk.
(0) SEVERE IMPAIRMENT: Performs task with severe disruption of gait i.e. stagers outside 15” path, loses balance, stops, reaches for wall.

5. Gait and Pivot Turn
Instructions: Begin walking at your normal pace, when I tell you, “turn and stop” turn as quickly as you can to face the opposite direction and stop.

(3) NORMAL: Pivot turns safely within 3 seconds and stops quickly with no loss of balance.
(2) MILD IMPAIRMENT: Pivot turns safely in >3 seconds and stops with no loss of balance.
(1) MODERATE IMPAIRMENT: Turns slowly, requires verbal cueing, requires several small steps to catch balance following turn and stop.
(0) SEVERE IMPAIRMENT: Cannot turn safely, requires assistance to turn and stop.

6. Step Over Obstacle
Instructions: Begin walking at your normal speed, when you come to the shoe box, step over it, not around it, and keep walking.

(3) NORMAL: Is able to step over box without changing gait speed, no evidence for imbalance.
(2) MILD IMPAIRMENT: Is able to step over box, but must slow down and adjust steps to clear box safely.
(1) MODERATE IMPAIRMENT: Is able to step over box but must stop, then step over. May require verbal cueing.
(0) SEVERE IMPAIRMENT: Cannot perform without assistance.

7. Step Around Obstacle
Instructions: Begin walking at your normal speed, when you come to the cone, walk around it to the right, when you come to the next cone, walk around it to the left.

(3) NORMAL: Is able to walk around both cones without changing gait
speed, no evidence for imbalance.
(2) MILD IMPAIRMENT: Is able to walk around both cones, but must slow down and adjust steps to clear cones safely.
(1) MODERATE IMPAIRMENT: Is able to walk around cones but must stop, then step around. May require verbal cueing.
(0) SEVERE IMPAIRMENT: Cannot perform without assistance.

8. Steps _____
Instructions: Walk up and down these stairs as you would at home (i.e. using the rail if necessary. At the top, turn around and walk down.
____ (3) NORMAL: Alternating feet, no rail.
____ (2) MILD IMPAIRMENT: Alternating feet, must use rail.
____ (1) MODERATE IMPAIRMENT: Two feet to a stair, must use rail.
____ (0) SEVERE IMPAIRMENT: Cannot do safely.
APPENDIX L

Pre- Intervention Interview Guide

Some questions have been modified from the Falls Efficacy Scale developed by (Tinetti et al. 1990)

A. Sample interview questions for patient with fear of falling

1. You indicated on your balance disorder questionnaire that you have a fear of falling. I want to find out more about your fear of falling and how this has affected you and your family.

2. Tell me about a typical day in therapy.

3. Tell me about a typical day at home.

4. Tell me what you did this morning.

5. Tell me about any concerns you have about falling.

6. Let me ask you to think about the changes in your life since your fear of falling began. How has your life changed since the fear of falling?

7. Describe the activities you are afraid to perform due to your fear of falling.

8. Describe what activities you depend on your family member/spouse to perform for you because of your fear of falling.

9. Describe a situation where you fell or almost fell.

B. Sample interview questions for family member/spouse

Your family member or spouse indicated in their balance disorder questionnaire that they have a fear of falling. I want to find out more about their fear of falling and how this has affected you and your spouse or family member.

1. Tell me about a typical day at home.

2. Tell me about what you did this morning.

3. Would you describe a typical outing with your spouse/family member?

4. Tell me about any concerns you may have about your family member falling.
5. Let me ask you to think about the changes in your spouse/family member since the fear of falling began. How has he/she changed since the fear of falling began?

6. Tell me a way in which you help your spouse/family member overcome his/her fear of falling.

7. Describe for me some activities your spouse/family member is afraid to perform due to the fear of falling.

8. Describe what activities your spouse/family member depends on you to perform due to his/her fear of falling.

9. What information do you wish would be available to you and your family member/spouse to help with overcoming a fear of falling (i.e. support groups, videos, brochures, in house training, etc.)

10. Describe a situation where your family member fell or almost fell.
APPENDIX M

Home Safety Letter


Dear _____________,

Thank you again for participating in my study. I will be in touch soon to check on your progress. In the mean time, here are a few helpful hints to reduce falls in and around your home.

It is important that you wear sensible shoes. Try to avoid high heels, slippers, and walking in your stocking feet. Here are a few more tips on how to buy and wear shoes to keep you safe:

1. Have your feet measured each time you buy shoes since your size can change.
2. Buy properly fitting, sturdy shoes with nonskid soles.
3. Avoid shoes with extra-thick soles.
4. Choose lace-up shoes instead of slip-ons, and keep the laces tied.
5. Select footwear with fabric fasteners if you have trouble tying laces.
6. Use a long-handled shoehorn if you have trouble putting on shoes.
7. Shop in the men's department if you're a woman who can't find wide enough shoes.
8. Always keep your toenails well trimmed.

You should also try to get rid of obstacles in your home that can be a tripping or slipping hazard. Here are a few suggestions:

1. Remove boxes, newspapers, electrical cords and phone cords from walkways.
2. Move coffee tables, magazine racks and plant stands from high-traffic areas.
3. Secure loose rugs with double-faced tape, tacks or a slip-resistant backing.
4. Repair loose wooden floorboards and carpeting right away.
5. Store clothing, dishes, food and other household necessities within easy reach.
6. Immediately clean spilled liquids, grease or food.
7. Use nonskid floor wax.
8. Sleep on a bed that's easy to get in and out of.
9. Replace satiny sheets and comforters with less-slippery cotton or wool ones.
10. Use nonslip mats in your bathtub or shower.

Keep your home well lit to avoid tripping on objects that are hard to see.

1. Place a lamp near your bed, and use it when you get up to use the bathroom.
2. Install easily accessible or glow-in-the-dark switches in room entrances.
3. Place night lights in your bedroom, bathroom and hallways.
4. Install light switches at the top and bottom of stairs.
5. Create color contrasts between walls and floors, ideally with lighter colored carpets.
6. Store flashlights in easy-to-find places in case of power outages.

Here are a few additional suggestions on how to modify your home to make it safe from slips and trips as bathrooms, stairways and hallways may be especially hazardous:

1. Install grab handles inside and just outside your shower or bathtub.
2. Mount a liquid soap dispenser in your shower.
3. Replace glass shower enclosures with a non-shattering material.
4. Use a raised toilet seat or one with armrests to stabilize yourself.
5. Place a sturdy plastic seat in your tub if you can't lower yourself to the floor.
6. Install handrails on both sides and across the entire length of stairways.
7. Put nonslip treads on each bare-wood step.
8. Remove raised doorway thresholds in all rooms.

As always, if you have any questions or concerns regarding the risk of falling program you may reach me at 513-475-8453. I will be in contact soon to set up a second interview to report your progress.

Take care,

Julie Honaker
APPENDIX N

Post-intervention Interview Guide

Patient Follow-up (post-intervention) Interview Questions

1. Explain to me if the risk of falling program has made you more confident to walk inside your own home, if so, how has it made you more confident?
2. Explain to me if the risk of falling program has increased your confidence to perform activities outside of your home, if so, how has it made you more confident?
3. Tell me if your overall balance and mobility have improved since entering the risk of falling program. If so, how has it improved?
4. Tell me about how you plan to keep up with risk of falling prevention now that you are being discharged from the program?
5. Describe if you have become more independent since entering the risk of falling program. If so, how have you become more independent?
6. Explain how your mood has changed since entering the risk of falling program.
7. Describe to me any changes in your fear of falling since entering the program.
8. Tell me about your present fear of falling concerns.
9. Overall, describe how you would rate the risk of falling program at reducing your fear of falling.
10. Describe any changes in your activity level since entering the program.

Spouse or family Member Follow-up (post-intervention) Interview Questions:

1. Describe if your confidence in your family member’s ability to maintain his or her balance has changed since entering the risk of falling program. If so, how has the program improved your confidence?
2. Describe if the risk of falling program increased your confidence that your family member can perform activities inside and outside of your home. If so, how has the program improved your confidence?
3. Explain if your family member’s balance and mobility have improved since entering the risk of falling program and if so, how has it improved?
4. Tell me how you plan help your family member keep up with risk of falling prevention now that he/she is being discharged from the program?
5. Describe if your family member has become more independent since entering the risk of falling program. If so, how has your family member become more independent?
6. Describe if your overall mood has changed since your family member started the risk of falling program. If so, how has your mood changed?
7. Describe any present concerns about your family member’s balance or fear of falling.
8. Overall, describe how you would rate the risk of falling program at reducing any fear that your love one will fall.
9. Describe any changes in your family member’s activity level since entering the program.
APPENDIX O

Initial Data Description Codes

Initial Codes
- Avoiding activities due to fear of falling
- Aggravation
- Activity level of patient before fear of falling
- Activities the patient needs help performing
- Anxiety + Balance Problems
- Attitude since balance disorder began
- Attitude since fear of falling
- Attitude toward balance therapy
- Attitude post program
- Assistive devices + patient’s attitude
- Assistive devices
- Assessment results
- Balance problem + unable to relax
- Change in mood pre program
- Change in confidence post program
- Change in attitude (mood) post program
- Change in activity level post program
- Change in activity level pre program
- Change in patient since onset FoF/Balance disorder
- Change in lifestyle post fall
- Change in family members’ attitude post program
- Compensating for balance problem
- Daily routine
- Daily activities + concerns
- Discussion of other treatment programs
- Decrease in independence (pre program)
- Description of fall experience
- Description of home exercises
- Description of near fall experiences (frequency of falls)
- Decline in activity level since onset of FoF (aggravation)
- Depression + aggravation
- Description of activities unable to perform (aggravation)
- Dependence on family members
- Dependence on others
- Description of near fall environment
- Description of balance problems
- Description of dizziness post program
- Decrease in activities post program
- Decrease in activities of daily living
- Depression/Family member concern
Description of balance therapy
Description of use of assistive device
Disruption of daily activities
Description of assessment tests
Decreased fear of falling (post program)
Description of team approach
Description of previous medical care + frustration
Description of dizzy episodes
Depression + balance problem
Education on balance disorder
Education on falls/risk of falling
Embarrassment due to balance problem
Future Falls medical plan
Family history of balance problems
Family member description of daily routine
Family member/friends concerns with balance or (other medical problem)
Family member concerns for future falls
Family member present balance concerns post program
Family member reaction to post-fall injuries
Family member perception of balance program (post)
Family member description of balance problems
Family member/friend support
Family member expectations for recovery
Family member support + attitude of patient
Family member’s increased confidence level post program
Family member stress + safety concerns
Family member suggestions for help post program
Fatigue
Hopeful about the program
Home safety concerns/advice
Impact of fear of falling/balance disorder on the patient
Impact of fear of falling/balance disorder for family member
Importance of keeping up with therapy
Improvement in program
Increase in confidence level post program
Increase in activities post program
Improved attitude/independence post program
Increased dependence pre program
Lack of confidence (pre)
Lack of family support
Lack of understanding cause of balance problem + frustration
Lack of information on balance therapy/risk of falling programs
Limiting activities since fear of falling/balance problem
Limiting activities post program
Medical problem associated with balance problems
Medications + vertigo/falls
- Medical advice
- Medical history
- New responsibilities for family member
- New responsibilities for family member (post program)
- Near fall/fall experience post program
- Overall impression of risk of falling program
- Overprotective family members
- Other medical concerns post program
- Outside referrals for risk of falling
- Present concerns about falling/fear of falling post program
- Present concerns about other medical problems post program
- Patient’s attitude about diagnosis
- Present mood/attitude pre program
- Patient’s concerns with falls + fear of falling (pre)
- Patient’s knowledge of balance problem/overall health
- Patient’s description of balance problem
- Patient concerns about dizziness
- Patient concerns with appearance of balance problem
- Plans to keep up with risk of falling program
- Problems with risk of falling program
- Problems with other therapy programs
- Present attitude + balance problems post program
- Patient’s advice for other patients
- Patient’s daily routines
- Referral history
- Simplicity of balance therapy exercises
- Self-motivation to overcome fear of falling/balance problem
- Therapy performance
APPENDIX P

Combined Data Description Codes

Combined Codes
- Dependence on Family members
- Impact of FoF/Balance Disorder
- Problems with Family members
- Limiting Activities/lack of confidence
- Family member stress
- Anxiety and Depression since FoF/balance problem
- Attitude of Patient since FoF/balance problem
- Embarrassment due to FoF/Balance problem
- Attitude of patient post program
- Discussion of assistive devices (canes etc…)
- Change in activity level post program
- Improvement/Increased confidence post program
- Problems with program
- Overall impression of risk of falling program
- Problems with previous medical care
- Falls + balance problems post program
- Plans to keep up with risk of falling program after discharge
- Medical concerns post program
- Simplicity of therapy exercises
- Limiting activities/Dependence on others post program
- Need for education on falls and balance problem/risk of falling