ORIGINAL ARTICLE

Effect of Dissemination of Evidence in Reducing Injuries from Falls

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ABSTRACT

BACKGROUND

Falling is a common and morbid condition among elderly persons. Effective strategies to prevent falls have been identified but are underutilized.

METHODS

Using a nonrandomized design, we compared rates of injuries from falls in a region of Connecticut where clinicians had been exposed to interventions to change clinical practice (intervention region) and in a region where clinicians had not been exposed to such interventions (usual-care region). The interventions encouraged primary care clinicians and staff members involved in home care, outpatient rehabilitation, and senior centers to adopt effective risk assessments and strategies for the prevention of falls (e.g., medication reduction and balance and gait training). The outcomes were rates of serious fall-related injuries (hip and other fractures, head injuries, and joint dislocations) and fall-related use of medical services per 1000 person-years among persons who were 70 years of age or older. The interventions occurred from 2001 to 2004, and the evaluations took place from 2004 to 2006.

RESULTS

Before the interventions, the adjusted rates of serious fall-related injuries (per 1000 person-years) were 31.2 in the usual-care region and 31.9 in the intervention region. During the evaluation period, the adjusted rates were 31.4 and 28.6, respectively (adjusted rate ratio, 0.91; 95% Bayesian credibility interval, 0.88 to 0.94). Between the preintervention period and the evaluation period, the rate of fall-related use of medical services increased from 68.1 to 83.3 per 1000 person-years in the usual-care region and from 70.7 to 74.2 in the intervention region (adjusted rate ratio, 0.89; 95% credibility interval, 0.86 to 0.92). The percentages of clinicians who received intervention visits ranged from 62% (131 of 212 primary care offices) to 100% (26 of 26 home care agencies).

CONCLUSIONS

Dissemination of evidence about fall prevention, coupled with interventions to change clinical practice, may reduce fall-related injuries in elderly persons.

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Fall-related injuries are among the most common, morbid, and expensive health conditions involving older adults.[1-5] Falls account for 10% of emergency department visits and 6% of hospitalizations among persons over the age of 65 years and are major determinants of functional decline, nursing-home placement, and restricted activity.[6-9]

The rate of falling rises after the age of 70 years.[1,2,4] Several factors — such as postural hypotension, the use of multiple medications, and impairments in cognition, vision, balance, gait, and strength — increase the risk of falling and fall injuries.[1,2,4,5] Risk increases as the number of these factors increases.[1,4,5] Randomized, controlled trials support the effectiveness of multicomponent fall-prevention strategies in reducing these risks.[10,11]

The voluntary Physician Quality Reporting Initiative (PQRI) of the Centers for Medicare and Medicaid Services (CMS) includes an assessment for the risk of falls.[12] The Joint Commission on the accreditation of health care organizations and the Medicare Payment Advisory Commission mandate attention to the prevention of falls.[13,14]

Despite evidence and mandates, falls remain largely ignored in clinical practice.[15] Furthermore, data are lacking on whether fall prevention is effective in the fragmented environment in which older Americans receive their health care. The components of the assessment and management of fall-related risk factors are under the purview of physicians, rehabilitation specialists, home care agencies, and other clinicians practicing in different settings under varying incentives and reimbursement mechanisms.[16] Several groups have called for improving the transfer of evidence from randomized, controlled trials into practice.[17-19] Reported barriers to incorporating evidence about fall prevention into practice include ignorance about falling as a preventable condition, competing time demands, a perceived lack of expertise, insufficient reimbursement, and inadequate referral patterns among clinicians. Factors that were reported to facilitate fall prevention included efforts to market new services and to develop referral networks.[16,20]

The Connecticut Collaboration for Fall Prevention (CCFP) encouraged clinicians and facilities to incorporate evidence from the Yale-based Frailty and Injuries: Cooperative Studies of Intervention Techniques (FICSIT) study and other trials into their practice.[10,11,20-25] The aim of our study was to compare the rates of serious fall-related injuries and the fall-related use of medical services among persons who were 70 years of age or older in the CCFP intervention and usual-care regions.

Methods

Setting and Design

We used a nonrandomized design to compare two regions in Connecticut.[26] We chose ZIP Code tabulation areas (ZCTAs; bounded areas that correspond to ZIP Codes) as the experimental units to maintain the anonymity of persons living in the regions while ensuring an adequate number of sampling units.[27] Anonymity was necessary because informed consent was not feasible. Clinicians and facilities in the two regions were identified through professional-licensing databases operated by the Connecticut Department of Public Health. Other than the CCFP project, there were no coordinated fall-prevention efforts under way before or during the study period in either the intervention region or the usual-care region. The study was approved by the Human Investigation Committee at Yale School of Medicine. The committee understood and agreed that informed consent was not required from the participating practitioners and patients.

Intervention Region

The intervention region included the 58 ZCTAs encompassing Hartford and surrounding towns (Fig. 1).[26] The region has 212 primary care offices (with 522 primary care clinicians, who were defined as family practice physicians, internists, physician assistants, and advanced practice nurses who self-identified in the professional-licensing database as providing primary care), 133 outpatient rehabilitation facilities, 26 home care agencies, 7 acute care hospitals with emergency departments, and 41 senior centers.

Usual-Care Region

We chose the usual-care region, which comprised 53 ZCTAs in southern Connecticut, to maximize the comparability of results with those in the intervention region (Fig. 1).[26] The usual-care region was similar to the intervention region in size and sociodemographic characteristics of the population of persons who were 70 years of age or older (Table 1), in preintervention rates of fall-related

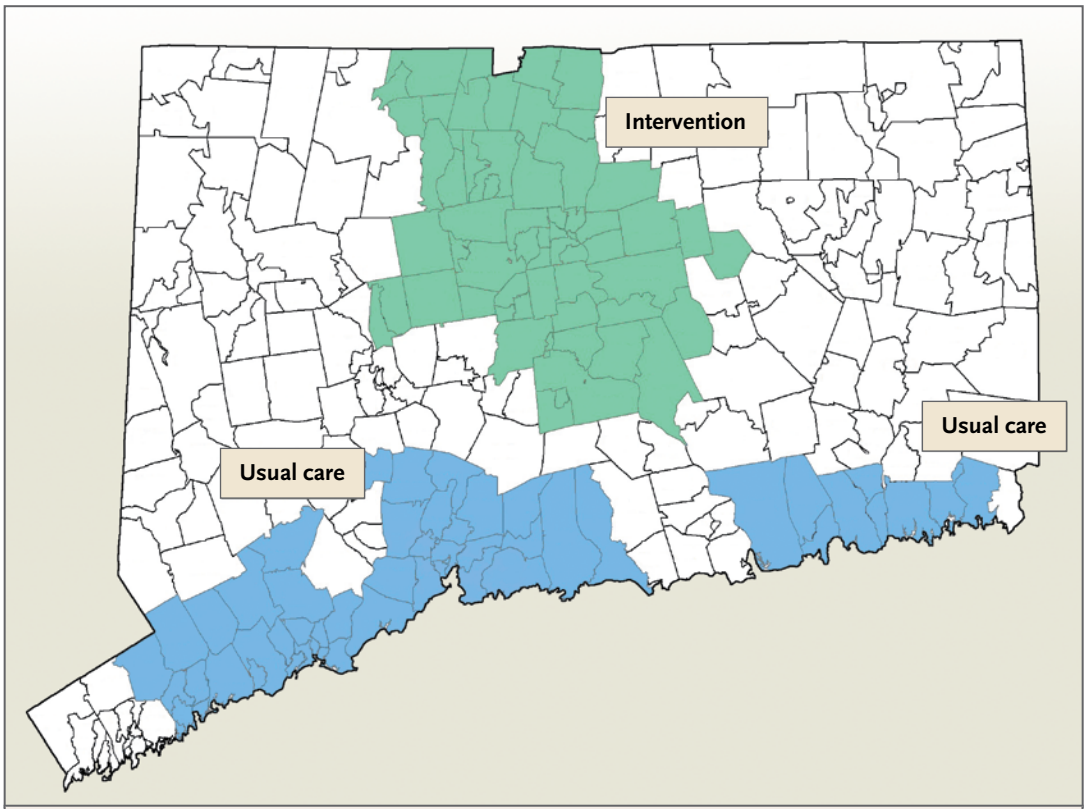


Figure 1. Intervention and Usual-Care Regions for the Connecticut Collaboration for Fall Prevention.
The intervention region included 58 ZIP Code tabulation areas (ZCTAs) encompassing Hartford and surrounding towns. The usual-care region (blue) comprised 53 ZCTAs that excluded an area in which some Medicare beneficiaries received care from the same clinicians as those in the intervention area (green).

use of medical services,[26] and in the numbers of clinicians (460 primary care clinicians and those in 146 outpatient rehabilitation facilities and 30 home care agencies), acute care hospitals and emergency departments (7 facilities), and senior centers (43 facilities).

The intervention region and the usual-care region are geographically separate, which minimized overlapping use of medical services by patients. ZCTAs within each region are contiguous, with one exception. A few Primary Care Service Areas (PCSAs),[28] which delineate regions where most Medicare beneficiaries receive care from the same clinicians, were shown to serve ZCTAs in both regions. These ZCTAs were excluded from the study (Fig. 1).

RISK ASSESSMENT AND TREATMENT

The recommended strategies for preventing falls included a reduction in medications, management of postural hypotension, management of visual and foot problems, hazard reduction, and balance, gait, and strength training. Clinicians were encouraged to incorporate assessments, treatments, and referrals into their practice, as appropriate to their discipline and setting.[20,22,23,25] The main clinician groups were primary care, home care (nurses and physical and occupational therapists), outpatient rehabilitation (physical and occupational therapists), and emergency department clinicians (physicians and nurse managers). All members of these groups were approached to participate. Other clinicians and facilities, which were included if they were identified by the intervention team, are listed in Table 2. Training and practice materials were developed and disseminated (for details, see the Supplementary Appendix, available with the full text of this article at www.nejm.org).

PRACTICE-CHANGE INTERVENTIONS

The multidisciplinary intervention team included 12 core clinician investigators plus working groups

of clinicians practicing in the intervention region, usually in supervisory roles. The team used well-accepted practice-change interventions, including media attention (television, radio, and newspaper), seminars, Web sites (e.g., www.fallprevention.org), posters, brochures, educational materials for patients, and advertising on buses to increase awareness; enlistment of opinion leaders to influence colleagues; and visits (outreach) to everyone in the main group of clinicians and facilities to explain evidence-based fall-related practices, provide materials, and demonstrate how to incorporate fall prevention into their practices.[20,29-33] Working groups provided input on local practices and resources, established referral networks, and performed outreach to local clinicians. Outreach efforts to older adults occurred in senior centers and other community sites (Table 2). The team sought support from relevant health-policy and community agencies. The intervention components are described more fully elsewhere.[20]

POPULATION DATA

The study population included persons who were 70 years of age or older who were living within the intervention region or the usual-care region. Age and sex were ascertained from Medicare denominator files.[34] Other sociodemographic and functional data were obtained from the 2000 U.S. Census.[35]

Medicare denominator files, which include all Medicare beneficiaries, were used to determine the population at risk in calculating the rates of fall-related injuries and use of medical services. In Connecticut, 97% of persons who were 70 years of age or older were Medicare beneficiaries. Medicare beneficiaries did not differ on the basis of age, sex, or race from the 3% of the population not receiving Medicare.

OUTCOME DATA

We determined the occurrences of serious fall-related injuries and use of medical services through the Connecticut Health Information Management (CHIME) database, which is maintained by the Connecticut Hospital Association (CHA). All acute care hospitals in Connecticut belong to CHA and provide data to the CHIME service. The CHIME database includes diagnostic, procedural, and utilization data on all residents of Connecticut who receive care in an emergency department or hospital. Unlike the Medicare administrative database, the CHIME database includes the 7% of Medicare-eligible persons in Connecticut who are beneficiaries of managed Medicare and the 3% who are not covered by Medicare.

Rates of serious fall-related injuries and use of medical services were based on codes and E-codes in the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9-CM).[36] The former codes are used by clinicians, health care facilities, and others to uniformly classify health conditions, including injuries; the latter are supplementary ICD codes used to describe the cause of injury.[37] Serious fall-related injuries included visits to emergency departments or admissions to a study hospital (seven in both regions) by any person who

Table 1. Characteristics of the Study Population.*

Characteristic	Intervention Region†	Usual-Care Region‡
	percent	
Female sex	61.3	61.4
Race or ethnic group§		
White	91.8	92.3
Black	5.2	5.8
Other	2.5	2.4
Hispanic or Latino	2.2	2.2
Education level¶		
High-school graduate or less	66.9	63.8
Some college or college graduate	33.1	36.2
Household income¶		
<$15,000	23.3	22.9
$15,000–$75,000	62.4	58.9
>$75,000	14.3	18.2
Persons meeting federal criteria for poverty status¶	7.6	7.2
Persons living in an institution¶	7.4	5.3
Persons with a physical disability not living in an institution¶	24.0	24.0

* Population data were obtained from the 2000 U.S. Census. Unless stated otherwise, the data refer to the persons who were 70 years of age or older.
† In the intervention area, there were 95,433 persons who were 70 years of age or older and 78,195 households headed by a person who was 65 years of age or older.
‡ In the usual-care region, there were 109,413 persons who were 70 years of age or older and 91,800 households headed by a person who was 65 years of age or older.
§ Race or ethnic group was reported in the 2000 U.S. Census.
¶ Data are for persons who were 65 years of age or older and were obtained from the weighted 2000 Census Sample Tables, in which the closest age cutoff to 70 years or older was 65 years or older. There were 125,067 persons who were 65 years of age or older in the intervention area and 145,296 in the usual-care area.

Table 2. Number and Type of Direct Encounters between the Intervention Team and Clinicians and Facilities.*

Clinician or Facility†	Working Group Sessions‡	Visits to Clinicians§	Outreach to Older Adults¶
	no. of encounters (total no. of persons)‖		
Main group			
Primary care clinician	6 (24; mean, 4 persons per session)	175 (469)	NA
Home care	10 (127; mean, 13 persons per session)	116 (922)	NA
Rehabilitation (physical or occupational therapist)	7 (54; mean, 8 persons per session)	194 (363)	NA
Emergency department physician director	4 (30; mean, 8 persons per session)	NA	NA
Senior center	NA	69 (145)	120 (4608)
Other groups			
Physician other than primary care	NA	26 (26)	NA
Emergency department nurse manager or hospital care coordinator or discharge planner	24 (47; mean, 3 persons per session)	101 (1028)	NA
Pharmacist	4 (23; mean, 6 persons per session)	NA	NA
Emergency medical service	NA	10 (102)	NA
Assisted-living facility	NA	33 (136)	40 (1180)
Subacute nursing facility	NA	25 (185)	NA
Other facility**	NA	39 (99)	97 (3760)

* NA denotes not applicable.
† All clinicians and facilities in the main group were contacted. All who accepted received at least one visit from a core member of the Connecticut Collaboration for Fall Prevention (CCFP) intervention team. Clinicians and facilities in the other groups were included if they were identified by members of the intervention team.
‡ The investigators convened working groups of clinicians who practiced in the intervention region, usually in supervisory roles, in group sessions throughout the project to adapt materials for local use, advise on local resources and practice patterns, establish referral patterns, and learn to carry out the outreach in their area.
§ Core members of the intervention team met with clinicians or administrators at their offices or facilities to discuss incorporating fall-related risk assessment and management into their practices. For example, primary care clinicians were given information on referrals to outpatient rehabilitation or home care for balance and gait problems, were shown how to perform medication review and reduction, and were reminded to check for and treat postural hypotension. They were given CCFP brochures for patients, physician checklists, posters, and a workbook of assessment and treatment recommendations.
¶ Members of the intervention team met with groups of older adults to educate them on fall prevention, perform risk assessments, and demonstrate how to incorporate fall-prevention strategies into daily activities and request fall-related assessments and treatments from their clinicians.
‖ Some clinicians and facilities were encountered more than once during the project. Not every person was counted for some encounters.
** Other facility included adult day centers, senior housing, health fairs, churches, and other community sites.

was 70 years of age or older and living in an intervention or usual-care ZCTA for which CHIME included both a fall-related E-code (817, 824, 880-888, or 927) and an ICD-9-CM code for serious injury: hip fracture (code 820), other fracture (codes 802, 805 to 819, or 821 to 829), head injury (codes 800 to 804 and 850 to 854), and joint dislocation (codes 830 to 839).[36,37] Fall-related use of medical services required both a fall-related E-code and any injury code (codes 800 to 994.99). Fall-related events and injuries were captured regardless of their place in the coding. State-mandated use of E-codes is enforced by CHA staff members, who monitor the accuracy of E-codes and ensure that there is an E-code for every injury-related ICD-9-CM code and vice versa. Thorough E-code reporting was another advantage of using CHIME data rather than Medicare administrative data.

STATISTICAL ANALYSIS

We used data that had been collected during a 2-year period from October 1, 1999, to September 30, 2001, to estimate preintervention rates.[26] Intervention efforts occurred from October 1, 2001, to September 30, 2004. The evaluation took place over a 2-year period from October 1, 2004, to September 30, 2006.

The estimated intervention effect was adjusted for time (evaluation vs. intervention period and

postevaluation period vs. intervention period); the successive number of 6-month periods since October 1, 2001; preintervention rates of fall-related injuries and use of medical services for each ZCTA; age group (70 to 74, 75 to 79, 80 to 84, and ≥85 years); sex; the proportion of residents over the age of 65 years who were nonwhite, resided in a nursing home, or lived in the community but reported having a disability; and the proportion of households headed by persons over the age of 65 years with an income of less than $15,000 or more than $75,000. (An age over 65 years was the closest cutoff to 70 years available in the 2000 Census Sample Tables.[35]) Units of analysis were combinations of age and sex within each ZCTA whose counts of fall-related injuries or use of medical services in each 6-month period were fit to a Poisson distribution. In turn, the rates were the Poisson mean divided by the expected count, which incorporated the population at risk.[38] With the use of an enhancement of the model described by Waller and colleagues, these rates were modeled on covariates and random terms for spatial correlation among, and undefined heterogeneity within, ZCTAs.[26,39] Model fit was assessed with the use of the deviance information criterion.[40]

Adjusted annual rates per 1000 person-years were calculated for persons who were 70 years of age or older.[40] Bayesian 95% credibility intervals were calculated from the 2.5 and 97.5 percentile values of the posterior distributions, analogous to a confidence interval.[41] Adjusted rate ratios were estimated as the adjusted rate of serious fall-related injuries or use of medical services in the intervention region divided by the adjusted rate in the usual-care region. Statistical and graphical analyses were performed with the use of SAS software (version 9.1), WinBugs software (version 1.4.1), and ArcMAP (version 9.1).

RESULTS

FALL-RELATED INJURIES

Population characteristics are shown in Table 1. Persons in the two regions were similar in sex, race, income, and percentage of older adults with a physical disability.

The number of direct encounters between members of the intervention team and clinicians and facilities in the intervention region are shown in Table 2. The rates of outreach visits to the main group of clinicians and facilities ranged from 62% (131 of 212 primary care offices) to 100% (26 of 26 home care agencies) (Fig. 2).

Among persons who were 70 years of age or older, the adjusted preintervention rates of serious fall-related injuries per 1000 person-years were 31.2 in the usual-care region and 31.9 in the intervention region. During the evaluation period, the rates were 31.4 in the usual-care region and 28.6 in the intervention region, representing a 9% decline in the rate of serious fall-related injuries in the intervention region, as compared with that in the usual-care region (adjusted rate ratio, 0.91; 95% credibility interval, 0.88 to 0.94) (Fig. 3).

Differences between the regional rates persisted after the reported study period. During 2007, 3 years after the intervention and 1 year after the evaluation, rates of serious fall-related injuries per 1000 person-years were 30.9 (95% credibility interval, 29.9 to 31.9) in the usual-care region and 28.6 (95% credibility interval, 27.6 to 29.6) in the intervention region, which yielded an adjusted rate ratio of 0.93 (95% credibility interval, 0.89 to 0.96).

FALL-RELATED USE OF MEDICAL SERVICES

The rates and adjusted rate ratios for fall-related use of medical services in the usual-care region and the intervention region during the preintervention, intervention, and evaluation periods are

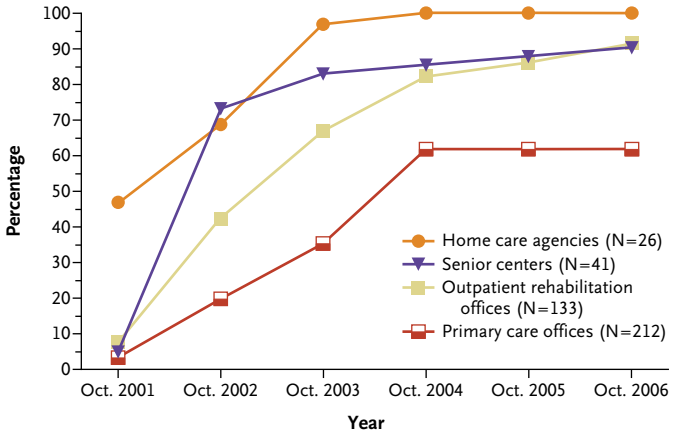
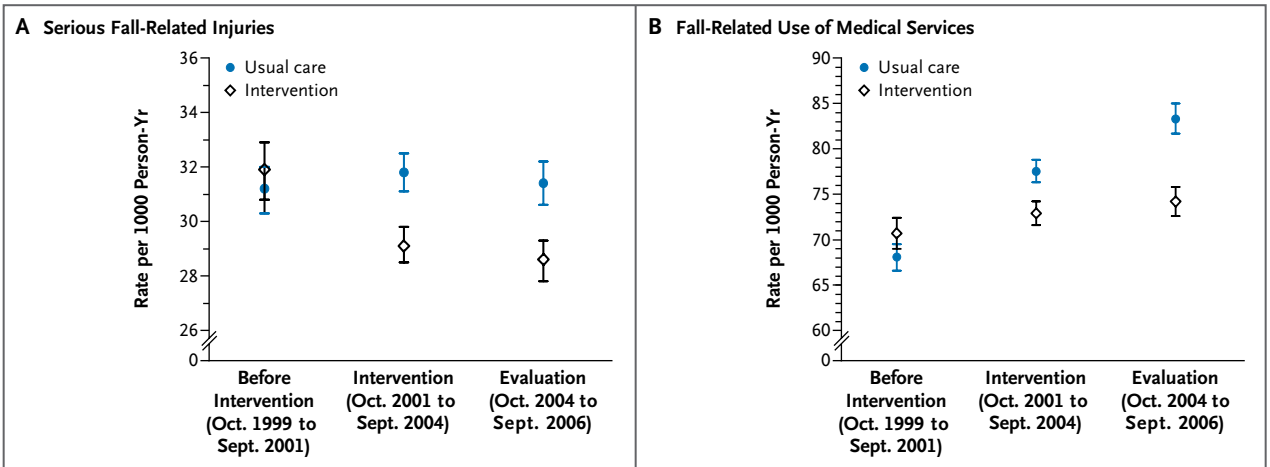


Figure 2. Proportion of Facilities in the Intervention Region That Received at Least One Outreach Visit.

All facilities in these groups (number in parentheses) were contacted. The proportion that accepted visits by members of an intervention team are shown. Most visits occurred before October 2004, although a few additional visits to home care agencies, rehabilitation facilities, and senior centers occurred through July 2006.



Adjusted Rate per 1000 Person-Yr (95% CI)			
Usual-care region	31.2 (30.3–32.0)	31.8 (31.1–32.5)	31.4 (30.6–32.2)
Intervention region	31.9 (30.8–32.9)	29.1 (28.5–29.8)	28.6 (27.8–29.3)
Adjusted Rate Ratio (intervention relative to usual care)			
	1.02 (0.98–1.07)	0.92 (0.89–0.95)	0.91 (0.88–0.94)

Adjusted Rate per 1000 Person-Yr (95% CI)			
Usual-care region	68.1 (66.6–69.5)	77.5 (76.3–78.8)	83.3 (81.7–85.0)
Intervention region	70.7 (69.0–72.4)	72.9 (71.6–74.2)	74.2 (72.6–75.8)
Adjusted Rate Ratio (intervention relative to usual care)			
	1.04 (1.00–1.07)	0.94 (0.91–0.97)	0.89 (0.86–0.92)

Figure 3. Adjusted Annual Rates of Serious Fall-Related Injuries and Use of Medical Services per 1000 Persons 70 Years of Age or Older during the Preintervention, Intervention, and Evaluation Periods.

Panel A shows the rates of serious fall-related injuries (hip and other fractures, head injuries, and joint dislocations), and Panel B shows the fall-related use of medical services, including all emergency department visits or hospitalizations with a fall-related E-code. The rates were adjusted for spatial variability, the baseline rate of falls or serious injuries, age, sex, race, income, and the proportion of persons over the age of 65 years who were institutionalized or disabled. The bars represent 95% credibility intervals (CIs).[41] Adjusted rate ratios were estimated as the adjusted rates of serious fall-related injuries or use of medical services in the intervention region divided by those in the usual-care region.

shown in Figure 3B. The adjusted rate of fall-related use of medical services declined 11% in the intervention region, as compared with that in the usual-care region, during the evaluation period. Differences persisted between the regions after the reported study period. The 2007 rates per 1000 person-years were 86.9 (95% credibility interval, 84.5 to 89.3) in the usual-care region and 77.9 (95% credibility interval, 75.6 to 80.3) in the intervention region, which yielded an adjusted rate ratio of 0.90 (95% credibility interval, 0.86 to 0.93).

DISCUSSION

During the evaluation period, the adjusted rate of serious fall-related injuries in the intervention region was 9% lower than that in the usual-care region, and the adjusted rate of fall-related use of medical services was 11% lower. These differences persisted beyond the intervention and evaluation periods. Over half the targeted clinicians and facilities in the intervention region received CCFP team visits during the intervention period.

Although there have been several trials of fall-prevention strategies,[10,11] few efforts have been made to evaluate translation of this evidence into clinical practice. The Assessing Care of Vulnerable Elders 2 (ACOVE-2) project is one study that focused on primary care physicians.[42] Our project was the first attempt to disseminate evidence regarding fall-related injuries from randomized, controlled trials to clinicians from multiple disciplines. Therefore, there are no benchmarks against which to measure effectiveness. Clinical trials of multicomponent interventions have shown reductions ranging from 2 to 37% (mean, 27%).[11] The Yale FICSIT trial, the primary source of evidence for CCFP, showed a 31% reduction in the rate of falls.[21] Decline in effectiveness is expected when moving from trials (in which most participants receive a tightly controlled intervention) to clinical practice (in which a smaller proportion

receive an intervention and the intervention is not as tightly controlled). Relative rate reductions of 9% in serious fall-related injuries and 11% in fall-related use of medical services represent a successful translation from research to clinical practice.

We used a nonrandomized design because a randomized one was not feasible. Although such a design is complex, the hierarchical, longitudinal analysis of a quasi-experimental design with a blinded outcome assessment can account for multiple levels of variability and minimize bias.[41,43] The creation of a single intervention region and a single administrative usual-care region was necessary, given the intense nature of the intervention. Although the two regions were similar in population characteristics, additional unmeasured characteristics may have confounded the results.

Although the fall-related use of medical services was lower in the intervention region than in the usual-care region, rates increased in both regions. For persons who were 70 years of age or older, rates also increased nationally, from 56.9 per 1000 person-years in 2001 to 62.6 in 2004.[44] Several factors may explain why rates in the usual-care region were higher, and increased more, than the national rates. First, our study population included 3 to 4% more persons than those included in the CMS denominator files, a factor that inflated our rates slightly. Second, we reported adjusted rates; the unadjusted rate in the usual-care region in 2001, 64.2, was closer to the national rate. Third, since Connecticut mandates the use of E-codes, it is likely that the use of such codes is higher in Connecticut than in states that do not mandate such use. Connecticut also levies fines if data are inaccurate or need to be revised, thereby encouraging complete and accurate reporting by hospitals. Fourth, rates of use of emergency departments and hospitals for any cause for persons 70 years of age or older increased in both the usual-care region (by 15%) and the intervention region (by 17%) between the preintervention period and the evaluation period. These rates were similar to the 22% increase seen in the usual-care region for fall-related use of medical services. Such use of services in the intervention region increased by only 5%, much less than the increase in the rate of use for any cause (17%) or in the national rate for fall-related use (10%).

We cannot exclude the possibility that there were differential changes between the two regions in coding practices or in the likelihood that older adults who fell would seek care. However, coders at the hospitals were unaware of the study, and CHIME staff members were unaware of the study hypothesis or which was the intervention region. Because persons with serious injuries essentially always seek care and these encounters are thoroughly coded, it was unlikely that observed differences in serious injuries in the two regions were the result of differential care seeking or coding.

Because no single intervention has proved to be exceptionally effective, we used multiple practice-change interventions.[29-33] We cannot definitively state which components were most effective. However, in qualitative interviews that were reported previously, the intervention team identified enlisting working groups of local clinicians, repeating face-to-face (outreach) contacts over time, and using outreach to older adults as key strategies.[20,22] We cannot determine which group or combination of groups (e.g., primary care clinicians or staff members involved in home care, rehabilitation, or senior centers) accounted for the observed differences in the rates between the two regions.

We previously reported on the adoption of fall-related practices after CCFP intervention.[20,22-25] For example, 50% of primary care clinicians reported referring patients for balance disturbances, and 88% reported performing medication reviews.[22] Among home care clinicians, more than 80% reported addressing postural hypotension, balance disturbances, multiple medications, and home hazards for at least some patients.[25] Similar rates for instituting balance and gait treatments were reported by outpatient rehabilitation.[23] We relied on clinician self-report, which may overestimate actual practices, because we could not directly measure practice behaviors. We also could not ascertain similar clinician practices in the usual-care region.

It is not possible to accurately determine the costs of the CCFP interventions or cost-effectiveness because, unlike trials in which investigators control the intervention, most activities occurred during clinical practice and training sessions. However, the intense efforts required are reflected in the number of encounters (Table 2). The increase in fall-related practices that were reported may have increased health costs, although many of the activities were incorporated into practices

already performed. Methods are needed for tracking costs for this type of intervention.

Although a causal effect between CCFP efforts and the lower rates of serious fall-related injuries and use of medical services cannot be proved, at least three factors suggest that CCFP's efforts accounted for differences observed. First, there were no other known secular trends that might explain the differences. Second, the lower rates were specific to fall-related use of medical services, whereas rates of use for any cause increased slightly more in the intervention region than in the usual-care region. Third, the divergence in rates coincided with intervention efforts.

Despite recognition of the need to improve the transfer of evidence from randomized, controlled trials into practice and evaluate the effectiveness of interventions in real-world settings, few such studies have been reported.[17-19] Methods that were used in this project can inform efforts to enhance the adoption of evidence-based practices.[17]

From a clinical and public health perspective, the 11% relative reduction in the use of fall-related medical services in the intervention region, as compared with the usual-care region, translated into approximately 1800 fewer emergency department visits or hospital admissions. In addition to discomfort and disability averted, this decrease represents a potential savings of more than $21 million in health care costs on the basis of an average acute care cost of $12,000 per event.[45] Although savings must be weighed against costs incurred in providing fall-related risk assessment and management, the recommended treatments represent good clinical practice apart from fall prevention because they bestow additional health benefits. Our findings must be replicated elsewhere, but they suggest that the dissemination of evidence to clinicians about fall prevention when coupled with practice-change interventions results in the adoption of effective strategies to prevent falls and may reduce the number of falls and injuries.

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