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FALLS PREVENTION: NATIONAL, STATE, AND LOCAL SOLUTIONS TO BETTER SUPPORT SENIORS

A REPORT

OF THE

SPECIAL COMMITTEE ON AGING
UNITED STATES SENATE

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LETTER OF TRANSMITTAL

U.S. SENATE,
SPECIAL COMMITTEE ON AGING,
Washington, DC, October 22, 2019.

Hon. MIKE PENCE,
President, U.S. States,
Washington, DC.

DEAR MR. PRESIDENT: Under authority of Senate Resolution 70 agreed to on February 27, 2019, I am submitting to you a report of the U.S. Senate Special Committee on Aging entitled: Falls Prevention: National, State, and Local Solutions to Better Support Seniors.

Senate Resolution 4, the Committee Systems Reorganization Amendments of 1977, authorizes the Special Committee on Aging "to conduct a continuing study of any and all matters pertaining to problems and opportunities of older people, including but not limited to, problems and opportunities of maintaining health, of assuring adequate income, of finding employment, of engaging in productive and rewarding activity, of securing proper housing and, when necessary, of obtaining care and assistance." Senate Resolution 4 also requires that the result of these studies and recommendations be reported to the Senate annually.

I am pleased to transmit this report to you.

Sincerely,

SUSAN M. COLLINS,
Chairman.

Falls Prevention: National, State, and Local Solutions to Better Support Seniors



Special Committee on Aging
United States Senate

Senator Susan M. Collins (R-ME), Chairman
Senator Robert P. Casey, Jr. (D-PA), Ranking Member

October 2019

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Abbreviation List

AAA	Area Agencies on Aging
ACL	Administration for Community Living
AI/AN	American Indian/Alaska Natives
A/PI	Asian/Pacific Islanders
AWV	Annual Wellness Visit
BMI	Body Mass Index
BRFSS	Behavioral Risk Factor Surveillance System
CAPABLE	Community Aging in Place, Advancing Better Living for Elders
CDC	Centers for Disease Control and Prevention
CHF	Chronic Heart Failure
CMS	Centers for Medicare & Medicaid Services
DDI	Drug to Drug Interaction
DXA	Dual-energy X-ray Absorptiometry
ED	Emergency Department
HER	Electronic Health Records
FLS	Fracture Liaison Service
HCBS	Home and Community Based Services
HELP	Hospital Elder Life Program
HSIM	Healthy Steps in Motion
HSOA	Healthy Steps for Older Adults
HUD	Department of Housing and Urban Development
Innovation Center	CMS Center for Medicare and Medicaid Innovation
MFP	Money Follows the Person
MIPS	Merit-based Incentive Payment System
NCOA	National Council on Aging
NIH	National Institutes of Health
OAA	Older Americans Act
PRIDE	Paramedic Referrals for Increased Independence and Decreased Disability
SAFE	Screen, Assess, Formulate, and Educate
SSBCI	Special Supplemental Benefits for the Chronically Ill
STEADI	Stopping Elderly Accidents, Deaths, and Injuries
TBI	Traumatic Brain Injury
The Plan	2015 Falls Free® National Action Plan
WONDER	Wide-ranging Online Data for Epidemiological Research
VA	Department of Veterans Affairs

Executive Summary

One in four Americans age 65 and older falls each year. From bruises and strains to broken bones and lasting trauma, falls threaten the health and safety of seniors as well as their economic security and independence. Falling, however, is not an inevitable part of aging. Falls are preventable, and recovery is possible.

Virginia, an 84-year old, is an example of the importance of prevention. She is a retired nurse, which gave her first-hand knowledge of the challenges individuals experience staying active as one ages. She knew that her health challenges would only complicate matters. She underwent knee replacement surgery. She has fibromyalgia, glaucoma, and low vision. She spent eight years in a wheelchair because of her fibromyalgia but was committed to walking again. She enrolled in a class at the Center for the Blind and Visually Impaired in Chester, Pennsylvania to prevent falls, called "Healthy Steps for Older Adults." She learned about how to reduce her risk of falling and engaged in activities to prevent a fall. Her physical health improved, she noticed an improvement in her mood and energy, and she took steps to make her home safer. Now, she takes Tai Chi, kickboxing, yoga, and Zumba classes, and she line dances and lifts weights. She also helps to get the word out to others about the importance of staying active to prevent falls.

Sandy, an 82-year-old woman, is proof that recovery is possible. Following a fall on an icy morning while walking her dog, she received care through MaineHealth, the largest hospital system in Maine. As a result of the fall, she slipped and broke her right leg. Once an active woman, Sandy found herself unable to walk. Following surgery, rehab, and physical therapy, she was able to get around with a walker but stayed home for days at a time. She started to exhibit signs of depression and loneliness. Her daughter suggested she try a program, called "A Matter of Balance" offered at MaineHealth. This program reduces fear of falling and improves balance. For Sandy, the program changed her life. Soon, she traded the walker for a cane, and ultimately, she shed the cane as well. Today, Sandy is a coach for the program, is able to walk miles on end, and feels like she has her life back.

This lesson of prevention and recovery is the subject of the United States Senate Special Committee on Aging ("the Committee") 2019 annual report. The statistics are staggering and the stakes are high. Falls are the leading cause of injury and injury-related deaths among adults aged 65 and older. Every 11 seconds an older adult is treated in the emergency room for a fall. Every 19 minutes an older adult dies because of a fall. As alarming as these numbers are, they may underrepresent the prevalence because almost half of older adults who fall do not report it to their doctor.

Falls and related injuries also bear enormous financial implications to individuals, families, and the health care system. A falls-related hospital stay costs an average of $30,000. Each year, Americans spend a total of approximately $50 billion in medical costs alone for fall injuries. By 2030 costs are expected to soar beyond $100 billion annually.

Risk of falling increases with age. Common risk factors associated with aging include changes in muscle strength, a deterioration of vision, a diagnosis of osteoporosis, arthritis, dementia, and

Vitamin D deficiency. Certain medications also increase falls risk. Falling can result in physical injuries, such as fractures, disability, and head trauma, as well as psychological and functional consequences such as loss of independence, social isolation, and institutionalization, and even death.

Falling does not have to be a natural part of aging. After decades of targeted trials, researchers have developed evidence-based programs to prevent falls among seniors. The programs vary by focus (e.g., physical mobility, medication management, home modifications, etc.), target population (e.g., the older adult, their caregivers, health care providers, etc.) and setting (e.g., home, hospital, nursing home, etc.). The Centers for Disease Control and Prevention (CDC) and the Administration for Community Living (ACL), as well as other national and federal entities, have disseminated these programs in partnership with state and local governments, universities, and service providers. Despite the existence of these programs, they are not widely used, thus reducing the risk and occurrence of falls among older adults remains challenging.

The Committee recognizes the impact of falls on older adults, their caregivers, and the health care system. This report marks the Committee's purposive effort to highlight the importance of falls prevention and discuss the comprehensive needs that older adults require following a fall. This report presents a broad overview of the impact of falls, including their prevalence, causes, and cost, as well as evidence-based programs that have been shown to effectively reduce and prevent falls. In addition, it highlights federal and state leadership in falls-prevention, as well as the role of technology and public-private partnerships aimed at reducing falls risk. Finally, the report contains recommendations for governments, private and public organizations, providers, and communities to prevent falls among older adults, and improve falls-related outcomes.

The Committee, through this report and other efforts, seeks to encourage individuals, communities, and governments to work together to reduce falls risk among older adults and make available evidence-based solutions to prevent falls in the home and community, as well as strategies to support complete recovery from falls. As part of its examination of falls among older adults, the Committee sent an official request for comments, recommendations, and best practices to federal and state governments, organizations representing older adults and people with disabilities, universities, and others throughout the country. The Committee received approximately 200 responses. These responses informed the findings and recommendations in this report.

Key Findings and Recommendations

Based on meetings with stakeholders and researchers, and nearly 200 public comments, the Committee has identified several areas in falls and falls-related injury prevention that are shared across groups and require concerted efforts to address.

Raising Awareness to Prevent Falls

A number of effective programs for falls prevention exist, but are not widely used. This is largely due to system-level barriers to implementation, such as a lack of standardized tools and resources necessary to help providers integrate the solutions into their day-to-day practice. For example, health care providers are often not adequately trained on how to assess falls risk or on the measures that can be taken to prevent falls. Also, electronic medical records do not always allow for the documentation of falls risk so that other providers can access and utilize the information, and there are limited resources available for providers to offer patients about falls risk assessment and prevention services. These barriers make it harder for individuals to be aware of the risks associated with falling, and preventive measures that can be taken to avoid a fall. It also makes it more challenging to reduce the stigma associated with falling.

- The Committee recommends the U.S. Department of Health and Human Services (HHS) and other relevant federal departments develop a national education campaign designed to prevent falls and falls-related injuries. This national education campaign would increase awareness for evidence-based falls prevention programs, preventive measures that an individual can take to prevent a fall, and reduce stigma, shame, and fear of the implications of falling.

- The Committee recommends continued investment in the development of and expanded access to evidenced-based falls-prevention programs to ensure greater awareness of the risk of falls among older adults and promote preventive steps that can be taken to avoid a fall.

Improving Screening and Referrals

The Welcome to Medicare Visit and Annual Wellness Visit in Medicare are not always utilized to assess falls risk and prevention, and opportunities exist for improved provider screening and referral protocols. For example, some health care providers are unaware that the Centers for Disease Control and Prevention (CDC) develops resources, called Stopping Elderly Accidents, Deaths, and Injuries (STEADI), to help prevent falls. These resources, if followed during the Welcome to Medicare Visit and Annual Wellness Visit, would help providers identify people at risk of falling, discuss preventive steps that can be taken, and refer patients to appropriative evidence-based programming.

While some progress is being made, there are financial barriers to screening and referrals. For example, in 2018 Congress eliminated payment caps on outpatient rehabilitation therapy

services. This will help ensure access to necessary services. Many providers, however, have not yet established workflows to support intentional referral of patients with a moderate risk for future falls to clinical interventions, such as physical therapy or community fall prevention programs. Some argue that Medicare should create specific billing codes for falls prevention around screening, assessment, and plans of care and strengthening quality standards for falls prevention. Others suggest that inadequate Medicare reimbursement for bone density testing, particularly for dual-energy X-ray absorptiometry (DXA), contributes to fewer individuals being screened for osteoporosis, which contributes to falls-related injuries.

- The Committee recommends the Centers for Medicare and Medicaid Services (CMS) consider strengthening screening and referral pathways as part of the Medicare Annual Wellness Visit benefit, including taking steps to ensure greater utilization of CDC's STEADI resources.

- The Committee recommends that CMS explore avenues that improve access to, and appropriate utilization of, bone density testing.

Targeting Modifiable Risk Factors

Home safety evaluations that allow an individual to make the necessary modifications are important but can be costly. As a result, they are out of reach for many individuals. The same is true for home-based interventions. One program, the Community Aging in Place, Advancing Better Living for Elders (CAPABLE) program teams a nurse, an occupational therapist, and a handyman to address hazards and risks in the home. These evaluations and modifications, paired with supportive services, can help an individual remain in their home and active in the community. It is for this reason that Medicare and Medicaid have begun paying for these home assessments and modifications, particularly for the chronically ill in Medicare, and through home and community-based services and Money Follows the Person grants in Medicaid. These interventions can also help with recovery. Following a falls-related injury, an individual would benefit from a home safety assessment, including an assessment for risks in the home that could cause a fall, and supportive services to help with recovery in the home.

- The Committee recommends continued investment in programs that offer home safety evaluations and modifications, as well as improved dissemination of information on public and private resources available for home assessments and modifications.

- The Committee recommends that CMS consider piloting the CAPABLE model more broadly among qualifying Medicare beneficiaries.

- The Committee recommends that Congress extend the Money Follows the Person program and encourage greater state adoption.

- The Committee recommends that CMS continue to explore pilot programs for secondary fracture prevention, including home modifications that are paired with supportive

services, and that have been demonstrated to improve utilization of effective screening and therapies, improve outcomes, and reduce costs.

Reducing Polypharmacy

For older adults, the risk of an adverse drug interaction as a result of polypharmacy is high. Frequently prescribed psychoactive drugs such as opioids, benzodiazepines, selective serotonin reuptake inhibitors, and anticonvulsants can trigger side effects like vision disturbances, orthostatic hypotension, confusion, and sleepiness, increasing the risk of falls in older adults. Health care providers have a role to play in ensuring that an individual's prescriptions, including the interaction of those prescriptions, do not result in an adverse health event, like a fall. This requires providers to regularly engage patients in a review of prescribed medications. These reviews would be better informed by additional studies that include older adults.

- The Committee recommends that CMS develop medication review best practices for health care providers to follow as part of the Medicare Annual Wellness Visit. These best practices should include information about how to conduct this review through a lens of falls prevention.

- The Committee recommends that the U.S. Food and Drug Administration (FDA) and the National Institutes of Health (NIH) continue to assess the potential impacts of polypharmacy, relationships between medications and falls, specifically medication classes (e.g., anticoagulants) or specific drug combinations (e.g., opioids and benzodiazepines), and how to ensure that older adults are included in clinical trials for drugs in which they will constitute the intended population.

Chapter 1. The Impact of Falls in the United States

The Public Health Significance: Incidence, Prevalence, Economic Impact

It is estimated that each year, more than one in four older adults (adults age 65 and older) in the United States experience a fall.[1] In 2014, approximately 29 percent of older adults reported at least one fall, resulting in a total of seven million injuries. Additionally, three million older adults were treated for falls-related injuries in the emergency department (ED), and 800,000 were hospitalized.[2]

Falls are the leading cause of deaths due to an unintentional injury for older adults in the U.S.[3] In 2007, over 18,000 adults age 65 and older died as the result of a fall.[4] Ten years later, in 2017, that number nearly doubled, reaching more than 31,000 deaths.[5] If that number continues to rise at its current rate, it is anticipated that by 2030 there will be nearly seven deaths every hour,[6] or 59,000 deaths annually,[7] due to a fall. It is important to note, however, that these numbers may underrepresent the prevalence because almost half of older adults who fall do not report it to their provider.[8]

As the population ages, from 52 million older adults in 2018 to a projected 95 million by 2060,[9] the rate of falls and falls-related injuries is also expected to increase.[10] Among those age 65 to 74, more than a quarter (26.7 percent) report having fallen at least once, and for those age 85 and older, that number is more than one third (36.5 percent).[11] Likewise, nearly 10 percent of those age 65 to 74 report a falls-related injury, while 13.5 percent of those age 85 and older report a falls-related injury.[11]

The rate of reported falls and falls-related injuries and deaths varies across demographic segments, including racial and ethnic groups, sex, and geographic location. Among American Indian/Alaskan Natives (AI/AN), 34 percent reported falls, while 29 percent of whites, 23 percent of blacks, and 20 percent of Asian/Pacific Islanders (A/PI) reported falls.[12] Likewise, 17 percent of AI/ANs reported falls-related injuries, compared to only 11 percent of whites, 11 percent of Hispanics, and eight percent of blacks.[13] Women have also reported falls and falls-related injuries more frequently than men,[14] but men have higher rates of fatal falls compared to women.[15]

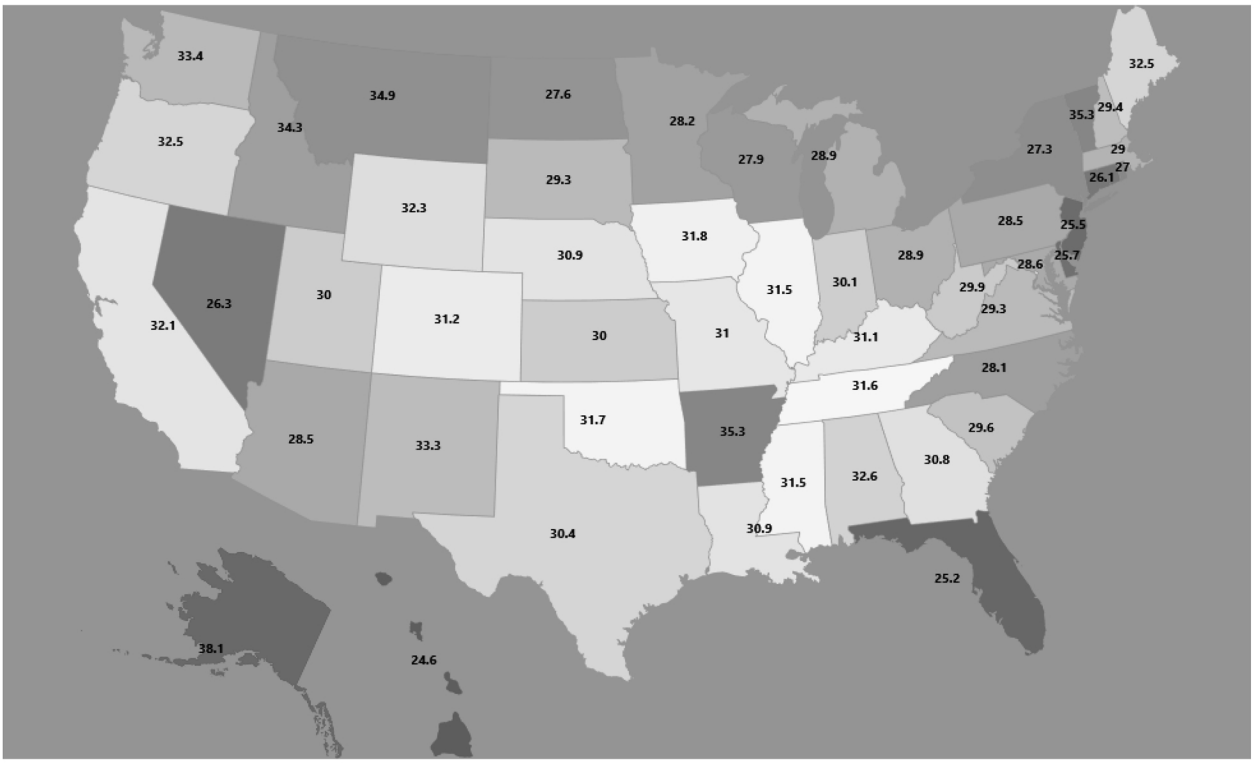
Table 1 shows that the falls rate, falls-related death, and the cost of falls vary across states. In 2016, the rate of falls among older adults varied from about 25 percent in Hawaii to 35 percent in Arkansas, while the average is 30 percent. Death rate from falls per 100,000 people varied from 24 deaths in Alabama to 143 deaths in Wisconsin, with a national average of 71 deaths.

Table 1. Falls Data by State

State	Rate of Falls among Older Adults (%)[16]	Falls-related Deaths (per 100,000)[17]	Total Costs of Falls ($Million)[18]
Alaska	38.1	87	$48
Alabama	32.6	24	$671
Arkansas	35.3	44	$436
Arizona	28.5	90	$857
California	32.1	40	$4,371
Colorado	31.2	112	$478
Connecticut	26.1	57	$610
District of Columbia	28.4	70	$94
Delaware	25.7	35	$162
Florida	25.2	66	$3,935
Georgia	30.8	56	$904
Hawaii	24.6	46	$172
Iowa	31.8	92	$432
Idaho	34.3	91	$164
Illinois	31.5	48	$1,582
Indiana	30.1	41	$850
Kansas	30.0	82	$338
Kentucky	31.1	45	$651
Louisiana	30.9	39	$605
Massachusetts	29.0	55	$1,148
Maryland	28.6	69	$759
Maine	32.5	83	$255
Michigan	28.9	53	$1,506
Minnesota	28.2	119	$713
Missouri	31.0	69	$883
Mississippi	31.5	62	$410
Montana	34.9	81	$130
North Carolina	28.1	74	$1,229
North Dakota	27.6	68	$91
Nebraska	30.9	65	$221
New Hampshire	29.4	95	$186
New Jersey	25.5	30	$1,349
New Mexico	33.3	101	$257
Nevada	26.3	58	$295
New York	27.3	40	$3,373
Ohio	28.9	69	$1,785
Oklahoma	31.7	95	$495
Oregon	32.5	101	$553
Pennsylvania	28.5	59	$2,318
Rhode Island	27.0	96	$183
South Carolina	29.6	58	$671
South Dakota	29.3	105	$106
Tennessee	31.6	61	$885
Texas	30.4	50	$2,405
Utah	30.0	55	$165
Virginia	29.3	65	$849
Vermont	35.3	123	$110
Washington	33.4	88	$764
Wisconsin	27.9	143	$781
West Virginia	29.9	86	$357
Wyoming	32.3	82	$60

Total medical costs for falls in 2015 were estimated at $50 billion.[19] These costs reflect spending in Medicare, Medicaid, private health insurance, and the cost to individuals for fatal and non-fatal falls. The majority of the cost accrues to Medicare and Medicaid.[20,21] On average for an individual, the hospital cost for a falls-related injury is approximately $30,000.[22]

Rate of Senior Falls in 2016 (Percentage)



Causes: Risk Factors at the Root

While the majority of falls occur as a result of a combination of risk factors, the likelihood of experiencing a fall increases with frailty and other age-related syndromes and diseases.[23,24,25] Common age-related risk factors that contribute to falls include changes in muscle strength, deterioration of vision, a diagnosis of osteoporosis, arthritis, dementia, and Vitamin D deficiency.[26] Other risk factors associated with increased falls include a low level of physical activity, impairment in mobility, hearing, vision, or cognition. In addition, chronic conditions such as cardiovascular diseases or Parkinson's disease, and mental health issues such as depression or fear of falling, are related to falls injuries. [27] A history of previous falls also tends to predict future falls.[28]

Certain types of medications and combinations of medications also increase falls risk.[29] Four out of five older adults take at least one prescription medication, and more than half take five or more prescription medications, over-the-counter medications, or dietary supplements per day.[30] These medications can increase the chances of falling by affecting a person's blood pressure or

through side effects, such as dizziness or sleepiness.[31] Drug classes most strongly associated with falls risk include sedatives and hypnotics, antidepressants and benzodiazepines, neuroleptics and antipsychotics, and nonsteroidal anti-inflammatory drugs.[32] Taking multiple medications can result in counter-indications and increased side effects, which also increases falls risk.

Consequences: Downward Spiral of Physical, Social, and Mental Health Outcomes

Falls can lead to serious injury, illness, disability, loss of independence, institutionalization, and death. The physical injuries from a falls can range from bruises to broken bones, and can result in a brief visit to a doctor's office, a trip to the emergency department, or even a hospital stay. Serious injuries include fractures in the hip, wrist, upper arm, or pelvis, which often require a long time to heal, and may even become chronic injuries. Often individuals who are hospitalized for a falls-related injury require some additional level of care after their hospital stay, with nearly half being discharged from the hospital to a nursing home.[33] Beyond the physical injuries associated with falling, there are often serious psychological consequences associated with falling. Many individuals may become fearful of subsequent falls,[34] which may cause them to become less active and in turn, may result in physical decline, social isolation, and feelings of helplessness.[35,36,37]

Older adults are at a particularly high risk of sustaining a falls-related traumatic brain injury (TBI) and tend to suffer worse outcomes compared to other age groups.[38] In 2014, falls were the leading cause of TBI-related death among adults age 65 and older, and responsible for 81 percent of ED visits among adults aged 75 and older. [39] Deaths due to TBI are also highest among adults age 75 years and older with a rate of 78.5 per 100,000 population. [40] A serious TBI has long-term, and sometimes permanent effects, including cognitive changes, reduced ability to function, and changes in emotional health. An estimated 775,000 older adults are living with disabilities resulting from a TBI.[41]

Chapter 2. Preventing Falls

Given the significant impact falls have on older adults, their caregivers, the health care system, and the economy, researchers have been seeking to identify the most effective ways to prevent them. As a result, there are now many evidence-based interventions (e.g., programs, practices, and treatments) available that have been proven to be effective through outcome evaluation.[42]

These evidenced-based interventions vary by focus (e.g., physical mobility, medication management, home modifications, etc.), target population (e.g., the older adult, their caregivers, health care providers, etc.) and setting (e.g., home, hospital, nursing home, etc.).

Educational Interventions

Educating older adults, caregivers, and providers about the risk of falls and ways to reduce that risk is an important first step to preventing falls. At the most basic level, these educational interventions can be in the form of written materials for patients, such as instructions on how to ask for assistance with mobility in a one-on-one session or in a group setting. Educational interventions that require in-person participation have also been developed and implemented. These programs are designed to increase patients' knowledge of falls risk, for example, in the hospital and at home.[43]

Educational interventions are a proven tool in preventing falls. For example, a randomized controlled trial was conducted of 801 older adult patients in the hospital on the use of written- and video-based educational materials about falling. The materials covered the frequency and causes of falls, allowed for self-reflection by the older adults on their individual risk, enabled them to identify problem areas, and supported the development of preventive strategies and behaviors, goal settings, and goal review for the participant in the trial. An in-person discussion with a physiotherapist complemented the materials. Results showed that among cognitively intact patients, falls in the hospital were significantly less frequent among those who received the intervention compared to those who did not receive the intervention.[44]

Other interventions aim to educate hospital providers about older adult falls risk and encourage providers to take preventive measures. For example, a falls prevention education intervention for nurses included self-study materials on patients' falls risk and encouraged the nurses to review patients' medications, and order physical or occupational therapy. The program increased the use of falls prevention strategies and decreased the average number of falls in the hospital.[45]

There are also effective falls prevention education interventions specifically for older adults who are transitioning from the hospital to another setting. A systematic review and meta-analysis found that such programs were successful in reducing falls for patients post-discharge.[46] These interventions often included in-home assessments and education sessions specifically about in-home risk factors, such as a lack of grab bars in the bathroom, insufficient lighting in hallways, bedrooms, and bathrooms, and improper footwear. These factors are discussed in greater detail in subsequent sections.

Many older adults are discharged from the hospital either to a nursing home or personal residence with the assistance of a home health care provider. Educational training for nursing home staff that included videos on vision awareness, and falls risk associated with bathing, showed a significant reduction in annual falls.[47] Similarly, education for nursing home residents, such as written materials, is also associated with a reduction in falls.[48] Systematic reviews and meta-analyses, however, have suggested that education alone is not enough to sustain falls prevention efforts, and that other methods should be employed as well.[49]

Medication Management

Managing medications can help to prevent falls. More than 90 commenters noted this strategy in their feedback to the Committee. Numerous studies have shown that reducing or managing older adults' medications, especially those used to treat depression and anxiety, such as psychotropic and benzodiazepine drugs, are associated with a decrease in falls and falls risk.[50] An individual that is taking multiple medications, often prescribed by multiple providers, may be at greater risk of a fall when those medications interact poorly. For example, medications can cause side effects, such as dizziness and blurry vision, and taken together or alone can increase falls risk. It is for this reason that medication management is so important to reducing falls.

Medication management to reduce falls can take place in a variety of settings, including the hospital, primary care, and the community. For example, a medication management intervention was integrated into a home health agency's existing quality-improvement falls prevention program. It was successful in helping staff identify high-risk patients and resolve potential risk factors.[51] Another study combined medication management and exercise (30 minutes of strength and balance training three times a week, and walking two times a week for four weeks) for older adults in the primary care setting, and found a significant reduction in falls risk.[52]

Physical Mobility Interventions

A common method to prevent falls among older adults is the promotion of physical mobility. These interventions primarily target older adults in the community,[53] and often include intervention activities that improve balance and increase exercise and strength-training. Over 40 commenters discussed the importance of physical mobility interventions in their letters to the Committee. There is an ongoing debate about the extent to which an older adult that is hospitalized for treatment should be mobile given concerns about the risk of falling. While some mobility limits may be necessary to prevent falls in the hospital, there is evidence that promoting mobility among older adults, such as through the Hospital Elder Life Program (HELP), actually decreases their falls risk and rate of falls.[54]

A meta-analysis of exercise interventions to prevent falls in older adults found that programs that included balance training and a higher dose (higher intensity and longer duration) of exercise were most effective at reducing falls.[55] One such study enrolled 59 community-living men, with an average age of 74, in a 12-week exercise program that focused on increasing strength and

endurance and improving mobility and balance. Results showed those in the program had a significantly lower three-month falls rate as compared to those not in the program.[56]

Home Safety and Reduction of Hazards

Another type of intervention tailored primarily for older adults living in the community is aimed at improving home safety and reducing falls risks. Hazards within the home that pose falls risk include loose rugs, inadequate lighting, unstable furniture, and obstructed walkways.[57] There is not yet agreement on the population that should receive this type of intervention. A systematic review and meta-analysis of falls prevention interventions for community-dwelling older adults found that home safety interventions were effective at reducing the rate of falls as well as the risk of falling.[58] However, another review found that home safety interventions may only be effective at preventing falls when tailored specifically for older adults with a history of falls or mobility limitations. The authors stated that frail older adults are less exposed to falls hazards in their home, and those with good mobility are more able to withstand the hazards. They stated that it is older adults in between – those with fair mobility who are still active – who may benefit the most from home modification interventions.[59]

More than a dozen commenters noted the importance of home modifications to decrease falls and falls risk. They also noted the challenges to securing modifications for older adults due to a lack of coordination among service providers. A lack of funding to provide these modifications, and landlord and real estate policies that prohibit residents from making modifications were also challenges, as well as the cost to the individual.

Several commenters discussed the Community Aging in Place – Advancing Better Living for Elders (CAPABLE) program, which was developed at the Johns Hopkins School of Nursing for low-income older adults to safely age in place. The approach teams a nurse, an occupational therapist and a handyman to address both the home environment and uses the strengths of the older adults themselves to improve safety and independence. The program was tested in Baltimore, Maryland, in research trials funded by the National Institutes of Health and the Center for Medicare and Medicaid Services Innovation Center. In a demonstration project, CAPABLE saved roughly $3,000 in program costs and yielded more than $20,000 in cost savings. Furthermore, Activities of Daily Living (ADL) limitations decreased from 3.9 to 2.0 after five months. [60] The program is now available in 25 sites across the country.

In order to overcome some of the funding challenges, and given the documented connection between addressing hazards in the home with falls preventions, Medicare and Medicaid are playing a growing role in supporting the cost of home assessments and modifications. For example, Congress has taken steps to begin to allow Medicare to pay for structural modifications to the home of someone who is chronically ill, including structural modifications (e.g., widening of hallways or doorways, permanent mobility ramps, easy use doorknobs and faucets), if it would have a reasonable expectation of improving or maintaining the health or overall function.[61] Medicaid can also support these changes. Congress has also provided states with options through Home and Community Based Services (HCBS) authority and Money Follows the Person grants in Medicaid, to allow older adults to continue to live in their homes. Funding

from these programs can be used for home modifications that address falls-risk in the home.[62]

Environmental Safety in the Community

Community-dwelling older adults are not usually confined to their homes, and therefore the community also plays a role in preventing falls. There have been numerous studies highlighting the importance of falls prevention in the community, specifically outside of the home. Older adults repeatedly cite the community environment as a source of falls risk, and state that the community environment contributes to their fear of falling, and limits their physical activity as a result.[63,64] In a qualitative study of older adults, a majority of participants said factors such as poor pavement conditions, curbs, steps, traffic patterns, and poorly lit areas in the community presented falls risk.[65] Furthermore, one study found that falls outside of the home happen as frequently as falls inside the home,[66] suggesting that this is an important area for prevention efforts. Interventions to reduce environmental risk factors, however, are not as common as interventions that prevent falls in the home. Interventions to reduce falls in the community environment primarily focus on modifying older adult behaviors as they navigate around the community, such as watching for uneven sidewalks or not walking in areas that are not well lit.[67] In the same qualitative study noted above, the older adults said that more railings, benches, elevators, and timed traffic lights would increase safety in the community.[68]

Cross-Cutting Interventions

The interventions discussed above primarily have a single component (i.e., education *or* physical mobility *or* medication management). Cross-cutting interventions that have multiple components are generally considered to increase effectiveness (i.e., education *and* physical mobility *and* medication management).[69,70] These interventions often include a physical mobility component with one or more additional components. These additional components can include medication management or home hazard risk assessment.[71] Furthermore, interventions, like those mentioned in the sections above, that are delivered by an interdisciplinary team, such as those that include providers from medicine, occupational therapy, social work, case management, and others, have been shown to be more effective than those that utilize the expertise and abilities of a single discipline.[72]

"A Matter of Balance," a nationally recognized program that reduces falls risk, is an example of a physical, social, and cognitive intervention. This program works with small groups of older adults to increase their physical activity, strength, and balance as well as make changes around the home to reduce falls risk and fear of falling, and improve their confidence in the ability to avoid falls.[73] In 2003, the Administration on Aging awarded a grant to the Southern Maine Agency on Aging, MaineHealth's Partnership for Healthy Aging, Maine Medical Center Division of Geriatrics, and the University of Southern Maine School of Social Work to adapt "A Matter of Balance" into a volunteer lay leader model. The volunteer lay model utilizes trained volunteers, called coaches, instead of healthcare professionals, to lead the classes. The coaches are trained by a Master Trainer, and receive annual training updates.[74] Maine has leveraged Medicaid funding through Section 1115 waiver authority for this initiative[75].

Another cross-cutting intervention is led by the National Council on Aging (NCOA), a leader in falls prevention programs since 2005. The Falls Free National Action Plan (the Plan) was developed by NCOA to assess the "progress, successes, and gaps" in falls prevention.[76] In 2015, NCOA hosted a Falls Prevention Summit that engaged 79 stakeholders, including academic experts in falls prevention, national health and aging nonprofit organizations and foundations, federal and state agencies, real estate, health care, and business corporations, and others. The results of this summit were used to update the Plan.

The 2015 Falls Free National Action Plan serves as a roadmap for falls prevention action and change. The Plan includes 12 broad goals, 40 strategies, and more than 240 action items to be carried out by 2025. These goals include:

- Increasing physical mobility to reduce falls risks, among older adults;
- Increasing the awareness and promotion of physical mobility programs by health care and service providers;
- Increasing awareness among older adults and health care providers of the adverse effects of polypharmacy, or multiple medications;
- Promoting home safety measures among older adults, health care and service providers, and the older adult network;
- Ensuring older adults have access to low falls-risk community environments and public spaces; and
- Expanding the availability of, and funding for, evidence-based falls prevention programs.

The NCOA's National Falls Prevention Resource Center, which is supported by a grant from the Administration on Community Living, is leading the dissemination and implementation of the Plan by sharing it at national and state levels through conferences and partnerships. It is also tracking the progress of the Plan's implementation, including related outcomes.

Chapter 3. Federal Response to Falls

As Chapters 1 and 2 demonstrate, falls are a significant challenge facing our country, and there are numerous evidence-based programs to prevent falls among older adults, and to help them recover after experiencing a fall. The federal government plays an important role in these prevention and recovery efforts. As part of the Committee's work on this report, federal agencies were asked about their current policies related to falls. This chapter provides a summary of those policies.

U.S. Department of Health and Human Services

The Centers for Medicare & Medicaid Services (CMS)

Preventive Care Supported by Medicare

Within the first 12 months of enrollment in Medicare Part B, a beneficiary is eligible for a "Welcome to Medicare" visit, a one-time preventive physical exam. The exam includes a review of overall health, medical history, and a check of vision, blood pressure, weight, and height. The physician will also check to ensure that cancer screenings, immunizations, and other preventive screenings are current. The exam also includes education and counseling about other preventive services, such as falls prevention.

The Centers for Medicare & Medicaid Services (CMS) also introduced the Annual Wellness Visit (AWV)[77,78] to address health risks, especially falls risks and existing diseases, and develop a personalized preventive plan. This service is available annually at no out-of-pocket cost if a patient has been enrolled in Medicare Part B for longer than 12 months.[79] During the AWV, a provider typically reviews a patient's medical history and medications; assesses height, weight, body mass index (BMI), blood pressure, cognition, depression, functional status, and falls risk; and creates a preventive health care plan for the patient. Based on the evaluation, the provider identifies treatment options for a tailored plan covering issues, such as falls risk, physical activity, and health education. The AWV requires a written screening schedule (e.g., screening for falls risk) that outlines a 5- to10-year plan of care, which is recommended be updated annually.

Research shows that those who take advantage of the AWV are more likely to remain fit and be alert to issues overlooked in a routine physical exam.[80] However, while Medicare began paying for the AWV in 2011, only 14.5 percent of eligible Part B beneficiaries had used the service by 2015.[81]

There are additional preventive services and quality improvement tools that help assess an individual's risk of falling, and drive providers to focus on falls prevention. For example, Medicare Part B covers bone mass measurements once every 24 months (or more often if medically necessary) if certain conditions are met. Bone mineral density tests (the most widely

recognized test is a central dual-energy x-ray absorptiometry (DXA) test) can identify osteoporosis, determine a patient's risk for fractures (broken bones), and measure a patient's response to osteoporosis treatment.[82] In order to tie Medicare payments to quality and cost-efficient care, improve care processes and health outcomes, increase the use of healthcare information, and reduce the cost of care, CMS implemented the Merit-based Incentive Payment System (MIPS). MIPS includes falls prevention quality measures, including: percentage of patients ages 65 and older, with a history of falls who had a risk assessment for falls completed within 12 months, percentage of patients ages 65 and older who had a plan of care for falls documented within the past 12 months, and percentage of patients ages 65 and older who were screened for future falls risk during the measurement period.[83] One stakeholder suggested that enhanced quality improvement efforts related to falls prevention would help in efforts to mitigate falls risk.

Innovative Demonstration Projects to Prevent Falls

The CMS Center for Medicare and Medicaid Innovation (Innovation Center) funds initiatives that make Medicare, Medicaid, and service provider payment systems more cost-efficient.[84] As an element of cost-efficiency, the Innovation Center has funded programs focusing on falls prevention, such as the Paramedic Referrals for Increased Independence and Decreased Disability in the Elderly (PRIDE)[85] program at Yale University. This program trains paramedics to make risk and medication assessments during the initial 9-1-1 call, as well as at follow-up visits. The paramedics, visiting nurse coordinators, and primary care providers work as a team to address unmet needs, provide access to community resources, and implement evidence-based falls risk strategies for older adults with limited mobility and social isolation. The goal is to decrease reliance on emergency services, reduce hospitalizations, and lower health care costs.

The Innovation Center also provides funding for the Community Aging in Place, Advancing Better Living for Elders (CAPABLE) program. As described in Chapter 2, CAPABLE aims to reduce the impact of disability among low-income older adults by addressing individual capacities and the home environment. The program uses an interprofessional team (an occupational therapist, a registered nurse, and a handyman) to help participants achieve their personal goals. For example, it provides assistive devices, and makes home repairs and modifications that enable participants to navigate their homes more easily and safely.[86]

Centers for Disease Control and Prevention (CDC)

Data Collection on Falls

To measure falls risk data, the CDC uses several tools including the Behavioral Risk Factor Surveillance System (BRFSS)[87], the Wide-ranging Online Data for Epidemiologic Research (WONDER)[88], and the National Vital Statistics System (NVSS). Working with state health departments, BRFSS gathers information on health characteristics, health-risk behaviors, chronic health conditions, and preventive behaviors. It began in 1984 as a random-dial telephone survey of adults age 18 years and older, and the CDC added cellular telephone-based surveys in 2011. The BRFSS relies on two key definitions, defining a fall as "a person unintentionally comes to

rest on the ground or another lower level," and an injury as, "the fall caused you to limit your regular activities for at least a day or to go see a doctor."[89] The most recent data available is from 2016.

WONDER is an online database for public health data compiled from many sources. Mortality data is collected through the National Vital Statistics System (NVSS), and anonymized mortality data are made publicly available through WONDER. Using these tools, the CDC released an analysis of county-level death certificate mortality data filed in the 50 states and the District of Columbia for the years 1999 through 2017.[90] Each death certificate listed a single, underlying cause of death. Results showed that, from 2007 to 2016, in 30 states and in DC, the death rate from falls for both men and women age 65 years and older increased 31 percent. Mortality rate by state is displayed in Table 1 (see page 10).

STEADI: Stopping Elderly Accidents, Deaths, and Injuries

Health care providers play a vital role in reducing falls. To assist both physicians and their care teams in falls prevention, the CDC developed the Stopping Elderly Accidents, Deaths, and Injuries (STEADI)[91,92] initiative. STEADI offers online training, resources, and tools to manage falls risk, including patient screening, risk factors assessment (such as medication review), and intervention. Resources also include identifying modifiable falls risk factors (e.g., poor balance, vision impairment) and interventions to reduce risk, using effective clinical strategies (e.g., physical therapy, medication management) and community strategies (e.g., community-based exercise programs like Tai Chi). A core part of STEADI is an algorithm that assesses levels of falls risk. Screening begins with three questions: *Have you fallen in the past year? Do you feel unsteady when standing or walking? Do you worry about falling?* Answers can point to increased risk, and the results of further assessments on gait, strength, and balance can provide the basis for prescribing vitamin D or calcium supplements, physical therapy, vision treatment, risk-reduction education, or medication management.

Consequently, there is also a need to assess medication beyond just updating different medication lists. Research shows that primary care providers lack an evidence-based framework for conducting medication reviews.[93] Adapted from the pharmacists' toolkit and patient care processes,[94,95] the Screen, Assess, Formulate, and Educate (SAFE) method[96] (part of the STEADI resources) provides a strategy to screen medications, assess patients' health, evaluate how to stop, switch, or reduce medications to the lowest possible dose, and educate patients and caregivers about medication changes.

Furthermore, the CDC is integrating STEADI into patient electronic health records (EHR) to efficiently screen and flag potential falls risk factors, such as blood pressure and psychoactive medication. States and hospital systems that have adopted STEADI are seeing results from increased falls risk screening to reduce hospitalizations. The Oregon Health and Science University[97] integrated STEADI into its internal medicine, geriatrics, and family medicine programs, and within 18 months, successfully screened almost half of the eligible patients for falls risk. Similarly, the launch of STEADI in primary care clinics throughout New York's United Health Services[98] resulted in 70 percent of the patients receiving screenings. Results of a study published by the CDC in 2018 revealed that a STEADI-based program in upstate New

York reduced hospitalizations due to falls by 40 percent.[99] The average cost of a hospital stay due to a fall has been estimated at $30,000,[100] which demonstrates that STEADI-based programs have the potential to also significantly reduce health care spending and costs to individuals and families.

Food and Drug Administration

Polypharmacy

For older adults, the risk of an adverse drug interaction as a result of polypharmacy, or the use of multiple medicines simultaneously, is high. Approximately 90 percent of adults age 65 and above take at least one prescription drug, 80 percent take at least two, and 36 percent take five or more.[101] In 2016, 4.5 billion prescriptions were filled,[102] corresponding to 14 prescription drugs for every person in the US.[103] A 2013 study of nearly 7,000 older adults living in the community revealed that more than half had used at least one psychoactive medication linked to falls.[104] Opioids (34.9 percent), benzodiazepines (15.4 percent), selective serotonin reuptake inhibitors (14.3 percent), and anticonvulsants (13.3 percent) were most frequently prescribed to participants in the study. As mentioned in Chapter 1, these psychoactive medications can trigger side effects causing vision disturbances, orthostatic hypotension, confusion, and sleepiness, any of which can increase the risk of falls in older adults.

As part of a new drug application, FDA requires conducting Drug to Drug Interaction (DDI) investigations. A new drug application must be submitted to FDA to obtain approval to market a new drug. The FDA has published draft guidance documents to help investigators design such studies.[105] The FDA also conducts post market surveillance to monitor the safety of a pharmaceutical drug after it has been released on the market, taking into account reported adverse drug reactions. FDA also can require postmarketing clinical trials or studies to continue to assess the safety and effectiveness of a drug. Given the implications that DDIs can have on falls, these are important safeguards to help address falls risk among older adults.

To help address other issues with medications, the American Geriatrics Society maintains the Beers Criteria, a list of potentially inappropriate medications for older adults. Providers who prescribe medications on the list need to consider stopping, switching, or reducing the dose of these medications to improve patients' overall health and reduce falls risk. Guidance for health care providers on inappropriate medications is also part of the STEADI Initiative. Still, more research is needed on relationships between medications and falls, specifically medication classes (e.g., anticoagulants) or specific drug combinations (e.g., opioids and benzodiazepines) and falls injuries.

Clinical Trials

FDA requires as part of the new drug approval process, data from clinical trials to provide evidence of a drug's safety and effectiveness. Older adults, however, are vastly underrepresented in clinical trials, even for drugs in which they represent the majority of the intended patient population.[106] More than 20 percent of clinical trials have excluded participants by setting an

upper age limit, usually adults over the age of 65; [107] and nearly half of the remaining trials use criteria that exclude older adults with multiple disorders, disabilities, and illness affecting life expectancy, cognitive issues, mobility issues, or residence in a long-term care facility.[108] Ensuring that older adults are included in clinical trials, particularly for drugs in which they are the intended population, may help address DDIs, as well as prevent other adverse events, including falls.

Applying data from a younger population to an older one can result in serious harm. One such case was illustrated with the RALES trial,[109] which found that a type of diuretic reduced hospitalizations and mortality in younger adults with chronic heart failure (CHF), but alarmingly increased hospitalization and mortality rates in older adults. This trial demonstrated how dangerous it can be to generalize results from one population to another, and underscores the need for drugs that are intended for older adults to be tested in the older adult population.

FDA has also been promoting the design of clinical trials that can address the safety of drugs in elderly patients, including those who may be on multiple medications. In June 2019, FDA published draft guidance, "Enhancing the Diversity of Clinical Trial Populations – Eligibility Criteria" with a specific section on the inclusion of older adults. To further address the issue of age inclusion, starting in 2019, the National Institutes of Health (NIH) issued new requirements for research funding.[110] Grant applications will have to include all age groups, and any reason to exclude an age group will have to be justified.

Administration for Community Living (ACL)

Education & Awareness

Falls are often unreported because many older adults, caregivers, and loved ones believe that falls are an inevitable part of aging.[111] One promising way to change this view is to increase education and awareness of effective falls prevention strategies that can be tailored to individual needs. Since 2014, ACL has awarded 61 grants to fund evidence-based interventions in communities across the U.S. that teach older adults about falls risk factors, and how to modify them. Grantees include state and local governments, health care providers, community-based organizations, and tribal governments and organizations. Together, they have reached more than 50,000 older adults through community-based health interventions (see Chapter 4). Typical interventions include "Tai Chi" for arthritis and "A Matter of Balance." All of these have been studied and shown to reduce falls risk factors. Based on grantee reporting data, 89 percent of participants reported a reduced fear of falling and 53 percent made changes in their home.[112] ACL also supports the National Falls Prevention Resource Center, run by the National Council on Aging, which provides information and resources about these and other interventions to the public and partners in the community.[113]

The programs funding through the Older Americans Act (OAA) are also overseen by ACL. These programs, available to all adults age 60 and up, help over 11 million older adults annually to live in their homes and remain active in their communities. In part to address the risk of falls, OAA programs can support home modifications, including residential repair and renovation

projects. OAA programs can also help screen high-risk home environments and provide educational programs on preventing falls and fracture injuries.

U.S. Department of Housing and Urban Development (HUD) & U.S. Department of Veteran Affairs (VA)

Home Modifications

Older adults prefer to stay in their homes as they age, but few homes have the necessary features to help them live independently and safely. The CDC reports that every year more than 1 in 4 older adults fall,[114] and the majority of serious falls occur at home.[115] The lack of financial security makes the problem worse. The Bipartisan Policy Center projects that over the next 20 years, nearly 40 percent of older adults over age 62 will have financial assets of $25,000 or less, and 20 percent will have assets of less than $5,000.[116] Furthermore, few older adults, especially low income, have long term care insurance, which can help offset the cost of home modifications.[117] Eighty percent of home modifications are paid for out-of-pocket, and are an increasing burden, with the cost of even simple home modifications, such as better lighting or putting grab bars in the shower, straining limited budgets.[118] More expensive changes, such as wheelchair access, may be out of reach.

The Department of Housing & Urban Development's (HUD) Section 202 Supportive Housing for the Elderly is the only program that finances construction or subsidized housing solely for low-income older adults.[119] In the fiscal year 2018 Notice of Funding Availability (NOFA) for this program, HUD strongly encouraged applicants to incorporate design standards that address fall prevention, including enhanced accessibility features, universal design, and electronic communication mechanisms when developing housing and community facilities. In 2019, Congress also created a new program, the Aging in Place Home Modification Grants,[120] to support home repairs for low-income older adults. In response to a request for information from the Committee, HUD reported that the agency is in the process of designing the home modification grant program and intends to incorporate promising falls prevention practices into the program design.

In fiscal year 2015, Congress authorized the HUD-Department of Veterans Affairs (VA) Housing Rehabilitation and Modification pilot program to fund competitive grants to nationwide or statewide nonprofit organizations that serve low-income veterans living with disabilities and in need of adaptive housing.[121] Funds may be used for the eligible veteran to make home modifications or take other measures to reduce the chances that an elderly person will fall in his or her home, and reduce the risks of an elderly person from falling. VA offers additional programs related to home modification including Specially Adapted Housing and Special Housing Adaptation Grants, as well as Home Improvements and Structural Alterations Grants.

Chapter 4. State Leadership & Private Sector Engagement

Just as the federal government has an important role in preventing falls among older adults, states and the private sector also play an important role. This chapter provides an overview of ways that states are working with partners in the community to implement falls prevention programs, as well as information about how the private sector is working to develop falls-related interventions using technology and other means.

State Leadership in Falls Prevention

At the state level, there are numerous effective initiatives to prevent falls and falls-related injuries. While unique to each state, these initiatives all share common practices, including targeting older individuals' balance, strength, and mobility, addressing home and environmental risk factors, and engaging the community, health care providers, and caregivers.

The Pennsylvania Department of Aging oversees two complementary programs, the Healthy Steps for Older Adults (HSOA) program and the Healthy Steps in Motion (HSIM) program. Both have been designated as evidence-based practices by the Administration for Community Living (ACL).[122] Offered since 2005 at senior centers, or other affiliated sites, to all Pennsylvanians age 50 and older and adults of any age with a disability,[123] HSOA is a four-hour course aimed at "screening, assessment, and education to reduce the incidence of falls." In numerous evaluations, HSOA has been shown to effectively reduce the incidence rate of falls,[124] the number of hospitalizations and emergency department (ED) visits, and health care costs due to fewer hospitalizations and ED visits.[125] A complementary program, HSIM, offers eight sessions of information about falls risk and prevention, and contains an exercise component tailored to each participant's fitness level.[126] HSIM was effective at reducing falls incidence by approximately 28 percent.[127] The sessions are held in-person at senior centers or other affiliated sites, and are in group format, which has the added benefit of creating social interaction and connectedness for older adults.

Three of Maine's Area Agencies on Aging (AAA) have partnered with community providers to offer older adults the opportunity to participate in Healthy Living for ME, an initiative intended to deliver evidence-based programs related to falls, chronic disease management, caregiver support, and more. Falls-specific evidence-based programs offered through Healthy Living for ME include Tai Chi, "A Matter of Balance," and "Enhance Fitness" – all focused on improving balance and strength through exercise while increasing confidence, and reducing older adults' fear of falling[128] while improving functional and health outcomes.[129] Healthy Living for ME has an added benefit, as it ensures coordination among participating community providers.[130]

In addition to the ongoing efforts in Pennsylvania and Maine, other states across the country are leading initiatives to prevent falls. North Carolina's Injury-Free NC initiative is a partnership between the North Carolina Division of Public Health and the University of North Carolina-Chapel Hill's Injury Prevention Research Center, to provide an online repository of "the best science about injury and violence prevention strategies focused on improving population-level health," of which preventing falls among older adults is a key area.[131]

Ohio is also leading an innovative falls prevention program with STEADY U. STEADY U Ohio is a comprehensive falls prevention initiative led by the Ohio Department of Aging along with partners including other state agencies, AAAs, health care providers, nursing homes, professional societies, and more. Through this initiative, STEADY U provides statewide access to "A Matter of Balance" and Tai Chi for older adults, as well as resources for health care providers to screen for falls risk and intervene on identified risk factors.[132] An innovative component of STEADY U is its focus on businesses. The Ohio Council of Retail Merchants and the Golden Buckeye program have partnered to provide tips and resources for local business retailers to make their businesses "fall-free zones."[133] By creating a safe community environment, older adults can remain active outside of the home, which increases walking and decreases social isolation.

State-based Falls Prevention Initiative

In 2019, 11 grantees in nine states received funding from ACL to engage in falls prevention activities. Grant recipients are located in Florida, Illinois, Chicago, Massachusetts, Maryland, Maine, North Carolina, New York, Ohio, Oklahoma, South Dakota, and Texas. These grantees are expected to reach over 30,000 older adults with evidenced-based programs to reduce the risk of falling.

Show Me Falls Free Missouri Coalition

A broad falls prevention coalition that includes partners from both the public and private sectors is the Show Me Falls Free Missouri Coalition. The purpose of the coalition is to "reduce the risk of falls and falls-related injuries…through education, awareness, and outreach" and includes local AAAs, health care providers and systems across the state, advocacy organizations, as well as exercise program providers such as Tai Chi and "Fit & Free, LLC."[1] The Coalition offers online resources, as well as ways for people to connect in person, whether it is an older adult needing a physical therapist, or a health care system needing an instructor trained in a specific evidence-based program (such as STEADI) to deliver that program in that system.

Public-Private Partnerships that Promote Falls Prevention

Many state-led initiatives involve partnerships between the public and private sectors. As mentioned in this report, the CDC program STEADI is a commonly used evidence-based falls prevention program. In an example of a public-private partnership, the CDC partnered with Epic, a private health care software company, to create a clinical program to help health care providers that use an Epic-made electronic health record integrate STEADI into their system so that they can more easily implement STEADI and screen, assess, and track patients receiving STEADI.[134]

Similar to the CDC-Epic partnership, technology is the basis of a partnership between the U.S. Department of Veteran Affairs and Careview Communications.[135] Careview Communications is a private company that offers technology-based solutions to health care providers to improve patient safety and reduce falls. The VA recently adopted Careview's Clinical Safety System, which includes "Virtual Rails" technology. With the Virtual Rails technology, health care

providers such as nurses use a computer program to "draw" an invisible motion-sensor border around a patient in his or her bed or chair.[136] If the patient moves beyond that border, the technology immediately notifies the provider with an audible alarm as well as a visual notification sent through the program. The program is designed to reduce falls and costs by allowing the monitoring of multiple patients from a central location, reducing the need for individuals to sit one-on-one with patients at risk for falls.

Other Public-Private Partnerships

Carenect. In Arizona, an innovative public-private partnership between AAAs and Critical Signal Technologies resulted in Carenect, a program to prevent falls and social isolation. With Carenect, older adults in Arizona can have a wearable sensor or an in-home sensor that connects to a 24/7 care center. By activating the sensor, older adults can receive emergency help for a fall and/or socialization assistance, such as screening for food insecurity or depression.

Fracture Liaison Service. The Secretary of Health for Washington State oversees an innovative public-private partnership between a local orthopedic clinic in Spokane, and the nonprofit organization Strides for Strong Bones. The partnership is a Fracture Liaison Service (FLS), which works with primary care practices and hospitals to ensure their patients who sustain a fall fracture are referred to a specialized clinic for falls risk and fracture risk, per guidelines from the International Osteoporosis Foundation. Five stakeholders mentioned FLS in their comments. These services have been shown to be effective at preventing fractures among individuals who have experienced a fracture and then been managed by an FLS.[137]

The Role of Technology in Falls Prevention

There has also been a recent focus on how technology can be used to aid in falls detection and prevention. Among the stakeholder comments the Committee received, more than a dozen, including five technology companies, cited technology as a way to detect falls and falls risk, and reduce or prevent falls from occurring. These technologic advances can be grouped into three categories: wearables, in-home devices, and devices for health care settings.

In recent years, major companies, including Apple and Philips, have introduced wearable falls prevention devices. These devices range from simple support services that can be integrated into an existing wearable, such as an AppleWatch (similar to purchasing a new application to use on an existing cell phone), to hearing aids that detect falls with more sensitivity than other wearables and immediately notify emergency providers and caregivers.[138]

There are also innovative technologies that can be installed in the home to aid with falls detection and prevention. Vayyar Imaging recently launched Walabot Home, a small tablet that is mounted to the wall and uses low-power radio waves to monitor movement and detect falls. Because Walabot does not use cameras, it allows for falls detection in rooms that pose a high risk of falls, such as bathrooms.[139]

The major electronics retailor Best Buy also recently began offering Assured Living, a smart technology system that makes aging in place easier. In addition to a wearable sensor, the system includes smart lighting that will automatically turn on lights when motion is detected.[140]

SafelyYou provides cameras equipped with artificial intelligence for in-home use to detect falls. The cameras detect not just that a fall has occurred, but provide a visual record of how the person fell, which can be valuable information that older adults may not always be able to provide themselves.[141]

Health care settings, such as hospitals or nursing homes are priority areas for the integration of technology for falls detection and prevention. Innovative technologies for these settings include virtual sitters, which allow providers to monitor multiple individual patients at a time, and broad falls detection systems, such as Kardian's room monitoring system that scans a room one million times per second to detect and alert providers to a patient's movements. The system can detect movements that may be precursors to a fall, such as sitting up in bed quickly, or getting out of bed.[142] Another technologic innovation to aid hospitals in falls prevention is a tool designed by Qventus that uses artificial intelligence and machine learning to predict and avoid falls among patients using real-time patient data from the electronic medical record to identify a patient's falls risk and alert providers.[143]

Conclusion

From community-led efforts that start at home to agency policies at the federal level, there is more to be done to prevent falls and improve recovery after a fall for seniors. Public policies at the national, state, and local levels can help to reduce the risk of falling for older Americans, improving health, longevity, wellbeing, and quality of life, while also reducing the economic burden of falls.

Based on the findings in this report, the U.S. Senate Special Committee on Aging identified four key areas of work for policy makers, academics, and stakeholders to focus on in an effort to prevent falls and better address falls-related injuries, including:

- Raising awareness about falls-related risks, prevention and recovery at the national, state, and local levels;

- Improving screening and referrals for those at risk of falling so that individuals receive the preventive care necessary to avoid a fall or recover after one;

- Targeting modifiable risk factors, including increasing the availability of resources for home safety evaluations and modifications, so that older adults can remain in their homes and communities;

- Reducing polypharmacy so that health care providers and patients are aware of any potential side effects that could contribute to a fall.

These findings and recommendations represent insight from based on decades of research on falls prevention and falls-related injuries, as well as approximately 200 comments that the Committee received from organizations representing older adults and people with disabilities, universities, and others throughout the country. Readers can access all of these comments by contacting the U.S. Senate Special Committee on Aging at (202) 224-5364.

The Committee is engaging with key federal entities, including the Department of Health and Human Services (including the Centers for Medicare and Medicaid, the Centers for Disease Control and Prevention, the Food and Drug Administration, the National Institutes of Health and the Administration for Community Living), the Department of Housing, and the Department of Veterans Affairs to better protect older Americans from falls and improve outcomes when falls occur. While costs are expected to exceed $100 billion annually by 2030, concerted actions have the potential to change this trajectory, improving prospects for individuals, families, and the health care system.

This report continues the U.S. Senate Special Committee on Aging's commitment to examining issues of importance to older Americans, and serves as a foundation for developing these and other policies that will improve the lives of seniors today and for generations to come.

Endnotes

[1] O'Loughlin J. et al. Incidence of and Risk Factors for Falls and Injurious Falls Among the Community-Dwelling Elderly. American Journal of Epidemiology, March, 1993, 137:342-54.
[2] Home and Recreational Safety: Important Facts about Falls. Centers for Disease Control and Prevention. Retrieved from: https://www.cdc.gov/homeandrecreationalsafety/falls/adultfalls.html
[3] National Center for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS). 10 Leading Causes of Injury Deaths by Age Group Highlighting Violence-Related Injury Deaths, United States – 2017. Retrieved from: https://www.cdc.gov/injury/images/lc-charts/leading_causes_of_death_by_age_group_unintentional_2017_1100w850h.jpg
[4] Burns E., Kakara R. Deaths from Falls among Persons Aged ≥65 Years — United States, 2007–2016. MMWR Morb Mortal Wkly Rep 2018; 67:509–514.
[5] National Center for Health Statistics (NCHS), National Vital Statistics System. Retrieved from: https://www.cdc.gov/injury/wisqars/pdf/leading_causes_of_injury_deaths_highlighting_unintentional_2017-508.pdf
[6] Home and Recreational Safety: Important Facts About Falls. Centers for Disease Control and Prevention. Retrieved from: https://www.cdc.gov/homeandrecreationalsafety/falls/adultfalls.html
[7] Allen, Kent. Deaths From Falls by Older Adults Sharply Increase. AARP. May 18, 2018. Retrieved from: https://www.aarp.org/health/conditions-treatments/info-2018/falling-deaths-surge-for-elderly.html
[8] Stevens J.A., Ballesteros M.F., Mack K.A., Rudd R.A., DeCaro E., Adler G. Gender Differences in Seeking Care for Falls in the Aged Medicare Population. American Journal of Preventive Medicine. 2012; 43:59–62.
[9] Population Reference Bureau. Fact Sheet: Aging in the United States. Retrieved from: https://www.prb.org/aging-unitedstates-fact-sheet/
[10] Burns E., Kakara R. Deaths from Falls among Persons Aged ≥65 Years — United States, 2007–2016. MMWR Morb Mortal Wkly Rep 2018; 67:509–514.
[11] Bergen G., Stevens M.R., Burns E.R. Falls and Falls Injuries Among Adults Aged ≥65 Years — United States, 2014. MMWR Morb Mortal Wkly Rep 2016; 65:993–998.
[12] Ibid.
[13] Ibid.
[14] Ibid.
[15] Cheng M.H., Chang S.F. Frailty as a Risk Factor for Falls Among Community Dwelling People: Evidence From a Meta-Analysis. Journal of Nursing Scholarship. September, 2017, 1;49(5):529-36.
[16] 2016 Data from the Behavioral Risk Factor Surveillance System (BRFSS). Retrieved from: https://www.cdc.gov/homeandrecreationalsafety/falls/fallcost/falls-by-state.html
[17] 2016 Vital Records Data Accessed via WISQARS. Retrieved from: https://www.cdc.gov/homeandrecreationalsafety/falls/fallcost/deaths-from-falls.html
[18] 2014 CMS data. Retrieved from: https://www.cdc.gov/homeandrecreationalsafety/falls/fallcost.html
[19] Florence C.S., Bergen G., Atherly A., Burns E.R., Stevens J.A., Drake C. Medical Costs of Fatal and Nonfatal Falls in Older Adults. Journal of the American Geriatrics Society, 2018 March, DOI:10.1111/jgs.15304external icon
[20] Ibid.
[21] Centers for Disease Control and Prevention. Old adult falls. Retrieved from: https://www.cdc.gov/features/falls-older-adults/index.html
[22] Burns E.R., Stevens J.A., Lee R. The Direct Costs of Fatal and Non-Fatal Falls Among Older Adults—United States. J. Saf. Res. 2016;58:99–103.
[23] Ibid.
[24] Stevens J.A., Phelan E.A. Development of STEADI: A Falls Prevention Resource for Health Care Providers. Health Promotion Practice. 2013; 14:706–14.
[25] Cheng M.H., Chang S.F. Frailty as a Risk Factor for Falls Among Community Dwelling People: Evidence From a Meta-Analysis. Journal of Nursing Scholarship. September, 2017 1;49(5):529-36.
[26] Cameron K. The Role of Medication Modification in Falls Prevention. NCOA Falls Free: Promoting a National Falls Prevention Action Plan: Research Review Papers. 2005:29-39.
[27] Iaboni A., Flint A.J. The Complex Interplay of Depression and Falls in Older Adults: A Clinical Review. The American Journal of Geriatric Psychiatry. 2013 May 1;21(5):484-92.
[28] De Jong M.R., Van der Elst M., Hartholt K.A. Drug-Related Falls in Older Patients: Implicated Drugs, Consequences, and Possible Prevention Strategies. Therapeutic Advances in Drug Safety. Aug, 2013;4(4):147-54.

[29] Graham J. More Seniors Are Dying In Falls. Doctors Could Do More To Reduce The Risk. Kaiser Health News. Jun 2019. Retrieved from: https://khn.org/news/more-seniors-are-dying-in-falls-doctors-could-do-more-to-reduce-the-risk/
[30] Qato D.M., Alexander G.C., Conti R.M., Johnson M., Schumm P., Lindau S.T. Use of Prescription and Over-The-Counter Medications and Dietary Supplements Among Older Adults in the United States. JAMA. December, 2008 24;300(24):2867-78.
[31] Freeland, Kathryn, Amy Thompson, and Yumin Zhao. "Medication Use and Associated Risk of Falling in a Geriatric Outpatient Population." Medscape. The Annals of Pharmacotherapy, 2012. Web. February 19, 2016.
[32] De Jong M.R., Van der Elst M., Hartholt K.A. Drug-Related Falls in Older Patients: Implicated Drugs, Consequences, and Possible Prevention Strategies. Therapeutic Advances in Drug Safety. August 2013;4(4):147-54.
[33] Sattin R.W., Lambert Huber D.A., Devito C.A., Rodriguez J.G., Ros A., Bacchelli S., Stevens J.A., Waxweiler R.J. The Incidence of Falls Injury Events Among the Elderly in a Defined Population. American Journal of Epidemiology. June 1990; 1;131(6):1028-37.
[34] Vellas B.J., Wayne S.J., Romero L.J., Baumgartner R.N., Garry P.J. Fear of Falling and Restriction of Mobility in Elderly Fallers. Age and Ageing 1997; 26:189–193.
[35] Cumming R.G., Salkeld G., Thomas M., Szonyi G. Prospective Study of the Impact of Fear of Falling on Activities of Daily Living, SF-36 Scores, and Nursing Home Admission. The Journals of Gerontology Series A: Biological Sciences and Medical Sciences. May 2000; 1;55(5):M299-305.
[36] Howland J., Peterson E.W., Levin W.C., Fried L., Pordon D., Bak S. Fear of Falling Among the Community-Dwelling Elderly. Journal of Aging and Health. May 1993; 5(2):229-43.
[37] Vellas B., Cayla F., Bocquet H., De Pemille F., Albarede J.L. Prospective Study of Restriction of Activity in Old People After Falls. Age and ageing. May 1987; 1;16(3):189-93.
[38] Centers for Disease Control and Prevention. Report to Congress on Traumatic Brain Injury in the United States: Epidemiology and Rehabilitation. National Center for Injury Prevention and Control. 2015:1-72.
[39] Centers for disease control and Prevention. TBI: Get the Facts. Retrieved from:: https://www.cdc.gov/traumaticbraininjury/get_the_facts.html
[40] Centers for Disease Control and Prevention. TBI-related Deaths. Retrieved from: https://www.cdc.gov/traumaticbraininjury/data/tbi-deaths.html
[41] Centers for Disease Control and Prevention. Report to Congress on Traumatic Brain Injury in the United States: Epidemiology and Rehabilitation. National Center for Injury Prevention and Control. 2015:1-72.
[42] University of Missouri. What are Evidence Based Intervention? Retrieved from: http://ebi.missouri.edu/?page_id=52
[43] Lee, D. C. A., Pritchard, E., McDermott, F., & Haines, T. P. (2014). Falls Prevention Education for Older Adults During and After Hospitalization: A Systematic Review and Meta-Analysis. *Health Education Journal*, *73*(5), 530-544.
[44] Haines, T. P., Hill, A. M., Hill, K. D., McPhail, S., Oliver, D., Brauer, S., & Beer, C. (2011). Patient Education to Prevent Falls Among Older Hospital Inpatients: A Randomized Controlled Trial. *Archives of Internal Medicine*, *171*(6), 516-524.
[45] Krauss, M. J., Tutlam, N., Costantinou, E., Johnson, S., Jackson, D., & Fraser, V. J. (2008). Intervention to Prevent Falls on the Medical Service in a Teaching Hospital. *Infection Control & Hospital Epidemiology*, *29*(6), 539-545.
[46]Lee, D. C. A., Pritchard, E., McDermott, F., & Haines, T. P. (2014). Falls Prevention Education for Older Adults During and After Hospitalization: A Systematic Review and Meta-Analysis. *Health Education Journal*, *73*(5), 530-544.
[47] Teresi, J. A., Ramirez, M., Remler, D., Ellis, J., Boratgis, G., Silver, S., & Dichter, E. (2013). Comparative Effectiveness of Implementing Evidence-Based Education and Best Practices in Nursing Homes: Effects on Falls, Quality-of-Life and Societal Costs. *International Journal of Nursing Studies*, *50*(4), 448-463.
[48] Becker, C., Kron, M., Lindemann, U., Sturm, E., Eichner, B., Walter-Jung, B., & Nikolaus, T. (2003). Effectiveness of a Multifaceted Intervention on Falls in Nursing Home Residents. *Journal of the American Geriatrics Society*, *51*(3), 306-313.
[49] Chang, J. T., Morton, S. C., Rubenstein, L. Z., Mojica, W. A., Maglione, M., Suttorp, M. J., & Shekelle, P. G. (2004). Interventions for the Prevention of Falls in Older Adults: Systematic Review and Meta-Analysis of Randomized Clinical Trials. *BMJ* 328 (7441), 680.
[50] Royal, S., Smeaton, L., Avery, A. J., Hurwitz, B., & Sheikh, A. (2006). Interventions in Primary Care to Reduce Medication Related Adverse Events and Hospital Admissions: Systematic Review and Meta-Analysis. *BMJ Quality & Safety*, 15(1), 23-31.

[51] Sperling, S., Neal, K., Hales, K., Adams, D., & Frey, D. (2005). A Quality Improvement Project to Reduce Falls and Improve Medication Management. *Home Health Care Services Quarterly*, 24(1-2), 13-28.
[52] Campbell, A. J., Robertson, M. C., Gardner, M. M., Norton, R. N., & Buchner, D. M. (1999). Psychotropic Medication Withdrawal and a Home-Based Exercise Program to Prevent Falls: A Randomized, Controlled Trial. *Journal of the American Geriatrics Society*, 47(7), 850-853.
[53] Gillespie, L. D., Gillespie, W. J., Robertson, M. C., Lamb, S. E., Cumming, R. G., & Rowe, B. H. (2003). Interventions for Preventing Falls in Elderly People. *Cochrane Database of Systematic Reviews*, (4).
[54] Growdon, M. E., Shorr, R. I., & Inouye, S. K. (2017). The Tension Between Promoting Mobility and Preventing Falls in the Hospital. *JAMA Internal Medicine*, *177*(6), 759-760.
[55] Sherrington, C., Tiedemann, A., Fairhall, N., Close, J. C., & Lord, S. R. (2011). Exercise to Prevent Falls in Older Adults: An Updated Meta-Analysis and Best Practice Recommendations. *New South Wales Public Health Bulletin*, 22(4), 78-83.
[56] Rubenstein, L. Z., Josephson, K. R., Trueblood, P. R., Loy, S., Harker, J. O., Pietruszka, F. M., & Robbins, A. S. (2000). Effects of a Group Exercise Program on Strength, Mobility, and Falls Among Falls-Prone Elderly Men. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, *55*(6), M317-M321.
[57] Lord, S. R., Menz, H. B., & Sherrington, C. (2006). Home Environment Risk Factors for Falls in Older People and the Efficacy of Home Modifications. *Age and Ageing*, *35*(Suppl_2), ii55-ii59.
[58] Gillespie, L. D., Robertson, M. C., Gillespie, W. J., Sherrington, C., Gates, S., Clemson, L. M., & Lamb, S. E. (2012). Interventions for Preventing Falls in Older People Living in the Community. *Cochrane Database of Systematic Reviews*, (9).
[59] Lord, S. R., Menz, H. B., & Sherrington, C. (2006). Home Environment Risk Factors for Falls in Older People and the Efficacy of Home Modifications. *Age and Ageing*, *35*(Suppl_2), ii55-ii59.
[60] Ruiz, S., Snyder, L. P., Rotondo, C., Cross-Barnet, C., Colligan, E. M., & Giuriceo, K. (2017). Innovative Home Visit Models Associated With Reductions In Costs, Hospitalizations, And Emergency Department Use. Health Affairs, 36(3), 425-432. doi:10.1377/hlthaff.2016.1305
[61] Department of Health and Human Services. Implementing Supplemental Benefits for Chronically Ill Enrollees. Retrieved from: https://www.cms.gov/Medicare/Health-Plans/HealthPlansGenInfo/Downloads/Supplemental_Benefits_Chronically_Ill_HPMS_042419.pdf
[62] Horton, K., Gwyer, G., & Seiler, N. (2018). Older Adults Falls- Costly But Not Inevitable. *Health Affairs.* Retrieved from: https://www.healthaffairs.org/do/10.1377/hblog20180402.25780/full/
[63] Chippendale, T., & Boltz, M. (2014). The Neighborhood Environment: Perceived Falls Risk, Resources, and Strategies for Falls Prevention. *The Gerontologist*, *55*(4), 575-583.
[64] Lockett, D., Willis, A., & Edwards, N. (2005). Through Seniors' Eyes: An Exploratory Qualitative Study to Identify Environmental Barriers to and Facilitators of Walking. *CJNR (Canadian Journal of Nursing Research)*, *37*(3), 48-65.
[65] Chippendale, T., & Boltz, M. (2014). The Neighborhood Environment: Perceived Falls Risk, Resources, and Strategies for Falls Prevention. *The Gerontologist*, *55*(4), 575-583.
[66] Li, W., Keegan, T. H., Sternfeld, B., Sidney, S., Quesenberry Jr, C. P., & Kelsey, J. L. (2006). Outdoor Falls Among Middle-Aged and Older Adults: A Neglected Public Health Problem. *American Journal of Public Health*, 96(7), 1192-1200.
[67] Chippendale, T., & Boltz, M. (2014). The Neighborhood Environment: Perceived Falls Risk, Resources, and Strategies for Falls Prevention. *The Gerontologist*, *55*(4), 575-583.
[68] Ibid.
[69] Gillespie, L. D., Robertson, M. C., Gillespie, W. J., Sherrington, C., Gates, S., Clemson, L. M., & Lamb, S. E. (2012). Interventions for Preventing Falls in Older People Living in the Community. *Cochrane Database of Systematic Reviews*, (9).
[70] Chang, J. T., Morton, S. C., Rubenstein, L. Z., Mojica, W. A., Maglione, M., Suttorp, M. J., ... & Shekelle, P. G. (2004). Interventions for the Prevention of Falls in Older Adults: Systematic Review and Meta-Analysis of Randomized Clinical Trials. *BMJ*, 328(7441), 680.
[71] Ibid.
[72] Close, J. C. (2001). Interdisciplinary Practice in the Prevention of Falls—A Review of Working Models of Care. *Age and Ageing*, 30(suppl_4), 8-12.
[73] MaineHealth. A Matter of Balance. Retrieved from: https://mainehealth.org/healthy-communities/healthy-aging/matter-of-balance
[74] A Matter of Balance: Managing Concerns about Falls. Retrieved from: http://www.mh-edu.org/events/a-matter-of-balance-master-trainer-session-hub-site/faqs-5d081c332eff47ad9749cb8fa4115ebb.aspx

[75] Medicaid.gov. Maine Waiver Factsheet. Retrieved from: https://www.medicaid.gov/medicaid/section-1115-demo/demonstration-and-waiver-list/Waiver-Descript-Factsheet/ME-Waiver-Factsheet.html
[76] National Council on Aging. Falls Free: 2015 National Falls Prevention Action Plan. Retrieved from: https://www.ncoa.org/wp-content/uploads/FallsActionPlan_2015-FINAL.pdf
[77] Hain DJ. The CMS annual wellness visit: Bridging the gap. The Nurse Practitioner. 2014 Jul 13;39(7):18-26.
[78] Centers for Medicare & Medicaid Services. Annual Wellness Visit (AWV): The Big Picture. 2017 May.
[79] Id.
[80] Camacho F, Yao N, Anderson R. The effectiveness of Medicare wellness visits in accessing preventive screening. Journal of Primary Care & Community Health. 2017 Oct;8(4):247-55.
[81] Id.
[82] National Institute of Health Osteoporosis and Related Bone Diseases National Resource Center. Osteoporosis Overview. Available from: https://www.bones.nih.gov/health-info/bone/osteoporosis/overview.
[83] Horton, K, Dwyer, G, Seiler, N. Older Adult Falls – Costly Not Inevitable. Health Affairs Blog. Available from: https://www.healthaffairs.org/do/10.1377/hblog20180402.25780/full/
[84] RAND. Falls Prevention Interventions in the Medicare Population. Available from: https://www.cms.gov/Medicare/Prevention/PrevntionGenInfo/Downloads/Falls-Evidence-Report.pdf
[85] Centers for Medicare & Medicaid Services. Health Care Innovation Round Two Project Profiles. Available from: https://innovation.cms.gov/initiatives/Health-Care-Innovation-Awards-Round-Two/Connecticut.html
[86] Szanton, S, Leff, B, Wolff, J, Roberts, L, Gitlin, A. Home-Based Care Program Reduces Disability and Promotes Aging in Place. Health Affairs. 2016 September. Available from: https://www.healthaffairs.org/doi/full/10.1377/hlthaff.2016.0140
[87] Bergen G. Falls and fall injuries among adults aged≥ 65 years—United States, 2014. MMWR. Morbidity and mortality weekly report. 2016;65.
[88] Burns E, Kakara R. Deaths from falls among persons aged≥ 65 years—United States, 2007–2016. Morbidity and Mortality Weekly Report. 2018 May 11;67(18):509.
[89] CDC. Behavioral Risk Factor Surveillance System Questionnaire. Available from: https://www.cdc.gov/brfss/questionnaires/pdf-ques/2016_BRFSS_Questionnaire_FINAL.pdf
[90] Burns E, Kakara R. Deaths from falls among persons aged≥ 65 years—United States, 2007–2016. Morbidity and Mortality Weekly Report. 2018 May 11;67(18):509.
[91] Sarmiento K, Lee R. STEADI: CDC's approach to make older adult fall prevention part of every primary care practice. Journal of Safety Research. 2017 Dec 1;63:105-9.
[92] Centers for Disease Control and Prevention, National Center for Injury Prevention and Control (d). Stopping Elderly Accidents, Deaths & Injuries (STEADI) initiative. www.cdc.gov/STEADI
[93] Tarn DM, Paterniti DA, Kravitz RL, Fein S, Wenger NS. How do physicians conduct medication reviews?. Journal of General Internal Medicine. 2009 Dec 1;24(12):1296.
[94] Burns A. Medication therapy management in pharmacy practice: core elements of an MTM service model (version 2.0). Journal of the American Pharmacists Association. 2008 May 1;48(3):341-53.
[95] Practitioners JCoP (2014). Pharmacists' patient care process. Available from: http://www.pharmacist.com/sites/default/files/files/PatientCareProcess.pdf
[96] Centers for Disease Control and Prevention, National Center for Injury Prevention and Control (d). Fact sheet: SAFE Medication Review Framework. Available from: https://www.cdc.gov/steadi/pdf/STEADI-FactSheet-SAFEMedReview-508.pdf
[97] Casey CM, Parker EM, Winkler G, Liu X, Lambert GH, Eckstrom E. Lessons learned from implementing CDC's STEADI falls prevention algorithm in primary care. The Gerontologist. 2016 Apr 29;57(4):787-96.
[98] Parker E, Lee R, Floyd F, Roma A, Talbut B, Moss H, Ory MG, Smith ML. Making older adult fall prevention part of routine care in a large health system in New York state. The Gerontologist. 2015 Nov 1;55(suppl 2):320.
[99] Johnson YA, Bergen G, Bauer M, Parker EM, et al. Implementation of the Stopping Elderly Accidents, Deaths, and Injuries Initiative in Primary Care: An Outcome Evaluation. The Gerontologist. 2018.
[100] Burns ER. Stevens JA. Lee R. The direct costs of fatal and non-fatal falls among older adults-Unites States. Journal of Safety Research. 2016; 58:99-103.
[101] Qato DM, Wilder J, Schumm LP, Gillet V, Alexander GC. Changes in prescription and over-the-counter medication and dietary supplement use among older adults in the United States, 2005 vs 2011. JAMA Internal Medicine. 2016 Apr 1;176(4):473-82.
[102] Total drug prescriptions dispensed U.S. 2009-2018 | Statista. Available from: http://www.statista.com/statistics/238702/us-total-medical-prescriptions-issued/
[103] U.S. and World Population Clock. Available from: https://www.census.gov/popclock/

[104] Haddad YK, Luo F, Karani MV, Marcum ZA, Lee R. Psychoactive medication use among older community-dwelling Americans. Journal of the American Pharmacists Association. 2019 Jun 14.
[105] US Food and Drug Administration. In vitro metabolism and transporter-mediated drug-drug interaction studies. Guidance for industry. 2017.
[106] Shenoy P, Harugeri A. Elderly patients' participation in clinical trials. Perspectives in Clinical Research. 2015 Oct;6(4):184.
[107] Zulman DM, Sussman JB, Chen X, Cigolle CT, Blaum CS, Hayward RA. Examining the evidence: a systematic review of the inclusion and analysis of older adults in randomized controlled trials. Journal of General Internal Medicine. 2011 Jul 1;26(7):783-90.
[108] Zulman DM, Sussman JB, Chen X, Cigolle CT, Blaum CS, Hayward RA. Examining the evidence: a systematic review of the inclusion and analysis of older adults in randomized controlled trials. Journal of General Internal Medicine. 2011 Jul 1;26(7):783-90.
[109] Juurlink DN, Mamdani MM, Lee DS, Kopp A, Austin PC, Laupacis A, Redelmeier DA. Rates of hyperkalemia after publication of the Randomized Aldactone Evaluation Study. New England Journal of Medicine. 2004 Aug 5;351(6):543-51.
[110] National Institute on Aging [Internet]. New NIH inclusion policy promises better representation of research participants across the age spectrum; 2019 March 20. Retrieved from: https://www.nia.nih.gov/research/blog/2019/03/new-nih-inclusion-policy-promises-better-representation-research-participants
[111] National Council on Aging. Debunking the Myths of Older Adult Falls. Retrieved from: https://www.ncoa.org/healthy-aging/falls-prevention/preventing-falls-tips-for-older-adults-and-caregivers/debunking-the-myths-of-older-adult-falls/
[112]Administration for Community living. Falls Prevention: Background and Goals; 2019. Retrieved from: https://acl.gov/programs/health-wellness/falls-prevention
[113] National Council on Aging. Evidence-Based Falls Prevention Programs. Available from: https://www.ncoa.org/healthy-aging/falls-prevention/falls-prevention-programs-for-older-adults-2/
[114] Burns ER. Stevens JA. Lee R. The direct costs of fatal and non-fatal falls among older adults-Unites States. Journal of Safety Research. 2016; 58:99-103.
[115] Bipartisan Policy Center. Healthy Aging Begins at Home. 2016 May. Available from: https://bipartisanpolicy.org/wp-content/uploads/2019/03/BPC-Healthy-Aging.pdf
[116] Gallo, G. Bipartisan Policy Center Releases Report: Highlighting Housing and Health Care Troubles Facing American Seniors. National Council of State Housing Agencies: Bipartisan Policy Center, National Council of State Housing Agencies: 2016 May 24. Available from: https://www.ncsha.org/blog/bipartisan-policy-center-releases-report-highlighting-housing-and-health-care-troubles-facing-american-seniors/
[117] US Department of Housing and Urban Development. Overcoming Obstacles to Effective Senior Falls Prevention and Coordinated Care. Available from: https://www.hud.gov/sites/documents/SENIORFALLS_TOOLKIT.PDF
[118] Office of Policy Development and Research. Aging in Place: Facilitating Choice and Independence. Available from https://www.huduser.gov/portal/periodicals/em/fall13/highlight1.html
[119] AARP. Section 202 Supportive Housing for the Elderly. 2016 Mar. Available from: https://www.aarp.org/home-garden/housing/info-2006/fs65r_housing.html
[120] United States Committee on Appropriations. FY2019 THUD Appropriations Act, S.3023. Available from: https://www.appropriations.senate.gov/imo/media/doc/FY2019%20THUD%20Appropriations%20Act,%20S.3023.pdf
[121] HUD EXCHANGE. Veterans Housing Rehabilitation and Modification Pilot Program Summary. Available from https://www.hudexchange.info/programs/rural/veterans-housing-rehabilitation-and-modification-pilot-program/
[122] Administration for Community Living. Healthy Steps for Older Adults (HSOA) Program Description. Available from: https://acl.gov/sites/default/files/programs/2017-03/HSOA-Intervention-Summary-Report.pdf; Pitt Public Health, Center for Aging and Population Health. Pennsylvania's Healthy Steps in Motion Falls Prevention Program Receives Evidence-Based Approval. 2019 Mar. Available from: https://www.caph.pitt.edu/pennsylvanias-healthy-steps-in-motion-falls-prevention-program-receives-evidence-based-approval/
[123] Albert, S. M., Raviotta, J., Lin, C. J., Edelstein, O., & Smith, K. J. (2016). Cost-effectiveness of a statewide falls prevention program in Pennsylvania: healthy steps for older adults. *American Journal of Managed Care*, *22*(10), 638-644.
[124] Albert, S. M., King, J., Boudreau, R., Prasad, T., Lin, C. J., & Newman, A. B. (2014). Primary prevention of falls: Effectiveness of a statewide program. *American Journal of Public Health*, 104(5), e77–e84. PubMed abstract Available from http://www.ncbi.nlm.nih.gov/pubmed/24625164

[125] Albert, S. M., Raviotta, J., Lin, C. J., Edelstein, O., & Smith, K. J. (2016). Cost-effectiveness of a statewide falls prevention program in Pennsylvania: healthy steps for older adults. *American Journal of Managed Care*, *22*(10), 638-644.
[126] Pennsylvania Department of Aging. Healthy Steps in Motion. Available from: https://d2mkcg26uvg1cz.cloudfront.net/wp-content/uploads/Healthy-Steps-in-Motion-Program-Summary.pdf
[127] Pitt Public Health, Center for Aging and Population Health. Pennsylvania's Healthy Steps in Motion Falls Prevention Program Receives Evidence-Based Approval. 2019 Mar. Available from: https://www.caph.pitt.edu/pennsylvanias-healthy-steps-in-motion-falls-prevention-program-receives-evidence-based-approval/
[128] Ibid.
[129] Belza, Basia, Anne Shumway-Cook, Elizabeth A. Phelan, Barbara Williams, Susan J. Snyder, and James P. LoGerfo. "The effects of a community-based exercise program on function and health in older adults: The EnhanceFitness Program." *Journal of Applied Gerontology* 25, no. 4 (2006): 291-306.
[130] Healthy Living for Me. Creating a Healthier Maine: Healthy Living for ME's Evidence-Based Programs. Available from: https://www.healthylivingforme.org/Programs
[131] Injury-Free NC. About Page. Available from: http://www.injuryfreenc.org/about/
[132] Ohio Department of Aging. STEADY U Ohio Partners. Available from: https://aging.ohio.gov/Portals/0/PDF/STEADYUPartners.pdf
[133] Ohio Department of Aging. It Takes Everyone, Make Your Business A Falls-Free Zone. Available from: https://aging.ohio.gov/steadyu#64820-businesses
[134] Centers for Disease Control and Prevention, STEADI (Stopping Elderly Accidents, Deaths, and Injuries) Initiative for Health Care Providers. Electronic Health Record System Adopts STEADI Algorithm to Prevent Older Adult Falls. 2016 Oct. Available from: https://www.cdc.gov/steadi/stories/ehrs.html
[135] U.S. Department of Veterans Affairs. VA Technical Reference Model v 19.8, CareView Clinical Safety System. Available from: https://www.oit.va.gov/services/trm/toolpage.aspx?tid=11402
[136] CareView Communications. Virtual Rails. Available from: http://www.careviewinc.com/our-solutions/virtual-rails/
[137] Eisman, J. A., Bogoch, E. R., Dell, R., Harrington, J. T., McKinney Jr, R. E., McLellan, A., ... & ASBMR Task Force on Secondary Fracture Prevention. (2012). Making the first fracture the last fracture: ASBMR task force report on secondary fracture prevention. *Journal of Bone and Mineral Research*, *27*(10), 2039-2046.
[138] Apple, Inc. Use fall detection with Apple Watch. Available from: https://support.apple.com/en-us/HT208944; Philips Lifeline. GoSafe. Available from: https://www.lifeline.philips.com/medical-alert-systems/gosafe.html; Fall Call Solutions. Webpage. Available from: https://www.fallcall.com/; Starkey Hearing Technologies. The first and only hearing aid with fall detection and alerts. 2019 Mar. Available from: https://www.starkey.com/blog/2019/03/Fall-detection-technology-in-a-hearing-aid
[139] Lovett, L. Vayyar launches Walabot Home for Fall detection: Walabot Home uses low-powered radio waves to monitor a user's movements and can alert a family member if a fall is detected. MobiHealthNews: 2018 Oct. Available from: https://www.mobihealthnews.com/content/vayyar-launches-walabot-home-fall-detection
[140] Best Buy. Webpage, Care that Brings Families Together. Available from: https://www.bestbuy.com/site/services/assured-living/pcmcat1497550757159.c?id=pcmcat1497550757159&ref=199&loc=TnL5HPStwNw&acampID=1&siteID=TnL5HPStwNw-BcCQMzD0LbXtixRBPLcIvw
[141] SafelyYou letter to Committee
[142] Kardian. Webpage. Available from: http://kardian.com/
[143] Jefferson, R. S. Silicon Valley's Answer to Preventing Falls. Forbes: 2017 Sep. Available from: https://www.forbes.com/sites/robinseatonjefferson/2017/09/22/silicon-valleys-answer-to-preventing-falls/#38f31a2b1903; Westle, M. B., Burkert, G. R., & Paulus, R. A. Reducing Inpatient Falls and Injury Rates by Integrating New Technology with Workflow Redesign. *New England Journal of Medicine: Catalyst:* 2019 May. Available from:https://catalyst.nejm.org/reducing-inpatient-falls-virtual-sitter/