Fall Prevention Programs in Rural Areas: A Systematic Review

Marcy Sudbeck* & Melissa Schrader
Faculty: Ladonna S. Hale

Department of Physician Assistant

Abstract. Falls are a leading cause of injury and disability among older adults. A systematic literature review of Cochrane Library, MEDLINE, CINAHL, and Internet was conducted to evaluate efficacy of rural, community-dwelling fall prevention programs. Four studies focusing on different fall prevention programs were evaluated: 1) tai chi, 2) medication review, 3) program of education, exercise, home safety, and nutritional counseling, and 4) a comparison of education, home safety, and exercise. Two studies directly measured fall reduction, tai chi (no difference) and medication review (mixed results). All four demonstrated improvements in some fall risk factors. These strategies may effectively reduce fall risk factors in the rural setting [Grade B]. Not enough evidence exists to make a recommendation regarding actual fall reduction.

1. Introduction

Falls are the leading cause of injury-related deaths in older adults with more than 1/3 of adults ≥ 65 years falling annually. The population of people over age of 65 years is expected to double by the year 2030.[1] As the percentage of older adults rises, so does the percentage of older adults living in rural areas. The "aging" of these rural areas is due to aging-in-place, immigration of older adults from metropolitan areas, and outmigration of younger adults from rural communities.[2] Despite these growing numbers, people residing in rural communities have fewer options and significantly more limited access to health care professionals and services.

Four evidence-based strategies have been identified by the Centers for Disease Control (CDC) for the prevention of falls in older adults: 1) regular exercise, 2) medication review, 3) home safety assessment and modification, and 4) vision screening. Although effective, CDC recommended programs rely heavily on healthcare professionals for implementation. About 20% of the US population, more than 50 million people, live in rural areas, but only 9% of the nation's physicians practice in rural communities.[3] As the health professionals shortage grows, fall prevention programs will be more difficult to implement in rural settings, although their necessicity will be increased.

Study Purpose: The purpose of this systematic review was to evaluate the efficacy of community-dwelling fall prevention programs located specifically in rural areas and identify effective strategies in these settings.

2. Experiment, Results, Discussion, and Significance

Methods: A systematic literature review of the Cochrane Library, MEDLINE, CINAHL and the World Wide Web was conducted. For inclusion, articles had to focus on or describe: 1) a home-based fall prevention program in a rural area (≤ 50,000 population); 2) an evidence-based element such as education, exercise, medication review, home safety, and/or vision screening; and 3) measures of effectiveness. Articles were excluded if not in English.

Summary of Study 1 – Lin 2006 (level 3b)

This was a case control study evaluating tai chi exercise. Selected Taiwan villages received information on fall prevention via pamphlets and posters about exercise, walking aids, and home safety and offered free daily tai chi classes. Of the 472 adults ≥ 65 years, 88 participated in the tai chi classes. The control group (n=728) lived in villages that did not receive this education or offer free classes. A non-significant drop in falls was observed among the tai chi group (RR 1.16). Tai chi did improve balance ($p<0.04$, 95%CI=0.2 to 3.4). However, improvements in gait and fear of falling were not significant. [4]

Summary of Study 2 – Weber 2008 (level 1b)

This multi-center control trial randomized by clinic site focused on medication review and adjustment via an electronic medical record (EMR). Study participants included 620 rural community-dwelling patients ≥ 70 years old at risk for falls based on age and medication use. Of the 18 clinic sites included, 15 received the intervention and three served as controls. Either a geriatrician or pharmacist reviewed each patient's EMR focusing on the use of psychoactive drugs, polypharmacy, and inappropriate dosages. Potential medication issues were communicated to the patient's physician. Patients were contacted to obtain self-reports of falls at 3-month intervals over the 15-month study period. The intervention did not significantly reduce the total number of medications; however there was a significant negative relationship between the intervention group and total number of medications started during the study ($p<.01$, regression estimate -0.199) and the number of new psychoactive medications ($p<.05$, regression estimate -0.204). The impact of the intervention of falls was mixed. The intervention group was found to be 0.38 times as likely to have ≥ 1 fall as compared to the control group ($p<.01$, OR 0.38) according to EMR.[5]

Summary of Study 3 – Yates 2001 (level 1b)

This randomized control trial evaluated a multifactorial home-based fall prevention program incorporating education, exercise, home safety, and nutrition counseling through educational materials and

individualized instruction (1 hour, three times weekly for a minimum of 12 sessions). Participants included 37 adults ≥ 65 years randomly assigned to the intervention or control group. Seventy-two percent of the intervention group completed the exercise program at least 12 times, with 55% completing it three times a week. The mean change score for the intervention group was statistically significant for balance (1.44; $p<0.000$), bicep endurance (3.33; $p<0.000$), lower extremity power (34.2; $p<0.001$), falls efficacy (15.61; $p<0.023$), reduction of environmental hazards (14.21; $p<0.002$), and nutritious food behavior (14.92; $p<0.009$). Changes were not statistically significant for dorsiflexion of the left foot, dorsiflexion of the right foot, scratch test, Get Up and Go test, Locus of control for nutrition, and depression.[6]

Summary of Study 4 – Lin 2007 (level 1b)

This randomized control trial evaluated the benefits of fall prevention programs on quality of life measurements. Study participants included 150 residents of a rural Taiwan township ≥ 65 years, requiring medical attention due to a fall within the previous four weeks. Participants were block randomized into one of three fall prevention programs: 1) education, 2) home safety assessment and modification, and 3) exercise training. Education and home safety modifications were assessed by two public health workers, while exercise interventions were conducted by a physical therapist at the patient's home every two weeks during the 4-month period. Education had a positive impact on physical domain (3.9; CI=1.6-6.2) as well as activities of daily living (0.9; CI=0.2-1.7) and depression (0.5; CI=0.1-1.0). Exercise had a positive impact on psychological (3.8; CI=0.7-7.0), social (3.4; CI=0.7-6.1), and environmental domains (3.2; CI=0.8-5.7) as well as functional reach (1.5; CI=0.3-2.6), balance (1.3; CI=0.2-2.4), and gait (0.4; CI=0.1-0.8). The home safety intervention yielded no improvements. None of the programs was able to reduce actual falls.[7]

Discussion

All four studies demonstrated improvements in at least some fall risk factors (e.g. balance, gait, home hazards, number of medications). Two studies directly measured fall reduction: tai chi, which showed no statistically significant difference, and medication review, which had mixed results.

Although effective during the study duration, these fall prevention programs, like many of those studied in metropolitan areas, may be unfeasible long-term due to lack of sustainable funding and resources. Authors of all four studies were contacted to determine if these programs were still in existence. The programs described in Lin (2006), Lin (2007), and Weber have since closed due to lack of funding. Yates did not return our correspondence.

Clinically, these results have significant relevance for future fall prevention programs in rural communities. Although programs may be effective, there is still a significant gap that must be filled to sustain long-term fall prevention programs. Lack of funding must be addressed, along with the lack of healthcare providers to meet program needs. Without available providers, current fall prevention programs are non-functional. Future fall prevention programs will need to take into account these specific difficulties to be effective. Possibilities of home-based fall prevention programs incorporating the use of a family member/caregiver instead of a healthcare professional to conduct the program could be researched in the future to overcome these hurdles.

Currently, there is limited evidence in this area of research, making it difficult to implement these programs in the general public. Continued research pertaining specifically to rural communities, available funding and healthcare professional resources are key components to the success of future fall prevention programs and their effectiveness.

3. Conclusions

Fall prevention programs have been studied specifically in rural settings and strategies including physical activity, medication review, education, nutritional counseling, and home safety may effectively reduce fall risk factors [Grade B]. There was not enough evidence to make a graded recommendation regarding effectiveness of these programs in reducing actual falls.

References

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