Action Research Development of a Fall Prevention Program for Thai Community-dwelling Older Persons

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Abstract: Preventing falls in community-dwelling older people is a key public health priority. This action research developed the Multifactorial, Age-friendly Fall Prevention Program in collaboration with community participants and based on their needs and desires to prevent falls in older people. The study process was based on Lewin's concept of rational social management and included three phases: planning, action, and results from working with 80 participants comprising 50 older persons, 20 family members, six public health nurses, a community leader, and three public health volunteers. Planning included the steps of fall risk assessment, increased awareness, and brain storming for action. Action included implementation of the action plan designed around learning processes in collaboration with the community stakeholders, and the immediate evaluation. Lastly, results were the fall prevention behavioral changes, and measurement of output. The Thai Fall Risk Assessment Test was used at the planning step. Focus group discussion and in-depth interview were used to collect qualitative data which were analyzed by content analysis. Findings reported here are the initial development process of the program and the lessons learned from the study. The program focused on the older participants' preferences, and included intrinsic and extrinsic risk factors and is a multi-factorial intervention. It included fall risk assessment, fall education, exercise and cane use training, handing out a fall prevention handbook, home safety assessment, home visits, and giving reminders. Themes arising were improved communication about falls, mutual learning, and motivation through reminder calls. The limitations include the generalizability of findings in different contexts. Nurses should always consider including community participation in developing fall prevention programs so as to get more holistic understanding and support in helping older people.

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Introduction

Unintentional falls are estimated to be the first of 10 leading causes of non-fatal injuries and of unintentional injury deaths among older adults ≥aged 65 in the United States.[1,2] Fractures and injuries result in long-term disability and institutionalization in older persons.[3] Unintentional injury was also the cause of death of 21,649 American older persons in 2010.[2] Falls are multifactorial accidents caused by intrinsic

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factors, such as increasing age, history of falls, muscle weakness, gait and balance impairments, vision impairment, postural hypotension, chronic illnesses, and fear of falling; and extrinsic factors including psychoactive medications, poor lighting or glare, poor stair design, lack of grab bars in bathroom, slippery or uneven floor, hurdles and tripping hazards, improper use of assistive devices.[4] The predictors of falls in older people dwelling in the community are previous falls, depression, and timed rise (the time rising from a chair as fast as possible).[5] Furthermore, the amount and addition of some specific medications have also been associated with risk of falls and incidence of falls.[6,7] The Safety of Seniors Act of 2007 in the USA promotes a national education campaign for fall prevention among older persons in the community.[8] Systematic reviews and a meta-analysis reveal that multiple component interventions have resulted in a decreased number and rate of falls.[9-11] A number of studies have shown the effectiveness of multifactorial fall prevention programs (FPP).[12-17]

In Thailand falls are also the most common cause of injury in older people and have great impacts on the quality of life of them and their families.[18] A number of studies report considerable fall risks that have prompted the development of various types of FPP for Thai older persons living in communities.[19,20-21] However, there have been limited FPP involving community participation in the country. An action research (AR) study[19] developed a multi-factorial program using community participation. Although this study showed program effectiveness, limitations were the lack of involvement of family members and the availability of a responsible organization. It was found that District Office representatives did not have time for community environmental modifications. Families can play a crucial role in home modification to prevent falls of older members, so it is important to examine how their participation can enhance the effectiveness of a FPP. This AR filled the gap of the development process by including community stakeholders. Thai older persons, public health nurses (PHNs), community leader, public health volunteers, and family members of older persons (but not representatives from District Office) contributed to the development in this study of the Multifactorial Age-friendly Fall Prevention Program (MAFPP). In addition to the multi-component intervention, this study also focused on an age-friendly program which was based on Lewin's concept of rational social management.[22] The effectiveness of the MAFPP was assessed through behavioral changes and satisfaction with the program and this will be published separately in another journal article.

Literature Review

Strategies to prevent falls include fall risk assessment and reduction of such risks through education, environment and behavioral modifications.[23] Fall risk assessments include evaluation of mobility/functional limitations (gait, balance, transferring, joint movement, and activity of daily living), visual impairment, chronic illnesses, medications, and home environment safety. Fall risk reduction includes reducing the fear of falling, depression prevention, exercise, providing knowledge on fall risk factors, encouraging home environment modification, and promoting positive behaviors and lifestyle changes. The FPP for community-dwelling older people requires understanding and cooperation from them as well as a multidisciplinary team, and reliable follow-up.[10] A number of FPP have been developed; and it is evident that the most effective FPPs were multi-factorial interventions.[12-17] These programs included complex exercise interventions (2 or more types) and resulted in improved balance and physical function, reduction in fear of falling, and decreased risk and rate of falls.[12,24-26] A randomized controlled trial has also shown that an intervention failed to reduce falls among older persons due to low adherence with the home safety assessment.[27]

In Thailand, a quasi-experimental study evaluated the effectiveness of the FPP which included fall

education, exercise training, environment modification, and medication counselling.[20] The findings showed that participants receiving the intervention had higher fall prevention behaviors and better balance than those in the control group. Moreover, an AR study developed and evaluated a community-based FPP and revealed decreased fall incidence, improved fall prevention behaviors and physical performance, and high participants' satisfaction regarding the program.[19] Family support, a significant factor of environmental modification, was also recommended.[19]

The Ottawa Charter aims to strengthen community action, community participation in particular, and is a strategy to promote health in communities.[28] Most research has shown that the effectiveness of health promotion results from multi-factorial interventions. However, very few studies have demonstrated the effectiveness of programs with community participation and older people's preferences. This AR, therefore, aimed to develop a multi-factorial, age-friendly FPP for Thai community-dwelling older people that involved participation of community stakeholders. The qualitative aspect of this AR study is reported here.

Conceptual Framework

Kurt Lewin's concept of rational social management[22] focused on improvement with effective and permanent social change, was used as a framework for this study. Lewin explained that people tend to engage in new behaviors if they are involved in the decision-making process. The cyclical process of change comprises 3 steps: 1) planning (unfreezing), 2) action (changing), and 3) results (refreezing) in a spiral of steps, each of which also includes a circle of planning, action, and the result of action. The first step is the planning process or input phase, in which clients and the change agent collaborate to identify a need to change. The main elements of this stage include a preliminary diagnosis, data gathering, feedback of results, and action planning. The second step is the action or transformation phase including learning processes, action planning, and action steps. In this step, new models of behavior are introduced and implemented. The evaluation of this step serves as a feedback mechanism to the first step to support better planning. The last step of the process of change is the result or output phase which focuses on changes in behavior, data gathering, and measurement. The new behaviors are then assessed and the output of this step serves as feedback to the first and second steps.

Methods

Design: Action research was used for this qualitative study. Four main strategies: relationship, communication, participation, and inclusion[29] were applied throughout the study.

Ethical Considerations: Study approval was obtained from the Bangkok Metropolitan Administration Ethical Committee. All participants were informed about the risks and benefits of being involved in the study, their rights to not engage in the study or withdraw whenever wanted, and to confidentiality and anonymity. All signed a consent form before participation.

Setting: This was a community in the west of Bangkok, Thailand which has the highest population of older people of all areas in Bangkok.[30] Most people in this community are street vendors, employees of a private company, or manual labourers, and the economic status of most people is quite low. Anecdotally, PHNs reported that there was a high fall incidence and high risks for falls among older persons in this community, and that community members had a high interest in the MAFPP.

Sample: A total of 80 participants engaged in the study including Thai older persons (N=50), family members (N=20), PHNs (N=6), and public health volunteers (N=4). Thai older persons ≥60 and able to take care of their own daily living activities were recruited. Family members living in the same home

as these participants were also invited to join the study. Six PHNs, responsible for health services in the study community, also became participants. Most of them have been working in the local public health center >5 years. The public health volunteers (PHVs) were the villagers living in the study community and serving as assistants of PHNs in specific roles such as taking blood pressure and collecting data for health services.

Data Collection: To develop and learn from the MAFPP, three data collection measures were used, focus groups (FGs), indepth interviews and the *Thai Fall Risk Assessment Test (Thai-FRAT).*[21] The latter was developed by Thaimwong et al. and used to evaluate older persons at risk of fall. Six determinants of fall were assessed: gender, visual impairment, balance impairment, medication use, history of fall, and style of house. Each determinant was scored differently. Examples of items included "Is there a history of fall?" (yes=5 or no= 0); "Is the gender female?" (if yes=1 or no=0). Sensitivity and specificity were 0.92 and 0.83 respectively. In the process of MAFPP development, guidelines for focus groups (FG) and in-depth interviews were also used. The FG guideline included open-ended questions for discussing fall risks among older people living in the community, the impacts of falls, and how to prevent falls in the community. Examples of the items were: "What are the fall risks among older people in this community?"; "How did your life change after falling?"; and "What should we do to prevent falls in older people living in community?". The in-depth interview guideline focused on what older persons and the stakeholders learnt from the MAFPP, for example: "Do ideas from the fall prevention handbook help you prevent falling?"; "Does the MAFPP benefit you?"; and "Do reminder calls from nurses help you prevent falling?" The first FG aimed at identifying incidence and causes of falls, then the researcher offered community fall risk assessment. In the second focus group, the fall risks were reported and discussed. The last FG was done to validate the data with informants.

Data analysis:

Qualitative data from FGs groups and in-depth were transcribed *verbatim* from recordings, read, and analysed by content analysis. They were coded, categorized and interpreted, and finally, major themes were identified.[31]

Rigor and trustworthiness

The outcome validity was planned. The MAFPP for Thai older people was designed with community participation and it was in line with the evidence from the literature review. Data were collected by three different methods and findings validated with participants throughout the AR, that is process validity was emphasized in the cyclical process of change including planning, action, and results.[32]

Results

These are reported here in two parts: 1) the development process of the MAFPP and 2) lessons learned from the process.

The Development Process of the MAFPP

The initiative development process of the MAFPP was based on Lewin's concept of rational social management.[22] As active decision-making in planning is a vital part of this concept, the study was focused on older participants' preferences of fall prevention activities as an age-friendly program. Various intrinsic and extrinsic risk factors were also included in the program as a multifactorial FPP. The development was done within a cyclical process of change including planning, action, and results as follows:

1. Planning (Unfreezing)

1.1. Preliminary Diagnosis: The research team set up a meeting with the community leader and the PHNs to discuss a number of health issues including falls in older persons living in the community. Later, the first FG identified the incidence and causes of falls in the community with ten participants, five older persons, two family members, one PHN, one community

leader, and one health volunteer. All participants agreed to have falls risk assessment in their community.

1.2 Data Gathering: The community leader made an announcement via a community broadcast system to invite older persons for fall risk assessment. The Thai-FRAT was completed by 50 older persons whose visual acuity was measured with the Snellen chart. A community survey was also done to identify home environments with risks of fall.

1.3 Feedback of Results: The second FG was organized to report fall risks among older persons in the community with the same group of participants to raise awareness of the risks of fall among older persons in the community being studied. The fall risks assessed by the Thai-FRAT were reported to the participants at the FG as follows: 63% of 50 older persons had visual impairment, 10.5% had balance impairment, 53% took antihypertensive or psychotropic drugs, 21% had more than 2 falls during the last 6 months, and 79% lived in homes with 1.5 meter high or with 5-step stair. The risks of fall from the older persons themselves and the unsafe home environment were discussed, and awareness of the detrimental impact of fall in older persons was emphasized.

1.4 Action Planning: MAFPP Development: In the second FG discussion and brainstorming from all participants in planning for the MAFPP was also conducted. The MAFPP, developed from the creative ideas of all participants, included fall education, an exercise and cane use training program, age-friendly fall prevention handbooks, home safety assessment during home visits by PHNs and PHVs, and reminders by a community leader and by nurses.

The research team planned a 45-minute fall education program which included knowledge about fall risk factors, impacts of falls, and how to prevent them. The PHNs suggested PowerPoint slides with photos of unsafe home environments in the community, while the older participants asked for knowledge on what they should do in case of a fall.

In addition to fall education, the participants wanted a training program to include exercises and cane/walker use. The former included muscle strength and balance training. A fall prevention handbook was designed as an age-friendly material including cartoon illustrations with few statements in large print. What older people should do and should not do are included in the handbook. The practices which need caution were stairs use, toilet use, changing position, getting up from the bed in the morning, safety walk, and travel by bus. Practices which should be avoided were: climbing ladders, stretching to reach things, collecting things on the stairs, walking with blurred vision at night, taking anticholinergic and sedative medications, wearing inappropriate clothes, and using unstable chairs. Safety in the home environment, such as the height of the toilet, grab bars, and non-slippery floor in the restroom, and age-friendly furniture were also recommended. The last page of the handbook is designed for recording fall experiences, including date, cause and impact of a fall.

The community factors involved in this program were the PHNs and the PHVs. The additional practices, which they performed during their home visits, were checking home environment safety such as the rest room. Another factor was a community leader reminding about fall prevention via the community broadcast system. The researcher asked the participants about the appropriateness of reminders to prevent falls by telephone calls from PHNs and by a community broadcast system. All participants agreed with both types of reminders.

2. Action (Changing)

2.1 Learning Processes: The first version of the fall prevention handbooks in black and white were distributed to the same group of participants and 20 additional older persons in community meeting where the content and the format of the handbook were discussed. The audience was satisfied with the font size and the cartoons, but recommended making the handbooks in colour with cartoons to draw the attention of family members, particularly grandchildren, who may remind their grandparent(s) of ways to prevent falling.

2.2 Action Planning: Three months after the planning, a large community meeting was organized, comprising 50 older persons, 20 family members, 6 PHNs, one community leader, and 3 PHVs. A fall education session was done by the research team. Recommendations to prevent falls such as night light, alarm bell, suitable clothes, and bed side toilet were also demonstrated. A training program including muscle strength training, balance training, and cane and walker use was also organized on the same day. The fall prevention handbooks were distributed to all older persons who attended the meeting. One week later, the nurses made a phone call at least once per family to ask the older participants or their family members how they prevented falls and what were the barriers to prevent them. The nurses also answered their questions and empowered them to attempt preventing falls. The community leader reminded the older participants and their family members to prevent falls by announcing via a community broadcast system twice a week.

The last strategy to encourage the older participants to prevent falls was the home visits by PHNs and PHVs once a week. They also asked for permission to check the home environment for safety. They asked the older persons and their family member how they prevented falls and discussed with them how the family members could modify the home environment to prevent falls.

2.3 Action Steps: Three months after the program, immediate evaluations were performed to identify the barriers to preventing fall. Three follow-up evaluations were done monthly on a regular basis by the research team. It was found that there were some older persons living in areas who could not hear announcements by the community broadcast system. The community, thereafter, repaired the system. This implied that the older persons were very interested in reminders about fall prevention.

3. Results (Refreezing)

3.1 Changes in behavior

Fall prevention behavioral changes: Six months following the MAFPP implementation, only one episode of a fall was reported, indicating older participants had changed their behaviors in fall prevention. Data from in-depth interviews revealed that the older participants were more cautious about falling, exercised more, stretched arms and legs before getting up from bed in the morning, and used a cane.

Engaging in regular exercise: Some older participants exercised by themselves at home while some went out to join community group exercise doing Chinese style workouts called *waitunkong* regularly every day. One old lady reported that "My doctor asked me what made me more energetic than the last visit". The communication with doctor strengthened her self-efficacy in exercising and encouraged her to join the exercise program regularly.

Moving with consciousness: In addition to caution and exercise, the older participants paid more attention to prevention of postural hypotension. Before changing position, they got ready by stretching their arms and legs, especially getting up from bed in the morning. A 77-year old woman said:

Every morning, I exercise on the bed for at least five minutes before getting out of bed, something I have never done before.

Cane use: The last behavior the older participants changed was cane use. First they changed their attitude towards using a cane, in that a cane is not seen as an assistive device for persons with disability, but for supporting persons with occasional sway. This led them to be more confident to walk. They could then go out shopping or visiting their neighbours. This increased their quality of life in a way that they had not experienced before the fall prevention. A male participant said:

I haven't been out of the home for many years because of fear of falling. Now, I am confident with a cane and go out buying things I want from the shop close to my home.

Home environment modification: Another barrier of fall prevention was financial burden, for example, older participants could not afford to modify

home environments such as installing a grab bar in the bathroom. What they were able to do was keep the floor in the bathroom dry, change light bulbs, keep things in order and not at a high level, and discard torn rugs. It was impossible to modify some of the environments in rented houses.

3.2 Data Gathering: Six months after the training program, the third FG was held in the community. Data arising were validated with a number of key informants. Clarification was provided for some issues such as the barriers to preventing falls and the benefits of phone call reminders to prevent fall.

3.3 Measurement of output: In addition to fall preventing behavioral changes, most participants were satisfied with this MAFPP. The older participants were most satisfied with the fall prevention handbook while the PHNs, PHVs, and family members were most satisfied with the benefits of the MAFPP.

Lessons Learnt: these were three-fold:

1. Improved communication about falls

The cartoon fall prevention handbook helps improve family communications about falls. Some placed the handbook where they could easily see it, for example keeping it close to their prayer book which they read daily to remind them to try to prevent falls every day. This made them and their family members read it regularly. The handbook with colour cartoon gained attention from the children, which prompted them to remind their grandparents to prevent fall. An older participant shared experience with happiness, saying that: "My grandchild reads the cartoon fall prevention handbook and reminds me to walk with a cane."

2. Mutual learning

The benefits gained during FGs were that the older persons learned from each other about the causes of fall. This made them alert when facing the events leading to a fall such as using stairs, extreme stretching to reach something, and doing activities too fast. An 85-year old man said: "I have learned from friends about causes of fall during the meeting."

3. Motivation from telephone reminders

These reminders from the nurses gave feeling of care. One older participant stated: "The nurse who is not my relative called me and expressed her feeling of caring about me. This made me cautious about fall prevention."

Discussion

This AR revealed that the MAFPP resulted in behavioural changes in older persons' and community stakeholders'. The program included fall risk assessment, fall education, exercise and cane use training, handing out a fall prevention handbook, home safety assessment, home visits, and giving reminders. The components of the program were in line with the facilitators' uptake of interventions reported by older people living in community.[33] Fall risks were assessed by the Thai-FRAT which was suitable for Thai community-dwelling older people.[21] The data of fall risks, which were reported to the participants, raised awareness of the detrimental impact of falls and led to behavioral changes. The findings were supported by prior research.[16,19-20,34] However, older people who had no fall experience failed to perceive themselves at risk of fall.[35] This group of older people may need more exclusive intervention.

The older participants in this study requested knowledge on the impact of a fall, risk factors of a fall, fall prevention methods, and practices after a fall. Their need for knowledge about practices after a fall reflected their sense of insecurity when staying at home. Most older participants were alone at home during the day as their children worked. This made them feel unsafe and worried what they should do in case of a fall. This finding is congruent with a prior study[36] which revealed that learning how to get up from fall reduced older participants' fear of falling. In Sweden, there is a 24-hour emergency phone number to call in case of a fall.[15]

A meta-analysis revealed the association between the impaired balance and fall risk rate in

community-dwelling older people.[37] Therefore, the MAFPP included muscle strength and balance training for the older participants. These exercises were supported by a study which showed that muscle strength training could improve balance while changing position.[25] In addition to muscle training, older participants were encouraged to join in the exercise program in their community every morning. The accessibility of this exercise was a significant factor in participation.[33] It was evident that older people did not do formal exercise to prevent falling; only those who fell would do it.[35] It was also found that the Lifestyle Integrated Functional Exercise, balance and strength training with activities of daily living, was more effective in reducing falls among older people,[38] than other exercises. This new kind of exercise should be considered in designing training for fall prevention; and it should be designed based on levels of fall risk of older people.[39]

Technical aids could be barriers of fall prevention due to feeling of embarrassed in social activities.[34] In the training sessions, cane and walker use was also demonstrated and practiced. This helped participants to change their attitude towards using a cane, from regarding canes as a device for the disabled to seeing them as a supporting device for persons with occasional sway.

The development of the fall prevention handbook was also found to be beneficial for it not only provided knowledge on fall prevention, but also reminded the readers to try to prevent falling. This finding is consistent with a previous study[40] that found permanent media such as handbooks and long-lasting stickers resulted in behavioral changes, and these were better than pamphlets or calendars. More interestingly, the colour cartoons in the handbook also helped to support the participant. For example their grandchildren were interested in the handbook and reminded their grandparents to try to prevent falling. The PHNs and PHVs integrated home safety assessment in their home visits, since research has shown that a home environment assessment was the most effective fall prevention measure for community-dwelling older persons.[27] A randomized controlled trial[14] also demonstrated that home visits including risk evaluation, home counselling, and a booster meeting lowered the number of falls.

Moreover, phone calls regarding fall prevention for participants was also effective, and helped to give them a feeling of being cared for and motivated behavioural changes. Another type of reminder was using the community broadcast system to give messages to participants and their families. Recently, a community broadcast system has been made available in both urban and rural communities in Thailand.

Limitations

There are several limitations to this study. First, according to the nature of AR, generalization findings is limited to settings similar to the study setting. This study was done in an urban area in Bangkok, and the application of the development process of the MAFPP in rural areas may need modification. Following the exercise training for fall prevention, the older participants in this study continued their exercise behavior in an exercise facility in the community. We believed this enhanced the effectiveness of the MAFPP. The generalizability of the findings to a community without an exercise facility may be limited. Second, although family members were encouraged to participate in this study, very few could engage in the whole development process of the MAFPP, as they were busy with their jobs. Family members are a crucial part of environmental modification. Therefore, the effectiveness of the MAFPP could have been limited by the lack of family support. In this study, hazardous medication and depression assessments as fall predictors were not included in the program. A home visit involving assessment of these and directed action might have made FPP more effective.

Conclusion and Implications for Nursing

We conclude this was a successful program resulting in a reduction of falls in this community. The MAFPP included fall risk assessment, fall education, exercise and cane use training, handing

out a fall prevention handbook, home safety assessment, home visits, and giving a reminder. Fall risks were assessed by the Thai-FRAT and reported to older participants. Education content included knowledge of risks, causes, and impacts of falls as well as self-care after a fall. For the training program, exercise for muscle strength and balance improvement including assistive devices use was demonstrated and practiced. The age-friendly handbook for fall prevention with cartoon illustrations in colour was developed with older participants' comments. The home safety checking was done by PHNs and PHVs during their home visits. The last part of the MAFPP was reminders by telephone call from nurses and by community broadcast system. This AR demonstrated the effective development process of FPP. The multifactorial and age-friendly intervention is promising in developing a FPP. Public health nurses can play an important role in fall prevention. Although involving community stakeholders in the process of setting up educational programs for other health problems is a challenge, it may be rewarding. Further research using both qualitative and quantitative methods is warranted to test this program in other communities, and studies could be longitudinal to provide evidence about the sustainability of the outcomes in fall prevention for older adults.

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การวิจัยเชิงปฏิบัติการพัฒนาโปรแกรมป้องกันการหกล้มในผู้สูงอายุไทยที่อาศัยอยู่ในชุมชน

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บทคัดย่อ: การป้องกันการหกล้มในผู้สูงอายุที่อาศัยอยู่ในชุมชน เป็นการดูแลสุขภาพที่สำคัญอย่างหนึ่ง การวิจัยเชิงปฏิบัติการนี้มีจุดประสงค์เพื่อพัฒนาโปรแกรมป้องกันการหกล้มแบบสหปัจจัยและมีความเป็นมิตรกับผู้สูงอายุไทยที่อาศัยอยู่ในชุมชน กระบวนการวิจัยพัฒนาตามแนวคิดการจัดการทางสังคมอย่างเป็นเหตุเป็นผล (Rational Social Management) ของ Lewin ซึ่งประกอบด้วย 3 ขั้นตอน คือ การวางแผนการปฏิบัติและผลลัพธ์ ผู้เข้าร่วมวิจัย 80 คน ประกอบด้วย ผู้สูงอายุ 50 คน สมาชิกในครอบครัว 20 คน พยาบาลสาธารณสุข 6 คน ผู้นำชุมชน 1 คน และอาสาสมัครสาธารณสุข 3 คน การวางแผนเป็นขั้นตอนของการประเมินภาวะเสี่ยงต่อการหกล้ม การกระตุ้นความตระหนักและระดมสมองวิธีป้องกันหกล้ม ขั้นตอนการปฏิบัติเป็นการลงมือปฏิบัติตามแผนที่ออกแบบจากการเรียนรู้จากผู้มีส่วนได้ส่วนเสียในชุมชนและการประเมินผลทันที ขั้นตอนสุดท้ายคือผลการปฏิบัติ เป็นการเปลี่ยนแปลงพฤติกรรมป้องกันการหกล้ม การตรวจสอบความถูกต้องของข้อมูลและการประเมินผลลัพธ์ของโปรแกรม แบบประเมินการหกล้มของผู้สูงอายุไทยที่อาศัยอยู่ในชุมชนใช้ในระยะเริ่มต้นการพัฒนาโปรแกรม เก็บรวบรวมข้อมูลเชิงคุณภาพโดยการสนทนากลุ่มและการสัมภาษณ์ระดับลึก วิเคราะห์ข้อมูลโดยการวิเคราะห์เชิงเนื้อหา ผลการศึกษาคือกระบวนการพัฒนาโปรแกรมและบทเรียนรู้จากกระบวนการวิจัย โปรแกรมป้องกันการหกล้มเน้นการพัฒนาตามความชอบของผู้สูงอายุและครอบคลุมปัจจัยเสี่ยงภายในและปัจจัยเสี่ยงภายนอก เป็นโปรแกรมแบบสหปัจจัยประกอบด้วย การประเมินภาวะเสี่ยงต่อการหกล้ม การให้ความรู้เรื่องการหกล้ม การฝึกออกกำลังกายและใช้ไม้เท้า แจกคู่มือป้องกันหกล้ม การประเมินความปลอดภัยของสิ่งแวดล้อมในบ้าน การเยี่ยมบ้านและการเตือนป้องกันการหกล้ม บทเรียนรู้จากกระบวนการวิจัยได้แก่ การสื่อสารเกี่ยวกับการป้องกันหกล้มในครอบครัวดีขึ้น ผู้สูงอายุเรียนรู้จากกันและกัน และโทรศัพท์เตือนมีผลจูงใจให้ป้องกันหกล้ม ข้อจำกัดในการวิจัยครั้งนี้คือการนำผลการวิจัยไปใช้ในบริบทที่แตกต่าง พยาบาลควรให้ชุมชนมีส่วนร่วมในการพัฒนาโปรแกรมป้องกันการหกล้ม เพื่อให้เข้าใจประเด็นอย่างครอบคลุมและได้รับการสนับสนุนการช่วยเหลือผู้สูงอายุมากขึ้น

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