

Preventing Falls in Older Californians:  
State of the Art

A California Blueprint for Fall Prevention  
*A background document for the conference*

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## **PREFACE**

### **Introduction**

Our goal is to engage a select and representative group of recognized leaders in California's health and human services for older adults to establish *A California Blueprint for Fall Prevention*. On February 5-6, 2003, we will bring together diverse stakeholder groups to begin the strategic planning process and to explore issues in small work groups. The invitees include thought leaders in aging services and programs; public health; local, regional and statewide legislators, policy analysts, and civic leaders; advocacy groups, consumer organizations and voluntary organizations; academic faculty in geriatric medicine and gerontology; and the health care industry. This White Paper provides background information on the state-of-the-art, best practices for fall prevention. We strongly believe that fall prevention for older adults is an important statewide priority that must occur in the home, community and healthcare settings. Our consensus statement of principles important for establishing a statewide program is outlined in Appendix A.

### **The White Paper**

California is fortunate that its key academic centers include nationally and internationally recognized experts in fall prevention among older adults. These experts represent the University of California, California State University, University of Southern California, and Veterans Health Administration. In addition, our experts represent Rancho Los Amigos National Rehabilitation Center, the California Departments of Aging and Health Services and the California Association for Adult Day Services. Together they have prepared the White Paper. For your convenience, we have also included a glossary of terms in Appendix B.

The White Paper is divided into three main sections. The first section reports on the significance of injurious falls to older persons and the best practices to reduce fall risk. The evidence is based on rigorous international scientific research. Screening for fall risk in community and medical settings, comprehensive assessment of high-risk individuals or those after an actual fall, and appropriate interventions tailored to individual needs are described. This section sets the groundwork for prevention and interventions.

The second section reports on how California community-based programs are currently working to prevent falls. This section describes the infrastructure that is in place and best practice models that have been established. This section also outlines the opportunities that can be built upon to implement statewide initiatives.

The final section discusses environmental modification in the home and in the community. For those at high-risk, making the home a safe environment is a priority for health and human services. To prevent falls, communities must recognize the everyday hazards to persons who are frail, visually impaired or have disorders that affect their gait and mobility.

## **Why Fall Prevention is Important To California**

California has the largest elderly population of any state in the USA, with over 3.5 million Californians age 65 and older. The risk of fall injury increases dramatically with age. The highest fall rate is among Californians over age 85 and these persons are the fastest growing segment of the California population. Nearly one third of older Californians fall each year and, fortunately, most falls do little harm. However, 200,000 falls annually in California result in injuries, particularly fractures, head injuries and death. Currently, Californians spend about \$375 million each year to repair hip fractures and, on average, every day in California, two older adults die from fall-related injuries. Beyond the high economic costs of serious falls in this population, is the human cost: disability, loss of independence and premature mortality.

Many falls can be prevented and these costly risks can be reduced. The White Paper describes the state-of-the-art to reduce these risks. Each section highlights the challenges of fully implementing fall prevention programs in California.

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## KEY POINTS

### PREVENTION OF FALLS BY OLDER CALIFORNIANS

#### **Older Californians sustain serious and costly falls each year**

- California has the largest elderly population of any state in the USA, with over 3.5 million Californians age 65 and older. Persons over age 85 are the fastest growing segment of the California population.
- The risk of fall injury increases dramatically with age. The fall-related injury rate among the oldest Californians (age 85 and older) is 57 times higher than among California's young and middle-aged adult populations.
- On average, over one million older Californians fall each year, and over 200,000 falls result in injury. Over 100,000 of these injurious falls are very serious, causing fracture, head injury or laceration.
- About 30,000 older Californians suffer hip fractures each year, mostly due to falls. The average medical bill for a hip fracture is \$12,500 in California, or a total of \$375 million a year in California – not counting costs of long-term disability and premature mortality.
- Older Californians are 10 times more likely to be hospitalized for a fall-related injury than for a traffic accident injury.
- On average, every day in California, two older adults die from fall-related injuries.

#### **The majority of falls can be prevented through proven methods**

- Appropriate risk assessment and follow-up by healthcare practitioners.
- Exercise, strength training and flexibility aimed at reducing falls.
- Environmental modifications, such as removing clutter and installing grab bars.

#### **Many interventions are already in place in California**

- Strength training programs can be found at most of the 1,002 Senior Centers.
- Multipurpose Senior Services Program (MSSP) serves 11,700 frail older clients/month.
- California Departments of Aging and Health have promoted fall prevention and health exercise initiatives.
- Guidelines for fall assessment by healthcare practitioners have been established.
- Medicare reimbursement for post-fall assessment.

#### **Need to close the gap**

- Although exercise can reduce the risk of falling, most older persons are not regular exercisers, and 34% of persons over age 65 do not engage in any leisure physical activity, putting the majority of older Californians at increased risk for falls.
- Insufficient number of senior centers to meet the exercise needs of 4.7 million Californians over the age of 60 years.
- Physicians are not widely practicing fall prevention and assessment strategies, despite published clinical guidelines.
- Environmental assessment and modification programs are not widely available.
- Fiscal constraints limit resources and personnel for multifaceted fall prevention.
- Lack of a statewide program to plan and coordinate fall prevention activities.

# Best Practice Interventions For Fall Prevention

Prepared for:  
A California Blueprint for Fall Prevention Conference

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# **BEST PRACTICE INTERVENTIONS FOR FALL PREVENTION**

## **Executive Summary**

Falls are a common and often devastating problem among older people. In California, over a million people age 65 and over will fall each year, more than 100,000 of whom will suffer a serious injury or fatality.

Most of these falls are associated with one or more identifiable risk factors (e.g., weakness, unsteady gait, confusion, certain medications), and research has shown that attention to these risk factors can significantly reduce rates of falling. Considerable evidence now shows that the most effective (and cost-effective) fall reduction programs have involved systematic fall risk assessment and targeted interventions, exercise programs, and environmental inspection and hazard reduction programs. These findings have been substantiated by careful meta-analysis of large numbers of clinical trials and by consensus panels of experts who have developed evidence-based practice guidelines for fall prevention and management. Yet despite knowledge about these effective programs, there is a relative paucity of these programs in real world settings. And despite the existence of professional guidelines advocating fall prevention programs and activities, they are consistently underutilized.

Medical assessment of fall risks and provision of appropriate interventions is challenging due to the complex nature of falls. Optimal approaches involve interdisciplinary collaboration in assessment and interventions, particularly exercise, and attention to coexisting medical conditions.



## **BEST PRACTICE INTERVENTIONS FOR FALL PREVENTION**

### **Epidemiology, Causes and Risk Factors for Falls**

Falls are a common geriatric syndrome that causes considerable mortality and morbidity among older persons. Multiple causes and predisposing risk factors are usually implicated, making diagnosis, treatment and particularly prevention difficult clinical challenges.

#### **Incidence of Falls**

Prospective studies have reported that 30% to 60% of community-dwelling older adults fall each year (Berg, 1997; Rubenstein, 2002) with about half of fallers experiencing multiple falls. Fall incidence rates for community-dwelling older populations range from 0.2 to 1.6 falls per person per year, with a mean of about 0.7 falls per year. Incidence rises steadily after middle age and tends to be highest among individuals 80 years and older (Campbell, 1990; Rubenstein, 2002). These incidence rates are mostly based on self-reported data that probably underestimate the true incidence of falls.

Incidence in institutionalized elderly populations is even higher, due both to the frailer nature of institutionalized populations and to the more accurate reporting of falls in institutional settings. In surveys of nursing home populations, the percentage of residents who fall each year ranges from 16% to 75%, with an overall mean of 43% (Robbins, 1989; Rubenstein, 1994). Annual incidence of falls in long-term care facilities averages about 1.6 falls per bed (range 0.2 to 3.6 falls/bed/year). Incidence rates from hospital-based surveys are somewhat lower with a mean of 1.4 falls per bed annually (range from 0.5 to 2.7). The wide variation in incidence rates between settings and institutions most likely reflects differences in case mix, ambulation levels, reporting practices, and institutional fall prevention policies and programs.

#### **Fall-Related Mortality**

Accidents are the fifth leading cause of death in older adults (after cardio-vascular, cancer, stroke, and pulmonary causes), and falls constitute two-thirds of these accidental deaths. About three-fourths of deaths due to falls in the United States occur in the 13% of the population aged 65 and older (Hogue, 1982; Rubenstein, 2002). Fall-related mortality increases dramatically with advancing age, especially in populations over age 70 years, and nursing home residents 85 years and older account for one out of five fatal falls (Baker, 1985). The estimated one percent of fallers who sustain a hip fracture have a 20% to 30% mortality rate within one year of the fracture (Magaziner, 1990).

#### **Fall-Related Morbidity**

A key issue of concern is not simply the high incidence of falls in elderly persons, since young children and athletes fall even more often, but rather the combination of a high incidence and a high susceptibility to injury. This propensity for fall-related injury in elderly persons is due to a high prevalence of clinical diseases (e.g., osteoporosis) and age-related physiologic changes

(e.g., slowed protective reflexes) that make even a relatively mild fall particularly dangerous. While most falls produce no serious injury, community surveys report that over half of falls do result in minor injuries, although usually not requiring medical treatment (Nevitt, 1991; Tinetti, 1995). Nonetheless, between five and ten percent of community-dwelling older persons who fall each year do sustain a serious injury, such as a fracture, head injury, or serious laceration. The proportion of falls that result in serious injuries is similar in community-dwelling and institutionalized populations, usually between five and ten percent, but the range is wide (1-39%), largely because of differences in reporting practices. These injuries are often associated with considerable long-term morbidity. Among community-dwelling fallers with hip fractures, studies have shown that between 25% and 75% of survivors do not recover their pre-fracture level of function in ambulation or activities of daily living (Magaziner, 1990).

In addition to physical injuries, falls produce other serious consequences for older persons. Repeated falls are a common reason for the admission of previously independent elderly persons to long-term care institutions. In one study, 50% of fall injuries that required hospital admission resulted in the elderly person being discharged to a nursing home (Sattin, 1990). In a prospective study of a community-dwelling older population, the risk of nursing home placement for individuals who had sustained a fall with a serious injury was three times greater than for individuals with only a non-injurious fall (Tinetti, 1997).

Fear of falling has also been recognized as a negative consequence of falls. Surveys have reported that between 30% to 73% of older persons who have fallen acknowledge a persistent fear of falling (Tinetti, 1994; Vellas, 1997). This post-fall anxiety syndrome can result in loss of confidence in the ability to ambulate safely, which leads to self-imposed activity restrictions resulting in further functional decline, depression, feelings of helplessness, and social isolation (Rubenstein, 2002).

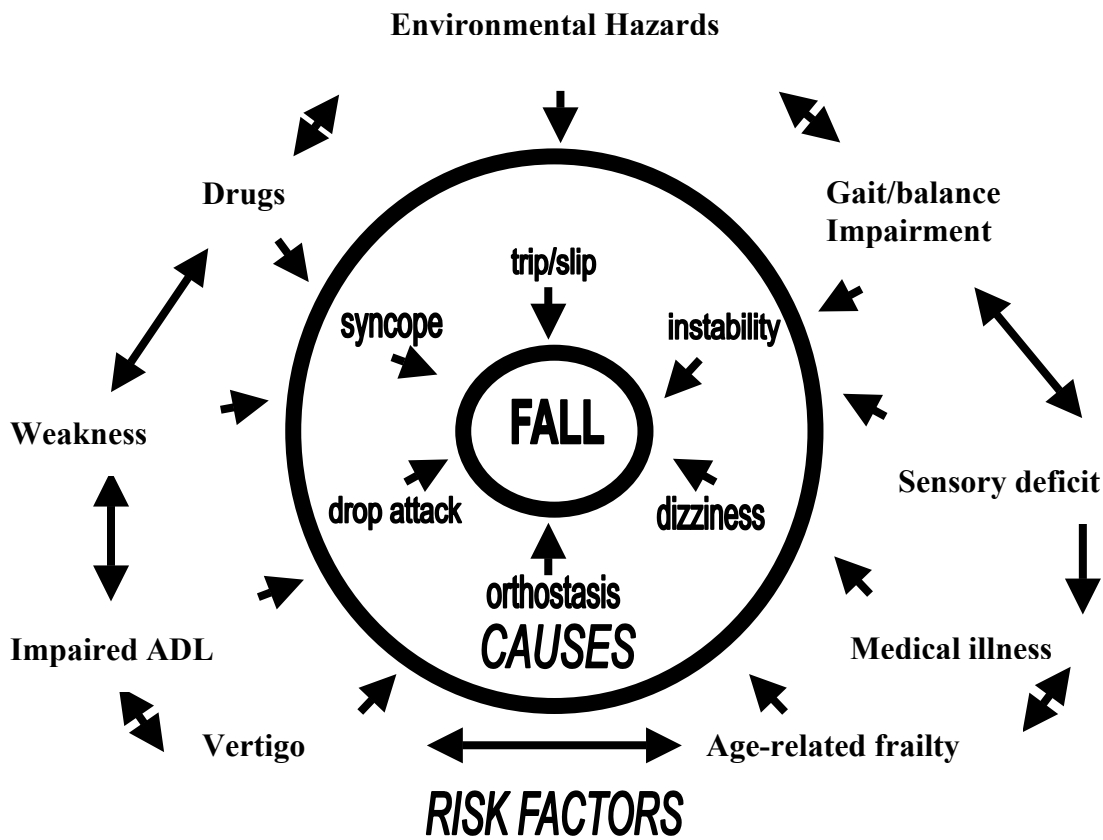
### **Causes and Risk Factors for Falls**

Falls are usually caused by a complex interaction between an extrinsic hazard or precipitating medical event together with one or more intrinsic risk factors that make an individual susceptible to this hazard or event. This complex relationship between risk factors and precipitating causes is illustrated in Figure 1. From a prevention standpoint, attention to minimizing risk factors is crucial.

Several well-done epidemiologic case-control studies have identified risk factors that increase the likelihood of falling. Taken together, these studies indicate that lower-extremity weakness, gait and balance disorders, previous falls, functional impairment, visual deficits, cognitive impairment, depression, and polypharmacy (defined as taking five or more prescription medications) are the most important risk factors for falls. For example, data summarized from 17 studies, suggest that persons with readily identifiable leg weakness have a four- to five-fold increase in risk for falls, and persons with impaired gait or balance have about a three-fold increase (Rubenstein, 2002). General functional impairment, visual deficits, arthritis, and having a prior history of falls increase the risk about 2.5-fold, and depression, cognitive impairment, and age greater than 80 years increase the risk about 2-fold. An excellent meta-analysis of studies exploring possible relationships between fall risk and medication identified a

number of specific medication classes that increase fall risk (Leipzig, 1999). Most prominently among these are psychoactive medications (including sedatives, anti-psychotics, anxiolytics, and anti-depressants), which increase fall risk by a factor of about 1.5.

Seven additional studies have identified specific risk factors for injurious falls (Rubenstein, 2002). In general, these risk factors are the same as those for non-injurious falls, with the addition of factors associated with osteoporosis (e.g., being female, having decreased bone density, being underweight) and the use of physical restraints. Perhaps as important as identifying individual risk factors is appreciating the interaction and probable synergism among multiple risk factors. Several studies have shown that the risk of falling increases dramatically as the number of risk factors increases. For example, three separate studies have reported that 65 to 100% of elderly individuals with three or more risk factors fell in a 12-month observation period compared with 8 to 12% of persons with no risk factors (Nevitt, 1989; Robbins, 1989; Tinetti, 1988).



**Figure 1: The multifactorial and interacting etiologies of falls**

## **Fall Prevention Research: Evidence From The Rand Meta-Analysis**

Under a contract from Medicare, as part of the Healthy Aging Project, RAND researchers undertook a meta-analysis of controlled trials of fall prevention (Shekelle, 2002). An extensive and systematic search and abstract screening revealed 826 articles for review. Of these, 95 met the inclusion criteria for detailed data abstraction, 38 of which were randomized controlled trials that met the criteria for pooling data and final inclusion in the meta-analysis. Pooling data from all these randomized trials revealed a statistically significant 11% reduction in the risk of falling, and a significant 23% reduction in the monthly rate of falling.

These programs differed among themselves substantially, ranging from multi-factorial risk assessment and management programs, to exercise programs, to environmental modification programs, to combined programs. A meta-regression analysis was performed to try to assess the relative effectiveness of the individual intervention components, while controlling for other components. Most potent of the interventions appeared to be multi-factorial risk assessment and management programs (20% reduced risk of falling; and 40% reduced monthly rate of falling). This was followed closely by exercise interventions (13% reduced risk of falling; and 16% reduced monthly rate of falling) although this did not quite reach conventional levels of significance. The meta-analysis was not able to detect statistically significant differences between the different types of exercise (balance, endurance, flexibility and strength), because most programs contained multiple components.

The meta-analysis also addressed cost-effectiveness and concluded that the evidence strongly suggests that an effective intervention program provided to people at high-risk of falling has the potential to be cost saving, with the costs of the program more than made up for by savings in reduced acute and long-term care costs.

### **Clinical Practice Guidelines for Fall Prevention**

An evidence-based clinical practice guideline to assist clinicians in reducing falls among their older patients was completed in 2001 by a joint United Kingdom-United States interdisciplinary expert panel (American Geriatric Society, 2001). Following a systematic literature search, including access to the preliminary findings from the RAND meta-analysis (Shekelle, 2002) the panel screened over 5,000 titles, assessed 754 article abstracts, and reviewed over 180 studies in detail in preparing the guideline. They prepared specific recommendations for fall prevention among older persons, aimed both at persons who have not yet fallen as well as at those presenting to health care professionals after a fall.

The guideline recommends a number of practices to be included in routine care for older persons not presenting after a fall:

- All older persons who are under the care of a health professional or their caregivers should be asked at least once a year about falls.

- All older persons who report a single fall should be screened for gait or balance problems using a standardized functional test (e.g., the “Get Up and Go Test”). Persons who have difficulty or demonstrate unsteadiness performing this test or who report more than one fall require further assessment.

For older persons presenting to medical attention after a fall, or who have abnormalities of gait and/or balance, or who report recurrent falls, the guideline recommends further assessment and intervention:

- Older persons presenting because of a fall, or who report recurrent falls in the past year, or demonstrate abnormalities of gait and/or balance should have a fall evaluation performed by a clinician with appropriate skills and experience (which may necessitate referral to a specialist).
- A fall evaluation was defined to include: a history of fall circumstances, medications, acute or chronic medical problems, and mobility levels; an examination of vision, gait and balance, and lower extremity joint function; an examination of basic neurological function, including mental status, muscle strength, lower extremity peripheral nerves, proprioception, reflexes, tests of cortical, extra-pyramidal, and cerebellar function; and assessment of basic cardiovascular status including heart rate and rhythm, postural pulse and blood pressure and, if appropriate, heart rate and blood pressure responses to carotid sinus stimulation. Specific interventions would be planned, based upon the fall evaluation.

Apart from specific interventions based upon the evaluation, the panel recommended several interventions shown to be effective as general fall prevention programs in community-based populations, both addressed to high-risk as well as normal-risk older individuals. The most potent of these are multi-component interventions that combine assessment, exercise, education and/or environmental inspection/modification strategies. Somewhat less potent, but still effective, were several types of single interventions, such as exercise programs alone, and environmental inspection/modification strategies alone, and medication evaluation interventions alone.

- Among community-dwelling older persons (i.e., those living in their own homes), multifactorial interventions should include: gait training and advice on the appropriate use of assistive devices; review and modification of medications, especially psychotropic medications; exercise programs, with balance training as one of the components; treatment of postural hypotension; modification of environmental hazards; and treatment of cardiovascular disorders, including cardiac arrhythmias. When older patients at increased risk of falls are discharged from the hospital, a facilitated environmental home assessment should be considered.

Patients who have fallen should have their medications reviewed and altered or stopped as appropriate in light of their risk of future falls. Particular attention to medication reduction should be given to older persons taking four or more medications and to those taking psychotropic medications.

In summary, the past ten years has witnessed a dramatic increase in fall prevention research, which has led to several interventions of proven benefit. The most effective of these include programs that combine fall risk assessment with specific interventions such as exercise, medication adjustment and environmental inspection and modification. Although these interventions are clearly effective, based on extensive clinical trials, we still need to know some important additional information, including the best strategies for recruiting/motivating individuals (both high-risk and lower-risk) to enroll in intervention programs, as well as the key characteristics to include in exercise programs.

### **Medical Assessment In Fall Prevention Programs**

The efficacy of any intervention depends upon understanding the spectrum of underlying chronic illness and physical/mental limitations, and applying the intervention appropriately. The goal of this section is to apply the information discussed in the previous sections in two different ways: (1) to consider the type of medical assessment previously published in fall prevention studies and apply accepted quality criteria (both the AGS/BGS Guideline [American Geriatrics Society, 2001] and the quality indicators from the Assessing the Care of Vulnerable Elders [ACOVE] project [Rubenstein, 2001] are criteria standards for appropriate medical assessment of falls); and (2) to discuss how the quality of the assessment may have affected the conclusions.

Overall, these studies show substantial variability in the medical assessment of fall risk. Exercise/therapy-based interventions often lack thorough screening of medical conditions that contribute to falls (i.e., Dean, 1993; Gill, 2002; Pardessus, 2002). Conversely, many medical or geriatrics based programs have thorough medical assessments but are not linked to an adequate therapy intervention (Baraff, 2001; Lightbody, 2002; Coleman, 1999; Hogan, 2001; Vetter, 1992; Fabacher, 1994). The detail required in the medical assessment generally relates to the overall frailty of the population, and the source of patient referral, as well as the planned intensity of the intervention. More significant impairments of balance and mobility suggest the need for more detailed review of medical contributors, especially if the changes are recent.

The studies reported in the RAND meta-analysis (Shekelle, 2002) of randomized controlled trials (RCTs) report variable referral processes to fall prevention programs and also report a variety of staff performing the medical assessments. Because of the complexity of falls, it is common to employ teams that bridge the vast terrain of specialized knowledge. For example, pairing pharmacists with clinicians in physical medicine/rehabilitation or pairing physical or occupational therapists with internists/geriatricians has been noted to be particularly beneficial.

### **Screening in Primary Care**

The lack of published literature on fall prevention screening in primary care suggests that implementing primary care screening is indeed challenging. Providing a detailed assessment of fall risk at the time of hospital discharge and in the emergency room has been widely accepted and certainly is warranted. However, screening in primary care is apparently rarely done despite its being recommended by the AGS/BGS Guideline and the ACOVE expert panel.

## **Hospital Referrals**

Fall prevention programs that perform case-finding in emergency rooms or at the time of hospital discharge have demonstrated a benefit. However, it has been found that the rate of falls is substantially increased in the first month after hospital discharge, and fall-related injuries accounted for 15% of all hospitalizations within one month of hospital discharge (Mahoney, 2000; Baraff, 1999; Mahoney, 2000; Timonen, 2002).

## **Medication Review**

Medication review is important in fall prevention programs, and medication review and adjustment is a common component of many multiple intervention strategy studies. Medication review with adjustment has demonstrated a beneficial effect on reducing falls and multiple falls (AGS/BGS guideline, 2001). However, specific guidelines on what, who, and how medication adjustment should be done are lacking. Several studies suggest that removal of psychotropic medications, in particular sedative-hypnotics, can reduce falls (Campbell, 1999; Tinetti, 1994; Close, 1999). However, in order to be successful, sedative-hypnotic reduction strategies need to effectively deal with assessment and management of sleep disorders and anxiety.

Adjustment of cardiovascular drugs is complex, and existing guidelines for specific diseases are often not helpful due to the overlap of multiple chronic conditions. While several studies report an association between falls and patients taking four or more medications, in today's management of chronic heart disease, most patients are taking more than four medications, and reducing the number of drugs is not possible or appropriate. Appropriate disease management is likely more important than simply reducing the number of drugs (Avorn, 2001).

## **Professional Roles/Personnel in Fall Prevention**

Personnel in medical settings vary substantially. Usually the medical fall assessment is performed by a general physician, a geriatrician, or a rehabilitation specialist, although sometimes an ear specialist, a neurologist, or a cardiologist can be involved. The type of assessment varies with the discipline and may not cover the broad range of medical contributors to falls. Geriatric medicine as a discipline has always focused on falls as a key syndrome that is screened for and evaluated, and geriatricians often work with nurse practitioners or other physician extender team members who use standardized protocols and clinical practice guidelines.

Regardless of the type of physician, a multidisciplinary evaluation is recommended due to the complexity of falls. Pharmacists are skilled at evaluating whether clear indications for medications exist, and whether a potentially adverse reaction or side effect of a medication could be contributing to fall risk. Pharmacists assess whether there is evidence of excessive or interacting medications, chronic conditions that may increase the risk of an adverse event from a medication, or knowledge gaps interfering with the ability of a patient to adhere to a prescribed medication regimen. Rehabilitation therapists play an important role in evaluating fall risk, and also in monitoring how this risk "plays out" as a patient performs activities of daily living.

Physical therapists and kinesio-therapists focus on gait and mobility, while occupational therapists focus on performing activities of daily living.

Nurses are also pivotal in assessing and managing fall risk in inpatient and long-term care settings, since they are with the patient more of the time. They monitor and identify unsafe practices, particularly as they may relate to memory disorders, impulsive behavior, agitation or new confusion. They see patients performing activities when a therapist is not present, and they often are involved in training family members. While it is common practice for nurses to screen for fall risk, having structured and creative interventions is not as easily accomplished. Recent work has identified the importance of not using bed rails and restraints, as they increase the risk and seriousness of injury. Alternatives, such as focused monitoring, use of low beds and mats, bed alarms, hip protectors, as well as early mobilization of patients and use of therapy are important strategies. Cross training, coordination and communication between team members in assessing and managing fall risk patients is essential to effective programs.

In summary, falls are complex and their evaluation and prevention require the coordination of the primary care provider (disease management and indications for medications), rehabilitation and therapy services, and sub-specialists (e.g., cardiology, neurology), as well as other multidisciplinary team members.

### **Fall Risk Screening and Assessment in Community Settings**

Safe and successful balance and mobility programs depend upon using a multi-system approach to screening and assessment in order to match individuals to optimal programs. Because people fall for a variety of reasons, no single assessment tool can measure all the possible underlying causes related to mobility problems and falls. In addition to screening the medical and physical activity history, it is also critical to assess a client's physical impairments, functional limitations, risk of falls, and disability status before designing a fall prevention balance and mobility intervention. The purpose of this section of the paper is to (1) discuss the benefits of screening and assessment, (2) outline the criteria used for selecting appropriate screening and assessment tools, and (3) recommend screening and assessment tools appropriate for use with older adults in a community setting.

#### **Benefits of Assessment**

Many of the factors that increase the risk for mobility problems and falls among older adults are preventable and even reversible through the early detection of physical impairments and functional limitations. A multidimensional assessment can help to (1) identify and predict those at risk for mobility problems and falls, (2) determine if the older adult is appropriate for a community-based program, (3) target exercises for individual needs, (4) increase safety of participants, (4) motivate clients to set personal behavioral goals, (5) provide meaningful participant feedback, (6) determine if a referral to the client's physician is recommended, and (7) document the benefits of a balance and mobility program.

## **Criteria for Selection of Screening and Assessment Tools**

Numerous assessment tools have been developed to measure balance and mobility problems among the high-risk older adult population, however fewer measurement tools have been developed for use with low-to-moderate risk community-dwelling older adults. The selection of measurement tools recommended for use in the community setting is based on the following criteria: (1) meet scientific rigor regarding reliability and validity; (2) have discrimination power (i.e., measure a continuum of performance levels, with minimum floor or ceiling effects); (3) are “user-friendly” in terms of training, administration, equipment, space, cost, and time requirements; and (4) have the ability to detect meaningful change over time. In addition, the recommended test items are limited to ones that have performance norms, and are able to predict individuals at-risk for falls, mobility problems, and/or disability.

### **Recommended Screening And Assessment Tools For The Community Setting**

#### **Measures of Pathology and Physical Activity Status**

The first step in the screening process for risk factors and co-morbidity is to administer a questionnaire identifying information about medical conditions, medication use, visual and cognitive ability, and physical activity status. The disablement process model (Verbrugge & Jette, 1994) identifies psycho-social, cognitive, and environmental factors that may hasten or delay the onset of disability. Therefore, additional items are suggested that measure the client’s perception of such dimensions as quality of life, self-efficacy, self-esteem, fear of falling, depression level, and physical symptoms such as pain. Fear of falling has been found to be a predictor of future falls and may need to be addressed during intervention. A number of indicators are available for measuring fear of falling, ranging from single questions to more precise scales (Powell & Myers, 1995).

#### **Impairment Measures**

Often functional impairments are underlying factors that lead to falls and disability. For this reason, it is important to identify underlying impairments. Typical measures of impairment include indicators of strength/power, aerobic endurance, flexibility, body composition (body mass index), and balance (sensory and motor). There are numerous single item tests, and test batteries that measure physical impairments among older adults. A good example is the Senior Fitness Test (SFT), formerly referred to as the Functional Fitness Test (Rikli & Jones, 2001). This test battery meets all desirable test selection criteria and has normative and criterion-referenced performance standards that increase the interpretability of the test items.

#### **Measures of Functional Limitations**

Several test batteries and individual test items are available that measure functional limitations related to balance and mobility problems. The following measures are recommended based on

their practicality of use in a non-clinical setting and strong psychometric properties:

- (1) 8-foot Up & Go (Rikli & Jones, 2001)
- (2) 50-foot walk test, Berg Balance Scale (Berg, 1992)
- (3) Physical Performance Test (PPT) (Reuben, 1990)
- (4) Walkie Talkie Test (Lundin-Olsson, 1997)
- (5) Performance Oriented Mobility Assessment (POMA)

### **Measures of Disability**

The two most commonly used scales to measure disability are the basic activities of daily living (ADLs) and instrumental ADLs (IADLs) scales (Katz, et al., 1963). ADLs include tasks such as bathing, eating, dressing, toileting, and getting in or out of a bed or chair. IADLs involve more complex physical and cognitive tasks such as handling personal finances, preparing meals, shopping, doing housework, walking, and traveling. The Composite Physical Functional (CPF) Scale (Rikli & Jones, 1998) includes a wide range of functional abilities—from ADL to IADL, and even more advanced activities related to strenuous household, sport, and exercise activities. The CPF scale is an expanded version of three previously published scales, and requires a self-evaluation of one's overall functional ability. It was designed to assess function in community-residing older adults, and measures a wide range of physical abilities.

In summary, a multidimensional approach to screening and assessment is a pre-requisite for fall prevention programs. Identification of the different impairments, functional limitations, and disability status among participants can be done with established measurement tools and provides the instructor with essential information to select the most appropriate activities for targeted intervention and to provide a safe exercise environment.

### **Challenges**

Unfortunately, few practitioners in community-based settings actually conduct screening and assessment to individualize programs for their clients. Common reasons include: (1) lack of time, space, and budget; (2) lack of requirements by facility management; (3) lack of personnel resources; (4) lack of appropriate assessment tools for the wide range of functional levels; and (5) lack of training on how to conduct and interpret scores.

### **Exercise Programs: Best Practices**

In systematic reviews and evidence-based guidelines on fall prevention in older adults (American Geriatrics Society, 2001; Shekelle, 2002) randomized controlled trials are considered to provide the strongest evidence of the effectiveness of various fall prevention strategies. Fall prevention interventions for older adults that include an exercise component have usually shown a reduction in the rate of falls compared to a control group (Buchner, 1997; Campbell, 1997; Hornbrook, 1994; Robertson, 2001; Rubenstein, 2000; Tinetti, 1994; Wagner, 1994; Wolf, 1996). Additionally, exercise has been shown to reverse major fall risk factors in older adults by improving strength, endurance, balance, and gait velocity (Rubenstein, 2000; Fiaterone, 1994; Wolfson, 1996).

## **Risk Factors**

Identified risk factors that predispose older adults to falls include lower extremity weakness, generalized deconditioning or poor endurance, musculo-skeletal stiffness and rigidity, slow reaction time to perturbations in balance, and slow walking speed (AGS, 2001). Many of these characteristics are also seen in a younger, sedentary adult population and indicate the need for lifelong exercise habits (Healthy People 2010, 2002). However, the presence of these risk factors in older adults with chronic medical problems leaves them at greater risk for fall-related injury because of their limited reserves and their fragility (Rubenstein, 2001).

## **Types of Exercise**

Studies using randomized controlled trials have tested various types of exercise (e.g., strengthening, endurance, flexibility, balance training, or general physical activity) for their effectiveness in preventing falls in older adults (Buchner, 1997; Rubenstein, 2000). Some of the more common types of exercise include strengthening or resistance training. These strategies have been carried out either individually using inexpensive, portable weights available for home use or in a supervised exercise group meeting in a gym or clinic using weight machines and exercise equipment (e.g., treadmills, stationary bicycles, etc).

Whereas weight-training, cycling and walking are more general physical activities, exercise programs for fall prevention can be more specific, such as balance training. Balance training exercises can be done using expensive technology such as a computerized balance platform, or low-tech equipment such as rocker boards, foam rolls and cushions. Balance exercises can also be done without equipment, using a sturdy counter or wall for support while practicing standing in a progressively narrower base of support (e.g., standing feet together, in tandem, and on a single limb). Tai Chi is a traditional Asian form of exercise, often practiced in groups, that combines a series of slow movements fluctuating between double and single-limb support. The dynamic nature of this form of exercise is presumed to be the reason for its success in fall rate reduction among seniors (Wolf, 1996). The most effective type of exercises for fall prevention is still not clear, but fortunately most of the tested and effective programs have combined a variety of exercise approaches—as do most community programs.

## **Exercise Settings**

The two most common settings for exercise programs are in the home or in a group setting. When exercise programs are carried out in the home, they are often provided by a health professional, usually a physical therapist, exercise specialist or nurse, who tailors an individualized program following an assessment of the subject's deficits (Campbell, 1997; Tinetti, 1994; Wagner, 1994). The intensity of the exercise program increases over time and the subject continues to exercise individually between visits and throughout the follow-up period.

Group exercise programs usually meet at senior centers or other public sites and are supervised by trained professionals (e.g., physical therapist, exercise specialist, coach). They usually utilize equipment for weight and cardiovascular training in a classroom or gym. Some interventions in

the RAND study (Shekelle, 2002) began with group sessions for orientation and education, after which the subject was instructed to exercise independently and was later contacted in a telephone follow-up to monitor and encourage maintenance of the exercise routine (Wagner, 1994).

### **Frequency of Exercise**

The frequency of exercise programs studied has varied between three and seven days per week. Published programs that were supervised and carried out in a group setting met one to three times per week. Subjects in the independent exercise programs had one to eight home visits in the initial months of intervention and then were expected to carry out home exercises three or more times per week. Subjects involved in an independent walking program were expected to walk at least 20 minutes a day three or more days per week. Some exercise programs also combine weekly group sessions with daily independent exercise at home.

Most of the randomized controlled trials studied by RAND (Shekelle, 2002) had a follow-up period of one to two years with the actual intervention lasting between three and twelve months. In two studies (Campbell, 1997; Lord, 1995), a dosage effect was noted where greater adherence to an exercise regimen resulted in greater protection against falls and fall-related injury. Strategies to increase adherence to exercise programs, particularly those in which subjects were expected to carry out independent exercises in their home, included monthly telephone calls from the exercise instructor (Campbell, 1997).

### **Effectiveness of Exercise**

It is difficult to identify which types of exercise are most effective in reducing fall rates among older adults. Wolf and colleagues (1996) found balance exercises, particularly Tai Chi, to be especially effective in reducing the frequency of falls among older adults. One study (Buchner, 1997) compared the effects of strength training to endurance training, but was unable to determine which achieved the greater reduction in fall risk. However, the study did note that exercise provided a protective benefit in reducing falls in older subjects.

In the RAND meta-analysis (Shekelle, 2002) the results of several studies were pooled to determine effective exercise strategies. There were no statistically significant differences between strength training, flexibility, balance or endurance exercises. However, there were non-significant trends suggesting that balance training and endurance exercise are the most effective of the individual exercise interventions in reducing the risk of falls.

In summary, the effectiveness of exercise interventions in fall-risk reduction for older adults is supported in the literature. Exercise can either be general or specific physical activities, can be carried out in a gym or at home, and in a group setting or independently. Several investigators used a combination of the above in their interventions with good results. Less is known as to the relative effectiveness of specific types of exercise, but there are trends showing balance training and endurance exercise to be the most beneficial in reducing risk of falls in older adults. More research comparing different types of exercise is needed.

## **Successful Community-Based Fall Prevention Programs**

This section summarizes in more detail some of the issues for community programs raised by the findings in the RAND meta-analysis of controlled trials of fall prevention (Shekelle, 2002).

### **Fall Risk Assessment**

Multi-factorial fall risk assessments tied to individualized treatment plans and follow-up have been identified as, perhaps, the single most effective means of preventing falls among seniors (Shekelle, 2002), and these assessments were described in detail earlier in this paper. A comprehensive fall risk assessment is usually performed by a medical professional, although an abbreviated screening version can be administered by a trained lay person using a screening tool. A self-administered functional assessment questionnaire can allow community-based seniors without ready access to health providers to determine whether they might be at risk for falling. Those found to be at risk at screening could be referred to a central agency or health care professional offering more comprehensive geriatric clinical services. Regardless of how the assessment is administered, it is vital that the assessment results shape the planned intervention activities to target the individual's specific risk factors and concerns.

### **Exercise**

Exercise has also been identified as an effective ingredient to a community-based fall prevention program and can include exercises geared to support balance, flexibility, strength in upper and lower extremities, and gait/mobility. According to the RAND analysis (Shekelle, 2002), exercise programs that included more than one type of exercise were the most effective in reducing falls, demonstrating a significant reduction in number of falls per person. Exercises to improve cardiovascular endurance, muscular strength, flexibility and balance were **all** found to be effective. This permits wide latitude in choosing client-specific exercise regimes that are based on individualized risk assessments, client interest, and available resources in the community.

Group exercise programs are easier to monitor and standardize than exercises performed alone, and most effective exercise trials have included group exercises. However, it should be acknowledged that not all seniors at risk will be able to participate in group exercise sessions. It is important to study the effectiveness of alternative strategies that are increasingly available, such as videos and exercise. It is clear on many fronts that on-going exercise in a senior's life prevents physical decline and dysfunction and enhances independence and quality of life.

### **Group Education**

Group education has proven effective in motivating seniors to change their behavior or their living environment to decrease the risk of falling (Ryan, 1996). Group activities such as educational presentations or exercise programs enhance and promote successful behavioral changes among individuals. Social support networks developed within group settings promote compliance with many fall risk reduction activities. Group activities also serve as a source of outreach for the program when participating seniors encourage others to join. In essence, group activities motivate others and keep group participants motivated to continue. However, it should

be noted that to date group education programs alone (without a major exercise component) have not been shown to be effective in reducing falls.

Whenever possible, educational materials should be translated into appropriate languages, geared for low-literacy clients and presented in large print.

### **Follow-up**

Follow-up promotes adherence in prevention programs. Systematic follow-up is necessary, especially if potential medical problems are being addressed or life-style changes are being made. The provision of immediate feedback to participants demonstrating improved functional status (i.e., balance and strength) promotes continued enthusiasm and client participation. Seniors often encounter obstacles in accessing health care and social services, and follow-up can identify those needing assistance to reduce risk of falls. Long-range follow-up is also needed to ensure that individuals maintain proper activities and to assess if new risk factors have developed.

### **Staffing**

The RAND analysis (Shekelle, 2002) concluded that multiple personnel can be used to conduct various aspects of a multi-factorial fall prevention program. Multiple roles and staff provide greater flexibility in program planning and in making the best use of community resources that vary from one location to another. Physicians, nurses, pharmacists, social workers, physical therapists, health educators, exercise specialists, outreach workers, and lay senior staff with focused training can all be effectively used to conduct fall prevention activities.

The number of staff required to support successful fall prevention programs depends on the population served. Frail seniors or those with multiple disabilities will require greater staff support and follow-up compared to those who are more functionally independent. Local programs should also be culturally sensitive and include, whenever possible, staff representing the racial/ethnic/cultural client population served.

### **Cost-Benefit**

Projecting program costs is important in planning fall prevention programs. Information from other community-based programs may provide useful information in estimating costs of such programs. Cost issues include expenses relating to: personnel, training, space, equipment, program marketing, screening and assessment, environmental modification abatement services, and volunteer staff incentives.

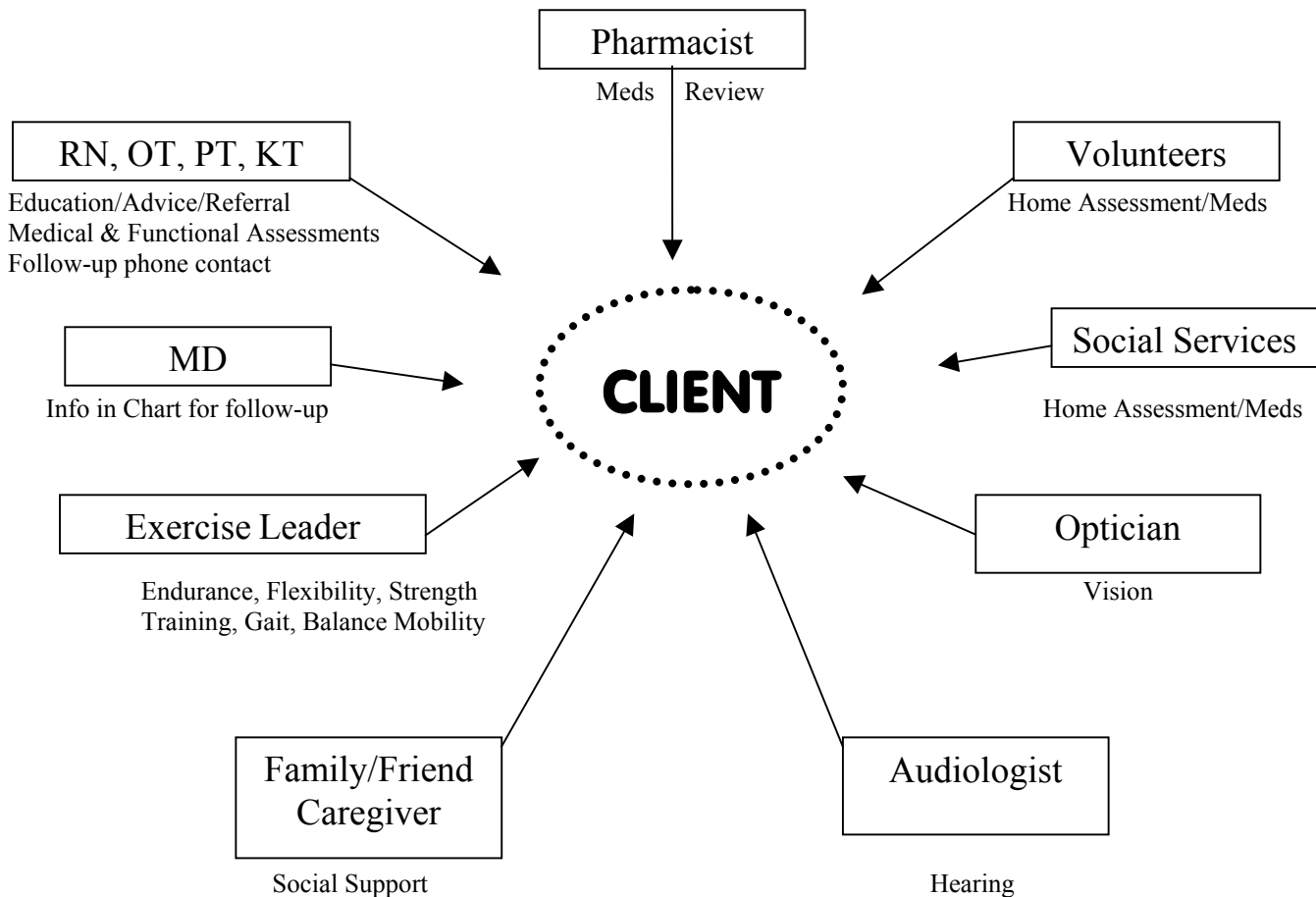
As mentioned in a previous section, the RAND meta-analysis addressed cost-effectiveness and concluded that the evidence strongly suggests that effective intervention programs provided to people at high-risk of falling have the potential to be cost saving, with the program costs more than made up for by savings in reduced acute and long-term care.

## Targeting Client Populations

Earlier research has been unable to determine whether fall prevention programs are more effective in high-risk vs. low- or moderate-risk populations (Shekelle, 2002). However, the degree of funding and available community resources will dictate the scope of the local program. If community funding and resources are limited, it is recommended that the fall prevention program identify and serve those at greatest risk for falling. (On the other hand, it has been also argued that programs for low-risk seniors are less costly per person served and that more individuals could be served for the same funds if programs focused on low-risk seniors – this is an active area of debate and more research is needed to establish the optimal target groups and trade-offs.) The American Geriatrics Society (2001) describes high-risk as: (1) older persons who have had one or more falls and present for medical evaluation, (2) those who report recurrent falls, defined as two or more within a six-month period, and/or (3) those with gait or balance problems.

## Developing and Sustaining Community Partnerships

Drawing upon the community’s existing resources builds the capacity of the community to work cohesively and promotes acceptance of and commitment to the common goal of fall prevention. There are likely many types of “experts” who can be drawn upon to work as a community collaborative and partnerships can be developed from a variety of local resources. Figure 2 below graphically illustrates the multiple professionals involved in serving the at-risk client.



**Figure 2: Multiple professional roles serving at-risk clients.**

The creation of a collaborative community partnership of local stakeholders will support sustaining the program over the long-term. Unfortunately, the analytic reviews report that few of the fall prevention programs studied were self-sustaining once the research component or grant support ended (Shekelle, 2002). Therefore, effort must be exerted to promote programs that include community resources and partner commitments from the start.

Identification of local partners and inclusion of these partners in the initial planning phase is essential to a sustained community-based program. Seniors themselves need to be included in the planning and operating of a community-based program. The uniqueness of the community can be represented by the inclusion of “seasoned” agencies as well as newly formed agencies. In addition, a lead agency can be designated to be responsible for organizing and facilitating meetings, delegation of responsibilities among partners, securing resources, and evaluation of the program.

Funds and other resources must be available to support the various program components such as assessment, referral, key intervention activities (e.g., exercise classes, medication management programs, home hazard abatement services), marketing and evaluation activities. Transportation services should also be made available to program participants.

## **Evaluation**

The evaluation component of a fall prevention program should include an assessment of the collaborative working relationship among agencies and the specific program components and activities. Services can be rated by local participants and monitored for their acceptance in the community. The capacity of participants to participate in activities of daily living while avoiding falls can be measured in an on-going manner. Annual reductions in numbers of fall-related fractures within a community can be measured in hospitals and medical clinics. Referrals to collaborative agencies can be monitored for successful linkages and barriers to success can be identified for on-going strategic planning and quality improvement.

In summary, public health research and practice indicate that a successful fall prevention program will require collaboration and coordination among medical institutions, local health departments, community-based non-profit agencies and the aging network. The sharing of resources and their investment over time will be critical to reducing fall risks and positively impacting the health and quality of life for large numbers of California seniors.

## **Challenges/ Barriers/ Issues**

In this white paper we have covered much ground in describing the large and rapidly expanding field of fall prevention among seniors. We have seen the tremendous problem of falls and the importance of their prevention. We have been briefed on the expanding fall prevention clinical trial literature and seen how effective these programs can be. We have visited the clinical guidelines and quality of care indicators assembled by interdisciplinary expert panels as they relate to falls. We have explored in more detail the components of successful programs, including fall risk assessment, exercise programs, and varying approaches to elders at risk.

These are all essential to understanding and planning a statewide fall prevention policy and program.

In the course of these discussions, particular challenges and unanswered questions were also introduced, helping to set the agenda for future research. Among the most important of these challenges are the following:

- Defining the most crucial components of the multi-component programs.
- Identifying optimal recruitment strategies to attract and retain at-risk elders.
- Promoting screening and assessment in community-based setting to individualize fall prevention programs to meet the clients' needs.
- Specifying the optimal frequency and duration of exercises.
- Defining the optimal reassessment interval.
- Determining the most efficient programs that provide adequate safety and optimal effectiveness.
- Defining the trade-offs between targeting high-risk seniors vs. providing community-wide prevention programs.
- Comparing the effectiveness of group exercise programs with that of individual programs (supplemented by educational materials).

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# The California Infrastructure and Best Practice Models for Fall Prevention

Prepared for:  
A California Blueprint for Fall Prevention Conference

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# **THE CALIFORNIA INFRASTRUCTURE AND BEST PRACTICE MODELS FOR FALL PREVENTION**

## **Executive Summary**

A number of fall prevention initiatives are currently in progress in different regions of California. Each of these initiatives include one or more intervention strategies that have been demonstrated in previously published studies to reduce fall incidence rates among older adults. These initiatives have been conducted at both the state and local levels within California and within different settings (e.g., hospitals, multiservice senior centers, adult health day care centers). While some initiatives have demonstrated their efficacy in reducing fall incidence rates, others have demonstrated significant improvements in overall physical and psychological function. Multi-factorial assessments and individualized follow-up intervention strategies have resulted in positive fall prevention outcomes in high-risk community-residing seniors as well as Veteran's Administration patients with a history of falls. Environmental modification strategies have also proven effective with moderate-to-low income healthy seniors.

One large-scale community-based demonstration project initiated at the state level is currently in progress and combines both of these successful intervention approaches. Although two of the community-based initiatives that have provided targeted exercise to moderate-to-high-risk older adults have resulted in significant improvements in physical function and reduced fear-of-falling, their impact on fall incidence rates have not yet been documented.

Although each of the initiatives described in this paper are clearly serving the needs of many older Californians using different types of intervention strategies that have already been shown to lower fall rates among older adults, it is time for these groups to pool their expertise and form a statewide coalition committed to the development and implementation of best practice fall prevention models that address the diverse needs of ALL seniors living in California.



## THE CALIFORNIA INFRASTRUCTURE AND BEST PRACTICE MODELS FOR FALL PREVENTION

### The California Infrastructure

In addition to being one of the fastest growing states in the country, the golden state of California also has an elderly population that is expected to grow at more than double the rate of the total population. By 2030, the older adult population is expected to represent 22% of the state's total population (California Department of Finance, Population Projections, 1993). An inevitable consequence of this exponential growth, however, is the need for more services and programs required by an aging population.

#### *The Older Californian*

- *The total population of 60+ older adults residing in California in 2000 was projected to be approximately 5,214,921, with the number expected to rise to 7,091,491 by 2010. At that time, the over 60 age group will represent 24% of the total population in California.*
- *It is estimated that 15% of the older adult population resides in rural communities.*
- *In 1998, minorities (Black, 5%; Hispanic, 15%; Asian/Pacific Islanders/Native American Indians, 10%) represented 29% of the 60+ age group.*
- *> 60% of seniors living in California are physically inactive (Gazzaniga, 1998).*
- *The total number of non-institutionalized Californians over 65 years living with disabilities in 2000 was listed as 2,977,123 with 721,927 older adults largely homebound as a result of those disabilities.*

Within California State Government, there are few resources devoted to injury prevention in the broadest sense of the word. The California Health and Human Services Agency is the pivotal state agency for injury prevention with such departments as the California Department of Aging, the California Department of Health Services and the Emergency Medical Services Authority focusing on primary, secondary, and tertiary prevention of injuries. Within the Department of Health Services (CDHS), the Epidemiology and Prevention for Injury Control (EPIC) Branch is designated as the lead injury prevention program unit. The Department has traditionally worked with partners in public health, academia, and the community to accomplish its mission.

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Also located within the CDHS is the Center for Gerontology whose mission is to improve the health and quality of life for California's aging population through service, education, and applied research, especially in the areas of Alzheimer's disease, arthritis, osteoporosis, and Parkinson's disease. The Preventive Health Care for the Aging (PHCA) Program is also located

within the CDHS and offers free health assessments, health education, counseling and health care service referrals to Californians, 55 years of age and older.

During the last two decades, state and local agencies, advocacy and interest groups, and a multitude of health professionals and concerned individuals have established coalitions in the areas of childhood injury prevention, traffic safety and injury prevention, violence prevention, accidental drownings, and other unintentional and intentional injuries. The need currently exists, however, to bring together all of the available resources to focus on the needs of our senior citizens in the area of fall prevention. This need is underscored by the knowledge that falls constituted the leading nonfatal injury and third leading fatal injury among older California residents in 2000 (Ellis & Trent, 2001).

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### **Legislation Addressing the Needs of Older Californians**

Several pieces of legislation have been advanced to address the needs of the older adult population in California. Under the Senior Wellness Act of 2001 (SB 370), when funding becomes available, the CDA, through the Senior Housing Information and Support Center (SHISC), will award grants to local entities for injury prevention. Programs will include personal and home environment assessment and mitigation as well as educational programs and services.

Other legislation, SB 2011, listed accessibility requirements for housing designated for seniors. It also created a role for CDA in developing guidelines for Universal Design and home modification. This was subsequently changed by AB 2787 which called for the standardization (through model ordinances and guidelines) of Universal Design and home modification measures, in part to enable the aging and frail to remain at home longer. The legislation also authorizes the California Department of Aging, in partnership with others, to develop and provide consumer advice regarding home modification for seniors and persons with disabilities.

It is the goal of the California Department of Aging to continue collaborating with other public and private organizations and to develop a variety of products and services (e.g., videos, print, and electronic educational materials, consumer information and assessment tools) related to injury prevention, wellness, and better living at home.

### **State Initiated Fall Prevention Programs and Services**

At the state level, the California Department of Aging (CDA) and the California Department of Health Services (CDHS) have implemented a number of programs focused on assisting the older Californian “age-successfully-in-place.” These programs address home injury prevention, home modification, home safety, wellness (including nutrition and exercise), and accessibility. Three important programs currently operated through the CDA include the Senior Housing Information and Support Center (SHISC), the Stay Well Program, and the California Fall and Injury

Prevention Public Awareness Campaign. The No More Falls demonstration project, initiated by the CDHS is also described in this section.

*Senior Housing Information and Support Center (SHISC):*

This center serves as a clearinghouse and resource center for older adults, caregivers, agencies, and professionals and promotes “aging-in-place” or preferably “better living at home.” Initially, a component of Governor Gray Davis’ multi-million dollar Aging with Dignity Initiative, SHISC was established in the year 2000 statutorily under the Older Californian’s Act. Major factors cited in the creation of SHISC included mitigating the risk of fall injury to prevent unnecessary hospitalization and institutionalization and to help older Californians live independently and safely through home modifications and supportive services.

*The Stay Well Program:*

The goal of the Stay Well program, included in the Governor’s Aging with Dignity Initiative, is to promote healthy lifestyles among older Californians. Wellness factors addressed include proper nutrition, exercise, injury prevention, mental and physical health that enable older adults to live longer, feel better, and to remain independent. Using television, radio, and print media, the Stay Well Program launched a statewide healthy aging campaign emphasizing exercise and nutrition. Interested persons were encouraged to contact Area Agencies on Aging using a toll-free number for local resources.

*California Fall and Injury Prevention Public Awareness Campaign:*

The CDA teamed with Kaiser Permanente in 2002 to distribute the HMO’s *No More Falls* video to Area Agencies on Aging, the State Library, and other organizations. This campaign alerts the public to simple steps consumers and caregivers can take to reduce fall injury risk. Other CDA sponsored programs, such as the Multipurpose Senior Services Program, Linkages, and Nutrition Services, assist clients who may be at risk for institutionalization (of which fall injury is a major cause) to remain in their homes with supportive services.

*No More Falls! A Senior Injury Prevention Demonstration Project:*

The No More Falls program is a multifaceted fall risk screening and health promotion project coordinated by the Epidemiology and Prevention for Injury Control (EPIC) branch of the Chronic Disease and Injury Prevention Division in California Department of Health Services. Communities in Tulare and Fresno counties served as initial pilot sites for the project and a federally-funded three-year demonstration project is currently in progress in selected communities within Humboldt and San Diego counties. A total of 552 community-residing seniors, aged 65 years and older are currently being enrolled into this study program.

A number of collaborative partners have been involved in various phases of the planning and implementation of the project. These include Preventive Health Care for the Aging (PHCA) programs, Active Aging Community Task Forces, Area Agencies on Aging, and a number of senior centers, neighborhood associations, health care provider networks, and related social

service agencies. Funding for the demonstration project was provided by the National Center for Injury Prevention and Control (NCIPC) in 2000. The Institute for Health and Aging at University of California, San Francisco is assisting with the formal evaluation of the demonstration project. Participants are randomized into either a control or intervention group.

Seniors enrolled in the intervention group receive: (1) a comprehensive PHCA health assessment modified to include fall risk identification; (2) an individualized fall prevention action plan listing activities to reduce identified fall risk factors; (3) individual counseling and education about care plan goals and activities; and (4) either a home hazard assessment checklist for client self-appraisal and/or the offer to have program staff conduct a home visit to evaluate, assess and abate hazards. Personal risk factors targeted include: poor balance; previous history of falling; vision and hearing deficits; alcohol or medication side effects or interactions; frailty, including weakness affecting lower limb strength/balance/gait; and hazards within the home. Fall prevention interventions include education on related risks, referrals to community-based physical activity programs to improve mobility, gait, strength, and balance, and improvements to increase the safety of the individual's home environment. In addition, clients with identified potential medical problems are given referrals to local providers for follow-up. The duration of the study enrollment period is one year for each participant.

A total of 351 seniors had been enrolled by November 2002, with enrollment continuing through March 2003. Multi-factorial interventions have been implemented. Although the efficacy of the demonstration project has yet to be determined, the results of the initial pilot study were promising, with program participants 20% less likely to fall one year after completing the program. If the results of the present demonstration study demonstrate the program's efficacy and additional funding is secured, PHCA will adopt the program in 14 other counties.

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### **Community-Based Fall Prevention Initiatives**

At the local level, Area Agencies on Aging (AAA), established under the Older Americans Act (OAA) of 1973, coordinate and provide services that can be divided into five broad categories: information and access services, community-based services, in-home services, housing, and elder rights. Multi-service senior centers provide opportunities for seniors to enjoy social, physical, and recreational activities as well as nutritious meals. In addition, DHS licensed Adult Day Health Care centers provide nursing and therapy services for older adults at high-risk for falls and DSS licensed Adult Day Care/Adult Day Support Centers serve a high percentage of persons diagnosed with early to moderate stage dementia. Several key initiatives in the area of fall prevention are currently being implemented in these community-based facilities. Many of these initiatives involve collaboration between the AAA's, academic institutions, community college districts, adult education, and other community-based volunteer organizations.

This section of the paper briefly highlights five community-based initiatives currently being implemented in different regions of California. The programs described address the issue of fall

prevention using intervention strategies shown to be effective in reducing fall incidence rates and/or fall-related injuries in the elderly (See Section 1 of the White Paper). While some of these initiatives target the well elderly, others have targeted older adult groups identified at moderate to high-risk for falls.

*Community and Home Injury Prevention Program for Seniors (CHIPPS):*

This health promotion program was initiated in 1987 with grant funding provided to the San Francisco Department of Public Health by the Henry J. Kaiser Family Foundation. The primary goal of the program is to prevent injuries to seniors by (a) increasing awareness among seniors and their caregivers that injuries are preventable, (b) developing and sharing simple ways to recognize and correct injury hazards, and (c) providing training and resource information to health professionals and the public.

The program targets moderate-to-low income healthy seniors, 65 years and older, and caregivers. The educational component of the program also targets senior-serving agencies. The program, in its most complete form, includes (a) education about injury risk factors, (b) distribution of written materials on home and medication safety, (c) assessment of homes for existing hazards, and (d) environmental modification. Since 1987, thousands of seniors and hundreds of agency staff have received training on injury prevention and safety hazard reduction. Approximately 600 seniors have directly received the full CHIPPS intervention, and 400 more have received services from some combination of CHIPPS and trained partner agencies. In addition, many more have received some kind of home safety assistance.

A formal evaluation study conducted during the first five years demonstrated the program's effectiveness in significantly reducing injury and fall incidence rates among older adults. Providing minor home safety modifications reduced falls 60%. The estimated cost of making such provisions per household was also relatively low, \$93 in materials and \$50-100 in labor (Plautz et al., 1996).

Collaborative partners include the San Francisco Commission on the Aging, a community council comprised of representatives from public and private agencies, and additional community-based volunteer organizations. Current funding for the program is provided by the California Health Department and a National Institute of Health (NIH) grant in partnership with the University of California, San Francisco.

*Providing minor home safety modifications at a relatively low per household cost reduced falls by 60%.*

*FallProof™ : A Targeted Balance and Mobility Training Program:*

Researchers at the Center for Successful Aging at California State University Fullerton (CSUF), have partnered with a local hospital, community college districts providing adult education, local PHCA programs, and senior centers, to provide a multidimensional balance and mobility program that targets community-residing seniors identified as moderate to high-risk for falls.

Initial funding for the program was provided by the Archstone Foundation in 1998 with the primary goal of implementing and testing the short-term efficacy of the program in 18 senior centers in Orange County over a three-year period. A modified version of the program is also being piloted in four residential care facilities in Southern California based on funding provided in 1999 by the Retirement Research Foundation. The Fallproof program targets the physical impairments and functional limitations identified during a comprehensive pre-program screening and assessment of balance and mobility. The program consists of six core exercise components: center-of-gravity control training, postural strategy training, multi-sensory training, gait pattern enhancement and variation, strength and endurance, and flexibility. Classes are scheduled two days per week and vary from 45 to 60 minutes in duration. Physical activity instructors who receive three months of specialized training in balance and mobility assessment and programming at CSUF currently teach the community-based program. Trained peer mentors (older adults) assist the instructor. To be eligible, older adult mentors must demonstrate strong leadership skills and be in good health.

The efficacy of the program in lowering immediate fall risk has been demonstrated. Significant improvements in targeted impairments and functional limitations, as well as balance-related self-confidence have also been documented (Rose, 2002). Randomly administered participant satisfaction surveys further indicate that participants find the program meaningful and enjoyable. Further evidence of program success is provided by the very high compliance rates (> 80%) associated with the program. The long-term effect of the program on fall incidence rates and fall-related injuries is currently being investigated in the residential care facility programs.

The program currently operates in 13 senior centers in Orange County and the Braille Institute in Anaheim and Los Angeles despite the completion of the funded project. The program is also being replicated in Fresno County, California, and multiple centers in Colorado will begin operating the program in February 2003.

To ensure the high quality of the program, a Balance and Mobility Instructor Specialist Certification program has been developed and currently operates at CSUF and at CSU-Fresno and will begin operating at CSU-San Diego in February 2003. The didactic portion of the program is delivered via Internet with practical laboratories and competency-based exams completed at one of the three distance sites. The Archstone Foundation provided the initial funding for the development of this certification program in January 2000. To date, 22 instructors have received the specialized training and certification. The multidimensional assessment and program content that constitutes the FallProof™ program is described in a book to be published by Human Kinetics Publishers in May 2003.

*A specialist instructor certification program has been initiated in California to provide health professionals working with the specialized knowledge and skills needed to assess and design targeted exercise programs for older adults at high risk for falls.*

### Project Independence:

This community-based exercise program is operated by San Diego State University in collaboration with Aging and Independence Services (AIS) of San Diego County. The program initially began in 1999 as a muscular strengthening exercise class in four senior centers serviced by the San Diego County Nutrition Program. The lead organization later partnered with the Department of Exercise & Nutritional Sciences at San Diego State University in 2000 and expanded the program from four to eight pilot program sites with the assistance of funding from the Archstone Foundation. The San Diego Community College District and San Diego Adult Education hired instructors to implement the program.

A total of 25 community sites currently offer exercise classes to community-residing seniors. The content of the program has been expanded to include balance, strength, and mobility training to reduce falls risk and improve functional fitness levels. The program also incorporates behavioral skills training at a small number of sites with specific goals of increasing program compliance, practicing learned physical activities and balance skills at home, reducing home hazards, and educating participants about medication side effects related to falls. Classes meet twice weekly for one hour each. On average, the instructor-to-participant ratio is approximately 1:20. The program had served 531 participants by November 2002.

Eligible participants complete a health-history questionnaire and are assessed prior to entering the program and at three and twelve months using multiple performance tests designed to measure multiple dimensions of fitness. A Physical Functioning (PF-10) questionnaire and Fear-of-Falling scale is also administered at the same intervals. Falls and near-falls data are also collected on a weekly basis. Baseline measures of functional fitness indicated that participants were mild to moderately frail.

After three months of program participation, improvements were observed in all measures of functional fitness. However, there was considerable variability between individuals. In the pilot study of the coaching intervention, those individuals randomly assigned to the coaching group had significantly higher attendance (82% vs. 74%) at the group sessions after three months, and made greater gains in several measures of functional fitness. The analysis of falls outcomes is currently in progress.

San Diego County Aging & Independence Services is committed to sustaining the program at those sites already in operation, and to expanding the program to other sites at an approximate rate of three per year, contingent upon funding. San Diego State University will continue its collaboration and will conduct on-going program evaluation. The coaching model is being modified to reduce the cost and burden of delivery.

### Senior Injury Prevention Program (SIPP):

Alameda County Public Health Department, in collaboration with non-profit and public sector agencies in Alameda County, currently administers this health promotion and education program. The Emergency Medical Service Authority, The California Endowment, and the Area Agency on Aging and Public Health Departments in Alameda County jointly provided the initial

funding for this program in 1999. A broad coalition of non-profit and public sector agencies assists with various aspects of program delivery.

Fall prevention discussion groups are held throughout Alameda County on topics such as physical fitness, behavior modification, nutrition, medication management, and home safety. A Falls Prevention Manual and Injury Prevention Resource Directory are provided to participants. The Directory lists service providers in Alameda County available to assist seniors in remaining “fit, healthy, injury free and self-sufficient.” An annual Senior Injury Prevention Conference is also hosted by the lead organization and is designed to further educate seniors about injury prevention. The program’s efficacy is evaluated on the basis of feedback provided by participants attending the various discussion groups. No other formal measurement of the program’s effectiveness is currently being conducted. The program has enjoyed a steady increase in membership. Fall referral programs have been instituted with area Fire Departments, and SIPP brochures have been distributed among patients over 60 years admitted to local hospitals. The coalition of agencies is currently working to create a senior injury prevention network, first in the bay area and then statewide.

### **Adult Day Care Services Initiatives**

Adult day services programs, which include adult day health care, adult day care and adult day support facilities provide an ideal setting for identifying persons at risk for falls and for implementing programs to prevent falls. All adult day services programs are community-based daytime programs for adults needing assistance to retain their independence in the community. These programs serve as an alternative to nursing home placement by improving and maintaining a person’s physical, mental and “spiritual” health. Three ongoing initiatives are described in this section.

#### *Balance and Gait Training:*

Grant funding awarded to Adult Day Services of Orange County, Huntington Beach by the Archstone Foundation in 2000, enabled the addition of gait and balance classes to the daily activities provided for early-stage dementia participants. A baseline assessment that included balance, gait, and functional fitness was conducted prior to program enrollment and again at varied intervals during the program. A preliminary report on program outcomes indicates that all ten participants for whom data is available have either maintained or improved their performance scores across time. Length of time participating in the program ranged from six weeks to as long as ten months. Scores of these individuals now place them in a low-risk category for falls.

#### *Frail Elders Fall Prevention Program:*

This program is currently operating at Rancho Adult Day Services in Downey with grant funding provided in 2001 by the Archstone Foundation. In addition to the usual care and services provided at the center, a 12-week fall prevention intervention is provided to a randomly selected group of day care clients. All participants in the fall prevention program also receive a home safety assessment conducted by a physical therapist (PT) and recommendations for

environmental modifications. Baseline measurements of balance, mobility, strength, and range-of-motion are conducted prior to and immediately following the twelve-week program, and again at six months post-program.

The intervention involves small group-structured exercise classes conducted by a PT three or more times a week, supplemented by a home exercise program supervised by the caregiver. Each session consists of conditioning exercises, including continuous walking, balance, and strengthening exercises. A multidisciplinary team that includes a physical therapist, registered nurse, and a physical therapist aide are responsible for administering the program. The effectiveness of the program will be determined using multiple measures of physical performance in addition to fall incidence rates. No program outcomes are available at this time.

*More fall prevention programs are needed that address the special needs of older adults with cognitive impairment.*

### **Hospital-Based Fall Prevention Initiatives**

In addition to the community-based initiatives described in the previous section, several hospital-based fall prevention initiatives are currently being implemented within California. Four such programs are briefly described in this section.

#### *Fall Prevention Screening Clinic (FPSC):*

A Fall Prevention Screening Clinic (FPSC) was initially funded and developed by a joint demonstration project initiated in 1995 with the Geriatric Research Education and Clinical Center and the Gait Laboratory within the Veterans Administration (VA) Greater Los Angeles Healthcare System. Expansion of the program was part of a large collaborative project with the VA National Patient Safety Center of Inquiry funded by the U.S. Department of Veterans Affairs as a multi-centered clinical initiative. The target population is ambulatory VA patients with a history of falls or identified at high-risk for falls, who are motivated enough to participate in intervention programs. Over 300 patients have been screened in the four Southern California clinics in the past year. Collaborative partnerships have been established with multiple VA centers, and the VA National Patient Safety Center of Inquiry.

The FPSC is staffed by a physician (physiatrist or geriatrician), pharmacist, therapist (physical, occupational or kinesiotherapist), and the Falls Clinical Initiative site coordinator. The format of the FPSC is a four-hour one-day per week screening clinic in which the patient is seen by three clinicians in fifteen minute blocks of time; approximately six patients are screened each week in the half-day clinic.

Each discipline follows an established protocol. The pharmacist completes a medication algorithm, reviews medication compliance and performs mental status testing. The therapist

conducts standardized performance tests, manual muscle testing, joint range of motion testing, and evaluates environmental factors and use of adaptive equipment and footwear.

The physician reviews the historical information, identifies medical contributors to falls, and assesses underlying disease management. This assessment is done by a standardized review of the medical record to assess the adequacy of controlling chronic diseases and the use of medications. Falls are then categorized into one of four groups: (1) cardiovascular (near faint, light headed, heart-related symptoms); (2) vertigo (room spinning dizziness); (3) dysequilibrium (loss of balance with no abnormal sensation of motion); and (4) weakness (knees giving way) or mixed categories (common) or no clear cut medical contributor. Focused and structured interdisciplinary meetings are conducted after each evaluation to address the underlying etiology of fall risk and to design appropriate interventions. A designated team member then reviews findings and recommendations with the patient and family.

Once per month, a follow-up clinic is scheduled for previously evaluated patients to ensure that prior recommendations were initiated and/or completed and no new problems have arisen. In the follow-up clinic, only one clinician sees a patient for approximately fifteen minutes, usually three months after their initial visit to the FPSC. In addition to the clinic, the pharmacist and therapist at the Greater Los Angeles facility have developed creative educational and group classes to provide specific interventions (e.g., medications education class, individual medication review, Tai Chi, balance class).

The efficacy of the program is evaluated using participant satisfaction surveys, balance and gait measures, and fall incident rates. At least 80% of all patients screened in the four clinics in Southern California and Nevada reported they were completely satisfied with their care within the FPSC. Furthermore, the Fall Prevention Screening Clinics met or exceeded patient satisfaction and waiting time guideline established by the Department of Veterans Affairs.

In evaluating the impact on care, pre-post measurement of the Fall Efficacy Scale (FES) demonstrated a significant improvement at follow-up in the Greater Los Angeles and Las Vegas clinics ( $p = 0.03$ ). Completion rates were assessed for FPSC recommendations. The highest completion rates, (>70% of patients completed these recommended interventions) were for physical therapy or kinesiotherapy, medication review, and prosthetics recommendations. In addition, all primary care providers acknowledged the FPSC pharmacist's recommendations and over 80% of those recommendations were followed by the primary care providers.

The clinical impact on fall rates was also determined. There was a statistically significant reduction in the number of falls reported. (At initial visit, 184 falls were reported in the previous three months; at follow-up visit three months later, 106 falls were reported ( $p = 0.0008$ ). Over sixty percent (62%) of the patients had a reduction in number of falls and 28% of the recurrent

*Fall prevention screening clinics (with consistent follow-up) in medical settings are an effective method of reducing falls among high-risk patient populations.*

fallers (> 2 falls within the previous three months) reported no falls at follow-up, following three months of program participation. The program has been scaled back into the physical medicine and rehabilitation clinic, but has attempted to maintain the basic format and approach.

*Department of Defense Spatial Orientation Center:*

The Department of Otolaryngology, at the Naval Medical Center in San Diego currently operates a fall risk screening and treatment clinic designed to prevent falls in the elderly dependent population and in patients with imbalance aboard ship. During the five years of program operation, over 300 people have been served. Funding for the program has been provided by The Naval Medical Center San Diego. Admission into the program requires referral by a primary care physician to the center and evaluation by an otolaryngologist and vestibular rehabilitation physical therapist. The program consists of weekly visits over a period of eight weeks. Standardized balance instruments are used to evaluate balance and vestibular function. Fall risk has been reduced in over 85% of all patients treated. Future plans are to expand the program and include a gait analysis as a standard assessment of all incoming referrals.

*Grossmont Hospital, Balance and Vestibular Rehabilitation Program (Sharp Healthcare):*

The program began operating in January 2001 with the primary goal of decreasing falls in elders in the community by identifying and managing risk factors. A secondary goal was to educate the community on intrinsic and extrinsic factors that affect balance. Presentations are made primarily to the hospitals' Senior Resource Center and to other senior centers in the San Diego community. Approximately 280 people have been screened to date. Funding for the program is provided by Sharp Healthcare and collaborative partners include San Diego Aging and Independence Services.

A physical therapist provides approximately 45 minutes of instruction concerning factors that contribute to falls, and handouts are distributed. The second part of the program involves physical therapists and volunteers who screen for fall risk prior to entry into the program. Individuals identified as fall risks, are provided with information to take to their physicians to identify contributing factors that affect balance (e.g., impairments in vestibular, strength, sensation, and vision). The physicians can then refer their patients to physical therapy for treatment. Evaluation of the program's efficacy has not yet been conducted but patients provide regular feedback regarding the program. In each class, usually one or two participants are identified who are referred for physical therapy. Future plans for the program include identifying and reaching more seniors in the community who are underserved (e.g., residents of mobile home parks, frail, homebound elderly).

*Long Beach Memorial Hospital Balance and Dizziness Center:*

The Center's program was established in 1998 in response to a significant increase in referrals to the Physical Therapy Department for diagnoses of imbalance, gait instability, dizziness and frequent falls, particularly in the older adult population. Administrators of the hospital-based program identified the need and potential for expanding the hospital's outreach efforts. The population targeted was persons of all ages who were experiencing dizziness or imbalance.

Approximately 2,000 persons had been served in the medical model and 250 persons had participated in the community-based classes by November 2002.

Local senior centers and dizziness support groups refer individuals to the hospital-based program, and physical therapy students from CSU Long Beach; occasionally assist in the program as interns. The program is only available to individuals through a physician referral. Referred patients receive a complete medical assessment followed by physical therapy for a clinically appropriate time, typically 2-3 times per week for 4-8 weeks, depending upon the diagnosis. The program consists of targeted exercises, patient education and strategies for reducing fall risk reduction. No home assessments are performed.

Once the patient is discharged from physical therapy, he/she is encouraged to continue with the community exercise program that operates once a week. Program effectiveness is measured using baseline and follow-up indicators of balance and dizziness. Client satisfaction surveys are also randomly administered. In an outcome study conducted between 1999 and 2001, 90% of all patients identified at risk for falls in baseline assessments and who subsequently completed the program of physical therapy were no longer identified as a fall risk based on follow-up assessments.

### **Professional, Paraprofessional and Other Personnel Roles**

#### Community Settings:

Many of the fall prevention initiatives currently operating within the community draw upon the expertise provided by health educators and researchers within academic institutions who specialize in the areas of kinesiology and gerontology and are therefore skilled in designing and implementing effective exercise-based interventions for older adults. In most cases, graduates of these academic programs provide the instructional expertise to implement the exercise component associated with these initiatives. While some of these professionals receive specialized training in the area of balance and mobility, others have more generalized training. Some initiatives have also adopted a “train-the-trainer” approach wherein initially untrained volunteers are provided with the knowledge and skills to implement less technical aspects of a program (e.g., administer questionnaires, assist exercise instructors, deliver educational materials, provide social support). Initiatives in Adult Day Health Centers have employed the expertise of physical and occupational therapists, and other support staff. These professionals possess the skills necessary to work with more frail older adults who are in the more advanced stages of disease or cognitively impaired.

#### Medical Settings:

The specialties of the personnel involved in fall prevention programs conducted in medical settings vary significantly. The focus of the medical assessment tends to shift depending on the domain that a falls assessment program falls under. A geriatrician, physiatrist (physical medicine and rehabilitation), an ear nose and throat specialist (specializes in inner ear disorders), a neurologist, and sometimes a cardiologist frequently perform this type of assessment. The type of assessment varies with the discipline however and may not cover the broad range of medical contributors to falls. Geriatrics as a discipline has long focused on falls as a key syndrome often

screened for and evaluated. Such screening and evaluation may be performed by nurse practitioners using standardized protocols and clinical practice guidelines.

Regardless of the type of physician, a multidisciplinary evaluation is recommended due to the complexity of falls. Pharmacists are skilled at evaluating whether clear indications for medications exist, and whether potential adverse reactions or side effects of a medication could be contributing to a falls risk. Pharmacists assess whether there is evidence of polypharmacy, meaning duplicate medications, medications that interact with each other, chronic conditions that may increase the risk of an adverse event from a medication, and also to assess the knowledge and ability of a patient to adhere to a prescribed medication regimen. Therapists play an important role in evaluation of the falls risk, and also in monitoring how such risks are likely to influence the performance of daily activities. Physical therapists and kinesiotherapists focus on the actual physical performance of tasks involving gait and mobility, while occupational therapists evaluate and train individuals in the application of these movements in the performance of a specific task related to an activity of daily living.

Nurses are pivotal in assessing and managing falls risk, as they are with the patient much of the time in both inpatient and long-term care settings. They monitor and identify unsafe practices, particularly as they relate to memory disorders, impulsive behavior, agitation or new confusion. They see patients perform their activities when a therapist is not present, and they often are involved in training family members. Therapists also conduct family training. Cross training, coordination and communication between team members in assessing and managing the risk of falls in patients is essential to effective programs.

Multidisciplinary teams comprised of physicians (preferably geriatricians), physical and occupational therapists, kinesiotherapists, pharmacists, nurses, and other clinical support staff (aides, physical therapy students, hospital volunteers) are necessary to implement the multi-factorial risk assessments and follow-ups that characterize the initiatives conducted with high-risk patient populations presenting with multiple co-morbidities.

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## **Outcomes Of Model Programs: What Does The Evidence Show?**

### *Community-Based Models:*

Although only preliminary data are available from several of the key initiatives currently being implemented in California, it is clear that a positive impact is being made on fall incidence rates, physical function, and the quality of life among seniors participating in these initiatives. Home assessment and modification strategies have yielded a significant reduction in fall incidence rates (60%), among relatively healthy seniors following minor home modifications, and at a reasonable cost per household. The published research, however, suggests that these strategies may be ineffective unless financial assistance is also available and the older adult is educated and aware of their fall risk. These elements were both features of the CHIPPS program. The No More Falls pilot project that adopted a multi-factorial intervention approach has also

demonstrated promising trends in reducing fall incidence rates among program participants, particularly among those seniors who demonstrated high levels of compliance with program recommendations.

The outcomes of initiatives that include targeted exercise as the primary intervention strategy also show promise. Although none of the current California initiatives have reported fall incidence data, significant improvements in physical function, balance-related self-confidence, and a reduction in fall risk have been demonstrated. These outcomes have been demonstrated for low-, moderate-, and high-risk seniors and also for frail seniors with moderate cognitive impairment. Adherence to the program is high and participant surveys indicate that seniors find these programs meaningful. What remains to be determined is how long these interventions should be conducted, and at what level of intensity across different levels of fall risk. The long-term efficacy and cost effectiveness of each of these initiatives also remains to be investigated.

*California initiatives that have included targeted exercise as the primary intervention strategy have demonstrated significant improvements in physical function, balance-related self-confidence, and a reduction in fall risk among low-, moderate-, and high-risk seniors as well as frail seniors with mild cognitive impairment.*

#### Medical Setting Models:

The hospital-based initiatives have also demonstrated success in reducing fall risk. In the case of the FPSC initiated within the Veterans Administration Greater Los Angeles Healthcare System, a significant reduction in fall incidence rates, particularly among repeat fallers was noted. The programs are also rated highly by participants as indicated by participant satisfaction surveys. More of these resource-intensive initiatives will need to document their fall prevention outcomes as well as cost effectiveness in order to ensure their longevity within a managed-care environment.

### **Challenges/ Barriers/ Issues**

#### Community-Based Settings:

- Providing a stable funding source to sustain and expand existing programs and services to older adults.
- Providing opportunities for existing community resources, agencies, and potential stakeholders to network and engage in collaborative planning; not just “senior-based” agencies—local community resources might include Universities with Departments of Exercise Science or Kinesiology, Park and Recreation leaders from local neighborhoods to provide space and recruitment, etc.
- Securing qualified personnel and/or training initially unqualified personnel to implement various aspects of a multi-factorial program.

- Establishing appropriate instructor-to-participant ratios in community-based programs providing targeted exercise to moderate-to-high-risk participants to ensure participant safety and program effectiveness.
- Implementing programs with hard-to-reach older adult populations (e.g., frail, homebound, socio-economically, and culturally or geographically (i.e., rural) isolated groups).
- Training and hiring bilingual instructors are needed to attract more culturally diverse clientele into fall prevention programs.
- Developing and piloting intervention strategies acceptable to culturally diverse groups.

*Hospital-Based Settings:*

- Multi-factorial fall prevention programs are resource intensive and require the establishment of strong networks of multidisciplinary provider organizations.
- Access to and understanding of the need for detailed and specialized medical assessments, such as special cardiology procedures (assessment of irregular heart rhythms, tilt table testing, and carotid massage to assess for abnormal response of heart rate and blood pressure under stressed situations) may be limited.
- Programs that focus on more medical conditions and medication assessments that contribute to falls risk may overlook more physical medicine causes of falls such as spinal stenosis, impingement of nerves, or peripheral neuropathies (damage to long nerves in legs and feet due to diabetes, poor blood supply or alcohol, among other causes).
- Timely access to therapy assessment and interventions may be limited or include a significant delay, leaving exposure to falls risk.
- Transportation to facilities for assessment and management may be particularly challenging for elders with gait and balance disorders.
- Ability to perform timely assessment in settings that frequently encounter falls events is usually limited and not logistically practical (primary care, emergency/urgent care, acute care).

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## PROGRAM INFORMATION

### CHIPPS Program

"Profile of Injury in San Francisco" July 2001, a joint project of the San Francisco Injury Center and the San Francisco Department of Public Health. Available on-line at <http://www.tf.org/tf/injuries/cov4.shtml>

"Injuries to San Francisco Seniors." Available on-line at <http://www.tf.org/tf/injuries/seniors.pdf>

Program-related materials (e.g., general program information, injury prevention tips, home safety checklist, preventing falls for seniors) available on the DPH Website (or by request): <http://www.dph.sf.ca.us/PHP/CHIPPS.htm>

Program Contact: Michael Radetsky, Injury Prevention, Community Health Education Section, San Francisco Department of Public Health. Email: [Michael.l.radetsky@sfdph.org](mailto:Michael.l.radetsky@sfdph.org)

### No More Falls!

Program-related materials (e.g., Preventive Health Care for the Aging (PHCA) brochure, No More Falls Program Summary, client education materials in various languages, slide presentations for use by professional and community groups)

Fall prevention specific materials provided by Centers for Disease Control –“ What You Can Do to Prevent Falls” and “Check for Safety” in English and Spanish.

EPIC Proportions #10: Serious Injury Among Older Californians, December 2000. California Department of Health Services.

Program Contact: Ann Horton, Coordinator, No More Falls! Senior Injury Prevention Project. Department of Health Services, State and Local Injury Control Section. Email: [ahorton@dhs.ca.gov](mailto:ahorton@dhs.ca.gov)

### Senior Injury Prevention Project (SIPP)

Preventing Falls for Sixty-Plus Adults. Senior Injury Prevention Project Manual.

Program Contact: Colleen Campell, Alameda Public health Department –EMS Division. Email: [cocampb@co.alameda.ca.us](mailto:cocampb@co.alameda.ca.us)

Prevention of Falls At Home:  
Home and Environmental Modification

Prepared for:  
A California Blueprint for Fall Prevention Conference

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## PREVENTION OF FALLS AT HOME: BEST PRACTICES IN HOME MODIFICATION

### Executive Summary

A home assessment followed by home modification (HM) is an important element in a successful fall prevention program. HM includes both reducing home hazards (e.g., removing slippery throw rugs, dangerous electrical cords), and adding supportive features (e.g., grab bars, handrails, ramps, walk-in showers) that will help prevent falls and improve functional performance. Together these changes have the potential to not only increase safety but also the independence, comfort, and ability of older persons to age in place.

Increasingly, as long-term care emphasizes staying in the community, efforts are needed to prevent falls in the places they occur most often: in and around the home. The most frequent locations for such falls are bedrooms, living rooms, kitchens and bathrooms where older persons spend a large amount of their time. Stairs and steps, both inside the home and outside, are also places where serious falls occur.

The home environment is implicated in approximately one-third of falls experienced by older persons. A number of studies suggest that HM have an important role to play in fall prevention but their effect is enhanced by appropriate home assessments and guidance by health care providers such as occupational therapists. Success is likely to be greatest if HM are integrated into multi-factorial fall prevention programs.

Key components of an effective HM intervention program include: (1) referrals for HM of persons with a history of falls by individuals, family members, aging services and health care providers; (2) appropriate home assessments; (3) consumer awareness, involvement and direction; (4) adequate funding; (5) a HM delivery system that is easy to access with staff knowledgeable about fall prevention; and (6) follow-up to insure the effectiveness of HM.

Unfortunately, many barriers have stood in the way of older persons obtaining HM including a general lack of awareness about the importance of the home environment, inadequate assessments, limited funding, and a fragmented delivery system. In the last five years, a number of initiatives in such areas as research, coordinated service delivery, coalition building, information sharing, and raising awareness have taken place that hold the promise of allowing HM to play a more effective role in fall prevention. These initiatives need the full support of organizations representing older persons, younger persons with disabilities, caregivers, service providers, housing interests and policy makers.



## PREVENTION OF FALLS AT HOME: BEST PRACTICES IN HOME MODIFICATION

The strongest preference of older persons is to stay in their own homes and never move. Unfortunately, however, the dwelling units in which they live often have numerous hazards and lack supportive features, both of which can contribute to accidents, reduce activities, and foster unnecessary dependence. David Oliver, President and Executive Director of the Home Safety Council, recently stated: “Americans believe they have a safe haven at home, but they need to be aware of hidden hazards. People don’t think about home safety until something happens.” Even then, many people do not know what to do in order to solve problems or confront a delivery system that is confusing, uncoordinated, and pays only cursory attention to the home environment. According to the 2000 census, over half a million older Californians have functional limitations. Extrapolating from national data, more than 170,000 older Californians with functional limitations have an unmet need for HM such as more accessible bathrooms and kitchens, ramps, lever door handles, and grab bars. Since those with functional limitations are at greater risk of falling, it is important to both address these current needs and insure that future housing is safer, more accessible and supportive.

### **What is Home Modification?**

Home modification (HM) refers to converting or adapting the environment to make performing tasks easier, reduce accidents and support independent living. HM attempts to reestablish an equilibrium between a person whose capabilities have declined and the demands of the environment (Lawton, 1973).

HM includes: (1) removing hazards (e.g., clutter, throw rugs); (2) adding special features or assistive devices (e.g., grab bars, ramps); (3) moving furnishings; (4) changing how activities are carried out or where they occur (e.g., taking a sponge bath instead of using a bathtub, sleeping on the first instead of second floor); and (5) renovations (e.g., installing a roll in shower). HM requires a willingness to alter the home environment coupled with changing behavior. HM ranges from low-cost (e.g., removing a throw rug, adding a hand-held shower) to more expensive adaptations (e.g., installing ramps, stair lifts). In some cases, modifying the home may also require repairs such as improved wiring to eliminate the need for extension cords or fixing loose stair treads.

### **Problems in the Home**

The dwelling units in which the elderly live can be characterized as “Peter Pan” housing, designed for persons who never grow old. Such housing contains three basic types of problems: hazards, problem areas and lack of supportive features. Hazards that may lead to or contribute to falls are very common in the homes of the elderly (Gill et al., 1999). Carter (2000) found, for example, that 80% of the homes investigated had at least one hazard and 39% had five or more hazards. Such hazards include clutter, electrical cords that cross pathways, slippery throw rugs, and loose carpets. Likewise, most homes contain physical problems and barriers. The three biggest problem areas for older persons are: outside steps to the entrance, inside stairs to a

second floor, and unsafe bathrooms. Such problem areas are more likely to exist in dwelling units of the elderly because they live in the oldest parts of the housing stock and their diminished capacities make activities such as climbing stairs difficult. Older persons with mobility and functional limitations report that their three greatest unmet needs for supportive HMs are handrails/grab bars, ramps, and easy access bathrooms (American Housing Survey, 2001). The absence of such features can: (1) cause residents to unnecessarily restrict activities; (2) create safety problems; and (3) make it more difficult for caregivers to provide assistance.

*Older adults report that the three biggest problem areas in the home are steps entering and exiting a house, stairs inside the home, and bathrooms.*

*Older persons report an unmet need for supportive features such as grab bars, ramps and easy access bathrooms.*

### **Where and How People Fall**

Among community-dwelling elderly, one-half to over three-quarters of falls occur in and around the home (Ellis & Trent, 2001; Norton et al., 1997). According to data compiled from the 1997 and 1998 National Health Interview Survey data, the majority (55%) of all injuries among older people occurred inside the house (Kochera, 2002). An additional 23% occurred outside but near the house and 22 % occurred away from the home. Approximately 43% of indoor and outdoor fall injuries occurred at floor or ground level (i.e., not from a height). Fourteen percent of falls took place on stairs or steps, 11% from a curb or sidewalk, and 9% from a chair, bed or other furniture. Approximately 4% involved the bathtub, shower or toilet. Another study of dwelling units that had no stairs found that falls for older persons occurred in the following areas: hallways (10%), bathrooms (13%), kitchens (19%), bedrooms (30%), and living rooms (31%) (Gill et al., 2000). It is unclear, however, whether such falls were due to a high number of hazards, lack of supportive features or the amount of time spent in these rooms. The variety of places and reasons that people fall suggest the importance of tailoring HM to each individual's particular circumstances instead of assuming that "one size fits all".

The most common way to fall is to trip or slip while walking forward, followed by falling during transfer and falling on stairs or steps (Campbell et al., 1990; Ellis & Trent, 2001). Falls due to trips and slips may be triggered by objects in one's path such as low chairs, loose mats or flooring, and electrical cords (Norton, 1997). Falls that occur while transferring often occur while moving from a chair or bed (Ellis & Trent, 2001).

*Older adults have more injurious falls at home than in the community.*

*Supportive features and hazard abatement can help reduce falls at home where older adults spend much of their time.*

### **The Role of Home Modifications in Fall Prevention**

A number of studies have indicated the efficacy of HM in improving independence, safety, caregiving, and functioning. For example, bathroom modifications such as grab bars and shower seats have been found to increase ease of bathing among persons age 70 and over and those with high degrees of functional disability (Kutty, 2000; Gitlin et al., 1999). A study involving older persons in a controlled intervention involving assessment by an occupational therapist (OT), home care services, and HM reduced home health costs and delayed institutionalization of those in the treatment group (Mann et al., 1999).

Studies indicate that the home environment is implicated in 35%-40% of falls of older persons (Josephson et al., 1991). There is ample evidence that HM have an important role to play in fall prevention. For example, a study of persons identified in the Emergency Room as having fallen who were provided with detailed assessments (i.e., medical, functional, environmental), counseling about safety, and HM reported significantly reduced numbers of falls compared with those in a control group (Close, 1999). Similarly, a controlled trial that included home assessment, home visits by an OT, and minor HM reduced by 36% the proportion of people who fell compared with those in the control group. The effect occurred, however, only for those who had fallen in the prior year (Cumming et al., 1999). The researchers attributed the results to the role of the OT (who supervised the completion of HM and encouraged compliance) and HM rather than HM alone. The most common HM were removal of floor mats and use of non-slip bathmats. Several other studies, however, have found weaker relationships between the presence of environmental hazards and falls, indicating the difficulty of isolating extrinsic factors such as scatter rugs and worn carpet from intrinsic factors such as balance, strength and reaction time (Anemaet et al., 1999). Accordingly, the overall consensus from Rand's meta-analysis is that the best approach is to include HM in a multi-factorial strategy of fall prevention.

*The home environment can impact fall rates.*

*Trained professionals, such as occupational therapists, with expertise in assessment and intervention strategies can help maximize the effectiveness of HM.*

### **The Process of Home Modification**

Successful HM interventions involve a process that includes: (1) information and referral for HM; (2) appropriate home assessments; (3) consumer awareness, involvement and direction; (4)

adequate funding; (5) a HM delivery system that is easy to access with staff knowledgeable about fall prevention; and (6) follow-up to insure the effectiveness of HM.

### Information and Referral:

A variety of persons and agencies that come into contact with older persons are in good positions to provide them with information about HM and referral to services. Individuals and their caregivers, including family members and home health aides, may recognize that a person is falling or tripping in the home environment, or restricting activities to avoid accidents. Physicians or other health care providers who assess individual health conditions that may contribute to falls (e.g., poor balance) are also appropriate persons to inquire about problems in the home. Case managers in aging service programs or discharge planners who prepare people to return home from a hospital or rehabilitation stay, can play especially important roles by considering the home environment. In addition, emergency responders (e.g., paramedics) who see people in their homes after an injury or acute medical condition may be able to identify where a fall has occurred and recommend that the person seek out HM. Just as importantly, HM providers, including agencies and building industry professionals, can recommend that their clients who have fallen seek help from injury prevention or other fall prevention programs. Unfortunately, many of these potential referral sources may not view the environment as their purview, are unaware of the role that the home environment plays in falls, lack protocols to identify environmental problems, and do not have information about where to refer people.

### Types of Home Assessments:

Home assessments are a key element in the home modification process. This section explores types of home assessments, the persons who conduct a home assessment, and when the home assessment should occur. Reliable, valid assessments are important in identifying the environmental factors that make one susceptible to falls in the home.

Home assessments include: a) safety and hazard checklists; b) analyses of supportive features in the environment; and c) functional evaluations of the person in the home environment (Anemaet et al., 1999). Home safety checklists that focus on hazards are a common approach to identifying needed HM. Typically, the basic checklists assess the presence of potentially dangerous hazards such as loose floor coverings, cluttered pathways, electrical and other cords in the flow of traffic, loose throw rugs, non-skid surfaces in the bath or shower, and low chairs from which it is difficult to get out. Many checklists include illustrations of typical problems and generic recommendations. Identification of particular hazards and areas in which falls have occurred are used to help pinpoint needed changes. Injury prevention programs often refer to this process as home hazard abatement.

In addition to identifying hazards, more comprehensive checklists also assess the presence of supportive features such as grab bars, handrails, night lights, and easy to reach telephones that, if absent, might need to be added to help a person safely carry out activities.

The most detailed information that allows tailoring of HM to the person involves functional assessments. These range from open ended questions in which the client is asked about areas and

tasks that are difficult or dangerous to more structured tools that systematically analyze areas of the house (e.g., stairs, bathrooms, bedrooms, kitchens) where falls may have occurred or are likely to happen. The gold standard of such comprehensive assessments involves observing persons interacting with their home environment such as walking along a hallway, getting in/out of bed or a chair, using a shower, and climbing stairs. Such comprehensive assessments are a component of many multi-factorial fall prevention programs but otherwise are infrequently conducted because they require trained personnel and are more expensive to administer than checklists.

There are a variety of persons who can conduct home assessments including older persons and their families, health and social service providers, and professionals in the building industry. Currently, there is no single recognized profession designated to assess people in their homes. When using a home checklist, studies have found that laypersons can reliably identify some structural home hazards, but are less adept than a skilled nurse in identifying trip/slip hazards and readily removable objects (Northridge et al., 1995). More comprehensive assessments require professionals such as OTs, physical therapists, nurses or case managers. OTs have proven especially skillful because many of them have experience in assessing homes and making home modifications (Cumming et al., 1999). They are trained to take into account characteristics of the person such as limited vision, poor balance, and mobility problems as well as the environment itself.

Although laypersons might be able to identify problem areas/tasks in the home (e.g., using the bathtub) of persons who fall, they may be unable to determine the best solution (e.g., a bath bench, a grab bar, a transfer bench, or some combination). In such cases, the involvement of a health professional such as an OT can be helpful in specifying appropriate solutions and identifying products. In situations that involve structural changes (e.g., installing a roll in shower) or equipment attached to the house itself (e.g., a stair glide), a professional from the building industry such as a contractor, remodeler, or handyman is often brought in to recommend how to make the installation and to estimate costs. Sometimes the building professional will be employed by a government or non-profit home modification agency. On their own, building professionals tend to focus on the structural problem presented to them and are less likely than health care providers to ask about a person's functional capabilities or to conduct systematic evaluations of the home. In complex cases involving structural changes or expensive equipment, team approaches involving the individual and/or family member, a health care provider, and the building industry installer are preferable (Sanford, J. et al., 2002).

The setting where fall risk assessment occurs varies. Multi-factorial assessments traditionally include a medical assessment by a doctor or nurse practitioner, a fall risk assessment by a nurse and a functional mobility assessment by a physician or therapist (Perell et al., 2001). These types of assessments usually occur in hospitals, outpatient care, or skilled nursing facilities. Self-assessment checklists and interviews about problems in the home can be administered while a person is in such a setting. Nevertheless, environmental assessments, as indicated earlier, are best done in the home setting itself. One research study recommends that such in-home assessments should be conducted of any one discharged from a hospital setting who has fallen in the prior year (Cumming et al., 1999).

In summary, checklists work well in identifying home hazards, can be conducted reliably by a variety of persons, and are low-cost to administer. Comprehensive assessments are better suited to identifying needs for supportive features related to carrying out activities. They are particularly well suited to addressing the needs for complex modifications but are more costly to administer than checklists and require professionally trained staff such as nurses and OTs.

*Consumer Awareness, Involvement and Direction:*

Hazard abatement, supportive features and HM are not terms that are immediately familiar to older persons. The implementation of HM often necessitates both behavioral and environmental changes that start with awareness of problems. Most people, however, have accepted and adjusted to deficiencies in their homes, unaware that problems in the environment exist or blaming themselves for the problems instead of the environment. David Oliver has pointed out: “We take our homes for granted. . .we don’t make things safer because for the most part, we don’t even know the problem exists.” Several programs such as San Francisco’s Community and Home Injury Prevention Program for Seniors (CHIPPS) have made education about home hazards a keystone of their efforts to reduce injuries. Evaluations suggest that such educational strategies result in about 20% of participants subsequently making changes. More professional guided interventions using health professionals such as OTs have found compliance with recommendations hovering around 50% (Cumming et al., 1999). Even professionally assessed needs do not completely result in client acceptance.

Client acceptance in making HM hinges not only on awareness of problems, but also such factors as participation in setting priorities, the ease of making adaptations, cost of HM, and the fit of the changes with the home and life style of the resident. Moreover, when environmental problems are identified, the number of hazards in homes can be overwhelming. Many checklists try to deal with this problem by asking the person to identify the three to five unsafe area or problems they would like to change. Although research about these factors is still in its early stages (Stephens et al., 2002), practice suggests several guidelines. Education of consumers about the danger of features in their homes may lead them to change the home environment. Some older persons, however, will still resist because of strong beliefs about what is proper in their home setting or a strong desire to keep items that have meaning such a throw rug in the hallway or in front of the kitchen sink. In such situations, strategies that allow residents to keep such items by, for example, securing valued throw rugs with Velcro to make them safer, are likely to succeed more than efforts to convince some residents to remove them. Adding features that are attractive (e.g., grab bars of materials and colors that fit into the décor) are also likely to meet with more approval than ones that appear institutional. In addition, for renters who are worried that making structural changes will create problems with their landlords, assistive devices such as temporary grab bars that screw onto the side of a bathtub may be more acceptable than more permanent types that are attached to the wall. Such fears should be dispelled, however, by a widespread campaign of information to both the public and providers, informing them that renters have the right under the Fair Housing Amendments Act of 1988 to make modifications in their apartments.

### Implementing Home Modification in Fall Management:

Depending on the nature of the intervention, the people involved in implementing HM recommendations may be individual clients, family members, health care providers, building industry professionals, or some combination. Frequently, the trained professionals who conduct the assessment also guide the modification process. As indicated earlier, OTs have often successfully played this role because of their skills in assessing both hazards and the need for supportive features, working with clients to accept changes in the environment, advising clients on how to live with hazards that cannot be removed, and acting as intermediaries between building providers and clients (Cumming et al., 1999).

### Costs and Financing of Home Modification:

Affordability is a serious problem that prevents many persons from obtaining needed HM. HM include home hazard abatement (e.g., removing clutter and throw rugs), adding relatively low-cost features (grab bars, handrails) and more costly adaptations (e.g., ramps, stair lifts). More than 75% of persons of all ages with home accessibility features pay for them out of pocket. Costs, however, remain a serious impediment to obtaining HMs, especially for those who are low income or who require expensive features or major modifications to their dwelling units. According to a recent AARP (2000) survey, lack of funding is a major reason that people do not make HM.

Cost is a barrier partly because there is no entitlement for HM. Traditional Medicare pays little in the way of HM. Medi-Cal pays for some HM as long as they do not require permanent changes to the home. For example, Medi-Cal will pay for temporary portable ramps but not ones that are built-in. Ramps, however, are not included in the list of covered durable medical equipment, but under the reimbursement code for “non-listed items.” Reimbursement for ramps is therefore discretionary, often decided on a case-by-case basis. Grab bars are generally covered, especially the type that can be easily removed. Stair lifts may now be covered owing to a recent court victory in San Francisco. Medi-Cal will not cover, however, permanent fixtures or changes to the home such as widening doors, lowering counters, modifying kitchens, or installing a roll-in shower. Consequently, there are situations where a person discharged from a hospital with a walker or a wheel chair paid for by a health care provider is unable to safely navigate stairs at home or even get into their own bathroom.

Because individuals and HM programs cannot rely on Medicare and Medi-Cal for HM, they have turned to other sources for funding. For example, the Veterans Home Adaptation Grant program provides HM for qualifying disabled veterans. Rebuilding Together uses volunteers and donations to upgrade homes of disabled and older persons, usually in April of each year. Most of California’s HM and repair programs, however, rely on funds from such sources as Community Development Block Grants and the Older Americans Act through Area Agencies on Aging (AAA). Intense competition exists for funding from these sources. Access to them often requires documentation of need in AAA plans and HUD’s Consolidated Plan. Advocates for HM are faced with the reality that CDBGs tend to favor repairs instead of modification and those Area Agencies on Aging that support HM generally pay for low-moderate cost changes. Reimbursement is therefore very spotty, most programs have long waiting lists and many gaps

exist in coverage. Therefore, although various public and private funding sources have been increasing, they are subject to strict eligibility requirements and year-to-year variability. A last resort for funding has been the California Department of Social Service's Special Circumstances program, which in the past has been able to provide qualified recipients of Supplemental Security Income (SSI) and In-Home Supportive Services (IHSS) with funds for urgent needs such as HM. Unfortunately; the program was not funded in the State's 2002-2003 budget. Consequently, existing fall prevention programs such as CHIPPs have sometimes found it difficult to obtain funding even for small changes for persons in dire financial circumstances.

#### *Accessing the Home Modification Service System:*

An effective HM delivery system should be easy to access with skilled providers able to assess problems and make appropriate adaptations. Consumers report, however, that lack of access to HM providers is a major reason that they do not make additional HMs that they report needing (AARP, 2000).

There are over 300 HM service providers in California (National Resource Center, 2003). These programs do not generally consider themselves as focusing on fall and injury prevention but rather on serving individuals in need. The great majority of providers of HM are government and non-profit agencies. Three-quarters of the providers install both HM and repairs. Many of these programs initially focused on repairs but have added HM in response to the growing need. Nevertheless, most of the funds are spent on repairs. Seventeen percent of the programs provide only HM. Providers report that ramps, widened doorways and hallways are the most commonly provided major modifications while grab bars and handrails top the list of most common minor modifications.

Many providers have a limited menu of services and, as noted above, restricted budgets. For example, Home Secure, a non-profit agency providing HM operates only in specific areas of the City and County of Los Angeles where it provides HM such as grab bars, hand-held showers, shower seats and a variety of safety related items such as non-skid strips, door locks and peep holes at an average cost of \$250/client. Many such programs, including those funded through California's Medicaid Waiver Multipurpose Senior Services Program (MSSP), have caps on expenditures per client, often preventing them from addressing complex needs or returning to make additional adaptations as circumstances change. Los Angeles's Handyworker program can provide more extensive modifications such as ramps but similar to Home Secure, it too has a very limited budget and waiting lists. Moreover, the eligibility requirements of many programs differ, making it difficult for individuals with needs for different types of HM to successfully navigate the system.

Until recently, HM services existed primarily in the public and non-profit sector. The development of a private sector HM industry has been hindered by the modest nature of many HM, the need for specialized skills, the low income of many persons needing modifications, and consumer fears about the trustworthiness of private providers. However, there has recently been a slow but steady increase in for-profit HM companies.

In order to upgrade skills of persons working the HM field, several programs have emerged in the last several years. Prior to this time, there has been no specific training in HM. Consequently, some practitioners have lacked the skills to tailor HM to the needs of residents or not known how to solve particular problems (e.g., installing grab bars in pre-fabricated showers). In the private sector, some professionals, including builders, architects, and remodelers, are beginning to specialize in HM services, and participating in educational opportunities via organizations such as the National Association of Home Builders (NAHB) and the University of Southern California's (USCs) online program in HM.

Overall, the HM delivery system in California can be characterized as fragmented, full of gaps, and limited in terms of what it can provide. Although many providers are skilled in both assessment and the provision of services, others lack expert knowledge of the needs of older persons and the most effective types of HM.

#### *Follow-up and Reassessment:*

Follow-up and reassessment are critical and often overlooked components of HM. They are essential to insure that HM have been implemented correctly and are working as planned. Effective programs include training clients and caregivers about how to use HM as well as monitoring the situation over time. Changes in the home, in the older person, and even in a caregiver may warrant additional home modifications.

Too often, unfortunately, adequate follow-up is lacking which can have negative consequences. Studies report, for example, that many assistive devices and special features malfunction, do not feel safe to older persons, or are a poor fit between the equipment and person or home environment. For example, Gitlin et al., (1999), found in a study of bathroom modifications, that the majority of clients had one of more difficulties with their equipment orders. The problems were provider-related (e.g., incorrect equipment delivered, equipment installed incorrectly) as well as related to the ability of the person to safely and effectively use the equipment. In these situations, the clients did not know how to rectify the problems. The researchers concluded that such problems could be prevented by OT assessments instead of self-reports as clients are often unaware of the full range of solutions. In addition, follow-up and training could help insure effectiveness. Unfortunately, the costs for follow-up are generally not factored into the original pricing of HM. Moreover, it is extremely difficult to obtain reimbursement for visits by professionals such as OTs, especially once the work is completed.

*Successful HM interventions are facilitated by a process that includes: (1) referral for HM; (2) appropriate home assessments; (3) consumer involvement and direction; (4) adequate funding; (5) easy access to the HM delivery system; (6) skilled providers; and (7) follow-up to insure the effectiveness of HM.*

#### **Recent Home Modification Innovations in California**

A number of recent developments have occurred in California that support the development of best practices and will further advance the field. This upsurge in activity indicates the increasing

awareness of the role that the home environment plays in helping older persons age in place and in injury prevention. Innovations have occurred at different levels (e.g., state and local) as well as in a variety of spheres (e.g., legislative, programmatic, research, information, training and education).

#### Research and Demonstration Projects:

Home hazard assessment and modification activities play an important role in the three-year multi-faceted “No More Falls” study described in more detail in the White Paper section on “The California Infrastructure and Best Practice Models for Fall Prevention.” Among the multi-faceted interventions are the provision of safety information (e.g., the CHIPPs Home Safety Checklist); the availability of a home hazard assessment visit by a trained outreach worker; referrals to home hazard abatement services; waiving of fees for particular features (e.g., grab bars and grip strips) for low income clients; and information about home hazard abatement programs (e.g., eligibility requirements and how to access services). Thus far, the study has found that the majority of seniors are making their own safety modifications without financial or direct assistance and that, in some cases, landlords have been willing to install grab bars at no cost to clients. Clients in poor health, however, have required multiple service referrals facilitated by case managers or a lead contact person to carry out abatement activities owing to the disjointed provision of HM (e.g., one agency may install grab bars and another service repair front steps). The biggest problems have been securing major modifications such as ramps for low-income persons.

Researchers at the University of California, San Francisco along with the San Francisco’s Department of Public Health CHIPPs program are involved in a unique study funded by the National Institute on Aging to better understand how older people interpret safety education materials and decide to make or forgo safety related modifications in their home environments. “Safe Houses: Meanings of Home Modification as Self Care” will help to better understand what meanings people attribute to such terms as home hazards and what influences them to make changes in their environment. Preliminary findings suggest a number of barriers to safety modifications: being a tenant, aesthetic concerns, perceived lower property values, not wanting strangers in the home, stigma associated with the visibility of HM, and failure of providers to approach the correct decision-maker in the family (Stephens et. al., 2002).

#### State and Local Level Activities:

Two major resources in HM have been created in the last several years to promote HM. AB 1846 created The California Department of Aging’s Senior Housing Information and Support Center. The Center has created an inventory of HM services in California, raises awareness of the aging network about the role of HM, participates in the creation of model codes, presents information on HM at various events and venues (e.g., senior centers, health fairs) around the State, and works with other state agencies to coordinate activities related to HMs. The Center has also developed a Public Service Announcement (PSA) that shows two different intergenerational families in modified homes that is ready to air on television.

The University of Southern California’s National Resource Center on Supportive Housing and Home Modification, funded by the Archstone Foundation and The California Endowment,

carries out research about best practices in service delivery in HM; conducts training about HM via long distance learning (offering an online Executive Certificate Program in HM); operates a website ([www.homemods.org](http://www.homemods.org)) that contains extensive information about HM and links to other websites; facilitates a list serve for participants in California who share information about HM; advocates for improved policies and legislation; provides technical assistance; and runs an annual conference on HM. The purpose of the conference held in 2002 was to produce a California Blueprint on HM, the results and proceedings of which will be available in April 2003.

Several efforts to focus on HM services and improve interdepartmental collaboration have occurred within State government over the last several years. The California Department of Aging and the Department of Rehabilitation have signed a Memorandum of Understanding that will help to coordinate new and existing services and policies. The Division of the State Architect has established the Office of Universal Design (UD), which is responsible for California's accessibility regulations and standards for all publicly funded housing. The Department of Housing and Community Development, along with several other state agencies, is in the process of rewriting building regulations on accessibility for privately funded housing.

Service providers, localities, professionals and product suppliers have created innovations that provide opportunities for increased availability of HM. For example, HM coalitions involving a variety of different constituencies (e.g., architects, contractors, aging services and health service providers, interior designers, independent living councils, legislators, older persons) have been created in a number of different locales (e.g., Ventura, San Mateo, Pasadena, Santa Clarita, Sacramento) to increase the availability of HM. Area Agencies on Aging, Centers for Independent Living, and Housing and Community Development Departments are starting to play a more active role in delivering HM. Several Rebuilding Together chapters are now offering HM services year round. Product suppliers such as Home Depot and Lowe's are beginning to display more attractive HM products in their stores.

*California innovations in HM include a National Resource Center, demonstration fall prevention programs that include HM, and recent state legislation that created the Senior Housing Information and Support Center, the un-funded Program for Injury Prevention in the Home Environment, the Division of the State Architect's Office of Universal Design, and the requirement for the Department of Housing and Community Development to develop a model ordinance and guidelines for Universal Design and HM.*

### **Challenges/ Barriers/ Issues**

Over the last decade there have been significant advances in the field of HM. Much has been learned from research about the role of HM in fall prevention and what best practices will improve their acceptance, availability and quality. Key attributes of effective HM interventions include: (1) referrals of persons who have a history of falling for home assessment and HM; (2)

assessments of both home hazards and supportive features, preferably in the home setting itself; (3) raising awareness about the role of HM in fall prevention through educational programs and the media (e.g., PSAs) for the general public, older persons, and professionals; (4) involvement of professionals such as OTs in assessment, implementation and follow-up; and (5) client involvement and direction in setting priorities for HM. The overall impact of such best practices, however, requires systemic changes in policies related to funding and service delivery, both of which are impediments to HM. Funding needs to be more available, especially for persons with low incomes or requiring expensive equipment and structural changes. In addition, better coordination among the health, social service, and housing sectors is required to make the fragmented system more accessible. There have been promising new initiatives in these areas. Nevertheless, important challenges remain in order for HM to play a more effective role in fall prevention.

- Raising the awareness of policy makers, health insurance providers, and consumers about the potential benefits of HM.
- Making home assessments by such professionals as OTs more easily available to persons who have histories of falls and broadening hazard assessments to include more comprehensive evaluations of individual functioning in the home environment.
- Improving our understanding of the factors that make individuals reluctant to change their home environment coupled with strategies that will lead to effective HM.
- Educating and training four target groups so they are able to play a more effective role in the process of implementing HM in strategies aimed at fall prevention: (1) the medical community, health care providers, and aging services about the home environment; (2) HM providers about fall prevention; (3) fall prevention programs about HM; and (4) the public about home hazards abatement and supportive environmental features.
- Creating a statewide strategy that involves health, long-term care, aging, rehabilitation, and housing agencies in a coordinated effort to fill the gaps, increase coverage, streamline eligibility requirements, and cover the costs of HM for persons who are unable to afford them.
- Understanding better how HM services affect quality of life and long-term care expenditures and the efficiency and effectiveness of different service delivery models and strategies.
- Encouraging the growth and replication of HM coalitions and insuring that they include fall prevention as a priority.
- Advocacy for continuation of the California Department of Aging's Senior Housing Information and Support Center which is in serious jeopardy owing to the State's budget deficit.
- A concerted effort by a broad based group of parties and organizations (e.g., injury prevention, housing, health, aging, independent living) to support universal design and visitability ordinances that will help insure that the housing of the future is safer, more accessible and supportive.



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**Important Principles for Establishing a Statewide Fall Prevention Program**

1. Fall prevention should occur in the home, community and healthcare settings through collaborative efforts of community-based organizations, healthcare organizations, researchers and policymakers.
2. A long-term commitment to reducing injurious falls involves changing provider behavior, as well as systematic changes in organizations, coalition-building and follow-up activities to promote new practices.
3. Fall prevention strategies also require changes in behavior of older adults. Communications and marketing are key strategies to increase public awareness.
4. A statewide prevention agenda should address the race/ethnic and cultural diversity of California populations, as well as differences based on region or rural-urban communities.
5. Research should be translated into practice so that appropriate risk assessment occurs at each level of care (medical, rehabilitation, community) and appropriate interventions are tailored to individual needs. Policy and regulations should support basic competencies to assess risk and deliver primary and secondary prevention strategies.
6. A research agenda for fall prevention should be supported.
7. Recognize the overall costs of injurious falls by older adults and prevention strategies to health and human services. Reducing healthcare costs from injurious falls will involve shifting resources to preventive activities. Some of this resource allocation will be cost neutral, entail better use of existing resources or require additional fiscal infusion.
8. Coordination and commitment across systems is necessary to realize savings from preventing injurious falls in older adults. The cost center that realizes savings may differ from the center that needs to invest in prevention or intervention activities. For instance, healthcare costs may be reduced by home modification activities performed by human service agencies.
9. Best practices have been established in multi-factorial risk assessment and appropriate interventions; many effective interventions currently exist. Increasing universal availability to these effective interventions requires a three-fold approach: recognizing services that are currently available; improving access and matching of need to services; and identifying additional needed resources.
10. There are additional ways to mobilize current resources toward improving fall prevention statewide. For instance, currently available training funds might support education of senior fitness practitioners.

## **APPENDIX B:**

## **GLOSSARY**

**Assessment:** Evaluation of symptoms and signs to determine if disease, or risk of disease, is present and recommend management strategies.

**Continuum of care:** The full range of healthcare services, from health promotion/disease prevention to palliative care, organized by levels of care: ambulatory care, acute care, intermediate care (such as rehabilitation), home care, skilled nursing care, hospice care.

Community-based care includes health promotion and disease prevention in both health and human services. In the reimbursable healthcare system, community-based care includes prevention activities, such as flu shots, and institutional care such as adult day healthcare or residential board and care. Human services include recreation and nutrition programs at senior centers or parks.

**Home modifications:** Converting or adapting the home environment to make tasks easier, reduce accidents and support independent living. HM includes: removing hazards, adding special features or assistive devices, moving furnishings, changing how activities are carried out or where they occur, and structural renovations.

**Risk factors for falls and fall injury:** Known factors that substantially increase risk for falls and fall-related injuries, including weakness, gait and balance impairments, osteoporosis and advancing age. Studies have shown that the number of factors correlates with the risk of falling.

**Intervention:** A strategy to reduce risk, such as post-falls assessment, education, exercise, and environmental modification.

**Primary prevention of falls:** Applying interventions, such as removing environmental hazards, to reduce risk factors for falls.

**Program assessment:** Evaluation of the impact of an intervention at the program level, rather than at the individual level.

**Randomized controlled trial (RCT):** Rigorous scientific method in which participants are randomly assigned to receive either an intervention or usual care.

**Screening:** A method for early detection of symptoms and/or disease (sometimes called secondary prevention). For example, routine mammography is a screening method to detect breast cancer at an early stage. The “Get Up and Go” test is a screening method to detect gait and balance problems.

**Tertiary prevention of falls:** Applying treatment interventions to mitigate risks after a fall has occurred, such as strengthening lower extremities, or prescribing an assistance device.