Prevention Program Lowered The Risk Of Falls And Decreased Claims For Long-Term Services Among Elder Participants

ABSTRACT The LIFT (Living Independently and Falls-free Together) Wellness Program is a multifactorial fall-prevention intervention developed for community-dwelling elders. Its effectiveness was tested in a randomized controlled trial of consenting people who were ages seventy-five and older and who held long-term care insurance policies with one of three major insurers. The study was conducted during 2008–12. In the first year following the intervention, participants in the intervention group had an 11 percent reduction in risk of falling and an 18 percent reduction in risk of injurious falls, compared to participants in the active control group. In the three years after the intervention, participants in the intervention group had a significantly (33 percent) lower incidence of claims for long-term services and supports than those in the administrative control group, for an estimated return of $1.68 on every dollar invested in program delivery. The results of this evaluation are unique in demonstrating that a multifactorial fall prevention program can do more than reduce falls in this population; they suggest that the broader availability of LIFT could benefit long-term care insurers and policyholders alike.

Roughly one-third of people ages sixty-five and older living in the community and up to 75 percent of those living in institutional settings fall at least once a year. Among people ages seventy-five and older, those who fall are four to five times more likely than others to be admitted to a long-term care facility for a year or longer. Therefore, people who experience a fall are more likely than others to have higher associated costs for acute care and for long-term services and supports.

The range of additional health costs among seniors who fell was from $3,500 for a fall without a serious injury to $27,000 for a fall with such an injury, in 2010 dollars ($3,925 and $30,270, respectively, in 2014 dollars). The Centers for Disease Control and Prevention (CDC) asserts that based on inflation adjustments for a 2006 study, direct fall-related medical costs for people ages sixty-five and older in the United States were $34 billion in 2013. As the population ages, cost-effective interventions that reduce the risk of falls could have important positive financial and quality of life implications for those who are at risk of falling, their families, and the US health care system.

Several fall prevention programs have been studied. However, few studies have examined such programs’ impact on the use and cost of long-term services and supports. Recognizing this, in 2004 the Office of the Assistant Secretary...
for Planning and Evaluation in the Department of Health and Human Services contracted with the authors to design and implement a multifactorial fall prevention intervention and evaluate the intervention’s impact on the use and cost of long-term services and supports and acute care services among people with long-term care insurance. The intervention was called the LIFT (Living Independently and Falls-free Together) Wellness Program. Enrollment in the program began in 2008.

In this article we report on the results of the LIFT Wellness Program and address the following primary research questions: Did the intervention reduce the rate of falls? Did it reduce the risk of falling? What was its impact on claims for long-term services and supports? Were there any observed differences in claims rates and expenditures in the following three years as a result of changes in fall-related injury claims?

Study Data And Methods

STUDY DESIGN AND SUBJECTS A quota sampling trial design was used to test the effectiveness of the intervention among a community-dwelling population of people ages seventy-five and older who had private long-term care insurance but who were not receiving claims payments for long-term services and supports. Three long-term care insurers provided a population from which to recruit the sample. Study participants had to have held their insurance policy for at least five years, so that in terms of health status, they might more closely resemble a general population of the same age than would new buyers of long-term care insurance. All participants provided informed consent and signed authorizations for the study.

Study enrollment began in 2008 and concluded in 2011. Participants from two of the three insurers were enrolled concurrently, and those from the third insurer were enrolled later.

Participants were randomly assigned to one of three groups: an intervention group (n = 2,839), an active control group (n = 2,471), and an administrative control group (n = 1,919). Of the participants assigned to each group, 1,813 in the intervention group, 2,025 in the active control group, and 1,919 in the administrative control group received their allocated intervention. A flowchart that provides details of the group breakdown can be found in the online Appendix.

The assignment to any group was always “blind.” However, the probability of assignment to a particular group was intermittently modified to ensure reaching target analysis numbers that compensated for attrition prior to completion of the follow-up period.

We hypothesized that quarterly data collection during the follow-up period might influence the behavior of the active control group. Therefore, we created a second control group, the administrative control group. This consisted of people who had no additional contact with study staff after agreeing to participate in the program. The insurance companies provided claims experience data for all three groups, to permit accurate comparisons of long-term services and supports utilization.

DATA COLLECTION PROTOCOLS Participants in the intervention and active control groups received an initial baseline assessment by telephone, which gathered information on demographic characteristics, exercise, and fall history.

People in the intervention group subsequently received a comprehensive, in-home clinical assessment conducted by a registered nurse—the first step in the intervention. This assessment gathered an in-depth fall history and health and medication information, including information about functional capacities. The nurse also examined environmental (home) risk factors and performed physical screens that tested participants’ gait and balance.

Participants in the intervention and active control groups were interviewed at three-month intervals over the course of one year. The interview questions that are germane to this analysis pertain to reports of any falls or changes in fall risk factors during the preceding three-month period, and of changes to the home environment that were related to fall safety. Participants had been provided with a fall diary to aid their recall about falls. Additional questions assessed changes in exercise history and medications, among other things. A stipend of $50 was provided to each member of the intervention and active control groups to encourage retention during this follow-up activity. Follow-ups concluded in 2012.

Insurance companies provided cost and utilization data for long-term services and supports for the intervention, active control, and administrative control groups for three years after the intervention. Data files obtained from the companies contained information on whether or not claims for long-term services and supports were paid and where they were paid, and associated claim-cause diagnosis codes. The latter enabled us to identify fall-related claims.

THE INTERVENTION The fall prevention intervention consisted of four components, described below. The initial three were conducted sequentially over a six-week period. All components were delivered between 2008 and 2011. (For
more detailed information about each component, see the Appendix.\(^\text{10}\)

**Clinical Assessment:** A nurse performed an in-home assessment, as described in the “Data Collection Protocols” section above.

**Customized Recommendations and Education:** Study nurses used the data collected during the assessment to create an action plan for each participant. The plan, which was mailed to each participant, documented specific fall risk factors and provided recommendations for minimizing fall risk. Participants also received a fall prevention and wellness tool kit.

Each participant’s primary care physician also received the results of assessment tests and a guide explaining how to interpret the results and their implications. The document served as an easy-to-navigate summary of the specific fall-related issues faced by the participant.

**Coaching Call:** Within two weeks of the delivery of the action plan, a nurse conducted a follow-up call with the participant and reviewed the assessment findings and recommendations. Additional education and coaching occurred during the call, and participants were encouraged to set up a follow-up appointment with their primary care physician to discuss contents of the action plan—both findings and suggestions.

**Quarterly Newsletter:** A newsletter was mailed to participants quarterly for a period of one year. It provided additional coaching and education about fall prevention, along with suggestions and tips for implementing fall-mitigating behaviors.

**Analysis** The variable used to identify participants who had fall events was a dichotomous outcome—a yes-or-no answer to the question: “Since our last call have you had one or more episodes of fainting, falling or dropping to the ground, passing out or have you lost your balance or tripped over something that resulted in falling or dropping to the ground?”

This question regarding falls differed slightly from that recommended by the Prevention of Falls Network Europe, which asks, “In the past month, have you had any fall including a slip or trip in which you lost your balance and landed on the floor or ground or lower level?”\(^\text{11}\) In contrast, fainting and passing out were included in the definition used in our study. Participants were additionally asked a follow-up question to identify the cause of the fall.

With regard to the insurance companies’ data files, we relied on the Agency for Healthcare Research and Quality’s diagnostic classification to discern fall-related and non-fall-related claim causes.\(^\text{12}\)

The rate of falls was calculated as the total number of falls per unit of person-time that falls were monitored. In the “Study Results” section we present the rate ratio, which compared the rate of falls in the intervention and active control groups during the study period. The risk of falling was a dichotomous outcome defined by whether or not someone fell. If a participant reported a fall, we also assessed whether a fall was injurious by asking the question “Did you sustain any injury?” This, too, was a dichotomous outcome.

The findings for both risk of falling and risk of injurious falls are presented using a relative risk ratio. For all fall-related analyses we compared the intervention group to the active control group.

The probability of needing long-term services and supports increases with age. However, annual claim incidence rates among long-term care insurance policyholders age eighty-one (the average age of the study participants) are typically below 3 percent.\(^\text{13}\) To increase our ability to determine whether any observed differences in claim rates between those receiving the LIFT program and those receiving no intervention were significant, we focused on the three-year period following the completion of the intervention. To look at the effect of the intervention on costs of long-term services and supports, we considered both claims incidence rates and claims costs.

In our claims analysis we focused on the differences in outcomes between the intervention and the administrative control groups. This enabled us to eliminate the contact bias that could result from the collection of data during the quarterly calls to the active control group.

The claims incidence rate for each of the three groups was defined as the number of people who received at least one claims payment during the three years after the intervention, divided by the number of people exposed to the claims risk during the same period. Claims costs were calculated using data for each participant provided by the insurer.

To validate our randomization procedure, we compared demographic and health and fall history data for the intervention and active control groups, to ensure that there were no significant differences at baseline. Tests of sample attrition were also performed to ensure that no significant differences existed between those who dropped out of the intervention group and those who dropped out of the active control group. For results from these analyses and more detailed explanations of the analytical techniques used, see the Appendix.\(^\text{10}\)

**Limitations** The current study has certain limitations, the most important of which is the unique nature of the sample. We found that the
intervention had positive effects on key outcome variables. However, we cannot know for certain whether the level of compliance with recommendations would be the same in other populations. Moreover, the study population was particularly healthy, given its average age of eighty-one. In addition, we do not know whether the program would be more or less effective with community-dwelling elders who had less favorable health status.

A second concern is the difference between our definition of falls and that used by the Prevention of Falls Network Europe. Our analysis showed that only 6 percent of falls were a result of fainting or passing out; the remaining 94 percent were within the network’s definition. Thus, we believe that the fall events identified by the two definitions are very similar and that it is possible to compare our results with those of other studies.

The optimal approach to data gathering is using daily calendars that are returned monthly for at least a year.14 However, we did not believe that using this somewhat burdensome approach would be feasible with our study population. We opted instead for a less frequent approach to data gathering that would cover a longer period. This made it more likely that participants’ recall would be inaccurate, but it should not affect cross-sample comparisons. The Cochrane Review of falls interventions indicated that 50 percent of studies included in the review used retrospective gathering of falls data.14

Study Results

FALL RATES AND RISK OF FALLING In all follow-up periods, participants in the intervention group had a significantly lower (p<0.05) rate of falls than those in the active control group. At the three-month follow-up, participants in the intervention group had 0.72 (95% confidence interval: 0.60, 0.87) times the rate of falls of participants in the active control group. At the six- and nine-month follow-ups, we observed rate ratios of 0.79 (95% CI: 0.69, 0.91) and 0.80 (95% CI: 0.71, 0.89), respectively. The intervention effects persisted at the one-year follow up, when participants in the intervention group had 0.87 (95% CI: 0.79, 0.96) times the rate of falls, compared to those in the active control group.

After one year, participants in the intervention group had an 11 percent reduction in risk of falling compared to those in the active control group (relative risk: 0.89; p<0.1) (Exhibit 1). This represents a strong shrinking of the effect compared to after nine months, when the reduction was 22 percent (relative risk: 0.78; p<0.05).

Finally, the risk of injurious falls was also significantly lower (p<0.05) for the intervention group than for the active control group at six, nine, and twelve months after the intervention. After one year, for example, the relative risk for people in the intervention group was 18 percent lower than for people in the active control group (Exhibit 1).

Also after one year, 10.9 percent of participants in the intervention group had reported a fall that required medical attention, compared to 13.6 percent in the active control group (data not shown). This was a significant decrease (p<0.05) that persisted throughout the study period.

LONG-TERM SERVICES AND SUPPORTS COSTS

The following presentation of results pertain to the intervention and administrative control groups. Results from the active control group are presented in Exhibit 2 but not discussed in the text because of the potential of contact biases from data-gathering calls, as discussed above. A further discussion of findings from the active control group compared to the other two groups can be found in the Appendix.10 Demographic information and claims types (for example, for nursing home, assisted living, and home care) indicated that the three groups did not differ in composition.10

As noted above, annual claim incidence rates are low in general among people who have long-term care insurance and are the age of our study population. Fall-related claim incidence rates are particularly low. Thus, we used a three-year evaluation period. During that period, the intervention group had a claim incidence rate that was 33 percent lower than that of the administrative control group (4.9 percent versus 7.3 percent; p<0.05) (Exhibit 2). Although fall-related claim rates were lower for the intervention group than for the administrative control group, this differ-

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<td><strong>Risks Of Falling Or Injurious Falling For Participants In The LIFT Intervention Group And Active Control Group, By Follow-Up Quarter</strong></td>
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**Source**: Authors’ analysis. **Note**: CI is confidence interval.
ence was not significant. Given the low fall-related incidence rate during the period, if a significant difference existed, our sample likely did not have adequate statistical power to detect it.

The average all-cause claims cost per claimant was $32,584 for participants in the intervention group and $36,884 for those in the administrative control group. These differences were not significant. Thus, in subsequent analyses we conservatively used the average claims cost ($34,734) across both groups to evaluate aggregate program financial impacts.

As a result of the decreased claims incidence rate in the intervention group, there was a significant difference \((p < 0.05)\) between three-year per participant costs in that group and the administrative control group (Exhibit 3). The gross savings on long-term services and supports for each participant in the intervention group was $838 over the three-year period. When we removed the estimated $500 deployment charge of the intervention (for details regarding the derivation of this amount, see the Appendix),\(^\text{10}\) we found that the net savings were $338 per participant. In other words, every $1.00 invested in the intervention led to $1.68 in savings on long-term services and supports.

### Discussion

The multifactorial LIFT falls prevention intervention tested on elderly policyholders of long-term care insurance reduced the rate of falls and number of fallers, leading to lower all-cause long-term care claim rates. All told, the intervention saved more money than it cost to deliver. Its impact was strongest in reducing all-cause claims for long-term services and supports.

The incidence of fall-specific claims during the study period was very low, which makes it difficult to draw any conclusions about the effect the program might have had exclusively on falls claims. Claims savings for long-term services and supports resulted primarily from lower all-cause claim incidence instead of from a decrease in the cohort’s costs per claim.

In addition to its focus on falls, the intervention included a comprehensive assessment that covered a broad range of health and wellness issues. This information was shared with the participant and his or her physician; to enhance the engagement and empowerment of participants, both parties were encouraged to discuss the results and recommendations. Even excluding the value associated with improved quality of life and potential impacts on acute care spending, the program had a positive return on investment when viewed against reductions in three-year costs for long-term services and supports.

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**Exhibit 2**

**Three-Year Fall-Related And Non-Fall-Related Claims Incidence Rates For The LIFT Intervention Group, Active Control Group, And Administrative Control Group**

```plaintext
\[ \text{Exhibit 2} \]
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**Source**: Authors’ analysis.

**Exhibit 3**

**Three-Year Claim Costs Per Participant In The LIFT Intervention Group And Administrative Control Group, And Savings From The Intervention**

```plaintext
\[ \text{Exhibit 3} \]
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**Source**: Authors’ analysis. **Note**: LTSS is long-term services and supports.

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Our findings on falls are consistent with those documented in the Cochrane Review on falls studies, which found that many multifactorial interventions significantly reduced the rate of falls.\(^\text{14}\) The review could not confirm that such interventions significantly reduced the risk of falling. However, our evaluation of the LIFT intervention found a 22 percent reduction in risk after nine months and an 11 percent reduction after one year.

The comprehensive review of intrinsic and extrinsic risk factors and associated recommendations ensured that a variety of potentially beneficial actions were presented to participants. These ranged from suggestions about the instal-
loration of bathroom safety equipment and other in-home modifications to encouraging active participation in wellness activities such as exercise programs, dietary changes, doctor consultations leading to therapy, and reexaminations of medication regimens. Sending the key findings from the in-person assessment to the physician might have increased the likelihood that the participant would act on some of the recommendations. We believe that the combination of nurse follow-up by telephone and physician engagement educated both the physician and the participant and provided guidance on improving wellness.

Much of the information collected for the LIFT intervention was directly relevant to the management of a variety of medical, functional, and cognitive issues. The evidence presented here suggests that the intervention had an impact on conditions that were unrelated to falls but that were potentially related to increased risk of functional dependency—which is the primary factor associated with the need for long-term services and supports. In an aging population that is likely to have multiple chronic conditions, an in-home visit by a nurse using a comprehensive, instead of a narrowly defined, assessment protocol for the purposes of developing a care plan to mitigate risk and fill care gaps might be particularly effective.

The data on claims incidence rates suggest that calls to gather data might have a beneficial effect: Participants in the intervention and active control groups, who received such calls, had lower claims rates than those in the administrative control group, who did not receive such calls. These research-based calls might have prompted participants to assess what they could do independently to improve their overall wellness. At the very least, the calls might have raised participants’ awareness of their fall risk.

The fall risk data show a tapering of effects from the nine-month to the twelve-month follow-up, which suggests that implementing “booster” interventions might increase the longevity of the impacts. “Booster” interventions could include additional follow-up calls from a nurse to monitor action plan implementation, setting up appointments for participants with physicians to ensure that recommendations are implemented, and continued education and coaching about risk mitigation actions related to home safety. The data might also suggest more intensive follow-up with the physician to ensure that the implications of the assessment findings are understood, discussed, and acted upon.

Over the past few years a growing number of companies have been increasing their premiums on policies already in force. That (among other things) reduced falls could allow companies to offer smaller rate increases to policyholders who voluntarily participated in the program. Such a program could also be required by insurers as a way to decrease their expenditures for long-term services and supports, thus helping mitigate the need for rate increases. Finally, such a program might be perceived by participants as an added benefit to existing policies, increasing satisfaction. When we deployed the LIFT intervention with another population after the study period, we found that there was a 96 percent satisfaction rate among participants and that 95 percent of them would recommend it to others.

The positive impacts from the LIFT intervention might be generalizable to other community-dwelling elders, although further research would be necessary to validate this. The intervention’s components are clearly applicable to elders in general. However, the willingness to follow recommendations and undertake behavioral change to reduce risks and enhance wellness, along with the magnitude of benefits gained from these changes, might be different among elders in general, compared to our study population—which had a relatively high socioeconomic status. For example, it is possible that a smaller proportion of the general elderly population might make an appointment with a primary care physician. Physician engagement was a key factor in helping ensure that changes suggested by the action plan were implemented.

Another pronounced difference between the sample and the general elderly population might be in the ability to afford recommended home modifications beyond Medicare-covered bathroom safety devices. Such devices are covered by Medicare if they are recommended by the physician, which minimizes the extent of this wealth disparity.

The major benefit of the intervention might lie in its potential to provide increased independence to participants. Currently, more than seven million people in the United States have private long-term care insurance policies. Many of these people purchased their policy so that they could access the services necessary to help them age in place, even if they required long-term services and supports to compensate for functional or cognitive disabilities. LIFT and similar programs could be offered on a voluntary basis to people who have such coverage as a way to help them preserve independence by reducing fall risk and health complications from falls, thus enabling them to age in place. Experience in marketing the LIFT intervention suggests that 30–40 percent of policyholders agree to enroll in it.
Conclusion
This study of the LIFT Wellness Program is unique in demonstrating that a multifactorial fall prevention intervention—based on assessment, tailored care (action) plans, physician involvement, education and coaching, and ongoing contact—can be effective in reducing falls and long-term services and supports claim rates for community-dwelling long-term care policyholders ages seventy-five and older. Broad deployment of LIFT by private long-term care insurers as a voluntary program for policyholders could reduce falls and claims incidence rates, provide financial benefit to long-term care insurers, and enhance elders’ ability to age in place. Further study is warranted to examine the generalizability of these findings to additional segments of the community-dwelling elderly population.

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NOTES
10 To access the Appendix, click on the Appendix link in the box to the right of the article online.
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