



U.S. Department of Health and Human Services
Assistant Secretary for Planning and Evaluation
Office of Disability, Aging and Long-Term Care Policy

THE EFFECT OF REDUCING FALLS ON LONG-TERM CARE EXPENSES:

Literature Review

April 2004

Office of the Assistant Secretary for Planning and Evaluation

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Abt Associates, Inc.
Center for Health and Long Term Care Research

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TABLE OF CONTENTS

| | |
|---|----|
| 1.0 BACKGROUND | 1 |
| 2.0 PURPOSE | 3 |
| 3.0 SCOPE OF AND METHOD FOR LITERATURE REVIEW | 5 |
| 4.0 RESULTS OF LITERATURE REVIEW | 7 |
| 4.1 Research Question 1 | 7 |
| 4.1.1 Risk Factors for Falls | 7 |
| 4.1.2 Discussion of Interventions and Therapeutic Strategies | 19 |
| 4.1.3 Most Important Elements for Inclusion and Minimum-Optimal Mix | 22 |
| 4.1.4 Assessment and Intervention Considerations | 22 |
| 4.1.5 Role of the Physician | 24 |
| 4.1.6 Targeting Strategies | 25 |
| 4.1.7 Privacy/Confidentiality Issues | 25 |
| 4.2 Research Question 2 | 25 |
| 4.3 Research Question 3 | 26 |
| 5.0 LIMITATIONS | 29 |
| 6.0 DISCUSSION | 30 |
| 6.1 Questions for the Technical Advisory Group (TAG) | 30 |
| 6.2 Conclusion | 32 |
| REFERENCES | 34 |
| APPENDIX I: FALLS PREVENTION PROGRAM INTERVIEW SITES AND SURVEY RESULTS | 40 |
| INDEX OF TABLES AND FIGURES | |
| TABLE 1: Most Common Risk Factors for Falls in Community-Based Seniors | 8 |
| TABLE 2: Systems Involved in the Maintenance of Postural Stability | 11 |
| TABLE 3: Medical Issues that may Contribute to Falls | 12 |
| TABLE 4: Home Safety--Areas that should be Addressed | 18 |
| TABLE 5: Safety Devices Included as Home Safety Modifications | 21 |
| TABLE 6: Summary of Risk Factors and Associated Evaluation and Therapeutic Strategies | 23 |

1.0 BACKGROUND

Expenditures on health care in the United States are rising rapidly and in 2002, reached \$1.6 trillion or \$5,440 per person; spending rose 8.5 percent in 2001 and 9.3 percent in 2002, contributing to a spike of 1.6 percentage points in the health share of gross domestic product (GDP) since 2000.¹ Much of the increase in spending is fueled by growth in the use of hospital care but there is also significant use of long-term care services such as nursing home and home health care. While accounting for roughly 12 percent of the U.S. population, elders account for more than 30 percent of all health care costs. Therefore, when thinking about strategies to reduce health care costs through preventive care programs, a focus on elderly populations is particularly warranted.

Although not commonly recognized, falls are the leading cause of injury deaths among individuals who are 65 years of age and older. In fact, falls among the elderly led to 1.8 million emergency room visits in 2000 and more than 10,000 deaths. Direct costs associated with those falls were estimated to be \$16.4 billion.² Clearly, fall-related injuries are a major source of excess morbidity and mortality for elderly persons. Over one-third of the population aged 65 and older falls annually, although most falls do not lead to deaths.³ As the population ages, cost-effective interventions that reduce the risk of falls can have important positive financial and quality of life implications for those who are at risk of falling, to their families, and to the American health care system.

As a leading cause of injury deaths, the subject of falls has received growing attention among clinicians and researchers who have identified many diverse risk factors for falls. Some risk factors may be totally beyond an individual's control to change, such as cognitive impairment or functional deficits resulting from chronic conditions. Others, like the acceptance and proper use of assistive devices to compensate for functional deficits, may be partially under an individual's control. Finally, other risk factors can be jointly influenced by the behavior of providers, caregivers and elderly individuals themselves. These include such things as environmental risk factors and polypharmacy. In its summary of the knowledge base on falls and interventions designed to reduce falls, The American Geriatrics Society (AGS) Falls Prevention Panel categorized risk factors as falling into two major categories: (1) "intrinsic" factors (balance problems, cognitive impairment) and (2) "extrinsic" factors (environmental factors, polypharmacy).⁴ The panel also observed that while it may be the case that an intervention focused on one risk factor could theoretically be the most cost-effective way to reduce falls, the literature provides no evidence to support this conclusion in practice. Thus, a focus on ways to reduce multiple risk factors appears to offer the best hope for a preventive strategy designed to reduce falls.

Most falls occur in the home. In fact, according to a study on risk factors for falls among the elderly, 77 percent of reported falls occur in the home.⁵ The most frequently

mentioned environmental hazards were objects tripped over and stairs, which accounted for 25 percent and 10 percent of the subjects' falls respectively. These types of hazards create danger for healthy elderly persons and pose a greater risk for those elderly already suffering from a functional or cognitive impairment.⁶ Among individuals age 75 and over, those who fall are four to five times more likely to be admitted to a long-term care facility for a year or longer.⁷

The RAND Corporation completed a meta-analysis of the literature on falls, which summarized research from more than 80 empirical studies. It concluded that a combination of risk assessment with tailored follow-up interventions holds the most promise of being a cost-effective approach to reducing falls among elders.⁸ As mentioned, AGS guidelines also propose multifactorial interventions, which focus on a number of risk factors and intervention strategies designed to address them.⁹

To date, however, research provides no definitive guidance on the relative importance of different components of interventions and on whether the benefits of such programs justify the costs of an overall intervention. Studies focusing on intervention components such as exercise have provided conflicting evidence of effects on the incidence of falls.^{10,11,12} Although there may be no consensus on the efficacy of specific intervention components, there is a growing body of research and programmatic experience suggesting that many falls are preventable; taking the necessary steps to "fall-proof" an individual and/or his environment can help elders remain independent and live in their own homes, thereby reducing the demand for both long-term care and certain acute care services.

2.0 PURPOSE

ASPE commissioned this Task Order to build upon the wide body of literature on falls and fall prevention and to incorporate areas of interest that have not been thoroughly addressed in prior studies. For example, there have been few studies that have included a thorough assessment of fall prevention strategies on long-term or acute care costs or discussed various approaches to implementing recommended intervention(s). Also, in two of the more comprehensive studies done to date, -- the RAND meta-analysis¹³ and the AGS Guidelines¹⁴ -- researchers have pointed to the need for further research to identify which intervention is effective for what population, as well as further study on the cost-effectiveness of recommended strategies. To that end, the specific objectives of this Task Order are:

1. To select and operationalize an effective falls prevention intervention;
2. To develop a study design that will test a *primary* falls prevention intervention and its effect on long term-care use and cost;
3. To determine overall long-term care cost-effectiveness of an effective falls prevention program.

This is the first of two documents that addresses the above research questions. In this literature review, we summarize what is known about falls and fall prevention and identify the components of effective strategies for reducing falls. Intertwined in our discussion are the results of interviews conducted with individuals representing nine fall prevention programs that have been identified as particularly successful. The goal is not to replicate research that has been already done, but instead to build on frameworks that have already been developed by experts in the field to inform the development of a “standardized and trackable” intervention. Also addressed are issues related to the effectiveness of interventions, that is, reducing the incidence of falls and associated acute and long-term care costs and the costs of implementing the intervention.

In order to accomplish these literature review objectives, we reviewed fall prevention studies, related literature, and collected detailed information on a number of fall prevention programs currently operating in the United States. We focused our inquiry on addressing the three major research questions summarized below:

1. What valid options exist for effective multifactorial falls prevention assessment and follow-up? What elements are the most important for inclusion? Is there a minimum-optimal mix that one could expect to be effective at preventing primary and secondary falls?

2. What is the estimated average cost of a falls prevention intervention (e.g., initial assessment, actual intervention or program, and follow-up)?
3. What is the best methodological approach for determining the efficacy and cost-effectiveness of a selected comprehensive falls prevention intervention?

3.0 SCOPE OF AND METHOD FOR LITERATURE REVIEW

We reviewed the literature of more than 50 studies conducted between 1990 and 2003 as well as any recent articles on the subject. While many of these studies were conducted in the United States, we did not restrict our search to the United States. In fact, we reviewed a number of key studies from Britain, Australia, and other European countries. We focused our search on empirical studies so that to the extent possible, we could identify “proven” methods and components for interventions. We purposefully did not replicate previous systematic reviews of the literature. Instead, we focused on those approaches that held the greatest promise of providing results in a cost-effective, easy to implement way. Where possible, we point out the strengths and weaknesses of programs, isolate elements that work and do not work (and try to understand the reasons why), and identify challenges and barriers to successful program implementation.

We categorized reviewed material using a standard taxonomy, keeping the following guidelines as defined by ASPE in mind:

- Falls prevention components -- a typology of interventions, weighing the effectiveness to get us to the final intervention.
- Performance measures and data collection tools -- validity and reliability of existing tools, challenges and how to address challenges.
- Risk Assessment tools -- existing instruments for targeting risk assessment and interventions, including intensity.
- Evaluation and performance monitoring methods.
- Disease management approaches.
- Issues of privacy/confidentiality.

In addition to empirical studies, we also examined a number of important descriptive studies even though with regard to particular risk factors, these studies do not control for variables that may explain the root cause of a fall. As part of this review, we also conducted detailed interviews with individuals currently running nine fall prevention programs in the United States. These programs were identified as “successful” in a recent study conducted by the Centers for Disease Control.¹⁵ These programs typically have interventions focused on patient education, home assessment and access to home modifications and repairs at little to no cost to the participant. Of 1,694 programs contacted, the CDC selection process revealed 18 “exceptional” fall prevention

programs. It is this group of 18 programs that we targeted to interview and inform the development of our intervention process. We completed interviews with nine of these Fall Prevention programs (See Appendix I). The information gleaned from these interviews provided us with the “real world” challenges associated with implementing a successful fall prevention intervention. At the time of our interviews, some of the programs had added other dimensions to their programs in a “newer generation program” than the ones originally researched by the CDC at the time of the publication. The findings from our interviews will be discussed in detail in the body of this document. Summaries of these interviews are provided in the Appendix.

In the sections that follow, we describe existing studies and focus on those findings that are consistent across studies, thus representing (to the extent possible) consensus expert opinion. We examine the risk factors that are important to help identify those at high risk for falling as well as the ways to address or remedy each of those identified risk factors that are potentially modifiable. We also summarize the features that may make an elder more likely to fall.

4.0 RESULTS OF LITERATURE REVIEW

A fall is often a “sentinel event” for a senior. Many people view falling as the first in a string of events that can lead to increasing dependence. Falls may also be the first visible symptom of underlying morbidity processes well underway. Some individuals are afraid to report falls to their families or to their physicians because they fear that their independence will be taken away, or that they will be “forced” to move to an institutionalized setting such as a nursing home. Some do not want to allow any formal (non-family) paid help into their homes because they do not trust outside caregivers, or they fear that the caregiver will further scrutinize their abilities. This fear can lead to a (conscious or unconscious) restriction of activities, which in turn leads to further frailty -- the very thing that can actually increase the risk of falling and must be avoided.

Below we begin to address each of the major research questions. To begin, we summarize the knowledge base on the risk factors associated with falling. These factors are the ones that need to be the focus of any recommended intervention.

4.1 Research Question 1

What valid options exist for effective multifactorial falls prevention assessment and follow-up? What elements are the most important for inclusion? Is there a minimum-optimal mix that one could expect to be effective at preventing primary and secondary falls?

4.1.1 Risk Factors for Falls

Numerous fall prevention research projects have shown that the nature of falling is multifactorial -- that is, there is not typically a single “cause” of falls, but rather, a combination of multiple risk factors that put an elder at risk for falling. These risk factors are commonly classified as either intrinsic (occurring in one’s own body) or extrinsic (occurring in one’s environment).¹⁶ Intrinsic risk factors may include: vision or hearing impairment, high/low blood pressure, gait, balance or postural deficits or medical conditions such as diabetes, congestive heart failure and osteoporosis. Identifying and isolating such factors through an assessment process is important so that the impact and manifestation of these conditions can (to the extent possible) be altered. Extrinsic risk factors characterize threats in one’s environment. Extrinsic risk factors may include: home safety hazards like uneven walkways, loose carpeting, poor lighting, overly steep stairs, exposed extension cords, poor footwear, and loose clothing. Table 1 shows the consensus listing of the most common categories of risk factors for falls among community-based seniors, classified as intrinsic or extrinsic risk factors. Our review of the literature suggested that some are more important predictors of falls than others and we have listed them in order of importance. For example,

muscle weakness is one of the most important contributors to falls whereas the fear of falling -- relative to the other factors -- is among the least important contributor.

| TABLE 1. MOST COMMON RISK FACTORS FOR FALLS IN COMMUNITY-BASED SENIORS^{1,2,3,4} | | | |
|---|--------------------------------|--|--|
| Risk Factor | Intrinsic vs. Extrinsic | Risk Factors for increasing probability of Injurious falls^{5*} | Factors shown to have Maximum Predictive Accuracy for Falls^{6**} |
| Muscle Weakness | Intrinsic | Not explicitly identified | XXX |
| History of Falls | Intrinsic | Yes -- Particularly if fracture occurred | |
| Gait Deficit | Intrinsic | Not explicitly identified | |
| Balance Deficit | Intrinsic | Yes | XXX |
| Use of assistive devices | Intrinsic and Extrinsic | Not explicitly identified | |
| Visual deficit | Intrinsic | Not explicitly identified | |
| Arthritis | Intrinsic | Not explicitly identified | |
| Impaired ADL | Intrinsic | Not explicitly identified | |
| Depression | Intrinsic | Not explicitly identified | |
| Cognitive impairment | Intrinsic | Yes | XXX |
| Age > 80 years | Intrinsic | Not explicitly identified | |
| Medication use | Intrinsic and Extrinsic | Yes -- Psychotropic medications | XXX |
| Environmental Hazards | Extrinsic | Not explicitly identified | |
| Fear of falling | Intrinsic | Not explicitly identified | |
| <p>* It is important to note that many of these factors have not been specifically tested as risk factors for injurious falls. Thus, a finding of "Not Explicitly Identified" does not mean that the factor is not an important predictor of injurious falls, but rather, empirical evidence has not yet been collected to adequately test this factor.</p> <p>** These were the factors found to have maximum predictive accuracy in the context of a multivariate study that took into account multiple risk factors.</p> <ol style="list-style-type: none"> 1. Leipzig, RM, Cumming RG, Tinetti, ME. Drugs and falls in older people: a systematic review and meta-analysis: I. Psychotropic drugs. <i>J Am Geriatr Soc.</i> 1999; 47: 30-39. 2. Rubenstein LZ, Josephson KR. Risk factors for falls: a central role in prevention. <i>J A Soc Aging.</i> Winter 2002-3; 6(4): 15-21. 3. American Geriatrics Society, British Geriatrics Society, and American Academy of Orthopaedic Surgeons Panel on Falls Prevention. Guideline for the Prevention of Falls in Older Persons. <i>JAGS.</i> 2001; 49: 664-672. http://www.americangeriatrics.org/products/positionpapers/Falls.pdf. 4. Tinetti ME, Baker DI, McAvay G, Claus EB, Garrett P, Gottschalk M, Koch ML, Trainor K, Horwitz RI. A multifactorial intervention to reduce falling among elderly people living in the community. <i>NEJM.</i> 1994; 331: 821-827. 5. Nevitt MC, Dummings SR, Hudes ES. Risk factors for injurious falls: a prospective study. <i>J of Gerontology.</i> 1991; 46: M164-170. 6. Robbins AS et al. Predictors of falls among elderly people. Results of two population based studies. <i>Archives of Internal Medicine.</i> 1989; 149: 1628-1633. | | | |

It is important to note that not all falls should be treated equally. Clearly, as important as the likelihood of falling, are those risk factors related to injurious falls. While this distinction is not always made in the literature, where possible, we have identified factors that have been shown in the empirical literature to be related to injurious falls. Finally, this table shows which risk factors present the maximum predictive accuracy for falls; that is, which risk factors in multivariate studies have been shown to have the strongest correlation with the probability of falling. Identifying such factors is important because they can inform the development of an effective targeting strategy for the allocation of prevention resources.

Each of these risk factors and the corresponding interventions to ameliorate them is next explored in greater detail. While there may be other factors that have been identified as contributing to falls, these are the ones that have been shown in empirical studies to be statistically significant.

Muscle Weakness

Muscle weakness, especially in the lower body, is a primary risk factor having a major impact on the incidence of falls.^{17,18} In fact, as shown above, muscle weakness is thought to be the number one risk factor for falling. Muscle strength and tone in the quadriceps, as well as range of motion in the hips, knees and ankles are important indicators of possible diminished balance, which in turn can lead to falls. Despite its identified importance in the literature, many fall prevention programs do not employ muscle strength testing as part of their standard assessment process. In fact, none of the nine sites that were interviewed for this study undertook muscle strength testing. The reasons for this are varied but typically included the desire to focus on a few factors related to home modification, the lack of knowledge or expertise to adequately assess muscle strength, and the belief that such testing is outside of the scope of their program mandates.

It is important to note that manual muscle testing is an easily implemented method of testing for muscle weakness. The types of methods that can be used include hip flexion, hip abduction and hip adduction, knee extension, as well as general range of motion. Manual muscle testing can easily be employed, either during an in-person assessment with a nurse or nurse practitioner or during a follow-up visit with a primary care physician or physical/occupational therapist.

History of a Fall or Falls

Not surprisingly, compared to individuals who have never fallen, individuals who have fallen once are at greater risk for falling again. Yet, unlike other intrinsic risk factors, this is really a derivative of some other underlying risk factor. Its primary value as an identified risk factor is for targeting purposes. Put another way, if one is devising a strategy to minimize the risk of falling, a good place to start is with individuals who have

a proven track record of falling. Consistent with the findings of the Fall Prevention Guidelines developed by the American Geriatric Society, there appears to be wide agreement across various studies and literature that performing a fall assessment in a “high risk” population, **who have a history of a fall or falls** followed up by intervention, is likely to reduce the probability of future falls and reduce related medical expenditures.^{19,20}

Elders who have fallen appear to share somewhat striking similarities. The bulk of elders who have fallen are females who typically live alone and have one or more medical impairments. These individuals are also likely to be taking multiple medications, this indicating a variety of co-morbidities that can lead to an increasing probability of adverse side effects such as dizziness, fainting or loss of balance.^{21,22} In our interviews with the nine fall prevention programs, all respondents cited a history of falling as a significant indicator of risk. Moreover, a number of programs use a prior history of a fall as a targeting strategy for enrollment in their falls prevention efforts. Their underlying presumption is that scarce “prevention resources” should be targeted to those individuals most at risk and a previous fall is viewed as a particularly good threshold variable for this effort. Given that this factor is really symptomatic of other underlying risk factors, a history of falls should prompt a full multifactorial assessment, including an assessment of all possible contributing risk factors and interventions to ameliorate any of the findings.

All seniors should be asked about their fall history, including a history of “passing out” or “dropping down,” since these two terms are often used instead of admitting to a fall, or when the person does not recognize the incident as a fall. If a history exists, then comprehensive details about the fall should be obtained including details about the fall, antecedents, an historical account, (an eyewitness account is also helpful), where, when and how it occurred, and how they felt physically before the fall happened. These “markers” help point to some factors that could cause the fall. Some obvious examples include tripping or slipping on an object. Less obvious to the faller include hypotension (orthostatic or reflex), arrhythmia or other cardiac events, cerebrovascular weakness, or loss of consciousness.^{23,24,25}

Gait Deficit/Balance Deficit/Use of Assistive Devices

Many seniors, particularly those age 80 and above, begin to show problems with gait, but this is not necessarily a natural consequence of aging. A number of the key systems associated with maintenance of postural stability are summarized in Table 2.

When evaluating gait and balance, as well as an individual’s ability to use assistive devices, one must keep in mind that each of these systems plays a role in a person’s ability to remain upright. The literature does not provide guidance as to which of these systems or sub-systems is the single most important to evaluate. One can deduce, however, that in the context of a multifactorial assessment, persons should be observed walking, and to the extent possible, their speed, stride length, stepping height,

smoothness of gait, and arm movement should be noted. Formal testing methods include the Tinetti Performance-oriented Mobility Assessment²⁶ or the Get up and Go Test.²⁷ Clearly there are a myriad of possible causes for problems in these areas, many of which dovetail with the medical conditions and issues that will be discussed below.

| TABLE 2. SYSTEMS INVOLVED IN THE MAINTENANCE OF POSTURAL STABILITY ¹ | |
|---|--|
| System | Associated Subsystem |
| Peripheral Sensation | - Tactile sensitivity - Vibration sense - Proprioception |
| Vestibular Function | - Visual field dependence |
| Reaction Time | - Hand - Foot |
| Vision | - Visual Acuity - Contrast Sensitivity |
| Muscle Force | - Knee flexion - Knee extension - Ankle Dorsiflexion |
| 1. Lord SR, Sherrington C, Menz HB. Falls in older people: risk factors and strategies for prevention. Cambridge, United Kingdom: Cambridge University Press; 2001. | |

Another important issue relates to how and whether or not assistive devices are used when they have been prescribed to an individual. Many seniors do not like to use assistive devices, or do not know how to use them properly. Also, some people are embarrassed to use the devices because they see them as a “weakness” that others will notice. Theoretically, the improper use of assistive devices can lead to falls. Moreover, one would assume that if a practitioner has recommended using an assistive device, and an individual chooses not to do so, he/she would be at greater risk of falling. However, there is no direct evidence that the use of assistive devices **alone** will prevent falls.²⁸ As part of a multi-pronged approach, assistive devices can be important in reducing the risk of falls.

To illustrate the point regarding the use or non-use of assistive devices, during one of our Fall Prevention Site Interviews, program leaders indicated that many people do not use their devices; instead, they use walls or furniture for support when walking indoors. This may be for convenience, or because walking space is limited. Others who do use the devices often have to be corrected by the nurse or physical therapist on site as to their proper use. An obvious example is that they carry their canes instead of using them for support. Evaluation of gait and balance as well as observing persons using their prescribed assistive devices are important components of a comprehensive fall prevention risk assessment.

One of the challenges of incorporating the appropriate use of assistive devices into a program will be the cost and funding of such devices. Potential payers include the

Medicare program as well as private insurance (e.g. long-term care insurance or Medicare supplement) policies. Clearly, any new devices prescribed for participants must also include the proper training in their use.

Medical Conditions and Symptoms

Because falls are influenced by a variety of factors, there is consensus in the literature that it is critical to include an in-depth assessment of a person’s medical conditions and symptoms when considering their fall risk profile. In Table 3, we present a listing of some of the medical issues that the literature suggests are most associated with falls. Some are diseases, while others are symptoms that can sometimes be linked to diseases

| TABLE 3. MEDICAL ISSUES THAT MAY CONTRIBUTE TO FALLS ^{1,2,3} | |
|--|--------------------------------------|
| Arthritis | Metabolic Disorders |
| Arrhythmia | Muscle Weakness |
| Balance Deficit | Neuromotor Impairment |
| Cardiopulmonary Disease | Peripheral Neuropathy |
| Cognitive Impairment | Polypharmacy |
| Depression | Reduced hip, knee and ankle strength |
| Dizziness | Syncope |
| Foot disorders | Vertigo |
| Gait Deficit | Vestibular Impairment |
| Hypotension | Visual Deficit |
| Impaired Activities of Daily Living (ADLs) | Vitamin B ₁₂ Deficiency |
| 1. Alexander NB, Edelberg HK. Assessing mobility and preventing falls in older patients. <i>Patient Care</i> . 2002; 18-29. 2. Rubenstein LZ, Josephson KR. Risk factors for falls: a central role in prevention. <i>J Am Soc Aging</i> . Winter 2002-3; 6(4): 15-21. 3. Tinetti ME, Speechley M, Ginter SF. Risk factors for falls among elderly persons living in the community. <i>NEJM</i> . 1988; 319: 1701-1707. | |

One of the challenges in demonstrating the effectiveness of a fall prevention program is that the intrinsic (i.e. medical) problems a person has are very often the most important contributor(s) to the fall risk profile; yet in many of the fall prevention programs that were the target of our interviews a medical history is not taken, and therefore, the program people do not know what they are “dealing with” medically.²⁹ While they try to prescribe interventions to make the person’s environment safe (as an example), the intrinsic medical factor is left untreated and the risk for fall continues.

If, for example, we were to evaluate a person, and not elicit a complete medical/symptom history, we might never know if the participant suffers from dizziness, a clear

risk factor for falling. Not knowing this then leaves the assessor blind to that risk factor. The problem may manifest itself as gait imbalance, which leads the assessor to “prescribe” exercise or the need for a cane. On the other hand, if we ask about medical history and symptoms, we have important knowledge, which then enables deeper probing about underlying causes.

Eliciting information about the primary care physician’s awareness of the problem, treatment status and stability or control, also can inform the development of an appropriate intervention strategy. A symptom such as “dizziness” which has never been treated or brought to the attention of the physician must be addressed if other interventions are to be successful. It may well be that a person’s “gait instability” has less to do with muscle weakness or appropriate use of devices, and more to do with dizziness, something that makes them unstable and which could be addressed. Going further, the dizziness itself could be related to something as simple as benign positional vertigo, or more complex problems such as arrhythmia, hypertension, hypotension, cerebrovascular disease, or medication interactions.

In short, in order to fully evaluate the fall risk profile and prescribe the “right” interventions, it is critical to know about the individual’s baseline medical history, including medical conditions, common symptoms, and treatment status.³⁰ Further, physicians are the primary medical caregivers and should be made aware of these issues in order to provide the best treatment for their patient. To exclude or marginalize the role of physicians from such an important piece of the fall prevention strategy would lessen the probability of obtaining optimal results from an intervention.

Medication Use

Although clearly related to medical conditions, we are discussing medication use separately because of its independent significance as it relates to falls. The use of multiple medications usually signifies the presence of co-morbidities that can affect an individual’s risk of falling. Of even greater importance, however, is the risk associated with the side effects of specific medications or medications in combination, that can lead to dizziness, unsteadiness, or perception issues. Tinetti and Leipzig state: “although there is a clear relation between falling and the use of a higher number of medications, the risks associated with individual classes of drugs have been more variable. To date, serotonin-reuptake inhibitors, tricyclic antidepressants, neuroleptic agents, benzodiazepines, anticonvulsants, and class IA antiarrhythmic medications have been shown to have the strongest link to an increased risk of falling.”^{31,32}

Studies have demonstrated a significant link between the drugs prescribed to treat depression and the incidence of falls and subsequent fractures/injuries.^{33,34,35,36} In Canada, several epidemiological studies have been completed that identified the use of antidepressants (i.e., Tricyclic Antidepressants “TCAs” and Serotonin Reuptake Inhibitors “SSRIs”) as a significant risk factor among elders who have fallen. The effects of these traditionally prescribed depression/anxiety medications seems to produce

detrimental side effects (e.g., sedation, dizziness, unsteady gait, etc.) that increase the incidence and intensity of falls. What is more difficult to determine is whether it is the condition of depression and/or the consumption of these treatment medications that are the primary cause(s) of the increase in risk. In any event, it is clear that both need to be carefully considered when evaluating who fits into a high-risk category for a potential fall prevention intervention.

In the 70+ population Tinetti et al estimate that up to 42 percent of elders take four or more medications.³⁷ It is not uncommon to find that physicians prescribe medications without always knowing that other medications have been prescribed by other physicians. Contra-indications are a major concern with medications prescribed to this population. The literature provides sufficient data to suggest that any fall prevention assessment and intervention should closely examine and strongly encourage a periodic review of all prescribed and over-the-counter medications to determine whether the amount and type of medication is appropriate for the identified condition, taking into consideration all other medicines.³⁸ Ensuring compliance with the specified medication and dose remains a challenge because this responsibility rests solely with the patient; as mentioned, many such patients have cognitive issues or simply do not understand the effects of their medications.

Among the programs that we surveyed, one program reported having great success with their medication management approach.³⁹ In this program, a nurse completes a home assessment and among other things, obtains a full listing of all medications being taken by the elder, both prescription and over the counter. Noted are all of the dosages and the participant reports the days and times the medications are taken, and what (if anything) they are taken with (i.e., food, particular juice, etc.). This information is then forwarded to a volunteer pharmacist on staff who reviews the medications for all individuals who report taking five or more. The pharmacist then reports back to the nurse (assessor) and provides her with an assessment of the medications being taken, including side effects, potential interactions, problems with when or how they are being taken, etc. The nurse reviews this information with the participant, and if problems are found, encourages the person to visit with her/his doctor.

The results of the assessment are sent to the program participant so that they can be provided to the primary care physician. Out of the more than 60 participants for whom this procedure has been followed, slightly more than 30 have had adjustments made to their medications. Many of the adjustments related to issues involving duplicate medications being prescribed for the same problem. In many cases participants were unaware that they were to discontinue one prescription before beginning another. Perhaps the most dramatic case involved a program participant who had been taking 26 medications before the intervention, but as a direct result of the intervention and a subsequent visit to the physician, the number of medications was decreased to seven. What this illustrates is that medications monitoring can and should be part of a standard assessment designed to reduce the risk of falls.

Functional Impairment

To be safe, individuals must be able to function independently in their environments. Several studies have shown that decreases in functional status can significantly increase the risk for falls.^{40,41,42} When a person has a decrease in functional status, this is an excellent predictor for falls and more often than not, falls with resulting injury.

Assessment of a senior's ability to perform his/her Instrumental Activities of Daily Living (IADLs) and Activities of Daily Living (ADLs) is an important component of the risk assessment process.^{43,44} IADLs tell us about a person's ability to perform "higher level" functions, usually requiring intact cognitive as well as physical abilities. Two generally accepted scales used for assessing IADLs and ADLs are those described by Lawton and Katz, respectively. The seven IADLs used in Lawton's scale include: using the telephone, housework, laundry, shopping, paying bills, meal preparation and managing finances. ADLs are those physical activities that one must do at least once daily in order to take care of basic self-care functions. Katz's Index of ADLs includes: bathing, dressing, transferring, toileting, continence (bladder and bowel) and eating.

During the course of our site interviews, it became apparent that while some programs conduct formal IADL and ADL testing, others do not. In some programs, any issues with these two important domains are not directly assessed, but rather obtained coincidentally when the senior describes difficulty in performance of tasks as part of a broader issue. The rationale for a more informal assessment of functioning included: (1) the program did not support the type of trained personnel to assess these domains, or (2) the focus of the intervention is solely on home safety, that is, extrinsic factors. Even so, while not detailed, general information about functioning is often obtained. An example cited by one program administrator related to the ability to bathe.

"When an individual was asked about their bathroom safety, the participant reported that they do not take a bath because they cannot get in or out of a tub. Although the question is asked in the context of home assessment and modification, the participant described a deficit in bathing."⁴⁵

When such a deficit exists, this usually points to additional deficits in higher order IADL functioning. In this example, if the basis of the intervention is on home modification, it is likely that significant excess risk for falling will persist.

In discussions with several program operators, many suggested that, if they could design their program from "scratch," they would specifically ask about IADL and ADL abilities using a standardized instrument. They would do so because functional abilities are germane to finding the appropriate adaptive aides and other interventions (i.e., physical or occupational therapy, home health care, etc.) necessary to reduce the risk of falling.

Cognitive Impairment

The presence of cognitive impairment is a known risk factor for falls.^{46,47} The person with impairment in memory (short term in particular), executive function and planning is at high risk for falls.⁴⁸ Some individuals forget their own need to use their assistive devices. Some may “neglect” one side of the body, for example, as in the case of stroke, and increase the risk of unsteadiness.

In the case of severe memory loss, as in Alzheimer’s disease and related disorders, individuals can become so impaired that they wander aimlessly, or eventually cannot safely walk. On the other end of the spectrum, very mild or mild cognitive impairment can be difficult to detect, particularly in populations where the person has completed a higher level of education. Some studies have shown that up to 80 percent of mild cognitive impairment is missed in a physician’s office.⁴⁹ Identifying such individuals is important because most go on to develop more severe cognitive impairments.⁵⁰ These people are often socially adept, and can mask their level of impairment. Confusion is also problematic, not only for the reasons above, but because it can be sporadic. For example, a person with mild confusion may be able to function well during the day, but deteriorate at night (“sundowning”).

Despite the findings in the empirical literature regarding the importance of cognitive impairment as an explanatory variable in falls, most of the sites that were the subject of our interviews did not employ routine cognitive testing as part of their falls prevention programs. While many of the program directors acknowledged the importance of assessing cognition, they did not do so because they felt that they did not have the trained staff to collect the information. Others indicated that they did not have the budget to support the collection and interpretation of results. Still others felt that cognitive testing was outside of the “mandate” of their program. The implication was that if a cognitive impairment did not manifest itself in a very observable and conspicuous behavior, it was not typically noted and would remain an intrinsic risk factor.

Family members and caregivers can and should give their perception of a person’s cognitive status. However to obtain a clear and consistent picture, including learning about the presence of very mild or mild cognitive impairment, formal testing should be employed. Some of the formal testing methods for determining cognitive status that have been validated through clinical trials include the Mini-mental Status Examination (MMSE),⁵¹ the Telephone Interview for Cognitive Status (TICS),⁵² Delayed Word Recall Test (DWR)⁵³ or another relatively new exam designed to determine the presence of very mild cognitive impairment called the Mental Skills Test (MST).⁵⁴ Physicians, nurses, social workers and therapists can successfully perform cognitive testing, so long as they are using standardized, validated tools, and have been trained to use these tools effectively. Further, successful settings for the assessment of cognitive status can include not only a physician’s office, but also an in-person assessment or telephone assessment performed by a trained clinician.⁵⁵

Environmental Hazards

The area of environmental hazards and home safety modification is replete with information, suggestions, and ideas.^{56,57,58,59,60} While there is little evidence in the literature that home hazard modification alone is an effective strategy, it has been shown to be effective when combined with other strategies.^{61,62} We learned from each of our site interviews that from program to program, the concept of what constitutes a “home safety modification” varies greatly. This variation is based upon several factors: (1) the program’s focus, (2) the funding source for the program and (3) the educational/vocational background of the person running the program. The differences can be subtle and in fact at times the recommendations overlap, and the effects of the recommendations can therefore vary greatly. It should be stated that there is nothing “wrong” with any of the programs or the approaches, but it does highlight the impact of these factors.

For example, a “non-clinical” program may focus more on the *safety of the home* itself rather than on the person. The rationale is that by making the home a safer place to live, the rate of injury (fall) can be lessened. The recommendations typically include items such as: smoke detectors, fire extinguishers, water temperature adjustment, flashlights, non-slip mats, night-lights, handrails, stair repair, and personal emergency response systems. Persons who goes through this type of program are typically referred to their physician if they feel supportive devices or clinical factors should be implemented.⁶³

Other more “clinical” programs focus less on the safety of the home, but more on the *person’s safety within the home* environment. The rationale here is that persons whose health status is stable and who are using the appropriate devices will be less likely to fall. These programs tend to focus on deficits in ADLs, and therefore ways to ameliorate them, including medical equipment such as grab bars, toilet seat risers, walkers, reach extenders, hip protectors; gaining acceptance, and teaching people how to properly use these items. The programs also might include referrals to the physician or to a local home health care agency for support with ADLs. The home “modifications” include such things as night-lights, bath mats, telephone placement, clearing clutter and personal emergency response systems.⁶⁴ While both approaches have merit and are not entirely dissimilar, the focus, cost, implementation issues and challenges differ.

Another key factor relates to “follow-through” with respect to the implementation of recommendations. While a comprehensive assessment may identify “flaws” in a senior’s home environment, if the resources are not allocated to correcting these flaws, or if assistance is not provided to assure that the work actually gets done, little has been accomplished. Many programs are successful in identifying the problems, but success is impeded when the program does not include actually making, and in some cases paying for, the modifications.⁶⁵

Another barrier to success is the acceptance of modifications by seniors. Many people like their environment as it is, and are resistant to change even though they are given the rationale as to why the changes should be made. Many seniors feel that while there may be dangers outside of their homes, their own home is a “safe place”. When presented with an evaluation that their home may be unsafe in certain ways, there may be a tendency to reject this. Therefore, such recommendations may be more effective when positioned as increasing the comfort and ease of home living that will come about with certain home modifications.⁶⁶

With regard to the focus of the home modifications, the above non-clinical and clinical approaches should both be considered within the context of practicality and cost. While some of the modifications may not reduce the occurrence of falls, they may reduce the severity of injury that could result should a fall occur. At a minimum, the literature identifies the items in Table 4 as ones that should be addressed in all rooms of the person’s home, with particular attention paid to the bathroom, bedroom, kitchen and primary living area, as well as the entrances of the home.⁶⁷

| TABLE 4. HOME SAFETY -- AREAS THAT SHOULD BE ADDRESSED | |
|---|--------------------------|
| Stairs | Area rugs |
| Clutter | Fire hazards |
| Lighting | Access to telephones |
| Assistive devices | Walking hazards |
| Personal Emergency Response System | Hand rails |
| Grab bars | Ramps |
| Bathing aides | Reach extenders |
| Bed height | Tub/shower floor surface |

The challenge for successful fall prevention programs as it relates to home hazard risk assessment is to work collaboratively with a broad group of clinical professionals, trade workers, community-based organizations and government agencies to make the home a safer place to live.⁶⁸

Fear of Falling

A number of studies have found that the fear of a fall can influence the probability of falling; more specifically, the fear of falling can affect a person’s confidence in their physical ability, which can then lead the individual -- knowingly or not -- to restrict their daily activities.^{69,70} Over time, such self-imposed restrictions can lead to muscle weakness, which is one of the primary risk factors for falling. Moreover, feelings of isolation and depression, which are often related to an increased risk of cognitive impairment, can also result. Trying to assess fear of falling is, therefore, an important part of a multifactorial assessment. There are several methods of assessing a person’s

fear. One could simply ask if they are afraid, but research has shown that self-reports are imprecise because judgments tend to vary among people.⁷¹ The Falls Efficacy Scale (FES)⁷² is a validated tool for screening a person's perception of their abilities to perform their IADLs and ADLs, as well as their fear of falling. Measuring a person's perception of their confidence in these areas is an important addition to the person's actual ability to perform these tasks.

4.1.2 Discussion of Interventions and Therapeutic Strategies

In the following section, we discuss some of the possible intervention strategies that address the most important fall risk factors.

Exercise -- Including Gait and Balance Training

There is consensus in the literature that "exercise" is an important component in maintaining or improving a person's gait, balance strength and endurance.^{73,74,75,76,77,78,79,80,81} However, these same literature sources have not come to a consensus about which exercise(s) in what intensity, frequency or duration and for which types of impairments are most likely to lead to sustained improvements. Some of the exercise interventions that have been used in studies include: (1) Educational pamphlets describing both formal and informal exercises, (2) Supervised group exercise programs, (3) In-home unsupervised exercise programs, and (4) Therapeutic exercise programs supervised by Physical therapists. Types of exercise done within some of these programs include: (1) Tai chi programs, (2) Strength training either with free weights or machines, (3) platform balance, (4) endurance, (5) flexibility exercises, and (6) exercises designed to ameliorate a particular identified problem area.

In the Frailty and Injuries: Cooperative Studies of Intervention Techniques (FICSIT) trials, exercise interventions included training in endurance, flexibility, balance platform, Tai Chi and resistance. The FICSIT meta-analysis showed that those in the exercise groups had an estimated ten percent lower risk of falling than those in the control group, with balance exercises having the strongest effect.⁸² The Rand meta-analysis showed that exercise interventions reduced the risk of falls by 12 percent and the rate of falls by 19 percent, with endurance exercise reducing the falls risk among subjects who fell at least once, and balance exercises reducing the monthly rate of falling.⁸³ The AGS Panel was unable to determine which configuration of exercise program to recommend.⁸⁴ In fact, researchers in both the Rand meta-analysis and AGS Guidelines similarly conclude that more work is needed, in a large-scale study, to determine the efficacy of some or all of these programs with respect to falls prevention.

Further, common sense suggests that it is difficult to convince an (impaired) elder -- let alone a healthy adult -- who has never made exercise part of their life, that they should begin and maintain such a program as part of a fall prevention strategy. It is possible that the fear of falling may serve to be a more powerful motivator, but the empirical literature does not directly address this issue.

During our site interviews, we discovered that many of the programs do not incorporate exercise programs or even education about exercise. Again, this is largely due to the fact that their focus is on home modification. Those programs that do include exercise both encourage it and provide pamphlets on its importance, perhaps including some suggestions about the types of exercise to consider, or actually provide a more formal program. One of the programs appears to focus much of its intervention strategy on exercise, having developed a yoga class as well as stress reduction and relaxation classes.⁸⁵ Programs affiliated with home health care agencies also take advantage of integrating their physical therapy staff for individualized gait training and assistance using assistive devices.⁸⁶

For our purposes, it will be important to consider the practicalities of implementing various exercise interventions on a national basis. Thus, we cannot depend upon the availability of group classes from place to place, nor can we allow for varying content among programs. This would encumber our ability to measure the overall cost effectiveness of a well-specified intervention package. In order to truly measure the potential impact of exercise as part of an intervention, we must be able to channel appropriate individuals toward appropriate exercise for their personal situation. What is clear, however, is that the types of exercise that are considered should include those that focus on improving or strengthening endurance, balance, strength and gait.

Supportive Home Care Services

Supportive home care services are typically needed when an individual has deficits in their ADL or IADL functioning and family supports alone cannot help compensate for such deficits. In general, such services encompass the use of home health aides, companions, and homemakers. Often, social workers or licensed nurses supervise and monitor the family and non-family caregivers that are assisting a functionally impaired individual. In general, home health aides would be necessary if the individual shows deficits in their Activities of Daily Living. Homemakers/Companions can provide assistance with IADLs and/or monitoring of cognitively impaired individuals, as well as reassurance. Finally, social workers could be utilized for short-term therapy to focus on strategies for minimizing an individual's fear of falling.

For our purposes, it will be important to consider the referral and funding mechanisms for implementation of these services.

Physician Involvement for Disease Management and Medication Monitoring

The need for some level of physician involvement in any falls prevention intervention is critical given the often medical nature of the risk factors and the influence of a physician on the behavior and attitudes of a patient. Only a physician can manage the medical components of a person's care. Likewise, medication monitoring and/or withdrawal are areas that must involve the physician, for practical, legal and ethical reasons.

For our purposes, this component of an intervention strategy appears to be the most difficult area to “tease out.” Because the physician is “involved” in the assessment from the perspective of baseline knowledge of an individual, the lines between “assessment” and “intervention” concerning physician involvement can become blurred. The detection of a disease or medication falls risk will need to be clearly identified in any assessment, so that the medical intervention implemented by the physician can be linked to the identified risk factor, as well as to other non-medical aspects of the intervention.

Referral requirements must be considered when determining how the physician is included in the assessment and intervention portions of this program.

Home Modifications and Assistive Devices for Safety

In prior sections we addressed the rationale for relating to home safety concerns. At a minimum, we want to be able to address those areas that have been shown to affect the participant’s home safety the most. Table 4 identified the most important areas that a home safety evaluation should address. In order to correct or compensate for such deficiencies, safety devices may be necessary. Table 5 shows the safety devices that could be included as part of an intervention.

| TABLE 5. SAFETY DEVICES INCLUDED AS HOME SAFETY MODIFICATIONS | |
|--|------------------------------------|
| Pill Box | 3 in 1 Toilet Assist |
| Bath Mat | Hand Held Shower |
| Bath Stool | Raised Toilet Seat |
| Shower Bench | Molded Raised Toilet Seat |
| Shower Bench with Back | Toilet Safety Frame |
| Bath Seat (up to 400 lbs) | Personal Emergency Response System |
| Bath Tub Rail | Extension Cord |
| Bath Tub Rail (multiple height gripping) | Carpet Tape |

These items are meant to deal with extrinsic risk factors. As stated earlier, home modifications for safety, in the absence of other interventions will not, by themselves, completely eliminate the risk for falling. However, if these extrinsic risk factors are identified and incorporated into the larger scheme of fall prevention interventions, they do have merit.

Other Interventions

One should not conclude that the intervention components previously discussed represent all possible components of interventions that have been identified or tested. We reviewed various other interventions related to preventing adverse events and

which could theoretically impact the probably of falling. However, many were not focused on falls prevention per se, others focused on singular interventions where compliance has been proven to be particularly problematic, and others are outside the scope of this project because of practical implementation barriers. These include such things as bone strengthening medications,^{87,88} other medications,⁸⁹ footwear interventions,^{90,91} use of external hip protectors,⁹² the use of energy-absorbing flooring⁹³ and others.

4.1.3 Most Important Elements for Inclusion and Minimum-Optimal Mix

The consensus among researchers and practitioners alike is that a multifactorial falls risk assessment and management program is far more likely to be highly effective compared to single-component falls intervention programs.^{94,95,96,97} It further has been asserted that an effective multifactorial program should consist of at least three major components:

- A detailed risk assessment, either self-administered as a questionnaire or conducted by a professional;
- A thorough medical evaluation by the primary care physician (as warranted); and
- Follow-up interventions.⁹⁸

This line of thinking strongly suggests then, that a *multidisciplinary* approach to falls prevention and risk management will yield the best results. However, at face value, including all disciplines equally could make the program burdensome to participants and cost prohibitive to implement. The challenges for our program then will be to:

- Combine the risk assessment methods that best reveal the important falls risk factors as highlighted by the literature;
- Develop an intervention strategy that is practical. By “practical” we mean an intervention that is cost-effective, can be easily implemented on both a local and national scale, and is accepted by seniors;
- Determine the role of the physician in this program; and
- Develop targeting strategies, for both assessment and intervention purposes.

4.1.4 Assessment and Intervention Considerations

For our purposes, the risk assessment should be broad enough to uncover all of the risks identified in the literature as important contributors to falling, yet not so complex and burdensome as to deter people from participating in the program, or make the program cost-prohibitive. Based on our review of the literature as well as the experience of the program officers across the interview sites, we developed of the following matrix for a proposed minimum-optimal mix for an assessment and intervention strategy. It should be noted that this table is intended to illustrate the broad strategy for assessment and therapeutic strategies for each risk factor. Specific scenarios including targeting and assignment of individuals to various protocols will be

discussed with the Technical Advisory Group (TAG) and detailed in the design document.

| TABLE 6. SUMMARY OF RISK FACTORS AND ASSOCIATED EVALUATION AND THERAPEUTIC STRATEGIES | | |
|---|---|---|
| Risk Factor | Assessment Strategy | Therapeutic Strategy |
| Muscle Weakness | Lower body manual muscle testing and range of motion. | Home exercise program that focuses on endurance, strength and/or flexibility as appropriate (method to be determined). |
| History of Falls | <p><i>Primary Strategy</i></p> <ul style="list-style-type: none"> Detailed Fall History obtained during assessment. If a history of falls has not been evaluated by physician, then; <p><i>Secondary Strategy</i></p> <ul style="list-style-type: none"> Refer to primary Physician for medical evaluation of underlying causes. | <p><i>Primary Strategy</i></p> <ul style="list-style-type: none"> If physician referral is not necessary, then proceed with interventions, as prescribed by assessment findings. <p><i>Secondary Strategy</i></p> <ul style="list-style-type: none"> If necessary, physician to evaluate and treat the potential medical reasons for falls. |
| Gait Deficit/Balance Deficit/Use of Assistive Devices* | <p><i>Primary Strategy</i></p> <ul style="list-style-type: none"> Get up and Go Test; Tinetti Balance and Mobility Assessment;¹ Demonstration of ambulation (using aides). <p>If gait or balance deficits are newly identified, then;</p> <p><i>Secondary Strategy</i></p> <ul style="list-style-type: none"> Refer to primary Physician for evaluation of underlying causes, with referral to specialists (i.e., Neurologist) as necessary; Formal evaluation by Physical Therapist. | <p><i>Primary Strategy</i></p> <ul style="list-style-type: none"> Home exercise program that focuses on endurance, strength and/or flexibility as appropriate (method to be determined). <p><i>Secondary Strategy</i></p> <ul style="list-style-type: none"> Tailored exercise program, supervised by PT (ordered by physician). |
| <p>Medical Conditions and Issues** including:</p> <ul style="list-style-type: none"> Visual deficit Arthritis Depression Other chronic diseases Medication use | <p><i>Primary Strategy:</i></p> <ul style="list-style-type: none"> Detailed medical history obtained during assessment to determine if medical conditions and issues exist that are not effectively treated. Review of medications to include prescribed and OTC drugs. Evaluate for proper dose, route, compliance, interactions, side effects, etc. If medical conditions or medication issues are identified (interactions, improper dosing, multiple interacting medications), then; <p><i>Secondary Strategy:</i></p> <ul style="list-style-type: none"> Evaluation by primary physician with referrals to appropriate disciplines for problems identified. Participant encouraged to discuss review of medication regime. | <ul style="list-style-type: none"> Primary physician to evaluate and treat identified medical conditions that are not being optimally treated; Physician to alter medications as needed. |
| Impaired Functional Status (IADL or ADL) | <p><i>Primary Strategy:</i></p> <ul style="list-style-type: none"> In-depth evaluation of ADLs (Katz) and IADLs (Lawton) using “gold standard scales” during in-person assessment to determine whether or not functional impairment exists. <p><i>Secondary Strategy:</i></p> <ul style="list-style-type: none"> Evaluation by primary Physician, if one not recently done. Refer to physical therapy for evaluation of gait and possible need for assistive devices; Refer for home health care evaluation and possible assistance. | <ul style="list-style-type: none"> Order assistive devices, as needed; Order home health care services as needed. |

| Risk Factor | Assessment Strategy | Therapeutic Strategy |
|---|---|---|
| Cognitive Impairment | <i>Primary Strategy:</i> <ul style="list-style-type: none"> • Evaluation of cognitive status using the Folstein Mini-mental Status Exam (MMSE)² or other “gold standard scale” during assessment to determine whether or not there appears to be a cognitive issue. • If cognitive deficits are newly identified, then; <i>Secondary Strategy:</i> <ul style="list-style-type: none"> • Evaluation by primary Physician, if one not recently done. • Refer for home health care evaluation and possible assistance. | <ul style="list-style-type: none"> • Physician to treat cognitive impairment, as needed; • Order home health care services as needed. |
| Age > 80 years | Part of demographics ascertained during screening. | None necessary. |
| Environmental Hazards | Detailed Home Safety Inspection during in-person assessment. | <ul style="list-style-type: none"> • Recommend specific home safety modifications; • Perform home modifications, with buy-in from participant; • Ascertain whether or not financial assistance is needed to pay for modifications and attempt to secure payment. |
| Fear of falling | <ul style="list-style-type: none"> • Assess IADLs and ADLs, • Tinetti Falls Efficacy Scale³ • Informal assessment of client’s history of fear of falling. | Home exercise program that focuses on endurance, strength and/or flexibility as appropriate (method to be determined). |
| <p>* These three Risk Factors are combined because they are strongly associated with one another, and can be evaluated and treated in the same fashion.</p> <p>** These six Risk Factors are combined because they require a physician’s medical assessment and therapeutic intervention in tandem with other interventions.</p> <p>1. Tinetti ME. Performance-oriented assessment of mobility problems in the elderly. J Am Geriatr Soc. 1986; 34: 119-26.</p> <p>2. Folstein MR, Folstein SE, McHugh PR. Mini-mental state -- a practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res. 1975; 12: 189-198.</p> <p>3. Tinetti ME, Richman D, Powell L. Falls efficacy as a measure of fear of falling. J Gerontol B Psychol Sci Soc Sci. 1990; 45: 239-243.</p> | | |

4.1.5 Role of the Physician

As discussed under the “Medical Conditions and Symptoms” and “Medication” sections of this literature review, by virtue of the physician-patient relationship, the physician must play a role in any successful falls prevention program. It is important to keep the physician involved in disease and medication management, so that all areas of fall risk can be addressed from a medical perspective.

The important challenges for our purposes will be to determine how central the role of the physician should be in our program, as well as to determine how to close the feedback loop between the physician, patient and program, so that we are informed of what, if any, measures are taken to address disease or medication concerns identified.

4.1.6 Targeting Strategies

It is clear that in order to be a cost-effective program, some amount of targeting must occur. In many of the Fall Programs we interviewed, participants gained entrance to the program because they had already fallen at least once. In other programs, people were identified as fall risks through referrals by physicians, fire departments, housing authorities or other agencies. Some of the targeting variables we are considering include age, prior history of falls, number of medications, living alone, lack of informal support, and others.

At our meeting with the Technical Advisory Group, we will explore the study design and the targeting strategies that should be employed.

4.1.7 Privacy/Confidentiality Issues

We acknowledge that there will be privacy and confidentiality issues relating to any intervention that is employed. We plan to address these through the proper use of HIPAA-compliant authorizations and release of information. Protected Health Information (PHI) will be kept confidential at all times.

4.2 Research Question 2

What is the estimated average cost of a falls prevention intervention (e.g., initial assessment, actual intervention or program, and follow-up)?

In our site interviews and in the literature, the costs for a multifactorial assessment and intervention program to reduce fall risk vary greatly and in many cases were unknown. This is because many of the individuals involved in the assessment and intervention process are not devoted exclusively to the program and there is no accurate allocation of costs. In other cases, the “costs” associated with volunteer services are not adequately accounted for and many programs only look at the “intervention” component but not the “assessment” component of the aggregate approach. Finally, multiple funding sources, that cover a certain scope of activity but not other aspects, make accounting very difficult. In short, the literature is not particularly instructive when it comes to estimating the costs of intervention strategies that have been implemented to date. Nor were our site interviews helpful in this regard.

In the design report, we will determine the costs associated with each component of the intervention (i.e., assessment, intervention, and follow-up) and construct a detailed budget to determine the average cost of the total program.

4.3 Research Question 3

What is the best methodological approach for determining the efficacy and cost-effectiveness of a selected comprehensive falls prevention intervention?

Given the high rate of falls among the elderly and the substantial health and long-term care costs associated with these falls, the question of whether or not a particular intervention is effective has both clinical and economic implications. Is it enough to say that an intervention reduces the number of falls in the elderly, thereby reducing the associated health care costs and this deems it an effective intervention? Or is a more in-depth analysis of the cost and savings of a program necessary? Throughout our review of the literature, programs and interventions have typically measured their “effectiveness” as a reduction in the number of falls in the target group. However, there is limited and contradictory information as to the best way to both define and measure cost-effectiveness.

The term “cost-effective” typically refers to an analysis that is done to determine if one type of program is more cost-effective than another -- that is, which program produces the most benefits for the same amount of cost.⁹⁹ Although there may be some benefit here in trying to determine if a proposed intervention is more cost-effective than other interventions used in the past, this exercise would be extremely difficult and not particularly informative given the differing sample sizes, methodological approaches and measures of effectiveness used by various fall prevention programs.¹⁰⁰ Our review of the literature suggests that for those few who have undertaken an economic evaluation of their program, they measure “cost-effectiveness” by determining: (1) if there is a reduction in the rate of falls for the intervention group and then (2) projecting an estimate of the health care savings for the general population if the intervention were administered. While this is not a true “cost-effectiveness” evaluation, it seems to be the standard definition by which those programs that undertake such evaluations measure their effectiveness.

The programs that have undertaken the task of determining whether or not they are cost-effective are informative in that they do provide some retrospective insight in to the importance of understanding what should be used to comprise costs and expenditures. The Rand Meta-Analysis provides a good summary of the available literature on cost-effectiveness.¹⁰¹ Reviewed were 15 studies of the cost-effectiveness of various types of interventions. The conclusions drawn were that whether or not a program was found to be cost effective depended in large part on the different aspects of the programs, including target population, location of the intervention, the specific study design, how the program was to be implemented and what was used as the definition of cost and benefits. They suggested that while it was difficult to determine if one program was more effective than another, there was some evidence that an intervention could be cost-beneficial; that is, the economic benefits of a program would exceed the costs of implementing the program, particularly if administered to a high-risk population.¹⁰²

A first-order principle for measuring cost-effectiveness is to accurately and consistently track costs. Having a clearly defined, measurable and justifiable set of cost items will allow an accurate estimation of aggregate costs of an intervention. Although each intervention reviewed in the Rand Meta Analysis differed in its approach to reducing falls, those that tracked the cost of the intervention and associated materials were able to make a determination as to their economic impact. In 1994, Tinetti¹⁰³ showed that a multifactorial intervention of elders aged 70 and over living at home significantly reduced the number of falls, thereby being cost-effective. However there was some mixed evidence about whether or not the program would actually result in a savings given the cost of the intervention. Again, this program showed the most promise with a targeted high-risk population.

Similarly, another study by Robertson, et al showed that a home-based exercise program could be cost-effective, but only resulted in actual savings (based on an estimated reduction in hospital stays) for those aged 80 and over.¹⁰⁴ In contrast, many of the site interviews conducted for this literature review showed that almost all of the programs either did not have the resources to track costs, or often times were unable to make a determination of costs due to the cross-utilization of resources. In most cases there were shared staff resources and multiple funding/financing sources for intervention implementation.

The second important factor when determining the cost effectiveness of an intervention is having a control and experimental group. From a cost perspective, being able to track the number of falls, doctor's visits, hospital stays, equipment purchases, exercise programs, and home modifications for a group of individuals who received an intervention and a group that did not was the simplest way to examine both costs and savings.¹⁰⁵ Almost all of the literature reviewed with respect to cost-effectiveness employed this design.

Interestingly, the Lewin Group, using a sensitivity analysis designed to evaluate the cost-effectiveness of a home modification program, showed that by varying the assumptions used to determine cost or the length of time over which savings are projected, it may be possible to show a net savings in some cases and not in others.¹⁰⁶ This reinforces the importance of having accurate, reliable, and well-defined measures of costs and benefits. Lewin and others are also quick to point out that a strict economic analysis does not take into consideration the less measurable and often equally important benefits of administering a fall prevention intervention. These intangible benefits include improved quality of life, peace of mind, and reductions in missed hours of work for caregivers, etc. These factors should be mentioned as mitigating the outcome of a strictly economic analysis.

Clearly, determining the cost-effectiveness of a fall prevention program is critical to demonstrate whether and if, health care payers -- both private and public -- ought to invest the resources necessary to reduce falls. When savings exceed costs, the economic argument for such an investment is compelling. However in order to do this,

a program must accurately track the costs associated with the assessment, intervention and follow-up, as well as the resulting savings. This necessarily implies that in designing an intervention one must have a data collection strategy defined up-front; without building in a tracking mechanism at the outset of a program, it would be very difficult to accurately assess the economic costs and benefits of the entire program. Understanding what defines these parameters will facilitate a meaningful analysis of the intervention. In the design report, we will further explore the best methodological approach to determine the efficacy and cost-effectiveness of our proposed intervention.

5.0 LIMITATIONS

While the literature and site reviews have been extremely instructive in identifying key risk factors and components of a multifactorial assessment and intervention, limitations remain. For example, there are very few studies focused on the impact of programs on reducing long-term care expenses. Also, the population groups, associated strategies, analytic techniques, and outcome measures are often not standardized, thus making it difficult to compare results across studies. Further, it is difficult to draw conclusions about the applicability of a particular intervention to a new study population. In regards to measuring the efficacy of programs in terms of costs and benefits, much of the available information on costs (of assessment and intervention) is limited and must be inferred. Even in the case of program benefits, definitions vary, making it difficult to draw definitive conclusions about the costs and benefits of specific interventions. Developing a strategy for effectively evaluating costs and benefits is critical to making the case for an intervention strategy and will be addressed in the design document.

In terms of laying out the details regarding the implementation of a specific falls prevention program, here too the literature is limited. Very few studies go into depth defining a precise operational model. Little has been written on key implementation challenges. The site interviews provided some helpful, “*real world*” experience on the barriers and challenges, but many of the programs focused on only one or two of the areas that are being considered here as part of a comprehensive program. All of the programs are county-specific or regional, and therefore do not address potential issues that would be faced by a program implemented on a national basis. Although some of the programs have tracked program outcomes to a degree, many of the experiences are anecdotal and follow-up and outcomes measurement on a set of defined criteria over a period of time are incomplete.

Finally, it is very difficult to separate the efficacy of different intervention components. In fact, the literature does not really define any direct comparisons of the various components of an intervention. While there is some evidence that certain interventions hold more *promise* for decreasing the risk of falls, the specific “prescription” for these remains unclear.

6.0 DISCUSSION

Clearly, there has been a great deal of important descriptive and empirical research conducted on fall prevention. Some of that research focuses on specific components, such as a multifactorial assessment, or a specific strategy such as home modification. Other research, particularly the various meta-analyses, take a broader view of the literature and have distilled the larger body of work into comprehensive categories of actions that have an impact on reducing the probability of falling.

As discussed above, there remain limitations in the literature. These limitations suggest that a study that focused on a specific group, a set of homogeneous assessment and intervention strategies, outcomes measurement and tracking over time, as well as an analysis of the cost-effectiveness of the implemented strategies would make a significant contribution to the knowledge base. Based on our analysis of the literature, a carefully constructed fall prevention program designed exclusively for elders (age 65+) deemed to be at “high risk” would provide the greatest probability of producing a reduction in the incidence of falls, a reduction in related medical and long-term care expenditures as well as justify in a cost-benefit calculation the expenditures related to operating a multifactorial intervention. Clearly, targeting strategies will be important in determining the best mix of cost effective strategies for identified risk groups.

There is a consensus in the literature regarding the intrinsic and extrinsic risk factors associated with a fall and these include muscle weakness, history of a fall or falls, gait deficit, balance deficit, use of assistive devices, medical conditions and health issues, medication use, functional impairment, cognitive impairment, environmental hazards and fear of falling.

6.1 Questions for the Technical Advisory Group (TAG)

Targeting

- The purpose of this study is to develop an intervention that reduces falls. Should we focus on primary falls or secondary falls?
- It appears that a targeted approach to falls risk management is the best approach to obtain the maximum results while making the assessment and intervention process cost effective. Given that assumption, should we be focusing our intervention efforts on those who have never fallen, or should we be targeting those who have had at least one fall? Depending upon the answer to this question, what are the implications for the number of control and experimental groups?

Sample Method and Issues

- If the control group receives no intervention or information, how do we keep them interested enough to provide us with data through the study period? Should we give them some incentive to participate, and if so, what should it be?
- Should we give the control group any “reminders” such as a diary to track their falls? If so, what effect could this have on the group? Would it truly be a “no intervention” group?

Multidimensional Assessment

- Have we identified all of the key components of falls risk assessment strategies? If not, what have we missed?

Intervention

- Have we identified all of the key components of falls risk intervention strategies? If not, what have we missed? Are there any that we did not consider significant enough to include among the identified interventions that you believe should be included?
- How should we address referrals to identified “outside” programs to address other issues (i.e., Physical therapists and home health care)?
- We believe that individualized interventions designed to ameliorate the identified problems will yield the best outcome. Do you agree?
- We believe that the best way to ensure compliance and follow-through on the participant’s part is through educating the participant about all of the risk factors identified, reviewing the interventions that are recommended, and following-up with written documentation of these findings. Where possible, we will secure compliance with implementing recommended intervention(s). Is there some specific factor for success you would add to this?
- On what basis should we follow up with the program participant regarding falls after the intervention has been implemented? What is the best method to use for follow up (phone, mail, etc.)?
- How should we assure the participant’s compliance with intervention findings and recommendations?

Physician Involvement

- What should the role of the participant's Primary Care Physician for medical management and medication monitoring be? Does every person participating in the program need to be seen by their physician, or can the physician be contacted when significant new information is identified that requires their assistance?

Funding for Intervention

- Funding for all of the intervention components, including necessary additional evaluations, programs, equipment, home modifications, contractors, etc. is key to a successful intervention program. How should we coordinate this? Is there likely to be compliance without funding or paying for some of the recommended interventions?

Role of the Assessor and Care Manager

- We see an assessor (nurse) as the key person. This would be the person responsible for doing the assessment. We see a Care Manager (who may or may not be a nurse) as the person responsible for communicating with the participant on an ongoing basis and arranging for implementation of the interventions as necessary. Do you agree?

Costs

- What is the best way to track acute and long-term care expenses for falls-related injuries? What should be tracked as a "cost" -- for example, all cost reported in conjunction with a fall, hospital costs only, costs of informal caregiver's time?

Tracking and Outcomes Measurement

- For how long should we track the outcomes of this study? Is two years enough to show what impact the interventions may have had?
- What elements must be included in the development of a minimum data set of outcome measures?

6.2 Conclusion

The next step will be to have a pre-meeting conference call with members of the TAG, to obtain preliminary thoughts and recommendations. We will prepare a Draft Design

Report to be given to the TAG in preparation for our meeting in Washington, DC on July 19 and 20, 2004.

During and after the TAG meeting we will more specifically define the operational model for the intervention (i.e., targeting strategies, assessment, intervention, follow-up) including the total costs associated with implementation, and lay out strategies for evaluating the costs and benefits of the intervention.

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APPENDIX I: FALLS PREVENTION PROGRAM INTERVIEW SITES AND SURVEY RESULTS

| | |
|---|---|
| <p><u>SITE A</u> Ms. Ava Stanford Director Volunteer Interfaith Caregivers Program (VICaP) "Project Safe Home" 555 West Glendale Avenue Phoenix, AZ 85021</p> | <p><u>SITE B</u> Mr. Peter Merles Director Southeast Senior Housing Initiative 10 South Wolfe Street Baltimore, MD 21231</p> |
| <p><u>SITE C</u> Ms. Carrie Christ, PT, NREMT-P York County Fire and Rescue Fall Prevention Program P.O. Box 532 Yorktown, VA 23690</p> | <p><u>SITE D</u> Ms. Char Thompson Foundations for Rural Housing, Inc. 4506 Regent Street Suite 100 Madison, WI 53705</p> |
| <p><u>SITE E</u> Ms. Ellen Rubin, RN, MSN Program Coordinator VNA of South Central Connecticut 1 Long Wharf Drive New Haven, CT 06511</p> | <p><u>SITE F</u> Ms. Diane McNamara Community Healthcare Guilford 753 Boston Post Road Suite 200 Guilford, CT 06437</p> |
| <p><u>SITE G</u> Mr. Alan Abe Injury Prevention Coordinator for King County Fall Factors Prevention Program</p> | <p><u>SITE H</u> Mr. Michael Radetsky Community Health Promotion and Prevention Branch (CHIPPS) San Francisco Department of Public Health Community Health Education Section 101 Grove Street San Francisco, CA 94102</p> |
| <p><u>SITE I</u> Ms. Maralee Anderson SEICAA - RSVP 641 North Eighth Street Pocatello, ID 83201</p> | |

Programs contacted but no longer in operation:

1. Virginia: Elder Homes in Richmond
2. Virginia: LOA AAA in Roanoke
3. Virginia: New River AAA in Pulaski
4. South Carolina: Carolina Home Prevention for Seniors
5. South Carolina: Senior Centers of Spartanburg
6. South Dakota: South Dakota Office of Adult Services and Aging

7. Connecticut: New Opportunities for Waterbury, Inc.
8. New Hampshire: New Hampshire Housing Finance Authority/Home Injury Prevention Program in Manchester
9. Pennsylvania: Fall Injury Prevention Coalition in York

SITE A

Program Name: ViCAP

GENERAL PROGRAM DESCRIPTION

1. How long has your program been in operation? since 1993
 - a. How many individuals have been served from program inception? 630
 - b. How many on average do you serve on a monthly basis? 3
2. How many Full-time Equivalent (FTEs) are allocated to the program? .025 for coordination, all assessments and modifications are done by volunteers that get training.
3. Who is served by your program? (*Check all that apply*)
 - a. Elders
 - b. Medicare Recipients
 - c. Dually Eligible (Medicare and Medicaid)
 - d. Catchment area population
 - e. Other: Disabled-anyone 18 or older who is living independently and unable to drive
4. How do you target individuals eligible to receive benefits under this program? (*Check all that apply*)
 - a. Self-referred
 - b. Referral from MD
 - c. Outreach by program staff
 - d. Other: Neighbors (clients) already receiving other services (see attached)
5. Is your intervention or program targeted at people with certain characteristics that deem them at "high risk" for falling? No Yes
 - a. If **Yes**, how do you define "high risk?" (*Check all that apply*)
 - i. age; specify: elderly or disabled
 - ii. gender; specify:
 - iii. history of falling,
 - iv. Other: Individual and home care considered for project safe home when home assessment for other services is conducted
 - b. If **No**, then how are program participants identified?
6. Do you use standardized tools or assessment forms in your program? No Yes
7. Are you able to provide us with a copy of these tools/forms? No Yes

8. Does your fall prevention program include one or more of the following Components? (For each Component, specify whether or not it is included as part of your program's Assessment. If Yes, then tell us how it is addressed as an Intervention).

| Component | Part of Assessment | Intervention |
|---|---|---|
| Activities of Daily Living (ADLs) | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. <input type="checkbox"/> Suggestions about finding help to care for yourself 2. <input type="checkbox"/> Referral to Physician 3. <input type="checkbox"/> Referral to Home Care Agency 4. <input type="checkbox"/> Other |
| Instrumental Activities of Daily Living (IADLs) | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. <input type="checkbox"/> Suggestions about finding help to do these tasks 2. <input type="checkbox"/> Referral to Physician 3. <input type="checkbox"/> Referral to Home Care Agency 4. <input type="checkbox"/> Other |
| Cognitive Status | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. <input type="checkbox"/> Referral to Physician 2. <input type="checkbox"/> Referral to Home Care Agency 3. <input type="checkbox"/> Other |
| Fear of Falling | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. <input type="checkbox"/> Referral to Physician 2. <input type="checkbox"/> Referral to Counselor/Therapist 3. <input type="checkbox"/> Other |
| Medical History Review | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. <input type="checkbox"/> Referral to Physician 2. <input type="checkbox"/> Other |
| Medication Review | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. <input type="checkbox"/> Referral to Physician 2. <input type="checkbox"/> Other |
| Home Safety | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 1. <input type="checkbox"/> Suggestions 2. <input checked="" type="checkbox"/> Doing actual modification(s) 3. <input checked="" type="checkbox"/> Paying for actual modification(s) 4. <input checked="" type="checkbox"/> Other: referred to utility company for power lines |
| Exercise | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. <input type="checkbox"/> We make suggestions and encourage exercise 2. <input type="checkbox"/> Pamphlets 3. <input type="checkbox"/> Video Exercise Programs 4. <input type="checkbox"/> Scheduled program in a group setting; Type: _____ Program Duration: _____ ; Frequency of Exercise: _____ 5. <input type="checkbox"/> Individualized exercise program; Type: _____ ; Program Duration: _____ ; Frequency of Exercise: _____ |
| Balance | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. <input type="checkbox"/> We make suggestions and encourage balance-related exercises 2. Type of training: 3. Program Duration: |

| | | |
|------|---|---|
| Gait | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. <input type="checkbox"/> We make suggestion and encourage gait-related exercises 2. <input type="checkbox"/> Training in proper use of ambulatory aides 3. <input type="checkbox"/> Other: |
|------|---|---|

9. Do you send a report of your findings and recommendations after you visit the program participant? No Yes

a. If **Yes**, to whom are findings and recommendations reported?

(Check all that apply).

- i. Program participant
- ii. Participant's Primary Care Physician (PCP)
- iii. Participant's next of kin
- iv. Other: all copies sent to funder during beginning of program

10. Who is involved in the program, either for Assessment or Intervention? (Check all that apply).

- a. Administrative Staff
- b. Nurse
- c. Social Worker
- d. Physical therapist
- e. Medical Doctor
- f. Emergency Response Unit (EMTs)
- g. Fire Department
- h. Volunteers
- i. Other:

OPERATIONAL ISSUES

1. Do you provide educational materials to the program participant? No Yes

a. If **Yes**, what do you provide?

2. Do you supply any sort of "gift" or kit with information, supplies or equipment as part of the program? No Yes

a. If **Yes**, what do you provide? anything involved in safety is paid for. all supplies or equipment needed to make the home safe; grab bars, non-skid mats, night lights, etc.

3. If you discover that the program participant could benefit from equipment that might be covered by Medicare or Medicaid, how is this handled?

4. Do you run into any language barriers with the program participants you serve? No Yes

a. If **Yes**, how is it handled? utilize spanish speaking staff and volunteers

5. In an operational sense, what do you view as the biggest challenge with implementing your program? acceptance by the clients to have the inspection done. They may be suspicious that it truly is free and/or are worried that their house will be condemned. Afraid that independence will be taken away and they will need to go to ALF or NH.
6. What feedback do you get from the program participants you serve? "it's free" They are so grateful; impressed with the thoroughness; feel safer
7. What feedback do you get from the people actually performing the intervention or pieces of the intervention? They realize the importance of this program and feel that they are really helping someone. Feel gratified

FUNDING REQUIREMENTS

1. How is your program currently funded? "Project Safe Home" is funded by Salt River Project (SRP), a local utility company
2. Have you applied for and/or received any additional funding? No Yes
 - a. If **Yes**, from which types of organization(s)?
 - i. Governmental agency or body
 - ii. Private institution
 - iii. Private donations
 - iv. Other: fundraisers
3. Does the program pay for the cost associated with implementing the interventions or recommendations (e.g. home modifications, pill boxes, exercise programs, etc)? No Yes
 - a. If **Yes**, what is paid for under the program? Any purchase/modification to make the home safe from a fall or fire. Grab bars, non-skid mats, shower chairs, etc.
 - b. What is the average cost of a typical intervention? \$50 for 1st time
4. Does the program participant pay for any part of the intervention? No Yes
 - a. If **Yes**, what does the program participant pay for?
 - b. What is the typical out of pocket cost?
5. If you took the total costs associated with the program, including the assessment and intervention costs, what would you say the annual per participant costs would be?

\$44.00

6. How does this cost breakdown by each component of the intervention?
- Internal program staff cost: $\$10.80\text{hr} \times 52 \text{ hours} = 562/35 \text{ recipients} = \16 per person
 - Field staff cost: \$0
 - Printed Materials and Mailing: $\$50/\$35 = \$4$
 - Home Modifications: $\$832/35 = \24 (some had modifications that didn't cost anything)
 - Exercise Program: \$
 - Other: cost: \$

OUTCOMES MEASUREMENT

- Do you follow up with the program participants? No Yes
 - If **Yes**, how often? 1x year
 - What method(s) do you use to follow up? phone call and offer to go to home
 - What do you find when you follow up? most would like a follow-up check; usually only need new batteries for smoke detector, etc.
- Are you measuring program participants' compliance with the recommendations put forth? No Yes
 - If **Yes**, how do you measure this?
 - What do you find?
- Do you track program outcomes? No Yes
 - If **Yes**, what specifically do you track? (*Check all that apply*)
 - Changes in number of falls
 - Changes in number of repeat falls
 - Changes in number of injurious falls
 - Change in fear of falling
 - Change in Emergency Room visits
 - Change in use of outpatient services (Doctor's visits, physical therapy, etc)
 - Change in use of inpatient services
 - Change in Medications
 - Participation in an Exercise program
 - Other
- Do you track the program's impact on dollars spent by either the program participant or other funding source like Medicare or Medicaid? No Yes
- Do you have a way of measuring whether the investment in the program is justified by the benefits it yields the program participants? No Yes
If **Yes**, what have you found?

GENERAL OBSERVATIONS

1. What do you view as the single most important element of your program?
It is very structured and thorough
2. If you could add one element/component to the program to make it more effective, what would it be?
Promotion of the program, more outreach, reach more people
3. What is the single most important element to assuring programmatic success?
Completion of repairs/modifications/purchases to eliminate potential hazards.
4. What is the single most important barrier to success?
Acceptance of the program-allowing people to come in.
5. Do you have any thing else you would like to share with us?
We use our "Hazard House" in conjunction with Project Safe Home. See attached brochures and picture. It is utilized in safety fairs, presentations and often checked out by the public.

SUGGESTIONS FOR KEY COMPONENTS

If you were designing a new Fall Prevention program from “scratch” what would it look like?

Our program is so comprehensive that I can't think of any additions. I'm including our entire manual for your use.

SITE B

Program Name: SESH

GENERAL PROGRAM DESCRIPTION

1. How long has your program been in operation? 3.5 years including planning, 11/02 first clients
 - a. How many individuals have been served from program inception? 560
 - b. How many on average do you serve on a monthly basis?
2. How many Full-time Equivalents (FTEs) are allocated to the program? 3.5 staff
3. Who is served by your program? (*Check all that apply*)
 - a. Elders
 - b. Medicare Recipients
 - c. Dually Eligible (Medicare and Medicaid)
 - d. Catchment area population
 - e. Other: adults 55+ income less than 25K/yr, at risk.
4. How do you target individuals eligible to receive benefits under this program? (*Check all that apply*)
 - a. Self-referred
 - b. Referral from MD
 - c. Outreach by program staff
 - d. Other: in-service presentations to area hospital discharge planners, therapists, social workers, presentation to churches, neighborhood associations
5. Is your intervention or program targeted at people with certain characteristics that deem them at "high risk" for falling? No Yes
 - a. If **Yes**, how do you define "high risk?" (*Check all that apply*)
 - i. age; specify: over 55
 - ii. gender; specify:
 - iii. history of falling,
 - iv. Other: see referral form q1-6
 - b. If **No**, then how are program participants identified?
6. Do you use standardized tools or assessment forms in your program?
 No Yes
7. Are you able to provide us with a copy of these tools/forms? No Yes

8. Does your fall prevention program include one or more of the following Components? (For each Component, specify whether or not it is included as part of your program's Assessment. If Yes, then tell us how it is addressed as an Intervention).

| Component | Part of Assessment | Intervention |
|---|---|--|
| Activities of Daily Living (ADLs) | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 1. <input checked="" type="checkbox"/> Suggestions about finding help to care for yourself 2. <input checked="" type="checkbox"/> Referral to Physician 3. <input checked="" type="checkbox"/> Referral to Home Care Agency 4. <input checked="" type="checkbox"/> Other: provision of assistive devices and training |
| Instrumental Activities of Daily Living (IADLs) | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 1. <input checked="" type="checkbox"/> Suggestions about finding help to do these tasks 2. <input checked="" type="checkbox"/> Referral to Physician 3. <input checked="" type="checkbox"/> Referral to Home Care Agency 4. <input checked="" type="checkbox"/> Other: volunteers, assistive devices, program referrals |
| Cognitive Status | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 1. <input checked="" type="checkbox"/> Referral to Physician 2. <input type="checkbox"/> Referral to Home Care Agency 3. <input checked="" type="checkbox"/> Other: social work |
| Fear of Falling | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 1. <input checked="" type="checkbox"/> Referral to Physician 2. <input checked="" type="checkbox"/> Referral to Counselor/Therapist 3. <input checked="" type="checkbox"/> Other: home modification |
| Medical History Review | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 1. <input type="checkbox"/> Referral to Physician 2. <input checked="" type="checkbox"/> Other: reviewed by therapist |
| Medication Review | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 1. <input checked="" type="checkbox"/> Referral to Physician 2. <input type="checkbox"/> Other |
| Home Safety | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 1. <input checked="" type="checkbox"/> Suggestions 2. <input checked="" type="checkbox"/> Doing actual modification(s) 3. <input checked="" type="checkbox"/> Paying for actual modification(s) 4. <input checked="" type="checkbox"/> Other: assistive devices |
| Exercise | <input type="checkbox"/> Yes <input type="checkbox"/> No | 1. <input checked="" type="checkbox"/> We make suggestions and encourage exercise 2. <input type="checkbox"/> Pamphlets 3. <input type="checkbox"/> Video Exercise Programs 4. <input type="checkbox"/> Scheduled program in a group setting; Type: _____; Program Duration: _____; Frequency of Exercise: _____ 5. <input type="checkbox"/> Individualized exercise program; Type: _____; Program Duration: _____; Frequency of Exercise: _____ |
| Balance | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 1. <input type="checkbox"/> We make suggestions and encourage balance-related exercises 2. Type of training: 3. Program Duration: |

| | | |
|------|---|--|
| Gait | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 1. <input checked="" type="checkbox"/> We make suggestion and encourage gait-related exercises 2. <input checked="" type="checkbox"/> Training in proper use of ambulatory aides 3. <input checked="" type="checkbox"/> Other: refer to PT for specific exercise |
|------|---|--|

9. Do you send a report of your findings and recommendations after you visit the program participant? No Yes

a. If **Yes**, to whom are findings and recommendations reported?

(Check all that apply).

- i. Program participant
- ii. Participant's Primary Care Physician (PCP)
- iii. Participant's next of kin
- iv. Other:

10. Who is involved in the program, either for Assessment or Intervention? (Check all that apply).

- a. Administrative Staff
- b. Nurse
- c. Social Worker
- d. Physical therapist
- e. Medical Doctor
- f. Emergency Response Unit (EMTs)
- g. Fire Department
- h. Volunteers
- i. Other: building contractors city and non-profit programs

OPERATIONAL ISSUES

1. Do you provide educational materials to the program participant? No Yes

a. If **Yes**, what do you provide? brochures, handouts, packet

2. Do you supply any sort of "gift" or kit with information, supplies or equipment as part of the program? No Yes

a. If **Yes**, what do you provide? replace batteries in smoke detectors, fire extinguishers, long handled shoehorn and jar gripper prior to assessment and any devices recommended during assessment

3. If you discover that the program participant could benefit from equipment that might be covered by Medicare or Medicaid, how is this handled? referral is made to DME provider for Medicare so PT will evaluate and train

4. Do you run into any language barriers with the program participants you serve?

No Yes

a. If **Yes**, how is it handled? translators-either family/friend of client or community service

5. In an operational sense, what do you view as the biggest challenge with implementing your program? Funding
6. What feedback do you get from the program participants you serve? We are making tremendous impact on health and quality of life
7. What feedback do you get from the people actually performing the intervention or pieces of the intervention? Very rewarding to be a part of the process

FUNDING REQUIREMENTS

1. How is your program currently funded? grants
2. Have you applied for and/or received any additional funding? No Yes
 - a. If **Yes**, from which types of organization(s)?
 - i. Governmental agency or body
 - ii. Private institution
 - iii. Private donations
 - iv. Other:
3. Does the program pay for the cost associated with implementing the interventions or recommendations (e.g. home modifications, pill boxes, exercise programs, etc)? No Yes
 - a. If **Yes**, what is paid for under the program? Up to \$500 per client
 - b. What is the average cost of a typical intervention? \$425
4. Does the program participant pay for any part of the intervention?

 No Yes
 - a. If **Yes**, what does the program participant pay for?
 - b. What is the typical out of pocket cost?
5. If you took the total costs associated with the program, including the assessment and intervention costs, what would you say the annual per participant costs would be?

\$864, overhead and services and equipment
6. How does this cost breakdown by each component of the intervention?
 - a. Internal program staff cost: \$ see attached budget
 - b. Field staff cost: \$
 - c. Printed Materials and Mailing: \$
 - d. Home Modifications: \$
 - e. Exercise Program: \$
 - f. Other: cost: \$

OUTCOMES MEASUREMENT

1. Do you follow up with the program participants? No Yes
 - a. If **Yes**, how often? 90 days, 180 days (every 90 days)
 - b. What method(s) do you use to follow up? phone survey
 - c. What do you find when you follow up?

2. Are you measuring program participants' compliance with the recommendations put forth? No Yes
 - a. If **Yes**, how do you measure this? they are asked during f/u calls
 - b. What do you find? general compliance

3. Do you track program outcomes? No Yes
 - a. If **Yes**, what specifically do you track? (*Check all that apply*)
 - i. Changes in number of falls
 - ii. Changes in number of repeat falls
 - iii. Changes in number of injurious falls
 - iv. Change in fear of falling
 - v. Change in Emergency Room visits
 - vi. Change in use of outpatient services (Doctor's visits, physical therapy, etc)
 - vii. Change in use of inpatient services
 - viii. Change in Medications
 - ix. Participation in an Exercise program
 - x. Other: self care (ADL/IADL) level of function

4. Do you track the program's impact on dollars spent by either the program participant or other funding source like Medicare or Medicaid? No Yes

5. Do you have a way of measuring whether the investment in the program is justified by the benefits it yields the program participants? No Yes
If **Yes**, what have you found? falling has decreased

GENERAL OBSERVATIONS

1. What do you view as the single most important element of your program? Case management supervised by an OT and SW working together-implementing directly their recommendations

2. If you could add one element/component to the program to make it more effective, what would it be? On staff OTA to train on the equipment, do rehab 1-2 visits to retrain

3. What is the single most important element to assuring programmatic success? on-going case management and tracking

4. What is the single most important barrier to success? Isolationism by clients refusing service
5. Do you have any thing else you would like to share with us?

SUGGESTIONS FOR KEY COMPONENTS

If you were designing a new Fall Prevention program from “scratch” what would it look like?

1. Referrals from any source
2. OT and SW assessments
3. Funding and supervision of recommendation implementation
4. Follow-up

No Yes

7. Are you able to provide us with a copy of these tools/forms? No Yes

8. Does your fall prevention program include one or more of the following Components? (For each Component, specify whether or not it is included as part of your program's Assessment. If Yes, then tell us how it is addressed as an Intervention).

| Component | Part of Assessment | Intervention |
|---|---|---|
| Activities of Daily Living (ADLs) | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. <input type="checkbox"/> Suggestions about finding help to care for yourself 2. <input type="checkbox"/> Referral to Physician 3. <input type="checkbox"/> Referral to Home Care Agency 4. <input type="checkbox"/> Other |
| Instrumental Activities of Daily Living (IADLs) | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. <input type="checkbox"/> Suggestions about finding help to do these tasks 2. <input type="checkbox"/> Referral to Physician 3. <input type="checkbox"/> Referral to Home Care Agency 4. <input type="checkbox"/> Other |
| Cognitive Status | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. <input type="checkbox"/> Referral to Physician 2. <input type="checkbox"/> Referral to Home Care Agency 3. <input type="checkbox"/> Other |
| Fear of Falling | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. <input type="checkbox"/> Referral to Physician 2. <input type="checkbox"/> Referral to Counselor/Therapist 3. <input type="checkbox"/> Other |
| Medical History Review | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. <input type="checkbox"/> Referral to Physician 2. <input type="checkbox"/> Other |
| Medication Review | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. <input type="checkbox"/> Referral to Physician 2. <input type="checkbox"/> Other |
| Home Safety | <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | 1. <input checked="" type="checkbox"/> Suggestions 2. <input type="checkbox"/> Doing actual modification(s) 3. <input type="checkbox"/> Paying for actual modification(s) 4. <input checked="" type="checkbox"/> Other: give referral resource list |
| Exercise | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. <input type="checkbox"/> We make suggestions and encourage exercise 2. <input type="checkbox"/> Pamphlets 3. <input type="checkbox"/> Video Exercise Programs 4. <input type="checkbox"/> Scheduled program in a group setting; Type: _____ ; Program Duration: _____ ; Frequency of Exercise: _____ 5. <input type="checkbox"/> Individualized exercise program; Type: _____ ; Program Duration: _____ ; Frequency of Exercise: _____ |
| Balance | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. <input type="checkbox"/> We make suggestions and encourage balance-related exercises 2. Type of training: 3. Program Duration: |

| | | |
|------|---|---|
| Gait | <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No | 1. <input type="checkbox"/> We make suggestion and encourage gait-related exercises 2. <input type="checkbox"/> Training in proper use of ambulatory aides 3. <input type="checkbox"/> Other: |
|------|---|---|

9. Do you send a report of your findings and recommendations after you visit the program participant? No Yes

a. If **Yes**, to whom are findings and recommendations reported?

(Check all that apply).

- i. Program participant
- ii. Participant's Primary Care Physician (PCP)
- iii. Participant's next of kin
- iv. Other: phone call to MD to refer to home care or other referral

10. Who is involved in the program, either for Assessment or Intervention? (Check all that apply).

- i. Administrative Staff
- ii. Nurse
- iii. Social Worker
- iv. Physical therapist
- v. Medical Doctor
- vi. Emergency Response Unit (EMTs)
- vii. Fire Department
- viii. Volunteers
- ix. Other:

OPERATIONAL ISSUES

1. Do you provide educational materials to the program participant? No Yes

a. If **Yes**, what do you provide?

2. Do you supply any sort of "gift" or kit with information, supplies or equipment as part of the program? No Yes

a. If **Yes**, what do you provide?

3. If you discover that the program participant could benefit from equipment that might be covered by Medicare or Medicaid, how is this handled? call to MD while at the person's home

4. Do you run into any language barriers with the program participants you serve? No Yes

a. If **Yes**, how is it handled?

5. In an operational sense, what do you view as the biggest challenge with implementing your program? people unwilling to change habits-some

6. What feedback do you get from the program participants you serve? Love it, appreciative-like the time spent with them
7. What feedback do you get from the people actually performing the intervention or pieces of the intervention? many of them are uncomfortable doing the assessment- they would rather ID the people and have someone else do the assessment and intervention.

FUNDING REQUIREMENTS

1. How is your program currently funded? cost absorbed by fire department
2. Have you applied for and/or received any additional funding? No Yes
 - a. If **Yes**, from which types of organization(s)?
 - i. Governmental agency or body
 - ii. Private institution
 - iii. Private donations
 - iv. Other:
3. Does the program pay for the cost associated with implementing the interventions or recommendations (e.g. home modifications, pill boxes, exercise programs, etc)? No Yes
 - a. If **Yes**, what is paid for under the program?
 - b. What is the average cost of a typical intervention?
4. Does the program participant pay for any part of the intervention? No Yes
 - a. If **Yes**, what does the program participant pay for?
 - b. What is the typical out of pocket cost?
5. If you took the total costs associated with the program, including the assessment and intervention costs, what would you say the annual per participant costs would be?

\$
6. How does this cost breakdown by each component of the intervention?
 - a. Internal program staff cost: \$absorbed by fire dept
 - b. Field staff cost: \$
 - a. Printed Materials and Mailing: \$75 per person total spent o forms/printing
 - b. Home Modifications: \$
 - c. Exercise Program: \$
 - d. Other: cost: \$

OUTCOMES MEASUREMENT

1. Do you follow up with the program participants? No Yes
 - a. If **Yes**, how often? 2 weeks and 4 weeks
 - b. What method(s) do you use to follow up? phone
 - c. What do you find when you follow up? followed easy parts of recommendations-harder parts are not accepted or able to be gotten

2. Are you measuring program participants' compliance with the recommendations put forth? No Yes
 - a. If **Yes**, how do you measure this?
 - b. What do you find? 60% comply, 20% refuse, 20% went to NH due to the fire department notifying MD that they had fallen

3. Do you track program outcomes? No Yes
 - a. If **Yes**, what specifically do you track? (*Check all that apply*)
 - i. Changes in number of falls
 - ii. Changes in number of repeat falls
 - iii. Changes in number of injurious falls
 - iv. Change in fear of falling
 - v. Change in Emergency Room visits
 - vi. Change in use of outpatient services (Doctor's visits, physical therapy, etc)
 - vii. Change in use of inpatient services
 - viii. Change in Medications
 - ix. Participation in an Exercise program
 - x. Other

4. Do you track the program's impact on dollars spent by either the program participant or other funding source like Medicare or Medicaid? No Yes

5. Do you have a way of measuring whether the investment in the program is justified by the benefits it yields the program participants? No Yes
If **Yes**, what have you found?

GENERAL OBSERVATIONS

1. What do you view as the single most important element of your program? ID of people not "in the system" - no one knows they are falling

2. If you could add one element/component to the program to make it more effective, what would it be? Advertising the program so that people can self-refer before they fall

3. What is the single most important element to assuring programmatic success?
leadership, continued energy and support
4. What is the single most important barrier to success? Fire Department employees who feel this is not their job
5. Do you have any thing else you would like to share with us? We are initiating new plans, 1) core group of volunteers; 2) kit and 3) advertising.

SUGGESTIONS FOR KEY COMPONENTS

If you were designing a new Fall Prevention program from “scratch” what would it look like?