

**THE DEVELOPMENT AND PILOT TESTING OF A FALL
PREVENTION EDUCATION INTERVENTION FOR OLDER
PERSONS AT HIGH RISK OF FALLS IN A MALAYSIAN
PRIMARY CARE SETTING**

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KUALA LUMPUR**

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**THE DEVELOPMENT AND PILOT TESTING OF A
FALL PREVENTION EDUCATION INTERVENTION
FOR OLDER PERSONS AT HIGH RISK OF FALLS IN A
MALAYSIAN PRIMARY CARE SETTING**

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**THE DEVELOPMENT AND PILOT TESTING OF A FALL PREVENTION
EDUCATION INTERVENTION FOR OLDER PERSONS AT HIGH RISK OF
FALLS IN A MALAYSIAN PRIMARY CARE SETTING**

ABSTRACT

The aim of this study was to develop and pilot test a fall prevention education intervention for older persons with a high risk of falls in a primary care setting.

There were three phases in this study. In the needs assessment study, the needs of community-dwelling older persons with a high risk of falls and healthcare professionals (HCPs) who managed falls were explored using qualitative interviews. The study was conducted at University Malaya Medical Centre (UMMC), Kuala Lumpur from July 2012 to April 2013. Semi-structured topical guides were developed to facilitate the interviews. The transcribed interview data were analysed thematically using Weft QDA. A systematic literature review was conducted to determine the effectiveness of FPEIs. The intervention was developed based on the evidence from the findings of the needs assessment, systematic review, theories and clinical practice guidelines. The Multifaceted Fall Education by Interprofessional Team (MuFE_IT) intervention consists of presentations by inter-professional team and a fall prevention education booklet. The MuFE_IT was then pilot-tested in three group sessions and revised based on the feedback from the participants. The study participants' knowledge and behavioural changes were evaluated using questionnaires and focus-group discussions immediately, one-month, and three-month post-intervention. The data were analysed using SPSS and Weft QDA.

In the needs assessment study, both the HCPs and older persons highlighted the need for educational materials on fall prevention. HCPs perceived their roles as the

coordinator of care and provider of advice on fall prevention to older persons. HCPs were aware that they needed to consider older persons' views, beliefs and behaviours when offering fall prevention advice. A systematic literature review of 21 RCTs found that FPEIs which involved HCPs in providing fall advice, educational pamphlets, small group sessions, video and multimedia presentations were effective. In the qualitative evaluation of the MuFE_IT, four themes emerged: change of attitude towards fall prevention, actions taken related to fall prevention, barriers in MuFE_IT implementation, and reasons to take action to prevent falls. The participants were more 'careful', 'compliant' and 'motivated' to prevent falls. The participants found the following components of the MUFE_IT intervention useful: professional advice from the presentation on proper shoe wear, medication review and home interior modification; information from the education booklet on fall prevention activities such as exercises; small discussion groups that eased interaction and allowed information to be shared among the participants. However, a few participants perceived that the advice given at the MuFE_IT intervention was 'common sense' and 'not practical', as these participants were already practising fall prevention activities. In addition, there was no improvement in their knowledge after attending the MuFE_IT intervention sessions.

This study confirms the feasibility of developing an FPEI for older persons based on needs, evidence and theories using mixed research methods. The MuFE_IT warrants further study to evaluate its effectiveness in preventing falls in the Malaysian primary care setting.

**PEMBINAAN DAN UJI INTERVENSI PENDIDIKAN PENCEGAHAN JATUH
BAGI WARGA EMAS YANG BERISIKO TINGGI UNTUK JATUH DI
RAWATAN UTAMA MALAYSIA**

ABSTRAK

Kajian ini bertujuan untuk membina dan menguji intervensi pendidikan pencegahan jatuh (FPEI) dikalangan warga emas yang berisiko tinggi untuk jatuh di ruang rawatan utama.

Terdapat tiga fasa dalam penyelidikan ini. Di dalam penyelidikan penilaian keperluan, keperluan warga emas yang tinggal di komuniti berisiko tinggi untuk jatuh dan doktor kesihatan (HCPs) yang pernah merawat masalah jatuh dikalangan warga emas telah disoal selidik dengan menggunakan temubual kualitatif. Penyelidikan ini telah dijalankan di Pusat Perubatan Universiti Malaya (PPUM), Kuala Lumpur mulai Julai 2012 hingga April 2013. Panduan temubual semi-struktur telah dibina untuk memudahkan temuduga kualitatif. Hasil data transkrip temu-bual telah dianalisa mengikut aplikasi tema dengan menggunakan Weft QDA. Pengumpulan kesusasteraan yang sistematik telah dijalankan untuk menentukan keberkesanan FPEIs. Intervensi ini telah dibina berdasarkan bukti daripada hasil penyelidikan penilaian keperluan, pengumpulan kesusasteraan yang sistematik, teori dan garis-panduan klinikal. Intervensi Multifaceted Fall Education by Interprofessional Team (MuFE_IT) terdiri daripada syarahan oleh doktor kesihatan dari pelbagai bidang dan risalah pendidikan pencegahan jatuh. MuFE_IT itu kemudian diuji dalam tiga sesi kumpulan kecil dan pembinaan intervensi disemak semula berdasarkan maklum balas daripada para peserta. Pengetahuan dan perubahan tingkah-laku para peserta intervensi telah dinilai dengan menggunakan kertas soal selidik dan perbincangan fokus dalam kumpulan kecil serta-

merta, satu bulan dan tiga bulan selepas intervensi dilaksanakan. Data kuantitatif dan kualitatif dianalisa menggunakan SPSS dan Weft QDA.

Menurut penyelidikan penilaian keperluan, kedua-dua HCPs dan warga emas menekankan keperluan seperti bahan-bahan pendidikan mengenai pencegahan jatuh. HCPs melihat peranan mereka sebagai penyelaras kesihatan dan penasihat untuk warga emas dalam hal pencegahan jatuh. HCPs juga sedar bahawa mereka perlu mengambil kira pandangan warga emas, kepercayaan dan tingkah-laku sebelum menawarkan nasihat mengenai pencegahan jatuh. Pengumpulan kesusasteraan sistematik dari 21 RCTs mendapati bahawa FPEIs melibatkan HCPs sebagai penasihat jatuh, risalah pendidikan, sesi kumpulan kecil, video dan persembahan multimedia adalah berkesan. Didapati empat tema muncul dari penilaian kualitatif MuFE IT: perubahan sikap terhadap pencegahan jatuh, tindakan yang diambil berkaitan dengan pencegahan jatuh, ketidakberkesanan dalam pelaksanaan MuFE IT dan sebab untuk mengambil tindakan pencegahan jatuh. Para peserta didapati lebih 'berhati-hati', 'berpatuh' dan 'bermotivasi' terhadap pencegahan jatuh. Para peserta mendapati komponen-komponen intervensi MUFE-IT berikut berguna: syarahan nasihat profesional mengenai penggunaan kasut yang betul, semakan ubatan dan pengubahsuaian suasana dalaman rumah; maklumat daripada risalah pendidikan mengenai aktiviti pencegahan jatuh seperti senaman; sesi kumpulan kecil menambah interaksi dan membenarkan maklumat dikongsi bersama para peserta. Walaubagaimanapun, beberapa peserta menilai nasihat yang diberi di dalam intervensi MuFE IT sebagai 'kebiasaan' dan 'tidak praktikal' adalah kerana peserta-peserta ini telah pun biasa mengamalkan aktiviti pencegahan jatuh tersebut. Di samping itu, didapati bahawa tiada perubahan dalam pengetahuan para peserta selepas menghadiri intervensi MuFE IT.

DEDICATION

*To my mother, Alameloo Krishnan whom gives endless love, who stands all
obstacles, and adores all things I do.*

Everything changes but a mother's love is forever. This one is for you.

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LIST OF SYMBOLS AND ABBREVIATIONS

AGS	:	American Geriatrics Society
ANOVA	:	Analysis of Variance
ARCS	:	Situated Learning Theory and the Attention-Relevance-Confidence-Satisfaction
BGS	:	British Geriatrics Society
CCFP	:	Connecticut Collaboration for Fall Prevention
CD ROM	:	Compact Disc used as a read only optical memory
CONSORT	:	Consolidated Standards of Reporting Trials
CPG	:	Clinical Practice Guidelines
ECAQ	:	Elderly Cognitive Assessment Questionnaire
EVOs	:	Educational Outreach Visits
FES	:	Fall Efficacy Scale
FOG	:	Formula of Gunning
FPEIs	:	fall prevention education interventions
Fry	:	Fry readability formula
GP	:	general practitioner
HBM	:	Health Belief Model
HCPs	:	Healthcare Professionals
HCPs	:	healthcare professionals
HRA-O	:	Health-Risk Appraisal for Older People
IDI	:	in-depth interview
IT	:	Inter-professionals team
KM ²	:	kilometre square
MRC	:	Medical Research Council

MuFE_IT	:	Multifaceted Fall Education by Inter-professional Team
NCOA	:	National Council on Ageing
NICE	:	The National Institute for Health and Care Excellence
nRCT	:	non-Randomised controlled trial
OT	:	Occupational Therapist
PCC	:	Primary Care Clinic
PCM	:	Primary Care Medicine
PDF	:	Personal detail form
PIS	:	participant information sheet
PT	:	Physiotherapist
RCTs	:	Randomised control trials
REALM	:	Rapid estimation of adult literacy in medicine
SAIL	:	Stay Active and Independent for Life
SCT	:	Social Cognitive Theory
SMOG	:	Simple Measure of Gobbledygook
SOYF	:	Stay on Your Feet
SPSS	:	software package for statistical analysis
UK	:	United Kingdom
UK MRC	:	United Kingdom Medical Research Council
UMMC	:	University Malaya Medical Centre
Weft QDA	:	Window, easy-to-use, a free, open source tool for qualitative data analysis
WHO	:	World Health Organisation

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CHAPTER 1: INTRODUCTION

This chapter aims to justify the importance of developing an evidence-based fall prevention education intervention for older persons. The need for a fall prevention education intervention is justified in the context of a Malaysian primary care setting.

This chapter covers the following topics:

- Why focus on falls in older persons?
- What are the fall risk factors and the existing fall prevention interventions?
- Why is there a need to develop another fall prevention intervention?
- Why do older persons need fall prevention education interventions?
- The context: Primary care setting
- Objectives

1.1 Why focus on falls in older person?

Falls among older people are unexpected events of coming to rest on the ground, floor or lower level (Lamb, Jorstad-Stein, Hauer, & Becker, 2005). Falls are associated with increased dependency and mortality among older persons aged above 65 years. Falls cause minor injuries such as bruising, abrasions, lacerations, strains and sprains, which result in significant pain and discomfort. On the other hand, some falls can cause serious bone fractures and head injuries. Other fall-related consequences are impaired mobility due to a fracture, depression after admission to a long-term care facility, decreased quality of life due to the fear of falling and death (Campbell et al., 1990; Clemson, Kendig, Mackenzie, & Browning, 2014; Do, Chang, Kuran, & Thompson, 2015).

It is commonly cited that one in three community-dwelling older persons, aged 65 years and above, falls at least once over the course of a year (NICE, 2013; Tinetti, Doucette, Claus, & Marottoli, 1995; Tinetti, Speechley, & Ginter, 1988). The prevalence rate of falls among older individuals in lower- to middle-income countries varies from 10.1% in China to 54% in India, with 46% of the individuals in India requiring medical attention following an incident fall (Hua, Yoshida, Junling, & Huo, 2007). In a meta-analysis, the incidence of falls among the Chinese older persons, aged 65 years and above, increased in East Asian populations from China, Singapore, Taiwan, Hong Kong, and Macao, with reporting rates of 14.7% to 34% (Kwan, Close, & Wong, 2011). In Malaysia, 47% of older people attending a primary care clinic at a teaching hospital reported falls with 60% of fallers experiencing resultant injuries that needed medical attention in the preceding 12 months (Sazlina, Krishnan, Shamsul, Zaitun, & Visvanathan, 2008). In a separate rural population, 27% of older individuals living in a rural community reported falls in the previous year with 67% of the falls

occurring indoors (Rizawati & Mas Ayu, 2008). A ten-year follow-up study of 198 older individuals affected by falls at the emergency department of a teaching hospital in Malaysia revealed one-, three-, five- and 10-year mortality rates of 22%, 33%, 49% and 80% respectively, with significant deterioration in physical functions reported after one year (Tan, Kamaruzzaman, Zakaria, Chin, & Poi, 2016).

The world's population of those over 60 years old is projected to increase from 11% to 22% by 2050 (Kanasi, Ayilavarapu, & Jones, 2016). In Malaysia, the older population also will increase from 1.4 million (6.3%) to 22% by the year 2050 (United Nations, 2007). Thus, the number of older individuals affected by falls is also expected to increase exponentially. The morbidity and critical conditions associated with falls result in high medical costs for the healthcare system, and they are a major health problem for older persons (Hartholt et al., 2011).

1.2 What are the fall risk factors and the existing fall prevention interventions?

Managing falls in older people is challenging because of the multi-factorial nature. Contributing factors can be broadly categorised as either intrinsic or extrinsic (Deandrea et al., 2010) and exposure to risk (WHO, 2008). These are the intrinsic fall-related factors: old age, falls history, Sarcopenia, frailty, gait and balance disorders, visual impairment and chronic diseases such as arthritis, diabetes, stroke, Parkinson's, dementia, and incontinence (Kwan et al., 2011). The extrinsic fall-related factors include environmental hazards such as loose rugs, cluttered toys, dim lighting, absence of hand rails, broken or slippery surface, things kept in high shelves, worn out shoes, inappropriate use of walking aids, and use of psychotropic medications such as benzodiazepines and many more (Campbell, Borrie, & Spears, 1989; Tinetti et al., 1994; Tinetti et al., 1995). Among older people, exposure to risk causes falls, irrespective to physical ability. Factors possibly associated with exposure to fall risks

are hurrying, carelessness, inattention and engaging in activities with a high risk of falling (Buttler et al., 2014; Pohl et al., 2015). The risk of falling increases with a number of other risk factors; for example, those who have balance problems, poor vision (cataract), and slipping on cluttered toys (Campbell & Robertson, 2006).

Numerous published studies have demonstrated the benefits of a variety of primary and secondary fall prevention interventions, including home-based or group exercise, home hazard modification, medication review, cataract trials, rehabilitation, fall education, and multi-factorial fall risks assessment. An earlier systematic review showed that fall prevention interventions covering both the intrinsic and environmental risk factors for falls, can reduce the risk of falls in older people (Gillespie et al., 2003). Chang and colleagues found benefits of a multifactorial approach to assessing the risk of falls and subsequent targeted intervention (Chang et al., 2004). The Falls Management Exercise (FaME) is a nine month group-based programme led by a postural stability exercise instructor been successful in higher risk populations (Skelton et al., 2005). Another important expedited cataract removal trial had significantly reduced falls among women aged 70 and above (Harwood et al., 2005). Notwithstanding this study, additional evidence is needed to determine the most effective combinations of component interventions to prevent falls in older people living in the community (Gillespie et al., 2012). In one study, it was reported that over 90% of social organisations have implemented at least one evidence-based fall prevention intervention; 88% provided fall prevention education, and 48% provided exercise programmes (Markle-Reid et al., 2015). The study concluded that falls are preventable and are a top concern for older adults; and the fall prevention interventions are deemed beneficial.

However, even with subsequent updates of evidence in supporting the multifactorial fall prevention approaches, there is limited implementation of these programmes; it is because despite many interventions, there is sustained or increased rate of falls among older persons (Gates, Fisher, Cooke, Carter, & Lamb, 2008). Nevertheless, evidence is needed to identify which interventions are the most effective in reducing falls and fall-related injuries (Hopewell et al., 2016).

1.3 Why is there a need to develop another fall prevention intervention?

The reasons to develop another fall prevention intervention are complex and multifactorial. According to a review, there are several challenges of conducting fall prevention interventions in developing countries: they are largely hospital based, with variation in practices; the translation of fall prevention evidence into practice in these countries is difficult due to competing demand for acute diseases; a lack of healthcare providers; and older adults' beliefs and HCPs' trivialisation of falls (Kalula, Scott, Dowd, & Brodrick, 2011). These challenges are an open door to develop a new fall prevention intervention that meets the requirements of local older people, HCPs, and the healthcare system.

In another systematic review, the community-dwelling older persons may face various challenges to participate in these complex fall prevention interventions (Child et al., 2012). The older persons may lack the knowledge of fall prevention interventions, such as being unaware of the types of exercises that can improve balance and prevent falls (Horne, Speed, Skelton, & Todd, 2009); they may also perceive falls as not being a medical problem or serious enough to consult a doctor (Dickinson et al., 2011), and they may lack awareness of the availability of fall prevention interventions (Horton & Dickinson, 2011). In addition, they usually link falls to carelessness rather than home hazards (Simpson, Darwin, & Marsh, 2003).

In one study, 60% of older Australian people rated their fall risk as low and considered fall prevention campaigns irrelevant to them (Hughes et al., 2008). Another issue in adopting a fall prevention intervention, as observed among UK older persons with a high risk of falls, is the perception that fall prevention advice is not practical; mere common sense is to be used, just like any other information or advice (Yardley, Donovan-Hall, Francis, & Todd, 2006). Among older persons, there are behaviours that act as a barrier to initiating fall prevention intervention: resistance to precautions needed to prevent falls; engaging in activities with a high risk of falling (Pohl et al., 2015); hiding falls from their children; and fear of institutionalisation (Horton & Dickinson, 2011). Hence, these older persons do not feel the necessity of having their homes checked or fixed with aids because they perceive they are not at risks of falls (Simpson et al., 2003).

On the other hand, the HCPs may not be ready to manage falls in the community due to various challenges. In a qualitative study, primary care physicians who received an academic outreach education intervention reported the barriers of HCPs related to managing falls in older persons: a lack of appropriate knowledge, skills, and training; absence of fall education materials; poor coordination across disciplines for patient referrals and limited reimbursement for fall-related clinical activities (Chou, Tinetti, King, Irwin, & Fortinsky, 2006). In another study, HCPs in emergency departments with an outreach education intervention exposure reported that the barriers were managing falls in older people with multiple geriatrics health conditions, patients' compliance for successful referrals, and a shortage of HCPs (Fortinsky et al., 2004). Perhaps, for these reasons, even simple interventions such as fall prevention education pamphlets are considerably underutilised in practice; only 17% of them recommend care for falls (Jones, Ghosh, Horn, Smith, & Vogt, 2011; Wenger et al., 2003).

On the other hand, another systematic review reported the need to conduct more fall prevention interventions to determine the factors that contribute to the effectiveness of preventing falls among older persons (Gillespie et al., 2012). Hence, for a country like Malaysia, where there is limited existing evidence of fall prevention interventions, it is essential to gather new data on the need for fall prevention interventions (Craig et al., 2008). This can be done through conducting interviews with the older segment of the population, HCPs, and healthcare system stakeholders.

1.4 Why do we need a fall prevention education intervention (FPEI)?

Education in FPIs needs to be considered in terms of its role as a preventive tool. Moreover, education involves knowledge and skills development and is an important element in the implementation and sustainability of a fall prevention intervention. In this section, fall prevention education interventions (FPEIs) designed for older persons to acquire knowledge and make lifestyle changes to reduce fall risks. It is important to develop an FPEI because despite the significant development and implementation of fall prevention interventions, falls continue to prevail and are common among community dwelling older persons (Gillespie et al., 2012). To provide a comprehensive fall prevention intervention for older persons, there is need for an understanding about the scope of falls, fall-risks and the prevention through education.

Many older persons with fall problems who are involved in fall prevention interventions show poorer control over falls, compared with those who are not involved. In a multicentre RCT, involving older persons at a high risk of falls, a fall rate of 1.7 per person-year was achieved in the intervention arm, compared with 2.0 falls per person-year in the control arm (Conroy et al., 2010). Although the intervention arm comprised of medical review, physiotherapy and occupational therapy, the older participants in the control group who received only the fall prevention information leaflet, had reduced

falls equivalent to those in the intervention group. In a pilot RCT, it was found that the fall level lowered was not significant among older persons at a high risk of falls who engaged in 60-minutes of Pilates exercises (Barker et al., 2015). Thus, the implications for the prevention of falls among older persons at high risks of falls depends on not only reducing one or two major risks, but it also affected by the older persons' understanding of the fall risks in their context through education to make changes in reducing the fall risks. Although the Malaysian population is experiencing ageing, the concept of 'geriatrics' is still in its infancy; the existing evidence of fall prevention interventions in Malaysia is limited (Tan et al., 2014; Tey et al., 2015). One systematic review reported the lack of evidence on simple, practical, evidence-based approaches in preventing falls, such as an education-based fall prevention intervention in the developing countries like South Africa (Kalula et al., 2011).

In the development process of FPEIs, theories of behavioural change are commonly integrated to initiate the changes per se. As a result, theories play a role in achieving the outcomes of interventions, such as knowledge, uptake of activities, beliefs, self-management and skills learnt. Increasing a person's self-efficacy has been shown to be a powerful tool in initiating and changing health behaviour (Bandura, 1995; Strecher, McEvoy De Vellis, Becker, and Rosenstock, 1986). In a study by Cheal and Clemson (2001), they qualitatively evaluated the benefits of perceived self-efficacy in risk situation in a falls prevention program. Moreover, there have been suggestions that learning for older people is best when it is self-paced, so that they have more time for learning, benefitting from breaks to reduce fatigue, and from optimistic and positive feedback (Farmosa, 2002). The use of visual aids and practical example is valuable and tasks and material must be useable in daily life. Building on previous experience and knowledge is also an effective technique for older learners (Tambaum, 2015). However, in previous studies, researchers of fall prevention interventions focused on reducing

risks of falling, including changing home interior, reducing environmental hazards, improving balance and strength through exercises, and using walking aids. Nevertheless, there is a gap in the FPEIs incorporating behaviour change theories and older persons' learning principle and needs-based fall prevention intervention.

Over the years, FPEIs has been gradually included as part of the multifactorial fall prevention interventions, which aim to equip older persons with the knowledge about fall risks and fall prevention interventions (Hanley, Silke, & Murphy, 2011). The national and international bodies such as AGS/BGS, WHO and NICE have endorsed fall prevention education to be part of the multifactorial fall prevention interventions (Kenny et al., 2011; NICE, 2013; WHO, 2008). In a prospective RCT, one-time counselling by a geriatrician to withdraw or modify psychotropic drugs, and followed by a one-hour lecture on the drugs, has resulted in reducing the consumption of drugs by 35% (Salonoja, Salminen, Aarnio, Vahlberg, & Kivela, 2010). In a qualitative study related to fall prevention, interviews and tailored advice using booklets on home hazards have created the awareness in people, and they are more alert and careful to accept activities that prevent falls (Gopaul & Connelly, 2012). Thus, the incorporation of fall prevention education has benefited older persons at high risk of falls in two ways: improved knowledge of fall prevention; and cognisance of the importance of participating in fall prevention activities.

A study has revealed significant behavioural changes in older persons at high risk of falls, resulting from provision of two areas of assistance: fall prevention education which incorporated varied education components, including booklets and multimedia presentations; and facilitation rendered by HCPs from different backgrounds (Dapp, Anders, von Renteln-Kruse, & Meier-Baumgartner, 2005). Hence, indeed fall

prevention education should be developed based on the needs of older persons at high risk of falls.

1.5 The context: Primary care setting

Malaysia has a dual healthcare system. The public sector consists of government-subsidized hospitals and health clinics, which serve majority of the population; the private sector comprises fee-for-service hospitals and clinics. Patients are free to choose where they prefer to receive treatment. In a previous study, prevalence of falls was found to be 47% among older persons who attended a public university-based primary care clinic at the University of Malaya Medical Centre (UMMC) (Sazlina et al., 2008). Hence, primary care is an appropriate setting to implement a fall prevention intervention, in particular a fall prevention education intervention; it is because the primary care provides comprehensive facilities for screening, prevention, treatment, cure and palliative services. The primary care is where the older people would come for their health problems, such as diabetes, hypertension and falls. Indeed, the primary care is the first contact and is accessible to people affected by falls; the doctors are able to provide screening and preventive education. Hence, it is considered an ideal setting.

The secondary care centres, such as geriatrics service units, are specialist clinics and not so accessible to the general public; it is not a place anyone can just walk in without an appointment or referral from a doctor. So, many older people seek treatment in the primary care and it is a good opportunity for the doctors to advise or to promote fall prevention interventions, even before an event happens. Primary care is also ideal because of the fact that it can reach out to older people who come with chronic health problems, and they have the opportunity to get advice on fall prevention. For example, the primary care doctors who are seeing their older patients for diabetes and hypertension also can screen them for falls and educate them about the matter. This

study examines older people at a high risk of falls with some of them not even seeking any help for their falls. Hence, the primary care is an ideal place where doctors can introduce fall prevention interventions to the older people. A systematic review emphasises that in the primary care setting, the primary care physicians could use relevant materials to advise community dwelling older persons about fall prevention interventions, which will reduce the risks of falling (Michael et al., 2010). The American Geriatrics Society and British Geriatrics Society (2011) have updated the guidelines for primary care physicians to efficiently assess fall risks and introduce tailored, multifaceted interventions to older persons with a high risk of falls (Kenny et al., 2011).

Malaysia is a middle-income country facing a rapid increase in the number of older persons in its population (Forsyth & Chia, 2009); and thus, additional health care services are needed to meet the increasing demand (Ambigga et al., 2011; Poi, Forsyth, & Chan, 2004). This study was conducted in a tertiary hospital in Kuala Lumpur, Malaysia. Kuala Lumpur, the capital city, is the largest metropolitan municipality in Malaysia with an area of 243 km². Its population has reached 6.8 million, consisting of 44.2% Malay, 43.2% Chinese, 10.3% Indian and 1.8% others (Malaysian Demographic Profile, 2016). The University Malaya Medical Centre (UMMC), located in the urban centre of Kuala Lumpur, is a government-funded teaching hospital with 1000 fully equipped beds. The Primary Care clinic is one of the clinical departments in the UMMC.

With the rapidly ageing population in Malaysia, falls in older persons will continue to become an increasingly serious public health problem, unless effective preventive programmes are implemented (Azidah, Hasniza, & Zunaina, 2012; Sazlina et al., 2008).

Hence, it seems imperative to develop a fall prevention education intervention to curb fall problems of older persons in Malaysia.

This chapter provides justification for the development of a fall prevention education intervention. Although there is evidence that the fall prevention activities have effectively improved knowledge, changed behaviours, enhanced self-efficacy, and reduced falls and cost effectively, practices are limited in developing countries, such as Malaysia.

This thesis describes how a fall prevention education intervention was developed for older persons at a high risk of falls while facilitating to meet the needs of older persons and HCPs. Hence, this thesis illustrates the assessment of needs, and it gathers effective evidences for the development of a FPEI in the context of the Malaysian primary care setting. Falls are not a chronic disease, but it still is a major health concern for older persons nowadays. Older persons' falls can contribute to mild up to severe injuries, bone fractures, chronic diseases, functional disabilities and even deaths (Control & Prevention, 2008; Tinetti, Gordon, Sogolow, Lapin, & Bradley, 2006; WHO, 2008). Despite many interventions of fall prevention which effectively reduce falls, they are still common among older persons. These are the barriers encountered by older persons, HCPs and the healthcare system that limit the sustainability of fall prevention interventions on a long-term basis (Yardley, Donovan-Hall, et al., 2006).

Furthermore, there are some gaps in the application of FPEIs in the primary care setting. First, educating an older individual on multiple fall risks during official consultation may not be applicable as the number of older persons has been rising globally and in Malaysia. Secondly, many individualised fall prevention interventions cater to hospitalised older persons. Perhaps, older persons need a fall prevention intervention to prevent falls but they do not demand it. Therefore, exploring the wider

needs of the local community older persons is important in planning and developing a fall prevention education intervention (NICE, 2013). Under these circumstances, if users' needs are ignored, it will be difficult to achieve the long-term sustainability and effectiveness of a developed fall prevention education intervention. A fall prevention education intervention should reflect balanced fall information, in particular the fall risks and preventions. Moreover, pertaining to accessibility, older persons' help-seeking behaviours and caregivers' support should be considered when developing an FPEI in the primary care setting. Therefore, in this thesis, the development of the FPEI takes into account the needs of both older persons and HCPs for the long-term benefits and sustainability.

1.6 Research questions and objectives

Therefore, the overarching aim of this study is to develop an FPEI for community dwelling older persons at high risk of falls in a Malaysian primary care setting. The older persons at a high risk of falls defined as older persons whom experienced at least one fall in the past 12 months (Gillespie et al., 2012). Thus the following research questions are to be answered:

- What are the needs of older persons and HCPs to prevent falls among older persons at a high risk of falls in the primary care setting?
- What is the evidence of fall prevention education interventions and theories that have been used in the development of an FPEI for older persons at a high risk of falls?
- How to develop an FPEI based on needs, evidence and theories?
- How to pilot test and evaluate the feasibility and accessibility of the FPEI for older persons with a high risk of falls in a primary care setting?

- Based on the preliminary evaluation of the feasibility and accessibility findings, how to further revise and accomplish the final FPEI?

To operationalise the research questions, the following study objectives are proposed:

- To explore older persons at high risk of falls and HCPs' wider context of barriers, facilitators and needs, before deciding on the type of fall prevention intervention preferred in preventing falls among older persons in a primary care setting.
- To systematically search, select and synthesise the existing best evidence and theories for developing an evidence-based FPEI.
- To develop the FPEI systematically using the UK Medical Research Council (MRC) framework.
- To pilot test and evaluate the feasibility and accessibility of the FPEI among older persons at a high risk of falls in a primary care setting.
- To integrate the preliminary evaluation of the feasibility and accessibility findings into the final FPEI.

CHAPTER 2: LITERATURE REVIEW

The literature review in this chapter focuses on these areas:

- Fall prevention interventions (FPIs): the range, format, effectiveness, implementation, developing, reporting and gaps in research
- Fall prevention education interventions (FPEIs): Development, evidences, needs assessment, and theoretical underpinnings
- FPIs in the primary care setting: barriers and opportunities

2.1 Fall prevention interventions (FPIs)

Falls in older persons are common, which can cause unintentional injuries. Falls are caused by complex risk factors, including health problems, home and environmental hazards, risk-taking behaviours and social conditions (WHO, 2008). Due to a multitude of risk factors, preventing falls in older persons is challenging. Thus, in the past decade, there has been a substantial increase in research on the topic of prevention of falls among older persons. Considerable intervention evidences are associated with individual risk profile in the community, and residential and acute care settings are found more effective. Fall prevention interventions (FPIs) are typically for older persons who have experienced falls once or recurrently; these FPIs are based on reported risk factors of falls, such as poor balance and gait, home hazards, taking more than five types of medications, poor vision and poor hearing (WHO, 2008). These are some examples of FPIs: home-based or group exercises targeting balance and strength trainings, education programmes, medications adjustment and withdrawal, and modifying or removing hazards in the home and environment.

The FPIs are designed to reduce falls and minimise exposure to the effects from any fall risks in older persons living in the community (Gillespie et al., 2012). Generally, the FPIs help older persons at a high risk of falls to make changes to reduce the risks of falling and prevent falls. Evidence shows the benefits of each FPI in the prevention of falls, such as improved balance and strength, knowledge acquisition, reduced the risks of falling and falls. They are basically designed to be used after consultation with the physicians who confirm the patients' fall history and health conditions. In this section, the range of FPIs, formats, effectiveness, implementation, reporting and gaps are reviewed.

2.1.1 Range of FPIs

According to a current systematic review, there were about 159 trials of FPI conducted on 79,193 older participants aged above 65 years worldwide (Gillespie et al., 2012). Despite many FPIs for preventing falls, the scopes are overlapping and narrow. There has been a range of different types of supervised and unsupervised exercises focusing on balance and strength training (Kendrick et al., 2014): Tai Chi (Li et al., 2008), home visits and interior modification (Chase, Mann, Wasek, & Arbesman, 2012; Kamei et al., 2015), improving vision (Campbell et al., 2005; Cumming et al., 2007), medication review (Salonoja et al., 2010), cognitive behavioural interventions (Dorresteijn et al., 2016), walking aids (Luz, Bush, & Shen, 2015) and fall education (Brouwer, Walker, Rydahl, & Culham, 2003; Dapp et al., 2005). However, the research has largely focused on just a few conditions. For example, in the exercise intervention, there are many similar FPIs developed, including Tai Chi, Pilates, Otago home-based exercise and general home and group-based exercisers. Very few FPIs were developed and evaluated on footwear, walking aid, balanced food, and active ageing, where complex interventions need to be developed.

Similarly, there are very few FPIs designed for fall prevention education, which require development of a complex intervention. Using a fall prevention education intervention (FPEI) can potentially improve quality of care and lighten healthcare burden through better adherence to other FPIs and improving appropriate FPI utilisation. However, only five of the Cochrane Reviewed FPIs focus on FPEI and evidence for preventing falls is inconclusive (Gillespie et al., 2012).

- Promotion of health in older people using health risk appraisal (Harari et al., 2008);

- Promotion of health in older people using health risk appraisal in group sessions or home visits (Dapp et al., 2011)
- Cognitive behavioral strategy and Tai Chi exercise (Huang, Yang, & Liu, 2011)
- Education and Tai Chi Chuan exercise (Huang, Liu, Huang, & Kernohan, 2010)
- Fall education programme in group and individual formats (Ryan & Spellbring, 1996)

The first two fall education interventions were developed for older people without a fall history, while the other three were for older people with a fall history. Of these, only Ryan et al. (1996) provided information about the fall education information and evaluation findings. However, none had been developed based on needs of older people. Therefore, there is an urgent need to develop an FPI based on needs of older people at a high risk of falls, in view of the increasing incidence of falls (WHO, 2008), the rapid development of FPIs (NICE, 2013) of which the needs of older people are unexplored and unaddressed in these FPIs (Yardley, Bishop, et al., 2006; Yardley, Donovan-Hall, et al., 2006). The FPEI, which incorporates information about falls, risks and FPIs, will allow the older people to make changes to reduce risks of falling.

2.1.2 Format of FPIs

In some FPIs, single interventions had been evaluated; on the other hand, in other FPIs, more than one intervention had been evaluated. An FPI with multiple interventions, multifactorial FPI is conducted based on individual assessment of risks; meanwhile, a multifaceted FPI provides multiple interventions to all participants (Costello & Edelstein, 2008). A multifaceted FPI, with a combination of Tai Chi Chuan and education, significantly reduced falls among older persons in four villages in

Taiwan, compared with those that incorporated education alone, Tai Chi Chuan alone and the control group (Huang et al., 2010). On the other hand, a multifactorial FPI, with eight groups defined according to the presence or absence of each of the three interventions, namely exercise, home hazards removal or modification, and vision referral, did not prevent more falls than a single intervention, and the effects on injurious falls were smaller (Fitzharris, Day, Lord, Gordon, & Fildes, 2010).

Group and home-based (individual) FPIs have become popular formats for exercises, education and home hazards checking in recent years. In one study, Ryan et al. reported that older women aged 75 years and above who received education in groups, were enabled to recognise more fall-associated risks, and made changes to prevent falls compared with individual-based FPIs (Ryan & Spellbring, 1996). One survey, conducted among older persons with socio-economic deprivation from ten general practices in the UK, reported that older people preferred home-based exercises (Yardley et al., 2008). A multifactorial FPI with three consecutive home-based visits and counselling on fall prevention also significantly reduced falls among older participants with physical impairment (Luck et al., 2013). In particular, exercises and home-based FPIs have been evaluated on a range of formats compared with other FPIs, including education-based FPIs.

In previous studies, FPIs were found to be effective, when facilitated by instructors from different backgrounds, such as physiotherapist, occupational therapist, Tai Chi master, nurses, geriatricians, and ophthalmologist. One systematic review reported that an FPI, aided by an occupational therapist with environmental assessment and modifications, was significantly effective in preventing falls among older people at a high risk of falls (Pighills, Ballinger, Pickering, & Chari, 2016). However, a nurse-guided health promotion that was hypothesised to improve the quality of life of older

people aged above 80 years, was not supported by effective results (Imhof, Naef, Wallhagen, Schwarz, & Mahrer-Imhof, 2012). In one review, it was reported that the peer senior educators' role in sharing the fall prevention information exerted both advantages and disadvantages among older persons with different social-economic backgrounds (Peel & Warburton, 2009). In particular, previous systematic reviews had shed light on occupational therapists' and physiotherapists' roles and their positive impacts on the environmental-based fall risk assessment and management (Bunn, Dickinson, Barnett-Page, Mcinnes, & Horton, 2008; Child et al., 2012). However, there is still a lack of studies evaluating the roles and impacts of other inter-professionals, including primary care physicians, as facilitators of FPIs.

A range of media were utilised in delivering the FPIs, such as videos, multimedia, pamphlets, posters and web-based programmes (Gillespie et al., 2012). The media used in the delivery of FPIs are important in a number of ways: they affect the accessibility of the FPIs to the older patients, healthcare professionals and healthcare system. Difficulty in accessing FPIs has been highlighted by healthcare professionals and older persons as one of the barriers in the implementation of FPIs in a clinical setting (Child et al., 2012). This is because of the limited resources, such as a lack of healthcare providers, educational materials and facilities to conduct fall screenings and fall risk assessments (Kalula et al., 2011). Therefore, computer-based FPIs are widely utilised to accommodate the lack of resources in the clinical setting. However, each older individual might have different preferences for media type or how it should be delivered (Yardley et al., 2008). The preferences would depend on their socio-economic factors (i.e. age, education levels and income), computer-internet skills, or whether they have any visual, hearing or cognitive disability (Henshaw, Clark, Daniel, Kang, & Ferguson, 2012). The older people with visual, hearing and cognitive disability might need more resources to meet their special needs. However, it is important to take into consideration

costs and technical skills in developing a computer-based FPI. Nonetheless, the advantages of computer-based FPIs are that they could be more easily distributed and updated compared with written materials.

Few studies have evaluated the effectiveness of FPIs in terms of different formats preferred by older persons. Future research should focus on identifying a suitable format of FPI for older persons from various socio-economic backgrounds, health problems and needs; it is to enhance the interaction between different formats used and to improve sustainability.

2.1.3 Effectiveness of FPIs

A large number of RCTs, developed on multifactorial and multifaceted FPIs, have been found effective in reducing fall risks and injurious falls among older persons living in the community; however, few were implemented in the clinical setting. Gillespie et al. conducted a multicentre systematic review on a range of FPIs, and these are their findings: reduced falls and injurious falls, improved knowledge, assessed fall risks, tailored FPIs and improved uptake of FPIs (Gillespie et al., 2012). However, many studies did not show significant fall reduction and adherence among FPIs participants (Hendriks et al., 2008; Imhof et al., 2012; Perula et al., 2012; Shumway-Cook et al., 2007). The main purpose of evaluating FPIs is not solely to determine the effectiveness, but it is to assess ability to change behaviours, attitudes and beliefs of older participants themselves (WHO, 2008). For example, a 6-week education class will only be effective if the older persons attend the sessions, undertake the prevention methods as prescribed, and continue the practice after completion of the classes. According WHO (2008), there are four factors that determine the change in behaviours, attitudes and beliefs among older persons:

- It is within their ability to do
- They have the resources to make the changes
- The changes benefit them
- The benefit outweighs the cost or effort in overcoming barriers

In a systematic review conducted by Bunn et al., it was found that the factors that facilitated participation of older persons in FPIs are as follows: social support, low intensity exercise, greater education, involvement in decision-making, and a perception of the programmes being relevant and life enhancing (Bunn et al., 2008). Furthermore, Yardley et al. found that the older people accept home-based strength and balance training and home hazards checking compared with group-based exercises (Yardley et al., 2008). As a result, a more pragmatic FPI developed based on older persons' preferences that catered to their needs, may have a large impact on the sustainability of FPIs in the clinical practice. However, there is scant evidence of FPIs developed based on older persons' needs.

2.1.4 Implementation of FPIs

Although FPIs have positive effects on fall reduction, there is a gap in the implementation of FPIs in a real clinical setting. A systematic review conducted by Kalula, et al. found that very few FPIs were developed and implemented in the developing countries, in particular for older persons in South Africa. The reasons were absence of evidence, including competing demands for acute care health issues; and a lack of resources, healthcare providers and facilities (Kalula et al., 2011). A qualitative systematic review conducted by Child et al., shed light on factors that determined the implementation of FPIs: practical consideration in designing and implementation (i.e. cost, accessibility and time); considering different cultural and social influences of the older community; psychosocial impact of an older person who viewed self as old and

disabled; and older persons accepting themselves as experts on the prevention of their own falls (Child et al., 2012).

To meet these challenges in the implementation of FPIs and prevention of falls in older persons, WHO (2008) recommendations are listed as below:

- Raise awareness about falls and FPIs that could improve balance and prevent falls.
- Implement FPIs that highlight and promote positive self-identity.
- Utilise a variety of forms of social encouragements to engage older people (i.e. personal invitation from healthcare professionals).
- Ensure the FPIs are designed to meet the needs, preferences and capabilities of the older individuals.
- Encourage self-management rather than dependence on the healthcare professionals by giving older persons an active role.
- Use a validated method for promoting and assessing the processes that maintain adherence in the long term.

In some qualitative studies, the older persons perceived that they would participate in FPIs that meet their own health needs, help maintain independence and improve confidence (Calhoun et al., 2011; Yardley, Donovan-Hall, et al., 2006). These characteristics are compatible with the positive identity and benefits that may anchor older persons' participation in FPIs. In another qualitative study, the older persons opined that the primary healthcare professionals' role is to respond to reported falls by referring them to take up FPIs (Dickinson et al., 2011a). The multidiscipline healthcare professionals involved in FPIs include these specialists: geriatricians, physiotherapist, nutritionist and social workers, who indirectly also help promote greater acceptance and uptake of FPIs among older persons (Dapp et al., 2005). Thus, the healthcare

professionals, family, peers and social organisations should be encouraged to give continual support to FPIs, which may improve the rate of adherence as well as uptake of FPIs in practice (Lee, Arthur, & Avis, 2008; Leung, Chi, Lou, & Chan, 2010).

2.1.5 Older persons' challenges in the uptake of FPIs

Numerous published studies have now demonstrated the benefits of a variety of primary and secondary fall prevention strategies, including home-based or group exercise, home hazard modification, medication review, rehabilitation, fall education, and multi-factorial fall risk assessment (Gillespie et al., 2012). However, many older persons with an increased fall risk do not receive these interventions (Yardley, Donovan-Hall, et al., 2006; Yardley et al., 2008). Potential barriers to receiving effective interventions include the lack of knowledge about fall prevention interventions; the world older folks are unaware of the types of exercises that can improve balance and prevent falls (Horne, Speed, Skelton, & Todd, 2009b). They may also perceive that falls are not a medical problem or serious enough to require a doctor, and they may not be aware of the availability of fall prevention interventions (Horton & Dickinson, 2011). In addition, they usually link falls to carelessness rather than home hazards (Simpson et al., 2003). In one study, 60% of older Australian people rated their fall risk as low, and they considered fall prevention campaigns to be irrelevant to them (Hughes et al., 2008). Another issue in adopting fall prevention intervention, as observed by the UK elderly with a high risk of falls, is the perception that fall prevention advice is not practical, but mere common sense to be used like any other information or advice (Yardley, Donovan-Hall, et al., 2006). Below are some of the older persons' behaviours that act as a barrier to initiating fall prevention intervention: resistance to precautions needed to avoid falls and engaging in activities with a high risk

of falling (Pohl et al., 2015); concealment of falls from their children and fear of institutionalisation (Horton & Dickinson, 2011).

Other predictors of poor fall prevention uptake among the elderly with a high risk of falls include factors related to healthcare professionals (Choi & Hector, 2012). In one qualitative study, the elderly stated that healthcare professionals lacked awareness of fall intervention services, and they did not offer continuity of care to patients who reported falls; they failed to make relevant referrals and lacked knowledge on how to help the elderly gain access to fall prevention intervention (Dickinson et al., 2011; Loganathan, Ng, Tan, & WY, 2015).

Previous systematic reviews that highlighted barriers to the implementation of research evidence in the management of falls in older persons were mostly conducted among predominantly Caucasian populations (Bunn et al., 2008; Child et al., 2012). Prior to the effective implementation of falls interventions in the South East Asian setting, it is important to understand the perceptions of our older population on falls and falls interventions; their mind-sets are likely influenced by differences in culture, health systems and socio-economic status.

2.1.6 Developing and Reporting of FPIs

The study of falls in older persons focuses on tackling complex risk factors among heterogeneous older persons. Hence, the development of FPIs involves complex components; and they are implemented in different clinical settings. It is more impactful for older persons with multiple health risks to take up complex multifactorial interventions, rather than single component interventions (Vliek et al., 2008). Furthermore, WHO (2008) emphasises that the FPIs are promoted to make behavioural changes to reduce falls; an FPI needs to be appropriately framed so that it promotes

realistic beliefs and possible prevention actions. However, the evaluation of designs and reporting of FPIs are still limited. The complex interventions are difficult to develop, document and reproduce. Moreover, it is costly and challenging to develop effective randomised controlled trials (RCTs) that are suitable for publishing. The most recently updated guidelines of the CONSORT statement on RCT trial reporting necessitates the reporting of the main elements of complex interventions, but it does not specifically address the problem associated with describing complex interventions (Moher et al., 2010).

The UKMRC has developed a framework to systematically design, evaluate and implement complex interventions; the key factors determine the development and evaluation process of a complex intervention, including the development phase, feasibility and piloting phase, evaluation phase and implementation phase (Craig et al., 2008). Subsequently, the framework has proved useful in developing an FPI for cognitively impaired older persons; it is reported that it deserves greater dissemination and implementation (Faes, Reelick, Esselink, & Olde Rickkert, 2010).

In comparison, most recently, Lamb et al. developed a classification system (taxonomy) to report FPIs that are used in preventing falls among older persons (Lamb et al., 2011); the study reported that the taxonomy description of an FPI should consist of four domains:

- Approach
- Base
- Components
- Descriptors

Furthermore, the subdomains of the taxonomy developed are as below:

- Where participants are identified
- The theoretical approach of the interventions
- Clinical targeting criteria
- Details of assessment
- Description of nature and intensity of interventions

This method of reporting, however, has limited application as it focuses on fall-prevention interventions, and it is structured to ensure ease of complete reporting. Although replications of interventions are easier to achieve, this assumption requires testing. Furthermore, the taxonomy is complementary to but does not replace the Consort Guidance on the reporting of complex interventions.

In addition, Elley et al. used Fall Assessment Clinical Trial (FACT) in the reporting of a multifactorial FPI based on the intervention, design, recruitment techniques, and baseline results (Elley et al., 2007). However, further research is needed to ascertain the accessibility, reliability, and applicability of these standards when developing and reporting the FPIs. More research is needed to evaluate whether FPIs developed using the UKMRC framework are more effective compared with those developed using other standard criteria. This study explored the UKMRC framework to develop and evaluate FPIs in a primary care setting.

2.1.7 Gaps in FPIs Research

In the past 10 years, the number of FPIs developed for older persons on the prevention of falls has increased; though at a slower pace, the number of clinical trials on FPIs has risen (Gillespie et al., 2012); the researches on FPIs are broadly classified into four categories:

- Evaluation and effectiveness of FPIs for various fall-associated risks
- Evaluation of different format of FPIs
- Challenges to take up FPIs
- Reporting of FPIs

So far, the majority of researches focus on evaluating the effectiveness of FPIs, and they concentrate on a narrow spectrum of fall-associated risks. According to the Cochrane review of FPIs, 59 out of 159 clinical trials were conducted as single-exercise interventions, and another 40 clinical trials were on multifactorial interventions (Gillespie et al., 2012). It is understandable that an exercise-based FPI significantly reduced falls among older persons with balance and gait problems, but clinical evidences are still lacking. However, there are other fall-associated risks faced by older persons that should be tackled as well, such as vision and hearing problems, acute and chronic diseases, and environmental hazards.

In recent years, the education-based FPIs, due to their accessibility and benefits, have been conducted in combination with multifactorial FPIs. However, their effectiveness has not been fully assessed. There are few studies that compared different content of FPIs (group and home-based, facilitated by inter-professionals, pamphlets, video, multimedia and internet-based programme); and different formats (group-based and tailored) (Dapp et al., 2011; Hakim, Roginski, & Walker, 2007; Schepens, Panzer, &

Goldberg, 2011; Wyman et al., 2007). Future research should attempt to match the content and formats of an FPEI with older persons' preferences while taking into consideration their cost effectiveness as well.

Despite the availability of effective interventions for preventing falls among older people, dissemination and implementation of FPIs in the practice is scanty. The reasons could be that the HCPs may not be ready to manage older persons in the community due to various challenges (Chou et al., 2006; Dickinson et al., 2011; Fortinsky et al., 2004). In addition, many older persons do not seek help and exhibit conventional beliefs and behaviours against falls and taking up of FPIs to prevent falls (Boongird & Ross, 2015; Calhoun et al., 2011; Horton & Dickinson, 2011; Kruse et al., 2010). Thus, there is a gap in development of a new FPI that is needs-based to cater to older persons' needs (WHO, 2008).

Hence, in accordance with the reviews of, and gaps present in the previous FPIs, indeed, there is a need for the development of an education-based FPI. Education is an essential intervention that can be used as an eye-opener for many of those older persons who lack knowledge about the importance of fall prevention and risks of falls; it helps them understand how they can identify the types of strategies that may be implemented to minimise an individual's fall risk. Thus, this study focuses on the development and preliminary evaluation of the Fall Prevention Education Intervention (FPEI), using the UKMRC framework.

2.2 Fall Prevention Education Interventions (FPEIs)

Education in FPIs needs to be considered in terms of its role as a preventive tool. Moreover, education is an important element in the implementation and sustainability. In this section, FPEIs designed for older persons to acquire knowledge and make

changes to reduce fall risks are reviewed. The UKMRC framework is explored to provide guidance in the development of FPEIs; the older persons' needs for FPIs are also explored; and the theories underpinning the development of FPEIs that translate knowledge or awareness into behavioural change are also reviewed.

2.2.1 FPEIs targeting older people in preventing the falls

The Fall Prevention Education Interventions (FPEIs), due to their accessibility and low cost, have become mandatory to be part of multifactorial or multifaceted FPIs in recent years. Although multifactorial or multifaceted FPIs frequently incorporate an FPEI, there is very little quality research published that investigates the effectiveness of this approach (Gillespie et al., 2012). Many national and international bodies also recommend the FPEI to be used as vital components of FPIs, though not as a single FPEI; for example, the National Institute for Health and Clinical Excellence (NICE, 2013), World Health Organisation (WHO, 2008), and the American and British Geriatrics Societies (Kenny et al., 2011).

Various authors have developed specific FPEI topics as important components of FPIs: home safety (Gopaul & Connelly, 2012); environmental safety (Schepens et al., 2011); active ageing (Dapp et al., 2005); diet (Assantachai, Chatthawaree, Thamlikitkul, Praditsuwan, & Pisalsarakij, 2002); medications that cause falls (Salonoja et al., 2010); and balance exercise (Yardley & Nyman, 2007). However, there is little evidence to show specific benefits of such educational input on falls.

FPEI has been reported as a component of a multifaceted FPI using an RCT design. Reinsch et al. (1992) used four groups of healthy community dwelling older persons, and compared the effects of an FPEI, an exercise FPI, a combination of FPEI and exercise FPI, and a control group. After one year, there were no significant differences

between any of the groups in terms of falls, severity of falls or measures of balance, and fear of falling (Reinsch, MacRae, Lachenbruch, & Tobis, 1992). In another study, Brouwer et al. (2003) conducted a randomised study comparing two types of FPIs, exercise FPI and FPEI among older people above 65 years old living in the community, who reported a fear of falling and activity restriction. The eight-week FPEI engaged participants to discuss their concerns about falling and focused on identifying and reducing fall risks factors. Fall was not an outcome of the study, but both FPEI and exercise FPI demonstrated a significant improvement in balance and confidence. The majority of participants adopted a higher level of activity, although this was greater in the exercise FPI. The education group also demonstrated improvement in perceived physical health. However, education provided using pamphlets alone, reported no impact on the reduction of fear of falling among older people (Rucker et al., 2006).

FPEIs were found to be conducted using a variety of media, including pamphlets, video, web-based pages, and consultation or advice by healthcare providers (Gillespie et al., 2012). In a study, an FPEI, consisting of individual consultation and an hour lecture on drugs that were associated with falls, was tailored for older persons who were found consuming those drugs. The majority of participants reported significant withdrawal of those culprit drugs, after a year of follow-ups (Salonoja et al., 2010). Yardley et al. provided internet-based tailored and non-tailored advice on undertaking strength and balance training (SBT) for older people above 65 years living in the community. The tailored group was presented with advice tailored to their personal-related balance capabilities, health problems and activity preferences; meanwhile, those in the control group were presented with all the advice from which the tailored advice was selected. After reading the advice, those in the tailored group had more positive attitudes than those in the control group. Fall was not an outcome of the study, but the tailored group reported perceived relevance of the SBT activities, greater confidence and the ability to

carry out stronger intentions to undertake the activities (Yardley & Nyman, 2007). In another study, a series of interviews and advice on home hazards were provided to older community dwellers, using their own home hazards photographs and compiled into a booklet; the study reported a significant reduction of hazards in the home (Gopaul & Connelly, 2012). Hence, a structured FPEI, developed based on the needs of older persons, was found to be more beneficial to older persons in improving the understanding of their fall risks and making changes to reduce risks of falling.

2.2.2 UKMRC framework in the development of an FPEI

Complex interventions are increasingly used in attempts to tackle fall problems among older persons living in the community. Complex interventions are defined as interventions that comprise multiple interacting components (Craig et al., 2008). According to Craig et al. (2008) developing a complex intervention entails the use of a structured framework, and the consecutive phases of the framework involve the best available evidence, needs assessment and appropriate theories (Craig et al., 2008). The key elements and consecutive phases of the UKMRC framework are shown in **Figure 2.1**.

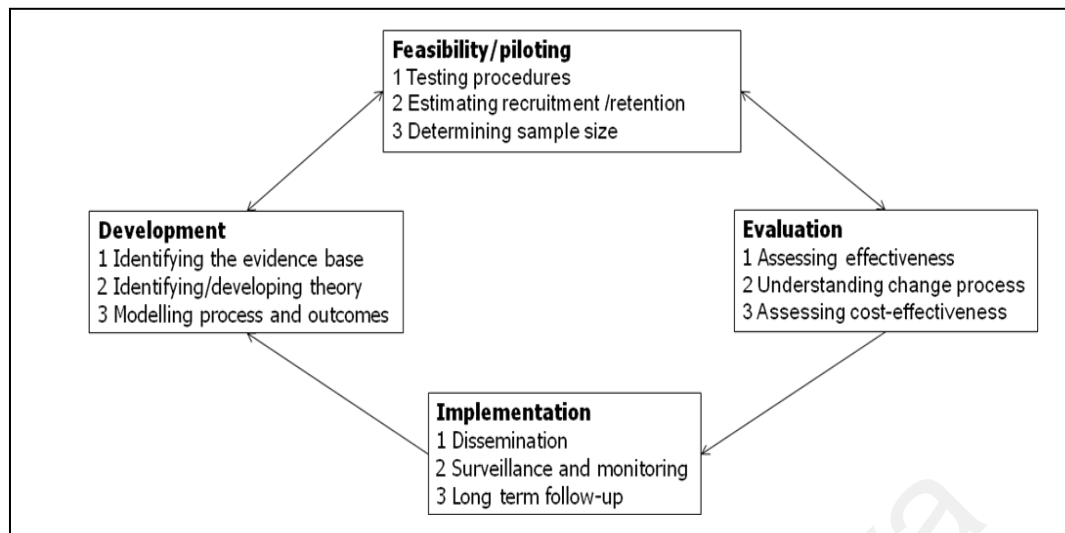


Figure 2.1: Key elements in the UKMRC framework: development, feasibility/piloting, evaluation and implementation stepwise processes involved in the development of a complex intervention (Craig et al., 2008).

This study focuses on Phase 1 and Phase 2. Phase I pertains to development. This phase started with a literature review, which provided the existing evidence and knowledge gaps present in FPIs. This understanding was further developed through qualitative interviews with healthcare providers and older persons. The developed intervention was iteratively reviewed by clinical experts and through pilot tests in a real clinical setting. The preliminary evaluation, conducted through interviews with older persons who participated in the interventions, was further used in revising the final version of the intervention. Phase II pertains to feasibility and piloting; Phase III, evaluation; and phase IV, dissemination which examined the implementation of the intervention, and it is not applicable in this thesis as it is suggested for future studies.

In a previous study, the framework was used to design an occupational therapy intervention for dementia patients and their caregivers (Graff et al., 2006). The framework was also found useful for complex geriatrics interventions in general (Graff

et al., 2008). Subsequently, Faes et al. (2010) provided detailed sections of the framework, particularly on the development of a fall prevention intervention (Faes et al., 2010). Hence, this study employs the UKMRC framework as guidance in the development and preliminary evaluation of the FPEI as described below:

2.2.3 The needs of older persons

A review of evidence, conducted by Yardley, suggests that a tailored personal approach, or even in group contexts, can greatly increase the chance of improvement in older people engaging with and maintaining an intervention programme (Yardley, Bishop, et al., 2006; Yardley, Donovan-Hall, et al., 2006). There is a need to consider the individual's lifestyle, values, religious and cultural beliefs, which may be associated with ethnicity and gender-specific factors. Environmental determinants, such as the socio-economic background of the society in which the older person lives; their place of residence and availability and access to services, should also be contemplated. Interventions need to be presented in ways that are tailored to the cultural preferences of older people and be realistic within the resources available (Loganathan, Ng, & Low, 2016). Group sessions with trained instructors for example, are relatively low-technology affordable interventions that should be within the means of many societies (Clemson et al., 2004). Although more research is necessary, there is growing evidence that many older people may prefer FPEIs delivered at home, with some professional guidance (Dorresteijn et al., 2016). Therefore, how FPEIs are best presented will need to be explored in the older persons, developed locally and should be tested before the large-scale roll out of a programme in the local context.

2.2.4 Theoretical frameworks used in FPEIs

In the development process of health programmes or interventions, theories of behavioural change are commonly integrated to initiate the changes per se (Mitchie et al., 2011). In previous studies, FPEIs using the cognitive behavioural theory were delivered via focus groups, discussions, goal setting, and role play, to reinforce the education messages (Clemson et al., 2004; Dorresteijn et al., 2016; Hornbrook et al., 1994; Reinsch et al., 1992; Tambaum, 2015). As a result, theories play a role in achieving the outcomes of interventions, such as knowledge, uptake of activities, beliefs, self-management and skills learnt. In one study, the Situated Learning Theory and the Attention-Relevance-Confidence-Satisfaction (ARCS) Model were integrated into a multimedia-based fall prevention education intervention to measure knowledge of the participants after a month (Schepens et al., 2011).

To date, many multifactorial fall prevention interventions, such as home visit and exercise, have merged education as part of the intervention or trials; however, the studies rarely described the theoretical underpinnings of trials or interventions (Hill et al., 2009). The Health Belief Model (HBM) and the Social Cognitive Theory (SCT) are the two most commonly utilised theories in the fall prevention interventions; for example, HBM is commonly utilised in FPEIs for inpatients or hospital discharged patients (Hill, Etherton-Beer, & Haines, 2013). The HBM is a theoretical framework widely used in health behaviour interventions focusing on changing behaviours at the individual level; it captures a person's action to change behaviours, which depends on a person's evaluation of perceived susceptibility (to the disease, condition), and severity; perceived benefits outweighing the barriers may motivate an action to change

behaviours. The person needs reminders or instructions (cues to action) to facilitate the change (Green & Murphy, 2014).

In a systematic review, FPEIs used peer educators utilising a range of theories: Social Learning Theory to initiate behaviour change; Social Identity Theory to get influenced by own social group; Diffusion Innovation Theory to initiate uptake of new information when it is being taught by professionals in that field; Empowerment to develop personal skills and strengthen community action; and Trans-theoretical Model to initiate behavioural change, such as improving confidence and abilities to address barriers (Peel & Warburton, 2009). In one study, it was also reported that the trans-theoretical change model was utilised in strength training intervention for Iranian women with osteoporosis (Shirazi et al., 2007).

2.2.4.1 Bandura's Social Cognitive Theory

The Bandura's Social Cognitive Theory has received considerable attention in the literature. It has evolved from the Social Learning Theory, which originated from Albert Bandura in 1960s, which informed that human behaviours were an interaction between personal factors, behaviours and the environment (Bandura & Walters, 1977). Key aspects in Bandura's theory constructs are shown in **Table 2.1**. According to Bandura, these key aspects are important in understanding health behaviour and in planning an intervention to pursue a specific behavioural change (Bandura, 1986). The Self-efficacy Theory, a derivative of the Social Cognitive Theory, defines self-efficacy as confidence and an important element for a person to pursue a behavioural change or play a role in a behavioural change (Bandura, 1994). In other words, self-efficacy or confidence of a person is influenced by the judgment over choice of activity, environment and coping

behaviours. The Self-efficacy Theory consists of four main components (Bandura, 1986):

- Mastery experiences
- Exposure to positive role models
- Information provision
- Verbal persuasion (assurance of ability to carry out behaviours and developments of social support).

Table 2.1 : Key aspects of Social Cognitive Theory (Fertman & Allensworth, 2010)

Key aspects	Definition
Environment	Social or physical circumstances or conditions that surround a person
Situation	A person's perception of his or her environment
Behavioural capability	The knowledge and skills needed to perform a given behaviour
Outcome expectation	Anticipation of probable outcome that would be ensured as a result of engaging in the behaviour under discussion
Outcome expectancies	The value that a person places on the probable outcome that results from performing a behaviour
Self-control	Personal regulation of a goal-directed behaviour or performance
Observational learning	Behavioural acquisition that occurs through watching the actions of others and the outcomes of their behaviours
Self-efficacy	A person's confidence in performing a particular behaviour
Emotional coping	Personal techniques employed to control the emotional and physiological states associated with acquisition of a new behaviour

In the Self-efficacy Theory, Bandura postulated the enactive mastery of an experience that is about doing, success and failure, and overcoming barriers. He added that telling others about personal progress also enhances self-efficacy, and gives

valuable self-satisfaction. The vicarious experience is one about observing others, who provide their own examples of competencies and attainments, which can impact how personal capabilities are appraised, while the verbal persuasion could be positive or practical persuasion which can encourage people to try harder and a leader has a role to provide and encourage by giving positive verbal support. Further, people use information from their physiological and emotional states to judge their capabilities; for example, the participants get motivated when their balance is gained due to routine exercise. In relevance to occupational therapy, Bandura's Self-efficacy Theory was practised and proved its efficiency in fall prevention interventions; the Steady as You Go programme and Matter of Balance have improved self-efficacy in situations of fall risks, specifically in outdoor activities for community dwelling older persons (Cheal & Clemson, 2001); and Stepping On programme enhances self-efficacy in fall risk conditions among community dwellers (Clemson et al., 2004).

(a) ***Social Cognitive Theory (SCT): Assessing determinants of FPEIs***

To understand why older persons face difficulties in accepting the FPEIs, it is important to identify the reasons that influence their thinking based on SCT. The SCT has classified the determinants into four main categories (Bandura, 1986):

- Social and physical circumstances
- Perception of own situation
- Perception of the FPEIs
- Anticipation of outcome benefits

Moreover, these determinants of accepting FPEIs are important because they serve as the main aspects in developing interventions to improve the degrees of acceptance and adherence. By modifying these determinants, the outcome of the FPEIs can be improved. However, not all determinants are modifiable. Factors such as social and physical conditions are irreversible, while most of the rest can be modified by FPEIs, which include HCPs consultation or a fall education pamphlet. For example, an older person with little knowledge about falls will reject participating in fall prevention interventions. Their knowledge can be improved by gaining access to the relevant information, such as FPEIs. Similarly, the older persons might associate walking aid with older-age usage or embarrassment, and this might influence their adherence to walking aid usage. Again, the HCPs can motivate the older persons to use walking aids by addressing their barriers in using them.

Therefore, identifying the determinants of FPEIs can help clarify the reasons why older persons find it difficult to participate in or accept the FPEIs. Similarly, when developing an FPEI to resolve the difficulties, it is important to ascertain which of these determinants are important in influencing older persons' participation and acceptance.

(b) Social Cognitive Theory (SCT): Clarifying information

Acceptance and adherence to fall prevention intervention options become difficult when older persons are faced with a lack of information about FPEIs that may clarify the usage and the preferences. FPEIs are an essential programme to support older persons who face barriers in participating fall prevention interventions, particularly if it is not to their preference. The FPEIs aim to promote an environment where the older persons are informed about falls, and the benefits derived from a fall prevention

intervention recommended by their HCPs. Bandura proposed that health behaviours or programmes should involve providing tailored information, clarifying preferences, peer-support, practical learning and self-management skills (Bandura, 1994). FPEIs are ways to encourage and support older patients to take up fall prevention activities, which are tailored to reduce the risks associated with falls. Therefore, fall prevention interventions should be supported with clarified information in accordance with older persons' preferences.

2.2.4.2 Older adult learning principle used in FPEIs: Gerogogy

Unlike the young learners, older persons tend to have strong preferences about learning (Pincas, 2007). However, according to Formosa et al. (2002), 'there has always been reluctance among the adult educators to examine the principles and practices behind teaching and learning of an older adult education'. Lemieux and Martinez (2005), reported that any educational intervention that is not based on gerontology might lead to failures. For example, teachers behaving in a patronising way that demean the older persons or decrease the personal responsibility for achievement may lead to an unsuccessful training session. Thus, the Gerogogy's older adult learning principle is used in the FPEI. The Gerogogy's principle refers to strategies applied in teaching older persons, as it takes into account an older person's disease process, age-related changes, educational level and motivation in teaching the patient (Formosa, 2002; Pearson et al., 2011).

Pearson et al. (2011) reported that Gerogogy has met an older individual's need, in which the teaching method includes transferring of essential information by modifying and adapting it according to the physiological and psychological changes of an older

individual. As a new approach to fall prevention intervention, Gerogogy has incorporated the process of FPEI development to facilitate disseminating information related to falls and fall prevention. The common principles applied in Gerogogy are detailed in **Table 2.2**. The principles are summarised as below (Formosa, 2002):

1. *Flexibility*: The target group of the older persons is not homogenous; they have different learning experiences. Learners have the option to choose their own pace of learning.
2. *Diversity*: Learners have different life experiences, which can be implemented in the study process. Learners can share their life experiences with others.
3. *Usefulness*: Older people want to feel useful, and therefore the material provided should be directly useable in their life. Training assignments, materials and examples are directly applicable.
4. *Modernity*: The objective of teaching the older persons is to support their independent coping skills in the modern society.
5. *Activeness and independence*: Older learners tend to act autonomously. Learners are given an opportunity to be active individuals in the study process who take responsibility for their learning. They are guided to be active in their future life. Learners are given an opportunity to be autonomous individuals during the studies.
6. *Security*: Older people need encouragement, as they tend to regard their existing knowledge insufficient for training, and their intellectual abilities required for learning have impaired with age.
7. *Sense of Success*: Older people get tired quickly, and feel that it is easier to learn at a younger age. Learners are informed of their progress.

8. *Sustainability*: Teaching of the older persons must support an individual's willingness and ability to continue learning and self -developing.
9. *Enjoyability*: Learning is easy, if led by a person's own inquisitiveness, and the environment is pleasant.

To the best of our knowledge, the Gerogogy principles had not been integrated as a learning approach in any fall prevention interventions, including FPEIs. Thus, we incorporated the Gerogogy principles to develop the FPEI using the UKMRC framework. As described, the methods of learning in older adults are unique and require alteration. Gerogogy meets these needs; the educational information about fall prevention interventions enables one to achieve adherence to and sustainability of the FPEI in the long term. In previous studies, adult learning principles had been utilised in the FPEIs; however, they were not specifically catered for older people (Cheal & Clemson, 2001; Clemson et al., 2004; Dorresteijn et al., 2016; Schepens et al., 2011).

Table 2.2 : The Gerogogy principles (Tambaum, 2015)

	Category/attribute	Explanation/ description of the principle
1	Flexibility	The target group of older persons is not homogenous, they have different learning experiences.
	Pace	Learners have the option to choose their own pace of learning.
	Study style	Learners have the option to choose the styles of acquiring new knowledge.
	Reinforcement	Learners have the option to choose the ways of reinforcing the knowledge learnt.
2	Diversity	Learners have different life experiences, which can be implemented in the study process.
	Sharing	Learners can share their life experiences with others.
	Usage	Learners can use their personal experience during training sessions.
	Transformation	Learners can transform their experiences during training sessions.
	Using connections in learning new things	Instructor explains new terms and subjects through the terms and phenomena known to the older persons.
	Using connections in reinforcing the knowledge learnt	Instructor reinforces the knowledge learnt by creating a connection between previously learnt knowledge and previous life experiences.
3	Usefulness	Older persons want to feel useful and therefore the knowledge learnt should be directly useable in their life.
	The applicability of the study content	Training assignments, knowledge gleaned from materials and examples are directly applicable.
	The applicability of the learning outcome	The learning outcomes of learners are applied in life.
4	Modernity	The objective of teaching the older persons is to support their independent coping skills in the modern society.
	Phenomena	Phenomena familiar to the younger members of the group are explained to the older persons.
	Means/tools	Means or tools familiar to younger members of the group are explained to the older persons.
	Terms	Terms familiar to the younger members of the group are explained to the older persons.
5	Competitiveness	The society is characterised by age-based stereotyping and discrimination. The older persons may not be aware of it.
	Awareness rising	The older persons are informed of the stereotyping and discrimination implications.

Table 2.2, Continued, The Gerogogy principles (Tambaum, 2015)

	Fighting	The implications of age-based stereotyping are fought against during the studies.
	Conduct	The conduct during the studies is characterised by equal treatment of the older persons.
6	Activeness and independence	Older learners tend to act autonomously.
	Activeness	Learners are given an opportunity to be active individuals in the study process who take responsibility for their learning.
	Autonomy	Learners are given an opportunity to be autonomous individuals during the studies.
7	Security	Older persons need encouragement, as they tend to regard their existing knowledge insufficient for training, and their intellectual abilities required for learning have impaired with age.
	Encouragement	Learners are encouraged during the studies.
	Avoiding intimidation	Intimidating is avoided.
	Avoiding isolation	Steps are taken to ensure learners do not end up in isolation during the studies.
	Respect	Respect for individuals is demonstrated during the studies.
	Kindness	Kindness to older learners is demonstrated during the studies.
8	Sense of success	Older persons get tired quickly and feel that it is easier to learn at a younger age.
	Praise	People are informed of their progress.
	Getting over tiredness	Group members and instructors are positive-minded about being tired.
	Sustainability	Teaching of the older persons must support individuals' willingness and ability to continue learning and self-developing.
	Metacognition	The techniques of developing people as learners are taught during the training.
	Self-help	The techniques of restoring the learning capability are taught during the training.
9	Enjoyability	Learning is easy, if led by a person's own curiosity, and the environment is pleasant.
	Curiosity	The curiosity of learners is stimulated during the studies.
	Informal atmosphere	Entertaining and informal atmosphere is created during the studies.

It is quite common when implementing the FPEIs, healthcare professionals are the ones who are resourceful in delivering the fall information. In one study, the older persons perceived that HCPs' recommendation in preventing falls was more convincing (Dickinson et al., 2011). As such, training of HCPs is fundamental in conducting or delivering the FPEIs among older persons at a high risk of falls (Scott, Gallagher, Higginson, Metcalfe, & Rajabali, 2011). Kerse and colleagues, in a randomised controlled study, investigated the change in the health-related behaviours of older persons, following a series of health promotional lectures attended by trained general practitioners (Kerse, Flicker, Jolley, Arroll, & Young, 1999). In the recent studies, HCPs' training has evolved into educational workshops and access to internet-based support resources (Tiedemann et al., 2015); and training and motivation by experts like geriatricians during the whole intervention period (Dapp et al., 2011).

In addition, inter-organisational networks have established joint programme activities and information sharing towards promoting health and preventing injuries. This includes specific fall prevention networks to share information, through a general injury prevention or health promotion partnerships, such as World Health Organisation (WHO); Safe Community (Lindqvist, Timpka, & Schelp, 2001); the 'Stay Active and Independent for Life (SAIL) (York et al., 2010); and RESPOND, a patient-centred programme (Barker, Cameron, et al., 2015).

Although the multiple dimensions of FPEIs are developed to overcome the complex fall-associated risks, only a few have addressed the older people's preferences and barriers in prevention of fall (Hill, Day, & Haines, 2014). Other reasons include a lack of human resources and time constraints (Hanson & Salmoni, 2011). It is common

knowledge now that falls are a significant cause of morbidity and injury for older persons, and that the older persons' beliefs and behaviour in accepting prevention of falls need to be tackled (Yardley et al., 2008).

2.3 FPEIs in primary care setting: barriers and opportunities

In previous studies, FPEIs have been focusing on inpatient falls, often in the hospital settings (Lee, Pritchard, McDermottc, & Haines, 2013). There has been less emphasis on interventions for less serious or common medical conditions in primary care, and currently there are increasing calls for developing FPEIs for community dwelling older people (Kuehn, 2010). However, the delivery of FPEIs in the primary care remains low (Michael et al., 2010). In one study, it was found that time constraints limited the primary care physicians' ability to deliver preventive services to the community (Yarnall, Pollak, Østbye, Krause, & Michener, 2003). Nevertheless, studies show that information about barriers faced in the prevention of falls among older persons were obtained mainly by the primary care physicians who had attended educational outreach visit (Chou et al., 2006; Jones et al., 2011).

As a result, based on the updated National and International guidelines for the prevention of fall in older persons, primary care physicians are urged to screen their patients annually and to recommend tailored, multifactorial fall prevention interventions for older persons at a high risk of falls (Kenny et al., 2011; NICE, 2013; WHO, 2008). One systematic review reported 19 effective fall prevention interventions, including FPEIs that were held in the primary care settings from six countries, namely UK, USA, Canada, Australia, Taiwan, and Thailand (Gates et al., 2008). In the study of (Dickinson et al., 2011), older people perceived that the HCPs were the source of fall

prevention interventions information, and they were obliged to follow HCPs' advice on the prevention of fall.

Many effective FPEIs have been designed and evaluated in the developed countries; however, this is not the case in the developing countries, of which the development is still in its infancy stage (Kalula et al., 2011). In these countries, the translation of falls prevention intervention evidences into practice is difficult, due to competing demands from acute health care, shortages of allied healthcare providers, and the premature stage of development in 'geriatrics' (Ambigga et al., 2011; de Negreiros Cabral et al., 2013; Tan et al., 2014). Currently, there is a paucity of RCTs conducted in prevention of falls in the developing countries like Brazil (de Negreiros Cabral et al., 2013) and Malaysia (Tan et al., 2014); however, the outcomes are yet to be known.

Falls are a complex health problem among older persons. Therefore, lifestyle and behavioural changes should be advocated to curb the rise of falls among older persons aged above 65 years. Kalula et al. reported that in the developing countries, there is no study to determine the older persons' knowledge about falls and the prevention strategies (Kalula et al., 2011). Therefore, the development of an appropriate fall education package could be effective in improving the prevention of falls among the older persons in Malaysia. The Family Health Division of the Ministry of Health of Malaysia (Ministry of Health, 2010) has developed a series of educational materials, including some for older persons. However, fall prevention strategies and fall risk factors component are plainly lacking.

In the developing countries like Malaysia or other similar countries, there is a low understanding of falls scope, a lack of accessibility to fall prevention interventions, and

limited resources to curb falls; hence, there is an urgent need to design and develop a new FPEI. Moreover, there is no structured clinical guidelines used by the healthcare practitioner or established in the healthcare system to address most of the medical problems in older persons; thus, the healthcare system practice, structure and the organisation may vary across the specialties in general practices (Ambigga et al., 2011). This has clearly pictured the scenario of the availability of fall care resources for older persons in the local primary care setting.

In summary, many opportunities are present in the primary care setting to implement an FPEI. However, the rising fall rate among older persons, coupled with healthcare and organisational factors, could hinder the implementation of such fall prevention interventions in the primary care setting. Therefore, opportunities and barriers must be taken into consideration in developing an FPEI to facilitate older persons' understanding and knowledge acquisition of falls and FPIs.

CHAPTER 3: METHODOLOGY

The importance of developing FPEI and rationales for selecting UKMRC framework as a guide are described in Chapter 2. Chapter 3 describes and explains the methodology used in developing the FPEI. The outline of each section in Methodology is described below.

- Systematic approach in developing the FPEI; this is the main section of the chapter, and it describes and explains the methods used in the development of the FPEI
- Convening expert panels
- Assessing needs of users (older persons and HCPs)
- Searching, selecting and synthesising evidences
- Drafting, reviewing and revising the FPEI-- an iterative process

This section also describes how the following research methods are used to develop the FPEI:

- Expert consensus
- Individual in-depth interviews and focus group discussions
- Systematic literature review

3.1 Systematic approach in developing the FPEI

The systematic approach in developing the FPEI is outlined in **Table 3.1**:

Table 3.1: Systematic approach to the development of the FPEI: steps, objectives and methods

Steps in FPEI development	Objectives	Methods
Convening the development and review panels	To inform and advise on the development process	Expert consensus
Users' needs assessment (older persons and healthcare professionals)	To explore the needs of older persons and HCPs in deciding on the design of the FPEI	Individual in-depth interviews and focus group discussion
Searching, selecting and synthesising the evidences	To search, select and synthesise evidences of effective FPEIs	Systematic literature review
Drafting the FPEI	To develop the FPEI based on UKMRC framework incorporating Bandura's self-efficacy theory and Gerogogy older adults learning principle	Expert consensus
Reviewing and revising the FPEI (an iterative process)	To pilot-test and evaluate the FPEI in a primary care setting	Focus group discussions (FGD) and questionnaire

3.2 Convening the development and review panels

To develop a complex intervention like FPEI, the UKMRC framework recommends that the intervention should be developed based on these items: the needs assessment study; effective evidences; and theories. Therefore, an expert panel committee was formed to provide guidance and advice in the FPEI development process.

In this case, it is crucial to select the members and distinguish the role of each panel: The development committee provides guidance and advice in the development process of FPEI; the review committee provides guidance and advice in reviewing and revising the FPEI. The development committee consists of individuals who are experts in

qualitative methodology, systematic review and development of a complex intervention; the committee should ensure that the FPEI is developed according to the UKMRC framework based on effective evidences and theories. On the other hand, the review committee is responsible for providing consultation and advice for the revision of the developed FPEI. In addition, the review committee is responsible for ensuring that the reviewing and revision of FPEI development is done iteratively. Hence, key opinion leaders or health policy makers from the primary and secondary care are invited to participate in the reviewing process.

The development process of FPEI is an iterative one. As a result, the roles of the development and review committee may sometimes overlap, and this may result in potential biases in the development of the FPEI. It is therefore important to describe the methods used in selecting the members for these committees and their individual roles; and it is also necessary to describe how expert consensus is reached if there is a disagreement.

3.2.1 Forming the development and the review committees

The development committee consists of investigators or researchers who have the executive control over the development process. They are responsible for undertaking the project management, oversee the recruitment of others, manage meetings and coordinate the group. They make the final decision on the content specification, design and testing phases. The position and the roles of the members of the development and review committees are summarised in Appendix A.

FPEI development committee

The development committee is responsible for the following tasks:

- Development of the FPEI based on the UKMRC guidelines.
- Revision of the FPEI based on pilot testing and the consensus from the expert review panel.

The disciplines and the roles of the FPEI development committee members are as described below.

Primary care physician and Family Medicine Specialist (NCJ)

The member provides input on the needs assessment study conducted among older persons and HCPs. Moreover, he plays the role of a key opinion leader in providing information on current primary care practice and needs in prevention of fall among older people.

Researcher (ANN – PhD candidate)

The member provides input on current effective evidences of falls and the preventions by conducting an extensive literature review. In addition, ANN is responsible for conducting the needs assessment study; searching, selecting and synthesising effective evidences and drafting the FPEI.

Health policy maker and investigator (LWY)

The member is responsible for reviewing the findings from the needs assessment study, carrying out a literature review and drafting the FPEI. Moreover, the member also provides information about the selection of the FPEI and reviewing of the FPEI draft.

Experts in research methodology (LWY, NCJ – both supervisors)

Two researchers, who have extensive experience in qualitative, quantitative and mixed methodologies, are responsible for assessing the research methodology used in the FPEI development. They provide information about the design of the FPEI based on the needs assessment data analysis.

FPEI review committee (Steering committee)

The review committee is responsible for reviewing the first and subsequent revised drafts of the FPEI developed by the development committee. They provide advice and consultation to the development committee members regarding the following matters: design, content and format of the FPEI; information that may be lacking in the FPEI content; resources and contacts of where to seek information; problem(s) that may arise while conducting the FPEI in the real setting (Fertman & Allensworth, 2010). Although they may not have editorial control, their opinions are considered in the iterative development process. The review is based on the members' experience as listed below (refer to Appendix A):

- Patients at a high risk of falls.
- Expert healthcare professionals who managed falls among older people in the primary and secondary care, such as primary care medicine, physiotherapy, occupational therapy, and geriatrics.
- Key opinion leaders or policy makers involved in making the policy of implementing health services in the local setting.

Patients

Three older patients at a high risk of falls from the primary care clinic of UMMC provide feedback on the FPEI pertaining to content, format and delivery according to older people's needs and feasibility.

HCPs

Two geriatricians, a primary care physician, an occupational therapist and a physiotherapist experienced in managing falls among older persons provide feedback on the content, format and delivery in the local healthcare setting.

3.2.2 Development and review committee meeting and consensus

The development committee drafts and revises the FPEI consecutively in each meeting. The development committee communicates through face-to-face meetings, emails and short messages through mobile phones.

The review committee met twice and members of the development committee presented the FPEI draft in the meeting; the first meeting was held after the completion of the FPEI first draft, and the second meeting was held to explain and clarify the amendments made to the FPEI draft.

Following the formation of the development and review committee, a meeting schedule and key agenda were drawn up to operationalise the objectives at different stages of the development process of the FPEI. A detailed agenda was prepared for each meeting and circulated to each member with relevant documents for their comments via email, at least a week before the meeting.

During the meetings, all comments were documented by the researcher using short notes and digital audio recorder. Any disagreements during the meetings were discussed, negotiated and agreed upon by the members through consensus. The process of reviewing-revising was terminated when there were no further new comments made by all members of the review panel. All changes to the FPEI were tracked, highlighted and labelled as new versions.

3.2.3 Development and review committees: limitations and opportunities

A few limitations and opportunities arose from the operational processes of the development and review committees. The opportunities were that the FPEI was developed iteratively through experts including older patients, interdisciplinary healthcare professionals and healthcare policy makers. In particular, the development committee had obtained feedback on FPEI from two experts (occupational therapist and FPI investigator) who have expertise in developing, evaluating, implementing and disseminating the 'Stepping On', a community-based fall prevention intervention. They met at separate meetings at their own locations, University of Sydney and Prince of Wales hospital respectively.

The limitation was that not all members of the committees attended all the meetings and this, in particular, might affect the development of the intervention in these aspects: what need to be included (or omitted) in the intervention; how it should be delivered; or evaluating the intervention. At least two members must be present in all meetings to reduce the possibility of 'unbalanced thoughts'. In some occasions, some experts may dominate the discussion and this might result in more weight given to their views. This is a common problem often encountered in a multidisciplinary group meeting. NCJ (supervisor), the chair of all the meetings, is a skilled facilitator with many years of

experience. He ensures that members are given the opportunity to voice their opinions at different stages of the meeting.

Due to the complexity of the FPEI development process, which requires expertise from different fields, forming the development and review committees for the FPEI is an important step. Feedback from the users, including patients, HCPs and policymakers, ensures that the intervention developed is feasible. In conclusion, the iterative process of reviewing and revision by the expert committees ensures that the FPEI is developed to fulfil the healthcare needs.

3.3 Assessing users' needs: The needs assessment study

As part of the systematic development process, UKMRC framework illustrates the importance of finding out what users (older person and HCPs) need, which will be an input to the intervention. In this study, the needs assessment gathers information about HCPs' and older persons' needs, which is utilised in developing a new fall prevention intervention. The following areas are explored at different levels:

- Older persons: do older persons need support for their fall problems? What kind of support do they need?
- HCPs: do HCPs need support in managing falls among older patients? What kind of support do they need?
- Intervention: are there any existing fall prevention interventions, including FPEIs?
- Falls condition: are falls a big-enough problem to warrant a study?
- Healthcare: does the healthcare system support the development of a fall prevention intervention?

The latter two issues, ‘falls condition’ and ‘health care’, have been addressed in Chapter 1 and 2.

3.3.1 Objectives

The needs assessment study aims to determine the following issues:

- The perceptions, beliefs and needs of older persons living in the community pertaining to fall prevention intervention.
- The HCPs’ perceptions, barriers and needs pertaining to fall prevention intervention.

Two common qualitative interview methods, namely individual in-depth interviews and focus group discussions, are employed in this study to explore older persons’ and HCPs’ needs. The following sections elaborate on the two interview methods.

Individual in-depth interviews

In-depth interviews are described as one-on-one interviews for older persons who are unable to join the focus group because of time constraints and conflicting tasks. In-depth interviews explore the breadth and depth of an issue by asking multiple focused questions in the respective fields (Pope & Mays, 1995). Hence, the researcher and the interview participants interact with each other using a topic guide to explore a participant’s needs; probing is also considered to obtain further information on the issues revealed during the interviews (Pope & Mays, 1995).

Focus group discussions (FGDs)

The focus group discussions (FGDs) are group discussions involving six to eleven people, which allow individuals to voice their views in the context of others’ views

(Pope & Mays, 1995). This approach can generate rich and robust data (Merriam, 2009). The participants not only express their personal views and thoughts, they influence and are influenced by others; hearing what others say can also trigger more thought processes, which they can challenge or clarify with one another (Krueger & Casey, 2014).

In this study, in-depth interviews and focus group discussions are used as the research method because of the following reasons:

- Older persons of different ages have different beliefs and perceptions as well as needs. In-depth interviews allow the researchers to explore older persons' views and needs in more detail compared with a focus group discussion. On the other hand, the focus group discussions allow older individuals to consider and express their views in the context of others' views; points raised by others in the group may trigger a chain of communications, and members can discuss the topics in a wider scope.
- There are variations in the healthcare practice of prevention of falls among older people; and the HCPs' experience in managing falls may also vary. In order to gather the maximum volume of information, the needs assessment study is aimed at capturing the range of views and practices in all the disciplines involved in this research. However, placing the HCPs in a focus group may create a heterogeneous group, which may hinder rather than facilitate free discussions. So HCPs working in a similar discipline come together in a focus group and have their own discussions, though this arrangement may cause some logistic constraints in organising the focus groups for the HCPs who have a busy schedule.

Older persons

The inclusion criteria for older persons are listed as below:

- Aged 60 years and above AND
- At a high risk of falls (experienced at least one fall in the past 12 months)

The older persons are also those involved in interventions or would-be participants of the fall prevention study.

The following older persons are excluded from the interviews:

- No experience of falls
- Not English speaking or
- Cognitively impaired or
- Have physical impairments that need care from others

Healthcare professionals (HCPs)

There is only one inclusion criterion:

- HCPs with experience in managing falls among older persons in the past months.

3.3.2 Setting

All interviews were conducted at the University Malaya Medical Centre (UMMC), located in the urban centre of Kuala Lumpur, Malaysia. The participants were interviewed in a conference room in the Primary Care Clinic Department, UMMC, their homes, or clinics respectively.

3.3.3 Ethics approval

This study received ethical approval from the University Malaya Medical Centre (UMMC) Medical Ethics Committee (Reference: 926.2) (Appendix B). All signed consent forms were obtained from the participants (older persons and HCPs).

3.3.4 Study Instruments

Two semi-structured interview guides (Appendix C: the older person and Appendix D: the HCPs) were designed based on the literature review and with consensus among the development committee members. Similar topic guide was utilised for both in-depth and focus group discussions. During the interview sessions, a duly completed form of personal details was collected from each participant.

3.3.5 Sampling

A purposive sampling aims at selecting participants based on their features or characteristics relevant to the subject matter the researchers are trying to explore or understand. The criterion used may be demographic characteristics, circumstances, experiences or attitudes (Ritchie et al., 2013). For the needs assessment study, the participants are purposively selected based on the following criteria:

- Older persons: age and fall history
- HCPs: experienced in managing falls in older persons; for example, had been working in primary and secondary care of older persons, and had initiated referrals of vision, hearing, and physiotherapy.

The HCPs in the disciplines include general practitioners, primary care physicians, occupational therapists, physiotherapists, internal medicine specialists, family medicine specialists and geriatricians who were invited through emails and short messaging

systems of mobile phones. The participants' names and their personal contact details were gathered from the general staff of each discipline's general office and from research assistants working in the departments.

On the other hand, the older persons at a high risk of falls were recruited from outpatient clinics of the various disciplines. On some occasions, the older patients' details were gathered through HCPs and research assistants. The participants were recruited using the snowballing method (Holstein & Gubrium, 1997). Snowball sampling was performed when interviewed participants named others whom they knew would fit into the study inclusion criterion.

3.3.6 Sample size

Interviews of ten older participants and ten HCPs were originally planned, and the interviews would continue until no new themes emerged from the data; in other words, when the 'thematic saturation' was reached (Bradley, Curry, & Devers, 2007). A total of 16 older participants and 20 HCPs were successfully recruited and interviewed before reaching the 'thematic saturation'.

3.3.7 Data collection

The participants were allowed to read the Participants Information Sheets (Appendix E: PIS for older persons; Appendix F: PIS for HCPs), gave written informed consent before the interviews (Appendix G) and took participants personal details (Appendix H: older persons; Appendix I: HCPs). The interviews were carried out between July 2012 and April 2013. The moderator (researcher) conducted the interviews, and detailed notes were taken by a note taker. The in-depth interviews lasted about 30–50 minutes each session, while the focus group discussions lasted for 60–80 minutes each session. All the interviews were audio-recorded and transcribed verbatim by the researcher, who

was proficient in English and the Malay language, and hence managed the transcribing in both languages. Each transcript was checked for accuracy before it was analysed. Interview quotations were verbatim; all interviews were conducted in English. One interview with some conversations in Malay was retained, and these conversations were translated only after the analysis was done.

3.3.8 Data analysis

The interview transcripts formed the data, which were transformed into a plain text format and imported into the computer-assisted quality data analysis software, WeftQDA (Version 1.0.1). The ‘thematic analysis’ was used to explore the range of needs of the patients and HCPs, which would be utilised to determine the design falls prevention intervention. ‘Themes’ are recurrent unifying concepts that characterise specific experiences of individual participants; these are apparent general insights from the whole of the data, and commonly used in applied qualitative research, which involves different stages (Bradley et al., 2007):

- Reading for overall understanding
- Coding qualitative data
- Developing code structure
- Grounded theory approach to develop a code structure
- Finalising and applying the code structure
- Applying the finalised code structure

The analysis was conducted by the development committee independently. The researchers read and reread the transcript to gain an overview of the data. This ‘reading for overall understanding’ process was also the first step for the researcher to identify the emerging themes. Thematic analysis was employed to identify the main themes

(Braun & Clarke, 2006). Two researchers independently coded two transcripts to determine the coding framework. First, the researchers read and re-read the transcript to get themselves familiarised with the data, reviewed sentence by sentence in detail and as a concept became apparent, a code was assigned. As more data were read, more codes emerged to form categories and themes. To confirm whether a code was appropriately assigned, the text segments of previously assigned codes were compared to decide whether they reflected the similar concept, also called constant comparison (Bradley et al., 2007). Coding discrepancies were resolved by discussions among researchers until consensus was reached. The final list of nodes was used as a framework for coding the remaining transcripts. New nodes that emerged during coding were added to the list upon consultation with the other researchers. The interviews stopped when the three researchers reached a consensus that no new categories or themes emerged from the interviews (Guest, Bunce, & Johnson, 2006).

Next, the researchers made notes while reading the transcripts or listening to the recorded interviews, keeping in mind the key topics that were linked to the research objectives. New themes, which were relevant but not part of the research aim, were included at this stage. These emerging issues or themes were reorganised to form a thematic framework. Each of these issues formed a 'coding framework', which was applied systematically to all the transcripts (coding). A paragraph from the transcript could be used in more than one 'code', and the 'double-coding' process was used by two independent researchers to ensure that the data were coded reliably.

Once coding was completed, the range of experiences, barriers and needs from the participants under each code were regrouped to form categories. These categories were also drawn bearing in mind the research aim, that is, the range of support the patients and the HCPs needed to inform a fall prevention intervention.

In finalising and applying the coding framework, data were synthesised by pulling together all the themes, issues and categories to map and interpret the data set as a whole. In the context of the needs assessment study, this aimed to provide the answer to the original research question, that is to identify the ‘range and nature’ of the older participants’ and HCPs needs’ in informing and explaining the reasons behind their needs.

3.3.9 Quality assurance

Different methods were used to ensure quality for the in-depth interviews and focus group discussions. To ensure credibility, the following measures were taken (Pope & Mays, 1995):

- Triangulation: findings from the in-depth interviews and focus group discussions of the older persons were triangulated with that from HCPs’ needs.
- Transparency and clarity in the method of the data collection and analysis.
- Reflexivity: Interpretation of interpreted data (Bradley et al., 2007). It is defined as ‘sensitivity to the ways in which the researcher and the research process have shaped the collected data’. The interviewer reflected on the potential influences he had on the participants directly after the interviews. Three researchers coded and analysed the transcripts independently, and the findings were presented to the development and review committees for discussion.

To ensure transferability, efforts were made to include older persons and HCPs who have distinct socio-demography; have varied backgrounds; and were in different positions to explore their needs on fall prevention interventions. Detailed descriptions of

participants' context and background were also provided. This is to ensure transferability of the findings to other clinical practices.

3.3.10 Development and review committee consensus

The review committee provided input on the needs assessment findings of older persons and HCPs. The input was added to the information obtained from the interviews and literature review and acted as a 'triangulation' of the data.

The interviews data and expert consensus were channelled to the development of fall prevention intervention. The findings from the needs assessment study were used to identify whether there was a demand for a fall prevention intervention in the local setting. It also provided the essential information the older persons and HCPs needed in the prevention of falls. Moreover, it helped to identify and clarify older persons' beliefs and perceptions that needed to be addressed when planning a fall prevention intervention. Finally, the barriers and facilitators were determined in recommending (for HCPs) and uptaking (older persons) which were addressed during the development and evaluation processes.

3.4 Selecting, searching and synthesising the evidences used in the FPEI

The FPEI must contain, at minimum, information about falls, falls-associated risk factors and effective fall prevention interventions (Kenny et al., 2011). Information about falls helps older person to take up informed prevention measures to prevent falls (Kalula et al., 2011). Therefore, the information for an intervention should be based on the effective evidence. This section describes and explains the criterion used to select the evidences to be included in the FPEI and the methods used for searching, and summarising the evidence.

3.4.1 Selection of information to be included in the FPEI

The selection of information to be included in the FPEI was based on the information provided by the older persons in the needs assessment study; the effective evidences include established clinical practice guidelines (e.g. NICE), systematic reviews, randomised trials or cohort studies; and the quality of the evidences and feasibility to conduct in a local primary care setting.

What information did the participants want?

The needs assessments study provided useful information about what the older persons and the HCPs needed for fall prevention in the local care setting. The findings are presented in Chapter 4. Briefly, the participants were seeking the following information:

- Falls information, in particular the education materials
- Small discussion group
- Easy and convenience accessibility to the intervention
- HCPs advice on the fall prevention interventions

3.4.1.1 Was the information available?

The information is not available. Thus, the information obtained by participants on the development of FPEIs is divided into two categories:

- The background information, e.g. falls definition, falls epidemiology, falls risks and consequences, and effective fall prevention interventions
- ‘Evidence-based’ information, e.g. delivery mode (multimedia, video, HCPs consultation), small group setting, convenient accessibility (e.g. one day, half-day and phone calls)

The background information was obtained directly from the HCPs and clinical fall prevention guidelines. The evidence-based information, on the other hand, required a systematic search on the best available evidence.

Ideally, the background information should be extracted directly from the local or national clinical fall prevention guidelines, of which the evidence was already reviewed systematically by health technology assessment experts (e.g. WHO). However, searching through literature reviews identified randomised control trials (RCTs) that compared the effectiveness of different designs of FPEIs. Therefore, the evidence used in this FPEI was derived from RCTs.

Was the information applicable to the local population?

The background information included in the FPEI was based on the national and international guidelines, including NICE (NICE, 2013), World Health Organisation (WHO, 2008), American Geriatrics Society, and The British Geriatrics Society (Kenny et al., 2011). The evidence-based information on FPEI outcomes was obtained from studies which were conducted across the world, in particular the developed nations. However, the fall problem receives poor attention in the developing nations (Kalula et al., 2011).

The subsequent sections describe the search strategy, data synthesis and summary for the following information used in the FPEI:

- Effect of ‘multiple FPEIs’ vs. ‘single FPEI’ vs. usual care on knowledge
- Effect of ‘individual’ and ‘group setting’ to reduce fall-associated risks and falls
- Effect of duration of FPEI conducted on fall reduction
- Extent of behavioural change, beliefs and knowledge

3.4.2 Searching the evidence

Objectives

- To identify the effectiveness of multifaceted and single FPEIs in reducing falls, fall-associated risk factors compared with usual care.
- To investigate the effectiveness of individual and group setting in reducing falls, fall-associated risk factors compared with usual care.
- To identify the feasible duration of conducting the FPEI
- To determine the effectiveness of multifaceted and single FPEIs on secondary outcomes, such as knowledge, behavioural change and self-efficacy.

Selection criteria

(a) *Types of studies*

The study designs included in the search were randomised-controlled trials (RCTs).

(b) *Types of participants*

The inclusion criteria for the participants are listed below:

- Aged ≥ 60 years and above
- Community-dwelling, community living, private residences
- At a high risk of falls or having concerns about falls
- Attended hospital for an out-patient service only

The following categories of participants are excluded from the review:

- No experience of falls
- Had cognitive impairment
- Hospital inpatients/residents of long term care/nursing home/ palliative care
- Health workers

(c) ***Definition of Education***

- Advice or counselling
- One-to-one or group-based
- Provision of leaflets/brochures/pamphlets/posters/booklets/video materials/written information
- Use of mass media
- Use of internet-based information

(d) ***Types of the FPEIs***

The inclusion criteria are listed below:

- Interventions that involved multifaceted and single FPEIs strategies to prevent falls among community living older people.
- Interventions that involved multifaceted and single FPEIs strategies, such as HCPs' advice, multimedia presentation, booklets/pamphlets and telephone communication.

The exclusion criteria are listed below:

- Studies involved the inpatients (acute or rehabilitation wards, or attended an emergency department because of a fall with subsequent admission to the ward or discharged into the community).
- Studies conducted in a palliative care or the residential care facilities.
- Studies that investigated staff's education.

- Publications written in languages other than English.

The outcome measures

The outcome measures for the benefits of using education are listed below:

- Falls
- Falls injuries
- Recurrent falls
- Knowledge
- Self-efficacy
- Behavioural changes
- Fear of falling

Searching methods

The Pub Med electronic database was searched for eligible studies from the years 1990 to December 2015. In addition, the reference lists and bibliographies of all relevant papers were searched for additional studies using ‘reference mining’. This was performed on key articles till it reached ‘reference saturation’. Only English-language publications were included in this review.

(a) *Search terms and search strategy*

Table 3.2 details the key terms used in the search strategies.

Table 3.2: The list of terms and strategy for the electronic database search

Older persons terms	Intervention terms	Primary Outcomes	Secondary outcomes
Older adult*	Fall information	Fall*	Knowledge
Older person*	Fall counselling	Fall* risk*	Behavioural change
Aged	Fall consultation	Accidental fall*	Awareness
Geriatric	Fall advice		“fear of falling”
Older patient*	Fall education		Belief*
	Pamphlet*		Self-efficacy
	Brochure*		
	Video		
	multimedia		
	Leaflet*		
	internet		

3.4.3 Selection of studies

The titles and abstracts of the identified studies were assessed independently. The studies were considered relevant when a clear decision could not be made on the basis of the title or the abstract. Full texts of all relevant studies were retrieved through requisition made in the university library online system. The method sections of the retrieved articles were examined to assess the inclusion criteria; uncertainty was resolved by asking a co-researcher.

3.4.4 Synthesising the evidence

The following data were extracted from all eligible papers:

- Background: title; authors; journal; year of publication
- Method: design; mode of delivery, use of theories, use of adult learning theories, duration of intervention; evaluation and follow-ups

- Outcomes: falls, recurrent falls, injurious falls, knowledge, behavioural change, fear of falling and self-efficacy

The outcomes of FPEIs, such as falls, fall-associated complications, knowledge, behavioural change, self-efficacy and fear of falling, were extracted from the RCTs. The fall event rates were reported as events per 1000 person-year stratified according to the fall rate. This event rate was later converted into number of people experiencing fall complications or death out of 100 people over five years. Quantitative and qualitative data evaluations were taken into consideration to study the effectiveness of single and multiple FPEIs. There was significant clinical heterogeneity in the outcomes measures, in terms of these aspects:

- Population characteristics
- Follow-up duration
- Knowledge measurement
- Different contents in the multifaceted FPEI
- Different format

Summary and conclusion

The background and evidence-based information included in the FPEI were based on the participants' needs, which encompassed availability of the evidence and relevance to the local population. The background information was obtained directly from clinical fall prevention guidelines. A comprehensive review of the literature was therefore carried out to search and synthesise the necessary information, which was utilised in the development of FPEI.

3.5 Drafting the FPEI

The FPEI was drafted based on the UKMRC recommendations. The ‘recipes’ of the FPEI were derived from the following sources:

- Findings from the needs assessment study provided input to the content and format of the FPEI.
- Findings from the effective evidence search provided input to the content, and format of the FPEI.
- The development committee provided its input to the content and format of the FPEI.

The first draft of FPEI was designed at UMMC under the guidance of NCJ and LWY. Subsequently, the FPEI was reviewed and revised through an iterative process by reviewers and the development committee. This section describes iterative processes of the FPEI development based on the UKMRC framework. The key components of the FPEI’s initial draft are as detailed in **Table 4.11**, Chapter 4 : Result.

Summary and conclusions

The drafting of the FPEI was based on the aim of developing an FPEI to help older persons with a high risk of falls participate in informed and clarified fall prevention activities. The UKMRC framework, therefore, provides a useful framework to operationalise the development of the FPEI, which based on needs assessment, effective evidences and experts consensus; the integration of findings of the needs assessment, effective evidences and experts consensus ensure a high level of quality:

- Tailored to the needs of the older persons and HCPs
- Provide accurate, balanced and understandable falls information
- clarify older persons' beliefs and perceptions using photographs, and
- Guide on the fall prevention interventions, including sharing and querying doubts and concerns with HCPs.

The early FPEI draft was reviewed by the review committee. The reviewing and revision processes of the FPEI draft are described in the next section.

3.6 Reviewing and revising the FPEI

The main purpose of reviewing and revising the FPEI through an iterative process is to ensure that the FPEI meets these standards:

- Acceptable to the users (older person and HCPs)
- Feasible to be implemented in the local care setting (feasibility study)

In line with the UKMRC recommendation, the FPEI draft was reviewed by the review committee and development committee in a steering committee meeting. This phase of the FPEI development was an iterative process.

3.6.1 Reviewing the FPEI draft

The review committee reviewed the FPEI draft. There were two formal reviewing/revising meetings held by the review committee and the development committee before the FPEI was pilot tested.

The review committee comprises of three patients, one occupational therapist and physiotherapist and two geriatricians attended the steering committee meeting. The development committee represented by ANN presented the processes involved in the development of the FPEI using PowerPoint slides. For each and every part of the FPEI development process, feedback and comments from the review committee were obtained. The feedback focused on the following topics:

- Content
- Format

All the feedback and comments were audio recorded, transcribed and analysed by the researcher.

3.6.2 Revising the FPEI draft

The FPEI content was revised by the development committee based on the consensus reached during the steering committee meeting. The revised draft was then pilot tested for another systematic step towards an iterative revision before finalising the FPEI. All the materials and questionnaire were agreed upon and proofread before conducting the pilot testing of the FPEI.

Summary and conclusion

An iterative process of reviewing and revising the FPEI was conducted through steering committee meeting before it was subjected to pilot testing. Consensus among the review committee and development committee was achieved, and the FPEI was revised according to the feedback received. This iterative process of revision ensured that the FPEI was acceptable to the users and after pilot testing, was feasible to be implemented in the local setting.

3.7 Preliminary pilot testing of the FPEI

This chapter aims to describe pilot testing and preliminary evaluation of the FPEI. The FPEI is a complex intervention that aims to help older persons with a high risk of falls to take up informed and clarified fall prevention activities. The FPEI development processes went through an iterative review and revision process during the steering committee meeting. The FPEI was then named as multifaceted fall education by the inter-professional team (MuFE IT). It was endorsed by the development committee and with consensus from the review committee.

The outline of this section is as follows:

- **Introduction:** This section describes the pilot testing and preliminary evaluation of the MuFE IT.
- **FPEI:** This section describes pilot testing of the FPEI based on the Consolidated Standards of Reporting Trials (CONSORT) statement for community-based intervention (Moher et al., 2010). In particular, it explains the rationale for and complexity in conducting the MuFE IT.

The MuFE IT designed for older persons to acquire knowledge and make lifestyle changes to reduce fall risks, contains education information on falls scope including definition, falls epidemiology, falls risks factors and fall prevention interventions using multiple components, including PowerPoint slides, booklet, facilitation by Inter-professional Team (i.e. Primary Care physician, rehabilitation physician, pharmacist, and life style advisor), small discussion group and phone call follow-ups. According to AGS/BGS guidelines for the prevention of falls in older persons, both multifaceted and ‘multi-factorial’ interventions have been used in reducing falls caused by multiple risk factors. The multifaceted or ‘multi-component education’ in these guidelines refers to a set of interventions offered to intensify the education information (Kenny et al., 2011). On the other hand, the multifactorial fall prevention intervention investigates the effectiveness of fall prevention by adding a different set of interventions in a sequence to an education intervention. This complies with the AGS/BGS guidelines as it recommends fall education needs to be part of a fall prevention intervention.

3.7.1 Objectives

The main objective of this pilot testing is refine the MuFE IT programme for community dwelling older persons at a high risk of falls through an iterative process of reviewing and revisions. This is to ensure the acceptability and feasibility of the intervention when it is implemented in the future. Moreover, the preliminary investigation of the MuFE IT intervention is to identify the effectiveness of the intervention in improving knowledge (quantitative), behavioural change (qualitative) of older persons involved in fall prevention activities, who in the present case are the community dwelling older persons at a high risk of falls.

3.7.2 Study design

A before-and-after study was done in a non-randomised controlled study or quasi experimental designs, where the participants in the study were allocated without random selection (Eccles, Grimshaw, Campbell, & Ramsay, 2003). The design is useful when the researchers have little control over the delivery of an intervention and have to plan an evaluation around a proposed intervention. The design is best to be used for evaluating before and after introduction of an intervention and observing differences in performance in the same study site; it is also used to answer the research question in this study:

“What is the effectiveness of the FPEI in increasing the uptake of fall prevention activities among community dwellers at a high risk of falls?”

However, the study design is a weaker evaluation tool because of these reasons:

- Sudden changes make it difficult to attribute observed changes to the intervention, and
- May overestimate the effects of quality improvement of an intervention.

Therefore, the before-and-after design in this study is used with caution in the interpretation of an improvement due to the intervention.

Rationale for using a before-and-after design

This study uses a before-and-after design because of the following reasons:

- Preliminary evaluation for an intervention

Ideally, older persons at a high risk of falls who have received an education intervention should evaluate their changes, e.g. knowledge, changes made or reasons for

the changes made (simple nRCT). The changes should be evaluated before and after conducting the intervention or after a short period of follow-ups.

- Practical issue

This is a pilot-testing study of a developed MuFE IT using an iterative process of review and revision; the purpose is to validate the acceptability and feasibility when it is implemented in the future. The preliminary effectiveness of a practical design needs to be evaluated before finalising the intervention. However, the main criticism of this design is that the potential for causing biases needs to be avoided by using qualitative interviews.

3.7.3 Setting

This before-and-after study was conducted in a primary care clinic based at the University Malaya Medical Centre (UMMC), Kuala Lumpur, Malaysia.

3.7.4 Ethics approval

This study received the ethical approval from the Medical Ethics Committee (Reference: 1150.37) (Appendix J) of the University Malaya Medical Centre (UMMC).

3.7.5 Study Participants and sampling

Eligibility criteria:

The logic table for the inclusion and exclusion criteria is shown in **Table 3.3**.

Table 3.3 : Logic table of the recruitment criteria

Who were recruited?	Why?
Inclusion criteria:	
<ul style="list-style-type: none"> Community dwelling older person 	The need to conduct fall prevention intervention with community dwelling older persons is not as urgent as that for hospital inpatients or older persons in long-term care residents. Those who reside in long-term care and hospital need more intensive care towards falls prevention to prevent further complications or death from falls. However, falls may occur by any chance among community dwelling older persons as they are at a high risk of falls and encounter the fall-associated risks in their surroundings.
<ul style="list-style-type: none"> Aged above 60 years 	Older persons in Malaysia aged 60 years (based on ageing meeting in Vienna in 1982).
<ul style="list-style-type: none"> Experienced falls at least once in the last 12 months, or have a concern about falls problem and accept or acknowledge that they are at some risk of falls 	This criterion is recommended in NICE (NICE, 2013) guidelines for the older persons to effectively reduce falls rates. Those who have not yet experienced falls, consider fall prevention education as not relevant to them (Yardley, Donovan-Hall, et al., 2006). This behaviour may limit their recognition of fall prevention messages.
<ul style="list-style-type: none"> Independent individuals, i.e. without disabilities (not in need of care or support) 	Participants with disabilities will receive less impact from the education-based fall prevention programme since they may need other risk-tailored or targeted interventions.
<ul style="list-style-type: none"> Without cognitive impairment 	Older persons with good cognitive health will receive and engage in education-based intervention
<ul style="list-style-type: none"> Literate in English 	The pilot testing of the intervention is delivered in English language. All the education materials are printed in English.
Exclusion criteria	
<ul style="list-style-type: none"> Cognitively impaired and are unable to understand simple instructions or guidelines 	These participants may not be able to listen to and discuss the education information due to their psychological state.
<ul style="list-style-type: none"> Unable to communicate and not literate in English 	The education fall prevention intervention programme is in English and requires the participants to listen to inter-professionals' PowerPoint Presentation sessions, and read and understand materials in English.
<ul style="list-style-type: none"> Already joined other fall prevention intervention. 	The participants with existing knowledge about fall prevention may show no improvement before-and-after intervention.
<ul style="list-style-type: none"> Unwilling to give consent 	The participants unwilling to give consent are disqualified to participate in the intervention.

The inclusion criteria are listed below:

- Community dwelling older persons
- Aged above 60 years
- Experienced fall at least once in the past 12 months, or
- Have a concern about falls problem and accept or acknowledge that they are at some risk of falls.
- An independent individuals, i.e. without disabilities (not in need of care or support)
- Without cognitive impairment, and
- Literate in English

The exclusion criteria are for participants who have these issues:

- Cognitively impaired and unable to understand simple instructions or guidelines;
- Unable to communicate and not literate in English, and
- Already joined other falls prevention intervention, and
- Unwilling to give consent

3.7.6 Recruitment

Several ways were used to recruit participants for this study. Firstly leaflets were used, which contain study details, such as introduction, objectives, study details, study benefits, inclusions and exclusions criteria and dates of the programmes; these leaflets were passed to the participants who attended the primary care clinic in UMMC. Interested older persons were asked to contact the researchers for further clarification about the study and eligibility to participate in the study. The leaflets were revised by the development committee prior to distribution. These leaflets were also distributed to

general practitioners and staff nurses in the setting. The researcher explained in detail the study objectives and eligibility criteria for participation, and interested older persons were asked to contact the researcher or if there was any referral. The leaflets were also posted on the notice boards in each consultation room of the general practitioners and the staff nurses' room.

In addition, the researcher also approached older persons, who were waiting for their turn to see doctors in the clinic. The researcher explained the study briefly, with details about the eligibility criteria, and asked these older people whether they were interested in joining the study. The researcher also approached other researchers working on older persons' study for eligible participants' contact details. Lastly, the researcher requested the older person who volunteered to participate to invite their spouses, siblings, or friends to join the programme (snow balling method). The researcher frequently updated the participants' list in consultation with the general practitioners and the staff nurses in the clinic. The researcher contacted older persons recommended by the general practitioners and staff nurses, volunteered older persons, and other study researchers; and appointments were arranged for them to attend the intervention. Table 3.4 shows the Logic table of the recruitment criteria.

3.7.7 Sample size calculation

This pilot testing was conducted to evaluate the feasibility of MuFE IT in the real setting; and feedback received from participants was used to further revise the final version of MuFE IT. Hence, there was no formal calculation of the statistical information, which was used to test the intervention for its effect on the outcome.

3.7.8 Study Instruments

All written materials were typed in a simple, 14-point font and printed on off-white paper to allow ease of reading among older persons (SMOG). The PowerPoint presentations were prepared using 24-point or bigger font, and plain English language.

Inter-professionals team briefing

The MuFE IT interventionist were the inter-professional team comprised primary care physician, rehabilitation physician, pharmacist and lifestyle advisor; members were recruited from the primary care team at the University of Malaya Medical Centre (UMMC), Kuala Lumpur. The researchers recruited the team members based on their qualification and experience in managing falls among older persons. The team were trained during three consecutive meetings (due to time constraints) and a briefing was conducted prior to every pilot test. This was done due to the busy schedule faced by the inter-professional team members. This briefing aimed at getting the team members familiarised with Gerogogy applications when delivering the intervention to the participants. Therefore, a briefing using PowerPoint slides was prepared and revised by the development committee. Then, each inter-professional team was briefed on the purposes, introduction, principles and quality facilitating the use of Gerogogy. Each team member received the PowerPoint slides prior to the briefing to ensure they were familiar with the content and Gerogogy principles. During the briefing, the researcher used an interactive approach to engage with the inter-professional members to have more meaningful discussions.

PowerPoint slides

Four sets of PowerPoint slides were prepared by the development committee and given to each member in the inter-professional team. The slides underwent iterative

reviews, and revisions were made by the development committee and the inter-professional team. The researcher went through the PowerPoint slides with each inter-professional team member to finalise the slides. The researcher took into account the team members' feedback in their areas of specialisation.

The researcher emailed the revised PowerPoint slides to the team members, and they were encouraged to read through the slides and highlight any queries that arose. The inter-professional team was requested to return the edited PowerPoint slides to the researcher for further revision. Finally, the final version of the PowerPoint slides was emailed to the team members prior to the intervention pilot test.

Fall education booklet

Photographs were taken while community dwelling older persons were involved in fall prevention activities, including exercising, gardening, cycling, doing Tai Chi, and eliminating any fall-associated risk factors in the house or in the surroundings. These photographs were compiled into a fall education booklet. The booklet contains brief descriptions of these items: the six simple and practical ways to prevent falls; simple and doable exercise chart extracted from Otago Exercise programme (Liu - Ambrose et al., 2008); medication plan template; activity calendar; senior activity centre contact details and researchers' contact details. The six practical ways of fall preventions comprises of 6S': safe ageing, safe environment, safe home, safe medication, safe moving and socialise. In addition, the booklet contains a simple medication plan template, activity calendar 2015 and senior social activity centres' contact details (the source from jkm.gov.my). The booklets were printed in colour with hard paper cover. The booklets present education content that had been emphasised in the PowerPoint slides. The booklets may be used at the participants' own pace to revise and use as a guide at home to do simple exercises, to record medication information and to write

down daily activities pertaining to prevention of falls. Before the intervention, the researcher went through the booklet with the participants, addressing their concerns and queries. The participants were encouraged to share the booklet with others, if appropriate.

3.7.9 Data collection

The process of data collection is summarised in **Table 3.4**.

Table 3.4 : Flow through of data collection during intervention

When the intervention was given and measures applied?	By whom?
Telephone screening ↓	Researcher
Participants recruitment ↓	GPs/staff nurses/researcher
Inter-professional team briefing ↓	Researcher
Pilot testing 1, 2, 3 ↓	Researcher
follow-ups	Researcher

Figure 3.1 illustrates the participants' flow through the study. The researcher screened the participants from the primary care clinic, UMMC through phone calls using contact details given by the GPs, staff nurses, other study researchers and patients themselves to shortlist eligible candidates based on the inclusion and exclusion criteria. Once the participants list was finalised for the pilot test 1 and the subsequent pilot tests, the participants were contacted again to remind them about the date, venue, and to bring the medications and assistive devices, if any that they were using. They were advised to bring along any assistive device that they use to the intervention and shared their experiences of the usage. The participants, who confirmed their visit, were contacted again prior to the intervention as a reminder.

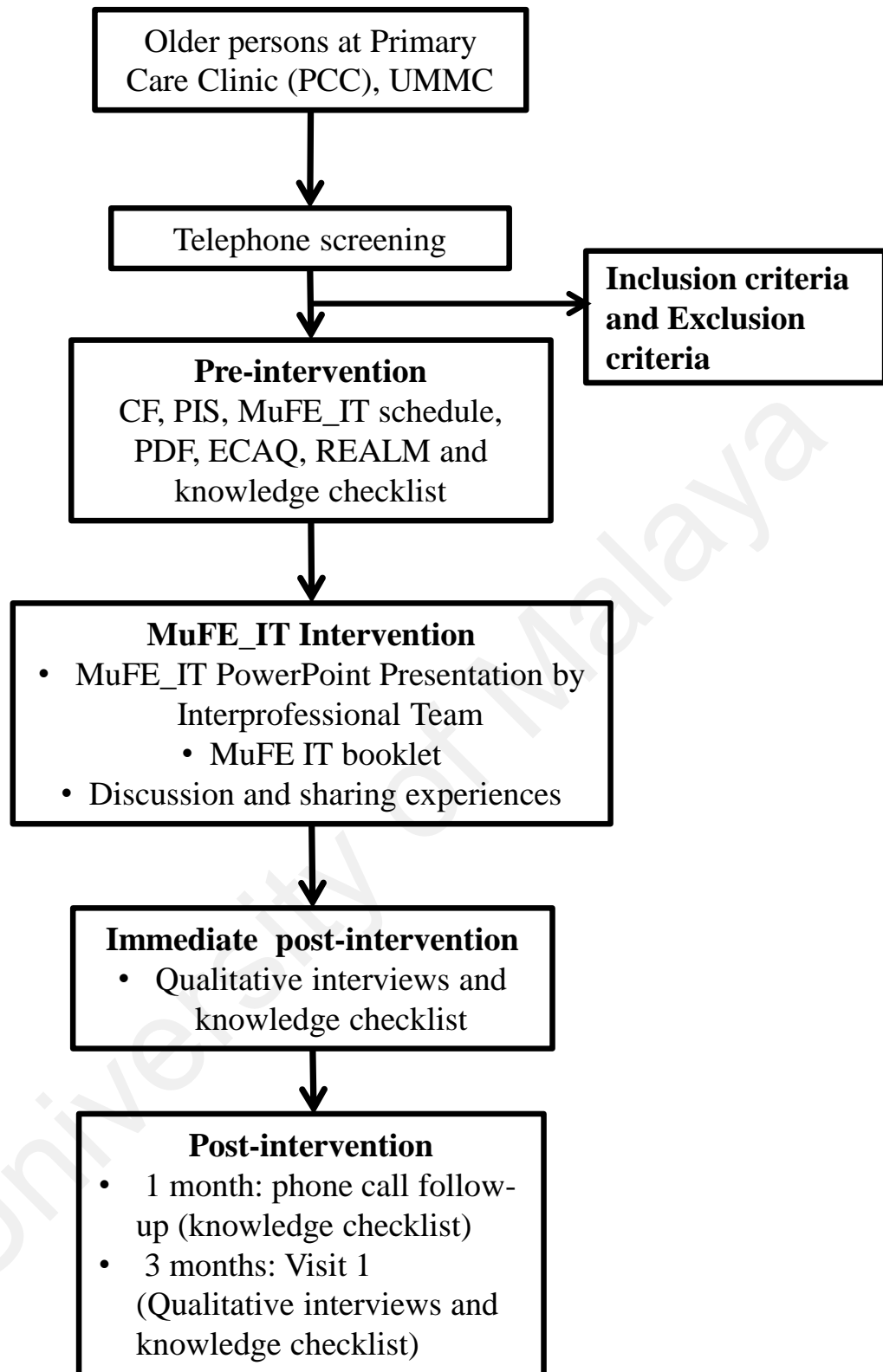


Figure 3.1: The participants' flow through the study: Participants information sheet (PIS), Participants' detail form (PDF), Elderly Cognitive Assessment Questionnaire (ECAQ), Rapid Estimation of Adult Literature in Medicine (REALM), Knowledge Checklist (KC)

Pre-intervention and Intervention

During pre-intervention, the researcher had a short briefing with the participants: explaining to them about the study, the questionnaire surveys that needed to be filled in, qualitative interviews to be carried out at immediate post-intervention and during 3 months post-intervention (Participants information sheet (PIS) Appendix K); and requesting from them the consent form (Appendix L) that were distributed to each participant. The participants were each given a name tag, with their first or last name written on it, and it was pinned to their shirt or blouse. The purpose was to enable the inter-professional team members and the researchers to address the participants by name during the intervention.

The participants were assisted by the researcher to complete the pre-intervention questionnaires by filling in the details of these forms: participants' personal details form (Appendix M), older person Cognitive Assessment Questionnaire (ECAQ) (Appendix N); Rapid Estimation of Adult literature in Medicine (REALM) (Appendix O); and Knowledge checklist (Appendix P). The participants were asked to read the terms listed in the REALM. The terms in the list were checked when the participants were able to pronounce the terms within 15 seconds, and unchecked if they paused or wrongly pronounced or unable to read the terms. Then the researcher added up the scores of the total number of terms read by the participants. The Older person Cognitive Assessment Questionnaire (ECAQ) (Kua, 1992) was adapted from the items in the Mini-mental State Examination and Geriatric Mental State Schedule. To date, most questionnaires designed to assess cognitive impairment among older persons are constructed in the West, the literacy rate of which is very high. However, such questionnaires may not be applicable to developing countries because of the cultural differences or low literacy rate (Kua & Ko, 1992). ECAQ is a satisfactory scale for quantitative assessment of

cognitive impairment among older people living in developing countries. This questionnaire contains 10 questions overall.

In the intervention, the participants were seated in a preferred 'Horse Shoe' configuration at the venue. This seems the most comfortable for both the participants and the facilitators, and it maximise communication across the group. Before the intervention commenced, the researcher introduced the inter-professional team by giving a brief outline of their areas of expertise. Firstly, the primary care physician described the connection between falls, preventions, changes in lifestyle and taking responsibility for growing old safely. Secondly, the rehabilitation physician explained the importance of regular simple stretching and balancing exercises; and simple and safe movements that could prevent falls. Examples of Otago exercises (in the booklet) and other forms of indoor and outdoor activities were promoted by the physician as part of daily routines. Thirdly, the lifestyle advisor gave an overview of simple and feasible home modifications; choosing safe pathways and parks; and importance of social contacts. Last but not least, the pharmacist informed the participants about their medications safety and side effects, and recommended medications to be reviewed by a pharmacist or physician. She discussed possible problems in relation to self-medication, wrong medication, wrong amount, polypharmacy and non-compliance (15 minutes) (Modernity); further, she helped the participants sketch a medication plan to manage their medications (as enclosed in the booklet) (20 minutes) (mastery experiences). At the end of every session, the researcher audited the participants' shoes, assistive devices (walking aid), and medications in a small group up to seven participants. Through this process, the researcher received various forms of feedback from the participants.

In each session the inter-professional team delivers their talk with the aid of PowerPoint presentation. The inter-professional team attempted to deliver the

information as simply and clearly as possible. Then, all the participants were drawn into discussions; they were encouraged to give opinions and share their experiences. The participants were given the liberty to learn about the information in the slides at their own pace. The researcher brought the intervention to a close by asking the participants to fill in the post-intervention questionnaire, followed immediately by a post-intervention interview session.

Immediate post-intervention

The participants were again assisted by the researcher to complete the Knowledge checklist. The researcher interviewed the participants using a new topic guide (Appendix Q) developed to evaluate the feedback immediately after attending the intervention. In the interview, the participants shared their opinions about the intervention: venue, timing, time interval for each schedule, PowerPoint slides, booklet, inter-professional facilitators, the learning process, and any further suggestions. The focus group interview was audio recorded and notes were taken by the note taker. The qualitative interview was conducted for about 30 to 40 minutes after every pilot test. The immediate post-intervention focus group discussions with the participants were conducted to measure the overall opinion about the MuFE IT. These were the key questions asked: What is your opinion about the MuFE IT? How about the usefulness? What do you think about the venue and timing? How was the group environment? How did the facilitators encourage you? How has the presence of inter-professional team affected you in learning? How are the contents of the programme? Are you satisfied with the contents covered in the programme? Do you have any suggestion for improvement? How has the programme impacted you? Are you motivated to make any changes in behaviours to take up fall prevention activities after this MuFE IT? Home Modification: face environmental hazards, change shoes or getting a proper walking

aid? Initiate exercise habit: review your medication and check the side effects and contact senior activity centres for weekend MuFE IT? And, will you recommend this programme to your friends/neighbours/relatives? The MuFE IT is assumed to impact the community dwelling older person to accept falls and its preventions strategies. The MuFE IT intervention brief schedule is detailed in **Table 3.5**.

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Table 3.5 : The MuFE IT intervention schedule

Sessions	MuFE IT programme
Pre-Intervention	Enrolment and Risk assessment Obtaining consent, ECAQ, reading ability (REALM), interview; overview of the intervention and booklets. (25 – 30 min.) <i>By Researcher Department of Primary Care Medicine.</i>
Session One	Falls and prevention Sharing fall experiences, recognising causes of falls, safe ageing, usage of proper walking aids and shoes. (50 – 60 min.) <i>By primary care physician Department of Primary Care Medicine.</i>
BREAK (15 min.)	
Session Two	Safe moving to prevent falls Moving about safely, staying independent, practising simple exercises indoor and outdoor, staying active and practising in simple exercises. (30 – 35 min.) <i>By Rehabilitation physician, Department of Rehabilitation Medicine</i>
Session Three	Safe home, safe environment and socialising Home modifications, safe environment; improving social interaction with family, friends and relatives. (30 – 35 min.) <i>By Lifestyle advisor, Department of Primary Care Medicine.</i>
Session Four	Safe medication and preventing falls Identify medication risks and falls, explore ways to reduce risk of falls from medication side effects or misuse. Medication audit. (45 – 50 min.) <i>By Pharmacist Department of Primary Care Medicine</i>
Immediate post-intervention	<i>Knowledge checklist and qualitative interviews (30 – 40 min.) By Researcher Department of Primary Care Medicine.</i>

Phone call follow-ups and visit 1 (1 month post-intervention and 3 month post-intervention)

Through the follow-up phone calls, the participants were contacted according to the time schedule as illustrated in **Table 3.6**. During the telephone conversation using a new topic guide (Appendix R), the participants were asked how they were doing after attending the intervention; and how they addressed the fall-associated risk factors in the house or in the surroundings. In addition, the researcher asked the participants several questions: have they taken up any form of fall prevention activities in the house or outdoors; have they changed any fall prevention behaviours; or are they participating in any social events? The details of the participants' self-reports about their behavioural change were recorded.

Table 3.6: Time schedule for the pilot tests and subsequent follow-ups

MuFE IT pilot testing	Phone call follow-ups	Visit 1 3 months Post-intervention
Pilot test 1: 6 th Feb 2015	6 th March 2015	18 th June 2015
Pilot test 2: 27 th Feb 2015	27 th March 2015	
Pilot test 3: 18 th March 2015	18 th April 2015	

During the 3-months' post-intervention, the participants were invited to a focus group discussion at UMMC. The topic guides were developed (Appendix S). The participants were provided the participants information sheet (PIS) (Appendix T) and written consent form (CF) (Appendix U). In the focus group discussion, an intended part of this intervention, attendance was not obligatory, but participants were offered an opportunity to discuss their experiences they had while acting on the intervention recommendations that were emphasised during the MuFE IT intervention. Successes

and failures were discussed in terms of self-reporting. In some conditions, visit experience helped participants to improve self-efficacy to express their experiences while taking up fall prevention activities. The visit 1, acted as a repeated stimulus for intervention participants to update the intervention recommendations.

Key questions explored were the participants' fall events, how intervention helped them in recognising the fall risks, how they were motivated to remove hazards or involved in fall prevention activities, what reasons (from the intervention) that may trigger the participants to confidently take up fall prevention activities? And, whether they shared their intervention experience with their friends and family? Prompts were used when necessary; however, participants' spontaneity was allowed.

3.7.10 Data Analysis

Quantitative

The data were analysed using SPSS version 21 for windows. Descriptive statistics were used to analyse the demographic characteristics of the participants. Range of scores and mean scores were used to compile results for knowledge. The main outcome variables in the knowledge checklist were treated as continuous variables.

Qualitative

Using the method of Bradley et al. (2007), the researcher engaged in line-by-line coding of the transcripts. First, the researcher read and re-read the transcripts to get familiarised with the data, reviewed sentence by sentence in detail, and as a concept became apparent, a code was assigned. As more data were read, more codes emerged to form categories and themes. To confirm whether a code is appropriately assigned, the text segments of previously assigned codes were compared to decide whether they

reflected them in similar concept, also called constant comparison (Bradley et al., 2007). Coding discrepancies were resolved through discussions among researchers until a consensus was reached. The final list of nodes was used as a framework for coding the remaining transcripts.

The WeftQDA software (Version 1.0.1) was used for data management and analysis. Thematic analysis was employed to identify the main themes. The researcher coded two transcripts to determine the coding framework. Coding discrepancies were resolved through discussions among researchers until a consensus was reached. The coding framework was used to code the remaining transcripts. New nodes that emerged during coding were added to the list of codes upon consultation with researchers, keeping in mind the key topics that were linked to the research objectives. Subsequently, codes from the list were grouped into larger categories that corresponded to the themes that emerged from the data. Researchers' views were reflected and debated so that any potential biases were identified and addressed to improve the accuracy of the findings. Researchers' reflexivity on the findings was discussed for accurate interpretations.

3.7.11 Study outcomes

The outcome variables and their collection schedule are summarised in **Table 3.7**.

Table 3.7 : Study outcome measures

Measures	Pre-intervention	Immediate post-intervention	1 month post-intervention	3 months post-intervention
<i>Quantitative Knowledge</i>	√	√	√	√
<i>Qualitative interviews</i>		√		√

Improving knowledge was the main goal of the intervention. It could be hypothesised that participants who attended the MuFE IT were more likely to be introduced to fall risks and fall prevention strategies; this would result in better fall control and improved of knowledge about falls. The knowledge improvement in this study was supported through the PowerPoint presentations, assisted by inter-professional team, booklets, phone call follow-ups and visit 1. Thus, the listed strategies were conducted in the form of repetition and reinforcement to improve and to sustain the knowledge among the participants. Therefore, this study aimed to have a significant difference in knowledge improvement and sustainability between the pre-intervention and post-intervention.

This study adapted a 75-item checklist to assess the participants' knowledge of fall risk factors and fall prevention strategies (Hakim et al., 2007). These items were adapted using previous evidences (Hakim et al., 2007; Robertson, Campbell, Gardner, & Devlin, 2002; Tinetti et al., 1994; Tinetti et al., 1995; Tinetti et al., 1988). The checklist contents cover these aspects: health problems that may increase risks for falls, behaviours that may increase risks for falls, health behaviours that may increase risks for falls, and indoor and outdoor environmental characteristics that may increase risks for falls. Each item on the checklist was considered as yes/no question with 'yes' response indicated by a check in the boxes: 'which of the following general health problem may increase the risk of falls?'; The behaviours that may increase the risk of falls, 'which of the following behaviours may increase the risk of falls?'; the health behaviours that may increase the risk of falls, 'which of the following health behaviours increase the risk of falls?'; identifying the risk of falls inside and outside the home, 'which of the following items increase the risk of falls outside and inside of the home?'. The checklist was scored: a percentage with 0 % indicated no correct responses, and 75% (75-items) indicated that all items were correct. The participants administered the

same checklist during pre-intervention, immediate post-intervention, 1-month's phone calls follow-ups and 3-months' post-intervention.

The qualitative interviews were conducted using focus group discussions. The researcher evaluated participants' behaviour change and the reasons for the change after attending the MuFE IT through focus group discussions.

The intervention was delivered as it was planned and not deviating from the protocol. The fidelity was achieved through careful briefing and feedback to interprofessionals after each pilot testing. The older participants' engagement in the intervention was ensured through the participants involvement in the sessions e.g. uses of visual aids (powerpoint presentation and booklet), fun learning time (questions and answers) using gerogogy principles and the participants' active participation in the mastery the experiences from the interprofessionals.

CHAPTER 4: RESULTS

The development of the FPEI was a systematic and iterative process. Firstly, it involved assessing the needs from community-dwelling older persons, which in turn, informed the format of the FPEI. Secondly, the effective evidences of FPEIs for older persons were collected through a systematic literature review. The needs, evidence and Bandura's Social Cognitive and Gerogogy theories were then incorporated into MuFE IT using the UKMRC systematic guidelines. The first draft of MuFE IT underwent iterative reviewing and revision process carried out by both the development and the review committees. Furthermore, the MuFE IT underwent three consecutive pilot tests in a real setting to receive responses from a diverse older population, as part of an iterative process of review and revision. With the pilot tests of the MuFE IT, the feasibility and acceptability (preliminary) were preliminarily evaluated via knowledge measures, immediate and three-month's post-intervention interviews.

This chapter reports the findings of the FPEI development process, in particular how the findings from each of the following steps were used to develop the FPEI:

- Assessing the needs
- Searching, selecting and synthesising the evidences
- Drafting, reviewing and revising the MuFE IT
- Pilot testing the MuFE IT

4.1 Needs assessment study

As part of the systematic development process of a complex intervention, the UKMRC recommends finding out the needs of the older persons and HCPs, if there is no particular information available in the context. Exploring the needs of the older persons helped to identify these areas:

- older persons' views and experiences about falls and their prevention
- older persons' barriers in taking up fall prevention activities
- older persons' help needed from HCPs, the healthcare system, or caregivers to take up fall prevention activities

On the other hand, exploring the needs of HCPs aimed to identify these areas:

- HCPs' perceived views on older persons' perceptions about falls
- HCPs' barriers while managing falls among older persons with a high risk of falls
- HCPs' help needed from the older persons, the healthcare system and caregivers in managing older persons with a high risk of falls

Therefore, the results of the needs assessments study, of the older person with a high risk of falls and the HCPs, provided data that revealed implications, for the development of a new FPEI.

This section will report these results:

- The qualitative results of two in-depth interviews and three focus group discussions with older persons at a high risk of falls.
- The qualitative results of ten in-depth interviews and two focus group discussions with the healthcare professionals from different disciplines.

- How these findings were summarised and incorporated into the FPEI.

4.1.1 Older persons' needs assessments study

This section reports the socio-demographic details of 16 older persons and the results from the thematic analysis. **Table 4.1** shows profiles of 16 older persons at high a risk of falls who joined the in-depth interviews and focus group discussions. There are 4 men and 12 women, age ranges from 62 to 81 years, of whom 11 are Chinese, 4 Malay and one Indian; their education levels range from primary (completed six years) to university education. They experienced falls once or recurrent falls in the past 12 months; some older persons had minor injuries and sought help from traditional medicine practitioners and never attended hospital for falls problems; however, few had received delayed medical treatment in the hospital after their falls. Their reasons for attending a fall prevention intervention varied, usually due to their individual risk problems that may cause them to fall. Some patients had delayed their consultations with their physicians for about one to two weeks. The older persons consulted their physicians if their pain persisted or the treatment provided by their traditional practitioners was not effective.

Table 4.1 : Socio-demographic details of the older persons

ID	Age (years)	Gender	Ethnicity	Falls in the past 12 months	Currently living with	Employment	Education
a1	68	Female	Chinese	Recurrent	Family	Retired	College
a2	79	Male	Chinese	Once	Wife	Retired	Completed 6 years
a3	67	Female	Malay	Once	Family	Housewife	Completed 12 years
a4	74	Female	Malay	Once	Family	Housewife	Completed 6 years
a5	81	Male	Indian	Recurrent	Wife	Retired	College
a6	74	Male	Chinese	Recurrent	Wife	Retired	University
a7	68	Male	Chinese	Recurrent	Family	Retired	University
a8	70	Female	Malay	Recurrent	Husband	Retired	University
a9	71	Female	Chinese	Once	Alone	Working	Completed 12 years
a10	66	Female	Chinese	Once	Husband	Working	College
a11	68	Female	Chinese	Once	Husband	Working	Completed 12 years
a12	62	Female	Chinese	Recurrent	Husband	Working	Completed 12 years
a13	68	Female	Chinese	Once	Husband	Working	College
a14	63	Female	Chinese	Recurrent	Family	Working	College
a15	62	Female	Malay	Recurrent	Family	Working	College
a16	68	Female	Chinese	Once	Husband	Working	Completed 12 years

Four themes emerged from the qualitative interviews conducted among older persons with a high risk of falls.

- Older person related needs
 - Healthcare system related needs
 - HCPs related needs
 - Caregivers related needs

The main themes, sub-themes and key issues from the thematic analysis are shown in **Table 4.2.**

Table 4.2 : Overview of themes and key issues in older persons' needs assessment

Main themes	Sub-themes	Key issues
Older person related needs	What are falls?	<ul style="list-style-type: none"> • Feeling fortunate to escape with minor injuries • Falls are inevitable • Falls are not a serious issue to be disclosed to others • Falls cause serious complications • Falls are an ageing issue
	How are falls treated?	<ul style="list-style-type: none"> • Seeking traditional medicine for symptom relief or cure after a fall • Delayed seeking medical attention for falls
	What is the response towards the fall prevention interventions? What are the perceived needs to prevent falls?	<ul style="list-style-type: none"> • Exercise can prevent falls • Walking aid usage issues • Home modification issues • Issues with referral • Being remindful and vigilant about environment • Exercise • Fall information
Healthcare system related needs	What are the barriers to attend a fall prevention intervention? What support is needed from healthcare system?	<ul style="list-style-type: none"> • Access issues • Access to fall prevention interventions • Fall-free environment • Continual care from HCPs • Falls information • Vision and hearing screening • Fall awareness campaign • Small-group discussion • Convenient access
Needs related to HCPs	What are the barriers to attending a fall prevention intervention? What are the older persons' needs from HCPs?	<ul style="list-style-type: none"> • Basic falls treatment • Issues with referral • Rational reasons to attend a fall prevention intervention • Falls and associated risk factors • Motivation to be involved in exercise
Needs related to caregivers	What support is needed from the caregiver?	<ul style="list-style-type: none"> • Support and motivation to attend a fall prevention intervention • Older person friendly home

Needs related to older persons

The older persons have a range of views and experiences about falls and the preventions that need to be tackled. In particular, the older persons have different opinions about falls, which reflect their varied knowledge about falls. These are the key points that the older persons raised about falls and their experiences:

- Feeling fortunate to escape with minor injuries
- Falls are inevitable
- Falls are not a serious issue to be disclosed to others
- Falls cause serious complications
- Falls are an ageing issue

What are falls?

Though the older persons in this study had experienced falls, they expressed various views about falls. These views may prevent older persons from taking up fall prevention interventions.

Feeling fortunate to escape with minor injuries

This was because they believed that falls were an ageing problem, not preventable, and felt lucky and thanked God that they had only minor injuries from falls. In this study, patients tended to use the word ‘luck’ or ‘thank God’ to express feelings about falls that caused only a minor injury. Some gave credit to God’s love for protecting them from devastating falls or injuries.

“It was just a minor injury. I don’t know, maybe my luck, you see. Maybe God loves me, so he doesn’t give me that bad fall.” – a8-[72 years-old; Malay female]

Falls are inevitable

The patients reported that falls are a normal, common event, and were part of the ageing process. Furthermore, older person perceived that falls were unpredictable. One participant expressed that he did not know how his latest fall happened.

“I was sitting on the chair. I was quite stable as usual. But I don’t know how I toppled over and fell, you know. I can’t explain that.” – a5-[81 years-old; Indian male]

Another participant also felt that falls were not preventable as she fell despite being aware of small steps that could lead to a fall.

“I was aware of the small steps, but it just happened in the blink of an eye. The next thing is, I found myself on the ground. I can do nothing to prevent it.”- a4-[64 years-old; working Malay female]

Fall is not a serious issue to be disclosed to others

The patients did not view their falls as a serious issue needing to be disclosed to others. One participant did not tell her husband about a fall to prevent him from worrying, while another participant discounted his falls as a serious issue needing medical attention. He explained that doctors had more pressing issues.

“I don’t tell anything. This is nothing so important to report to the doctor. He also has so many other patients to see” – a7-[68 years-old; Chinese male]

“I kept quiet. If I tell my husband, he will get worried, and he might get his blood pressure high.” – a3-[67 years-old; Malay female]

Fall causes serious complications

The patients recognised that falls could cause serious complications. Many patients expressed their concerns about potential bone fractures related to falling.

“Fall can cause hip bone fracture you know. It can make me lay down on a bed for life.” – a2-[79 years-old; Chinese male]

Concomitant with osteoarthritis and osteoporosis, the patients felt that a fall could lead to fractures.

“I am an osteoporosis patient, fall can easily cause fracture to my bones.” – a11-[68 years-old; working Chinese female]

Falls are an ageing issue

The patients also believed that their falls happened because of their old age.

“I did fall during my prayer, you know. I fell when I wanted to sit straight after a bending in a Muslim prayer. But I said never mind, I am old already.”
– a8-[70 years-old; Malay female]

How are falls treated?

The participants sought help from alternative sources rather than from local hospitals for their fall-related injuries. Some participants were still uncertain about the need to get a treatment, and only if the pain still persisted that they would go for medical treatment. This scenario may be attributed to the lack of awareness of the fall prevention interventions. Thus, the theme describes the older persons' varied help-seeking behaviours following a fall.

Seeking traditional medicine for symptom relief or cure after a fall

The patients self-medicated or sought traditional treatment for falls instead of the conventional treatment; the former was found to be effective based on their experiences. One Chinese participant took his own concoction of Chinese medicine for his fall-related injury.

“After that fall, it resulted in this cut (showing his wound) on my forehead, and it was bleeding. I used my own medicine to stop the bleeding, which I made myself, you know.” – a6-[74 years-old; Chinese male]

One Malay woman applied topical ointment and used traditional Malay massage to relieve fall-related swelling in her legs. She expressed satisfaction with the services:

“I don’t seek medical attention because I managed it by just applying some ointment on the swollen area. I also go for massage (traditional Malay massage) for my leg or ankle swelling. It always works better for me.” – a8-[70 years-old; Malay female]

Delay in seeking medical attention for falls

Obtaining medical attention for a fall-related injury is not the first option or immediate action for many older persons. The older persons felt that their injuries were not serious enough to need a doctor, and would heal from self-treatment. Only when an injury remained unhealed or worsened would they seek treatment from a doctor.

“First, I never wanted to go to see doctor, so I bandaged my hand myself, but I went after one week because the pain still persists.” – a13-[68 years-old; working Chinese female]

What are the barriers faced in taking up the fall prevention interventions?

Some patients in this study were aware of the importance of exercises, vision screening and getting physiotherapy for their knee weakness. However, there were delays in referring them for the fall prevention interventions; some healthcare providers were not informed about the fall prevention interventions available in the hospital. In this case, the HCPs' unawareness seemed to affect older persons' intention to attend a fall prevention intervention. Another issue here is the accessibility problem faced by older persons to attend a fall prevention intervention recommended by their physician through a referral. Due to this reason, the referrals are neglected because of the accessibility problem. Here in this third theme, the patients described their views about fall prevention interventions, such as exercise, physiotherapy referral, home modification checks, walking aid usage, and vision and hearing checks.

Exercise can prevent falls

The patients were aware of the importance of exercise in preventing falls. They were involved in a range of exercises, such as walking, aerobics, line dance and traditional exercises such as QiQong, Yoga, and Tai Chi.

"Exercise is good. I felt I have improved my balance, more alert and avoided falls." – a16-[68 years old; working Chinese female]

Walking aid usage issues

The patients did not view walking aids positively. They were hesitant to use walking aids as they remained able to carry out their daily activities without them. Many found it difficult to use a walking aid while carrying out their usual daily tasks. One participant

found using a walking aid cumbersome; it prevented ‘free movements’ when working in her garden.

“I don’t like walking aids, you know. How to do gardening with that stick? No la..it prevents me from free movements.” – a8- [70 years old-Malay female]

Some patients also viewed walking aids as stigmatising. Some felt embarrassed to use them, while others associated the use with weakness or frailty.

“I feel embarrassed to use that. Unless if I reached the age of 70 and above then maybe I use.” –a12-[62 years-old; working Chinese female]

“I still don’t require one; it will give me more problems. Maybe when my legs become weak to stand, then it is useful.” –a10- [66 years-old; working Chinese female]

Home modification issues

The study patients expressed dislikes towards home modifications suggested by others. They preferred to design their own homes.

“I think home modification is not necessary. I don’t prefer interference from others. It is your house; I know better about things in my home.” – a8- [70 years-old; Malay female]

Some expressed that falls were not related to the design of a house but to one’s own carelessness.

“I think it won’t help much la..our home usually quite full of things. So, basically you don’t fall because of the furniture but you fall because of your carelessness.” –a9- [71 years-old; working Chinese female]

Issues with referral

Among the patients who had received HCPs’ referrals for their fall treatment, their reactions varied. One participant expressed she had a difficulty to get an eye appointment in a short period of time.

“Here (the hospital) to get an eye or ear problem appointment is quite difficult. Maybe they give appointment for next year.” –a14-[63 years-old; working Chinese female]

One man rejected his referral for physiotherapy as he faced an accessibility problem. In addition, he expressed that travelling at his age is difficult.

“If I am staying nearby then it should be fine, but I am staying quite far, you see. It is not easy for an older man like me to travel and come to get physiotherapy.” –a5-[81 years-old; Indian male]

What are the needs to take up fall prevention activities?

The study participants shared their actions taken in preventing falls. The older persons, for example, have avoided visiting places, and activities or movements which are perceived as a likely cause of a fall. In particular, the older persons have taken these precautions: avoid crowded area, choose a safe pathway to walk, are careful when crossing the roads, hold on to the banister when going up or down stairs, are watchful around curbs, keep kitchen stuffs on lower shelves inside the house, make sure the kitchen floor is dry, and use non-slippery bathroom and floor mat.

Remindful and vigilant about environmental hazards

The older persons shared their experiences of carefulness to avoid falls. Some patients were remindful of the previous fall risk that might have caused falls earlier. By being remindful, they managed to prevent falls. Besides, some older persons were more conscious and watchful of things and hazards that could make them fall.

“I think, being mindful of things that can make us to fall, by just need to remind ourselves of those hazards.” –a8-[70 years-old; Malay female]

One older person shared her experience of how she fell while she was on her stilettos. She refuses to wear them nowadays. She also realises that whenever she is on that stiletto, she needs to hold on to her spouse. Nowadays, she claims that she only wears flat sandals to work.

“Now I don’t wear stilettos. When I wear stilettos, I have to hold my husband’s hand. So, now I wear flats to work.” –a14-[63 years-old; working Chinese female]

Needs related to healthcare system

Since older persons have travelled the life journey longer than many others, they want their opinions and suggestions to be taken seriously. The participants in this study listed a range of facilities from the healthcare system that might fulfil their unmet needs. In particular, the older persons wanted more information about fall prevention interventions, which they had not yet exposed to: vision and hearing screening, falls awareness campaign, small-group based discussion and the intervention to be held in the hospital.

What are the barriers pertaining to healthcare system to attending fall prevention interventions?

Participants faced various barriers to take up a fall prevention intervention. The barriers were transportation, time, health conditions, intervention access problem, lack of fall free environment in the hospital, and looking for the same physician in every consultation.

Accessibility

Access problem was common among study participants. The participants faced difficulties in attending referral consultation sessions in the hospital. The access problems were heavy traffic on the road, poor public transportation and parking problem.

“Ya, we always get referral here, in the University Hospital. However, it is difficult to go due to heavy traffic and also difficult to get parking here.”–
a15-[62 years-old; Malay female-working]

One older woman explained that she needed to fulfil a responsibility before she could leave her house to attend a referral session or an appointment in the hospital. She also explained about her experiences of travelling using the public transport. Although the participant was keen to attend a referral session, the access problem hindered her from attending the fall prevention interventions. Thus, she hoped she did not need to attend a weekly or monthly visit in order to participate in an intervention. This is certainly an important issue to be resolved if a fall prevention intervention is to be conducted in the hospital.

“You see, this morning, I left my house at 8.30 am and took a bus to come here. So until now I'm still here. Maybe it will take the whole day to finish and to go back home. The other day, when I came here, they took so long for me to go in for my appointment. But then, on the same day, I needed to attend a class at seven o'clock and I needed to cook, so I rushed back home after that appointment. Today, if you let me go around 4 or 5 o'clock, definitely I will reach home late, because of traffic jam. Moreover, I need to take two busses to reach my house, not direct to doorstep, as I still need to walk half an hour to reach my house.” –a1-[68 years-old; Chinese female-working]

Timing is another concern for participants, especially for those who are still working.

“The timing of the programme is very important because we are aged senior citizen you see, and we are still working. However, if you going to have one, I wouldn't mind going.” –a13-[68 years-old; Chinese female-working]

Another issue highlighted under the theme was accessibility of the fall prevention intervention in the hospital. The participants claimed that, there was a lack of screening for falls in the hospital. Besides, they were also uncertain about who was responsible to disseminate the information about fall screening or vision and hearing checks.

“So you know, here we have never attended such service to do screening for ears or eyes and we also not aware how often to do the checking.” –a12-[62 years-old; Chinese female-working]

Lack of fall prevention interventions

The screening and fall prevention interventions were scanty in this hospital. The participants were very rarely examined for falls and received referral for physiotherapy, vision and hearing screening. According to one participant, a physician had prescribed painkillers for her mild fall-related injuries.

“Once I fell at home, of course I rang up my doctor; since nothing serious the doctor advised me to take Panadol (acetaminophen), he never asked me or refer me to an intervention for that!”—a8-[70 years-old; Malay female]

Another participant stated that the accident and emergency department in the hospital was the only facility accessible to people affected with falls.

“If you have a fall, you go to the accident and emergency department, that’s all. There’s nothing more than that”—a11-[68 years-old; Chinese female- working]

Lack of fall-free environment

The study participants described that the hospital was not a fall-free area. Some even encountered falls in the hospital compound such as in the car parks and while walking on a pavement. One participant spotted wet toilets and a sloping pathway inside the hospital building, where they needed to walk on it.

“Don't say hazards in the house only, even in the hospital environment, it is not safe. The toilets are always wet and the entrance pathway to a clinic is sloping, it’s dangerous.”—a15-[62 years-old; Malay female-working]

Lack of continual care

Many participants faced difficulties in explaining to different physicians about their conditions during their office visits. The participants felt that their fall problem was a sensitive issue to be discussed repeatedly. So, one participant refused to report fall, unless the doctor raise the issue.

“But the only thing here is less personal. Today, I see A doctor, the next time, I come will be B doctor, so, every time I come also different doctor, so they might not able to keep track on my falls problem. Anyway, I am not going to repeat reporting falls if the new doctor is not aware of it.” –a7-[68 years-old; Chinese male]

What is the support needed from the healthcare system?

The participants in this study had a range of needs to overcome falls: mainly the lack of information about falls and their prevention in the hospital. Their unmet needs were fall information, vision and hearing screening, fall awareness campaign, small-group discussions and fall prevention intervention in the hospital. The study participants preferred healthcare professionals to deliver the fall prevention interventions.

Fall information

The participants in this study found that there was a lack of available information about falls and their preventions. One participant felt that the information should be available in the form of posters or pamphlets in the hospital area.

“I have never heard about fall information anywhere in this clinic. At least should have posters or pamphlets.” –a14-[63 years-old; working Chinese female]

Another participant explained that she did not receive any advice or materials to read about falls from her physician. But, she prevented falls by being careful and mindful, whenever she conducted her daily activities. Further, she mentioned that falls were her own responsibility and she ought to take precautions to avoid them.

“Falls I don't read much about falls. I don't hear much about falls from doctors but at least it is just myself and I do what I can do with falls that's all.” –a8-[70 years-old; Malay female]

Vision and hearing screenings

Some participants shared their experiences about falls that were caused by poor vision and hearing problems. However, they did not find any free access to both eye or ear screenings in the hospital.

“I will be very glad if I could get eye and ear screening often here for free, but unfortunately I don't think we have here(hospital).” –a15-[62 years-old; working Malay female]

Fall awareness campaign

The study participants also perceived that fall awareness campaigns could improve knowledge about falls and the prevention. Through such campaigns, the participants might be able to gain access to fall prevention interventions, pamphlets and build confidence by attending related talks.

“We are lacking in fall information and awareness, maybe we need a good public campaign about falls and we may get pamphlets too.” –a10-[66 years-old; working Chinese female]

Small-group discussions

One participant perceived that discussions in a small group might be workable for the purposes of sharing experiences and receiving moral support.

“Maybe like Mat Salleh (Caucasians), we need to sit around and share the experiences, that would be useful.” –a7-[68 years-old; Chinese male]

Convenient access

Many participants preferred to have a fall prevention intervention in the hospital area. The participants perceived that they were familiar with set-up and trusted the sources from the hospital.

“If the fall prevention programme going to take place in the hospital itself, the patient will be more likely to attend.” –a14-[81 years-old; Indian male]

Other factors such as distance, time and transportation were one participant’s priority.

“But still, distance, time and I still feel the needs for a convenient transportation.” –a14-[81 years-old; Indian male]

Needs related to the healthcare professionals

The study participants had varied perceptions of HCPs. The participants perceived that the HCPs did not provide much information about falls and the relevant referrals. However, the participants perceived that the HCPs were responsible for informing them about the fall prevention interventions. The information includes support and services

for older persons with a high risk of falls, access to fall prevention interventions and rational reasons to attend a fall prevention intervention.

What is the support needed from HCPs to attend fall prevention interventions?

The older persons perceived that the HCPs should elaborate on fall problem, risk factors and treatment options, just the way they dealt with other health problems. Further, the older persons felt that they did not receive information about attending a fall prevention intervention; this includes rational explanation and referrals.

Fall treatment

One participant claimed that he only received treatment for his fall-related injury. The physician did not ask the participant about the cause of his fall and gave advice on preventive measures. This could be the reason why the older persons at a high risk of falls were reluctant or hesitant to visit the hospitals to seek consultation and treatment for their falls.

“I had a fall and hurt my right toe, so I went to see this private doctor. I told the doctor that I had a fall. The doctor checked the wound and instructed a nurse to bandage it and prescribed some pain killers and cream. So, usually the conversation about ‘how’ and ‘why’ just doesn’t come in.” –a7-[68 years-old; Chinese male]

“Once I involved with a jogaton, you know while walking and running, I didn’t see a small hole on the road and I fell and twisted my leg; it got swollen. At a private clinic, the doctor couldn’t examine fractures, so he prescribed pain killers but the pain and leg swelling still persist.” –a7-[68 years-old; Chinese male]

Rationales behind referrals

Generally, the HCPs maintain a good rapport among the older persons. However, the older persons expected the HCPs to give rationales and relevant referrals for their fall problem.

“Doctor asked me to use walking stick because he felt that I am not stable when walking. But I think no need to use, I still can move without it. I don’t know... I was not convinced (laughed).” –a4-[74 years-old; Malay female]

“I was suffering from a hairline crack on my feet when I received a referral to go here (UMMC). The doctor here managed to treat my fracture and referred me to the falls clinic.” –a7-[68 years-old; Chinese male]

What are older persons’ needs required from the HCPs?

The participants faced some barriers in addressing their fall problems with their physicians. They had uncertainties about attending referral consultations due to a lack of exposure to fall information and participation in a fall prevention intervention. Besides, the participants were confronted with access problems in attending a fall prevention intervention. The older persons perceived that the whole process of attending a fall prevention intervention should be initiated, supported and encouraged by the HCPs.

Uncertainty of attending a fall prevention intervention

Due to limited exposure to fall information and rationales behind attending a fall prevention intervention (from their physicians), the participants did not continue their attendance in the referral follow-up consultations or sessions. Therefore, the older persons perceived that the HCPs should prescribe the referral based on the older

persons' capacity. One participant expressed his dilemma to continue doing an intervention exercise to prevent falls.

"I feel better after some intervention exercise (falls clinic) for my first falls. But lately I got pain in my heel. However, the doctor asked me to continue to do the exercises, but I found that the pain still persists. So the exercises don't really help much. I don't know whether I should continue." –

a7-[68 years-old; Chinese male]

Falls and associated risk factors

For example, the older persons were unable to link falls with a hearing problem. This might hinder them from performing the test in the early stage to prevent falls. One participant was told to attend a session about hearing check, when she encountered some falls. However, she refused to attend and thought that it had nothing to do with her hearing. However, she made her decision to check her ears when she had recurrent falls. Although the test confirmed her hearing problem, she was unable to see the connection and the solution for it.

"As far as I am concerned, this was my first time attending a hearing test. Earlier, I was asked to go for a hearing check up by another hospital because I had falls, but I didn't go. However, in this first test, the doctor told me that my right side ear is partially losing hearing sensitivity. The doctor told that I could fall because of imbalance, but I don't get it why she said that and what I am supposed to do about it." –a15-[62 years-old; Chinese female-working]

Motivation in exercising

The fall prevention intervention may cause significant impacts on older persons' life, especially for those who were inactive. This issue usually was raised by older persons who had never carried out any form of exercise as part of their lifestyle. One participant was aware of the need for exercise; however, she was exhausted and not motivated to do any exercise at the end of the day after work.

"I don't do any exercise. I know it is good but er.. it is just that you know you just want to do it but there is no time cause you back home, you're so tired and you are not motivated."—a11-[68 years-old; Chinese female - working]

Similarly, some older persons were aware of the benefits of doing exercises; however, it is difficult to convince them to carry out exercises routinely. Though many patients were concerned about their medical conditions, they lacked knowledge on the effects of the exercises for their medical conditions. As one participant described, he survived multiple medical problems through routine exercises as a result of the motivation given by his physician.

"I think exercise is basically catering for the older persons. But it is not easy to convince an older person to come and attend exercise and I feel message will go through, particularly telling them through the doctors who are very cautious of it that they must exercise in whatever conditions they were. Because I myself am an example of that you know. I have all kinds of medical problem but I can cope with all that illnesses till today because my doctor always emphasised the fact that we should always exercise."—a5-[81 years-old; Indian male]

Another participant willingly followed the physician's advice to incorporate exercise in her daily routines if it was meant to prevent falls.

"I think it is good to advise an older person to do exercise. I mean whatever to solve the falls problem and to prevent them. I myself also will accept the advice from a doctor. Yes, it will create awareness you know." –
a13-[68 years-old; Chinese female-working]

Needs related to caregivers

Many older persons live together with their spouses, family or relatives. The older persons felt that the caregivers' support was important in attending a fall prevention intervention. The support and care needed were transportation, accompanying them to attend the intervention, expenses to buy prescribed shoes, walking cane, and pay for home modification as per requested and so on.

What support is needed from the caregiver?

The caregivers' support has to be integrated in the fall prevention intervention. It is because the older persons do not have the means to make decisions by themselves and are financially dependent; this is particularly true for transportation needs.

Support and motivation to attend a fall prevention intervention

The quotation below highlights the importance of as well as the difficulty in getting consent from caregivers to support older persons to participate in the fall prevention interventions. The participant refused to attend a fall prevention intervention as she found difficulty in explaining to her family about her fall problem. The family might not find attending a fall prevention intervention as important as the treatment for other medical conditions.

“I might attend if I have another appointment you know for my other health problems. However, if it is just for fall I won’t come. I don’t know how to explain about this intervention to my family; they might laugh at me.”

–a9-[71 years-old; Chinese female-working]

Other participants felt that motivation and support should be in the form of accompanying older people for a walk, and buying them hearing aids or walking cane without any hesitation, or even before they asked for it.

“I think we need motivation to carry out exercises and need support from family or spouse to buy walking stick or hearing aid.”

–a3-[67 years-old; Malay female]

Older persons’ friendly home

Older persons preferred to age in a familiar place; they wanted to spend their entire old age in their own home. The older persons were familiar, felt safe and sound in their own home. So, if the caregivers wanted their older persons to stay with them, they must provide a home friendly to older persons, meaning, a safe and comfortable home for an older person to live in.

“The family should be concerned with their older persons’ needs when they want to build a house. For example, the floorings, the bathrooms, the stair case and all sort of things. The family must be aware of the preventive measures, which could also be applied to them as well when they grow older. A modern house may look beautiful, but for an older person they need to pay attention on the floors, in the bathrooms, staircase and the bedrooms. An older person friendly home is where the electrical outlet is fixed at their eye level so that they no need to bend down to fix the power plug, lowered

kitchen and wardrobe shelves, removing curbs and having an overall safe home.”–Maria-[68 years-old; working Chinese female]

Summary and conclusion

In summary, the needs assessment study of the older persons reveals that the older persons need help in the following four main aspects when they want to prevent falls: older persons, healthcare system, HCPs and caregivers. Older persons felt that being careful and remindful of the hazards that had caused their previous falls would help them to avoid further falls. The older persons wanted more information on falls in the form of pamphlets and posters, and they required convenient transportation for them to travel to hospital to attend referral sessions (healthcare system). Some felt they needed motivation and advice from their healthcare providers to carry out exercise (HCPs), and to refer them to a specific fall prevention intervention. Finally, these were the important factors that would influence older persons in preventing falls (caregivers): motivation to carry out exercises, transportation, and support to get assistive devices.

All these findings provided important insights into developing the content for the FPEI. They also served as the basis to compare with the needs assessment study from the perspective of the HCPs on older persons’ needs.

4.1.2 Healthcare professionals’ needs assessment study

This section reports the demographic details and fall management experiences of the 20 HCPs who participated in the needs assessment interviews. It presents the thematic analysis of the healthcare professionals’ interviews.

The thematic saturation was reached upon the 12th interview. In total, 10 IDIs and two FGDs were conducted. Twenty HCPs participated in this study out of the 35 who

were approached. Those who declined to participate cited reasons such as time constraints, on vacation, and not interested in falls. The 20 HCPs recruited were from different specialties. The HCPs had a range of 1–15 years of experience in managing falls and saw 0–30 older persons per week. The HCPs' demographic details are shown in **Table 4.3**.

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Table 4.3 : Demographic details of HCPs

ID	Age	gender	Ethnicity*	Professional status	Experience in managing falls (years)	Number of patients seen with falls per week
i1	36	Female	C	Family Medicine specialist	10	1
f2	31	Female	C	Geriatrician	3	5
f3	30	Female	L	Internal Medicine physician	2	5
f4	35	Male	I	Internal Medicine physician	2	1
f5	29	Female	C	Internal Medicine specialist	4	2
i6	41	Female	Ib	Rehabilitation physician	10	8-10
i7	30	Female	M	Internal Medicine physician	2	2
i8	38	Female	C	Geriatrician	8	20
i9	35	Female	M	Occupational Therapist	6	1
i10	33	Male	M	Geriatric Rehabilitation	3	15-30
f11	37	Male	I	Primary Care physician	5	4
f12	31	Male	M	Primary Care physician	3	4
f13	33	Female	M	Primary Care physician	8	1-2
f14	31	female	M	Primary Care physician	5	1
f15	34	Female	C	Primary Care physician	8	4
f16	34	Female	I	Primary Care physician	9	1
i17	50	Female	C	Family Medicine Specialist	12	1
i18	30	Female	M	Ophthalmologist	1	2
i19	51	Male	C	Geriatrician	13	3
i20	54	Male	I	Public Health and Gerontologist	15	0

*Ethnicity: Chinese: C; Malay: M; Indian: I; Libyan: L; Iban: Ib; i: IDI; f: FGD

The interviews with HCPs reveal barriers and opportunities in managing falls among older persons at a high risk of falls. The HCPs explained about the older persons' needs in attending fall prevention interventions. Therefore, the needs from both older persons' and the HCPs' perspectives were explored to support the design of the FPEI. The overview of the key findings from the HCPs thematic analysis is shown in **Table 4.4**. HCPs' needs are categorised as follows:

- Needs related to older persons
- Needs related to HCPs
- Needs related to the healthcare system
- Needs related to caregivers

Table 4.4 : The HCPs' needs assessment

Main themes	Sub-themes	Key issues
Needs related to older persons	What do older persons perceive about falls?	<ul style="list-style-type: none"> • Normalising falls • Stigma around falls • Fatalism • Denial
	What are older persons' responses towards fall prevention intervention recommendation	<ul style="list-style-type: none"> • Reluctance to use assistive devices • Home modification issues
	What are the perceived needs of older persons	<ul style="list-style-type: none"> • Fall information • Causes of falls • Link falls with their consequences • Pamphlets • Cost-effective fall prevention intervention

Table 4.4, Continued, The HCPs' needs assessment

Needs related to the healthcare system	What are the barriers encountered in the falls management?	<ul style="list-style-type: none"> • Lack of healthcare providers and facilities • Lack of continuity of care for fall management • Lack of fall education materials • Lack of HCP training on falls and their prevention
	What are the needs for fall prevention interventions?	<ul style="list-style-type: none"> • Adaptive tool shop for older person • Sufficient Healthcare providers • Adequate infrastructure • Multidisciplinary approach to manage falls • Healthcare professionals' training on the prevention of fall
Needs related to HCPs	What are the barriers faced by HCPs in managing falls?	<ul style="list-style-type: none"> • Trivialisation of falls • Lack of clinical skills in managing falls • Lack of inter-professional communication
	What does it involve to connect older persons to a fall prevention intervention?	<ul style="list-style-type: none"> • Older persons' referral to relevant fall prevention intervention
	What are the perceived needs of older person in managing falls?	<ul style="list-style-type: none"> • Fall screening • Use of video/pictorial diagrams to educate older persons • Advice by a doctor
Needs related to caregivers	Caregivers' support in the prevention of falls among older persons	<ul style="list-style-type: none"> • Decision to send older persons to nursing homes • Reinforcing older persons' independence
	What is the support needed from a caregiver	<ul style="list-style-type: none"> • Reminder for older persons • Fall history • Medication compliance

Older person related needs

This section describes the views of the HCPs on barriers and opportunities they faced while managing falls. Moreover, the older persons' needs as perceived by HCPs in the prevention of falls are analysed in this section.

What do older persons perceive about falls?

The HCPs described that the patients had varied perceptions about falls and their associated risk factors. The HCPs highlighted the older persons' varied perceptions in the following contexts:

- Normalising falls
- Stigma around falls
- Fatalism and
- Denial

Normalising falls

Older persons normalised falls and considered them to be part of the normal ageing process. They disregarded falls because they believed they were inevitable in old age.

"It's because many of the older person do not see falls as a problem. In fact, some would say falls are normal as you get older. When you accept it as something normal you do not seek attention." - i1- [Family Medicine specialist; Chinese female]

Stigma around falls

Older persons also viewed falling as a stigma because they associated falls with residential or nursing home admissions. They feared that their families might send them to residential homes.

“The older person is unlikely to report their falls because as soon as they tell their families that they’ve fallen, then they put them into nursing home.” – i8- [Geriatrician; Chinese female]

Fatalism

Physicians encountered obstacles in advising on fall prevention activities, such as exercise and referrals for physiotherapy. The older individuals might be fatalistic; they believed that nothing more could be done to prevent their health from deteriorating or that death was around the corner.

“If I advise them to do exercise or physiotherapy (older person) ... they would instead ask me, ‘how it would help me to live longer, and why I should live longer? I’m dying soon. So why should I do exercise?’” –i6- [Rehabilitation physician; Iban female]

Furthermore, older persons tend to adapt to living with deteriorating vision and refuse to proceed with medical treatment to correct their vision.

“Usually some patients will say ‘I think its ok, I’m old already, I don’t need very good vision because I can still do my gardening, can still see my grandchildren’s faces. I don’t need to read a lot and do meticulous work and all that.’ But they don’t accept that in certain situations they need

good vision to see slight water on the floor; they can step on it, and then they fall because of it.” –i18- [Ophthalmologist; Malay female]

Denial

Some older persons refused to admit they had muscle weaknesses, knee, balance, and gait problems. They instead found other reasons, for example, the floor was slippery; they refused to accept the fact that they had disabilities.

“In some cases, the older persons do not want to admit their weakness or balance problem but they blamed the external factors like the environment factor, such as, slippery floor, something blocked their vision and so on.” –i6- [Rehabilitation physician; Iban female]

Older persons also denied that there were risks in certain behaviour; hence, they fell.

“He was in hurry and he could not coordinate himself and fell again ... I don’t know (pause) they are careless when they want to be fast, they forget that they will fall down ... It’s not automatic anymore.” –i6- [Rehabilitation physician; Iban female]

How do older persons respond to recommendations of fall prevention interventions?

The HCPs had varied perceptions of the older persons at high risk of falls; in particular when recommending them to fall prevention interventions. The older persons encountered issues to attend fall prevention interventions: using walking aids, removing home hazards, or beliefs.

Reluctance to use assistive devices

Some older persons considered using assistive devices, such as walking frames, as a stigma, because they believed that using such aids was a sign of weakness and reflect a change in one's self-image.

"We advised them to get a walking stick but they rather used an umbrella. Because they said that the walking stick doesn't look good on them." –i19-
[Geriatrician; Chinese male]

Home modification issues

Issues like space problems and staying in a relative's home are challenging for an occupational therapist or physiotherapist to advise older persons on home modification.

"Sometimes, we from OT and PT side advise a patient 'ok, better to get a hospital bed' but a patient instead says, 'I can get it, but in my house I don't have a space for that bed.'" –i9- [Occupational therapist; Malay female]

Sometimes, the house design itself is hazardous.

"I cannot remove that curb; you know village houses, right? The curb was built at the entrance of a house. If you remove that, then the rain water will enter the house." –i9- [Occupational therapist; Malay female]

What are healthcare professionals' needs for fall prevention interventions to prevent falls among older persons?

The HCPs perceived a range of needs for the older persons, in particular the necessity of educating them on falls. The interviewees highlighted the need for fall information, falls and their associated risk factors, fall consequences, and fall prevention education pamphlets.

Fall information

The HCPs perceived that some older persons did have some existing knowledge on falls and their prevention, while some were naïve about falls. Although falls are common sense to some older persons, the HCPs felt that dissemination of information on falls, associated risk factors, consequences and prevention is largely helpful in general. In addition, the HCPs perceived that the advice or information should be tailored based on risks faced by older persons. Some HCPs recognised the presence of falls clinic and other fall prevention interventions, such as physiotherapy and home hazards checks in the current setting. This intervention has improved significantly over the years and getting a referral is easy and at a minimum cost. The HCPs suggested that advice on fall information could enhance older persons' understanding about falls and their interventions.

“Should give fall details that depends on what are their fall risks, if the older person risk for fall is because of medication which may cause them to be dizzy and become unsteady, we adjust the medication; or if the risk of fall is mainly because of the structure or mechanical problem such as knee problem then we tackle that area; we could suggest walking frame to support them to walk; advise about home environment and safety at home, including safety at

toilets, stairs, lightings, doors and then what they should do if they have all the symptoms for fall.” –i7- [Internal medicine physician; Malay female]

One healthcare professional suggested conveying the fall education messages using education materials would be efficient.

“Some, they do already know about falls and the consequences. Sometimes, they normalised it, but some do agree and they try to be more cautious. But, I think the thing is to educate them using materials like posters, because for us to mentioned everything to every one of patients is impossible, so posters would help so patient go and read about it.” –f13- [Primary care physician; Malay female]

Information on falls and its associated risk factors

The HCPs perceived that many older persons were unaware of falls and their associated risk factors. The older persons might neglect their fall risks, such as slippery floor, worn out carpets, worn out shoes and loose rugs in the surroundings. The risks associated with falls could be related to physical limitations, such as muscle weakness, frailty, and weak knees. The medications also are one of the risks factor. This is alarming, and education on falls and their associated risks factors should be delivered to older persons with a high risk of falls.

“Of course, the causes of falls could be common sense but this (fall risks information) needs to be emphasized to the patients..you know, like giving the advice of good lighting, no loose carpet, hold on to banister when you walk, be careful about spilled water, slippery area and home and environment outside. Obviously, the risks could be anything in the house or outside. For example, try not to lock the doors when you go into bathroom because if the

older person fell nobody can get into the bathrooms, and these are problems ok. Other causes are frail older persons and these frail older person must be accompanied, outdoor activities such as marketing, getting into the bus, walking in a crowd area, rushing, carrying heavy things, staircase and loose slippers. Others, like medication, weak limbs, osteoarthritis, weak knee, weak muscles when they stand, they stumbled, and they may trip as well. Other causes that the older person should know are about the type of medication that they taking. For example, high blood pressure or diabetes, they have what you called postural drop that means when they sit, they stand, they are unsteady and they might fall. So, these are the things that I need to tell the patients because most of them are older, may not remember. I also inform the family or the maids to do this sometimes.” –i17- [Family Medicine Specialist; Chinese female]

Information on falls and their consequences

Another issue highlighted by the interviewees was about linking fall-associated consequences to the older persons, such as fracture, head injury and death. The HCPs felt that by highlighting the fall consequences, this might give a psychological impact to older persons to avoid fall risks; the older persons might imagine being bedridden due to a fatal injury after a fall.

“I think to educate the patient about consequences after a fall, I mean what can happen if they fell. Because, they just think that if they fell, it’s only minor injury or bruise; but they don’t know that it can actually be fatal. I think that’s important also to educate them.” –f13- [Primary care physician; Malay female]

“Er we’re talking about the prevention of falls. Sometimes, it’s good to tell them (older person) what the complications are if they fell; not to make them scared but just to expose them to the truth. For example, if they fell, they might face fatal injury, head injury, hip fracture, or even death. So advise them on the need avoid the risk, falls and complications of course how to avoid the risks.” –f12- [Primary care physician; Malay male]

Pamphlets

The interviewees also highlighted the pamphlets used to deliver fall information among older persons with high risk of falls. The pamphlets played a role as a reminder of fall risks and its prevention methods. Either written pamphlets or verbal advice are essential.

“Ok, I will need a pamphlet to advise and remind the older person. If no pamphlets, it will be difficult for them to depend on your face-to-face advice.”

–i9- [Occupational therapist; Malay female]

Healthcare system related needs

The HCPs also voiced a range of needs related to the healthcare system. Firstly, tackle the barriers encountered while managing falls, such as lack of healthcare providers and facilities and adaptive tool shops; lack professional training and skills; and funding for older persons to carry out home hazards modification. Secondly, prepare evidence-based fall prevention intervention guidelines as highlighted by the interviewees who need them.

What are the barriers encountered in managing fall among older persons at a high risk of falls?

The interviewees highlighted that the healthcare system needed to tackle the problem of inadequate resources: manpower, infrastructure and facilities, and funding. They wanted a system that could encourage a multidisciplinary approach to managing falls caused by complex risk factors. Moreover, they also expected the healthcare system to allocate more funding to help older persons in these matters: carrying out home hazards modifications (e.g. hand rails, toilet seating and removing curbs); buying assistive devices (e.g. walking sticks, hearing aids, and glasses); improving pedestrian walking pathways and replacing bus steps with hydraulic system.

Lack of health providers and facilities

The HCPs mentioned the shortages of human capital and infrastructures; they explained that as a result, very little time could be spent on each older person at a high risk of falls during their visits to the hospitals. Consequently, the HCPs were hesitant to conduct fall screenings; they worried that due to time constraints, they might not be able to cope with a high number of older persons waiting with fall complaints.

“I don’t think we have sufficient staff and space to treat patients, in view of rising number of older person patients with fall. If I have 15 minutes to see one patient in the clinic and if I ask ‘Did you have a fall recently?’ I have to ask another minimum 10 more questions as to get the whole picture of patient’s fall history, which is not practical in a clinic with a high patient load.” –f4- [Internal Medicine Physician; Indian male]

In addition, HCPs complained about a lack of adaptive tool shops inside the compound or outside the hospital, which sells assistive devices for older persons. Therefore, they could not direct older persons or their caregivers to a point of purchase.

“The proper adaptive tools shop ... (pause) I think that is the major problem. I am not aware of the existence of these shops, so how to direct the older persons to get the tools?” –i1- [Family Medicine Specialist; Chinese female]

Lack of continuity of care for fall management

A lack of continuity of care is another issue highlighted by the HCPs. The HCPs found that older patients might see different doctors on their next follow-up visit. Hence, the HCPs felt that without the continuation of care in managing falls by the same doctors, this might hinder the older patients from receiving their optimal care.

“I might not see the patient (older persons with fall problem) in another visit, might be my colleague or MO (Medical Officer). So what you would have told the patient something during this appointment, it might not be reinforced in the next appointment. That’s it. And at the next appointment, a different opinion may be given.” –i6- [Rehabilitation Physician; Iban female]

In another context, HCPs found that there were no follow-up visits conducted by an occupational therapist (OT) after the first visit. Although the OT had suggested the necessary modifications to be done in the older patients’ home, nobody knew whether the patient complied with the suggestions recommended.

“I don’t know the effectiveness of educating patients on fall prevention during our home visits because we do it only one time, with no further follow-up after that.” –i9- [Occupational Therapist; Malay female]

Lack of fall education materials

Educational materials on falls and the ways of prevention were largely lacking too, and the HCPs tended to educate the older persons at a high risk of falls through verbal advice and drawings.

“The fall education materials are lacking here. So, we just actually advise by saying it and draw it for them; or the only thing we can do (pause) is referral for home visit when it’s really the home environment that matters.” – i1- [Family Medicine Specialist; Chinese female]

Lack of HCPs’ training in managing falls among older persons

The HCPs admitted that they were incompetent in managing falls among older persons at high risk of falls. They had only started to acquire expertise in the prevention of fall, through the geriatric posting. However, the techniques in managing falls among older adults were not emphasised anywhere in the entire medical curriculum.

“I think I was taught when I start working with the geriatrics consultant on how to deal with falls; only then I got it. It was not even emphasised in MRCP at all, and no one really emphasises the older person as a special subset of patients or geriatrics as a special kind of subject on its own.” –f15- [Primary care physician; Chinese female]

In its worst scenario, there was no clinical fall prevention guidelines implemented locally.

“There are no structured guidelines available. I think that we are unstructured in fall care so you tend to forget to ask something that might be important that might be the cause of the fall.” –i6- [Rehabilitation physician; Iban female]

What are the needs for fall prevention interventions?

The HCPs had listed a range of needs for fall prevention interventions, such as adaptive tool shop, sufficient human source, multidisciplinary approach, funding for older persons in the prevention of falls, and HCPs training. These needs may address the barriers faced by the healthcare providers while managing falls among older persons in the clinical setting. However, an evidence-based fall prevention intervention is warranted to help older persons with the fall prevention.

Adaptive tool shop

The interviewees felt that the healthcare system should provide them with an updated contact list of the adaptive tools shops. The healthcare providers could suggest suitable assistive devices or a simple home modification required; and with the updated contact list, older persons or their caregivers could contact the points of purchase directly.

“I think it will be good if the care setting could provide specialist adaptive tool shop or the addresses of these shops that selling all the adaptation tools and that will allow us to know where to direct the patients...” –i1- [Family Medicine Specialist; Chinese female]

Sufficient Healthcare providers

There is a limited number of healthcare providers trained in the prevention of falls for older persons. An occupational therapist (OT) and physiotherapist (PT) are those who are skilled in handling problems related to falls among older persons at a high risk of falls. Thus, there is a need to widen the spectrum of recruitment and involvement of OTs and PTs in the clinics.

'I think I would like to see more participation from the PT and OT's.' –f3-

[Internal Medicine Physician; Lebanon female]

Adequate funding

The healthcare providers perceived that certain amount of financial aid or subsidy from the hospital or the government would be helpful in supporting and motivating older persons; this fund can be utilised to change their assistive devices or modify home hazards as recommended by the healthcare providers in the prevention of falls.

'I think that an older person who needs walking aids should be given the opportunity to purchase it at a very reasonable rate.' –i20- [Gerontologist; Indian male]

'It will be really awesome if the system could give some subsidy to this older person; it is because the financial constraint is also a barrier for them to follow advice to build a safer house.' –f2- [Geriatrician; Chinese female]

Multidisciplinary approach in managing falls

The interviewees also noted that a multidisciplinary approach should be implemented in the healthcare system to handle the complex fall problems among older persons; this is because falls among older persons may be caused by multiple risks, such as multiple co-morbidities, home or environmental hazards, and improper assistive devices. Further, the interviewees also wanted the older persons to have a smooth and transparent process of referral from one discipline to another.

“Ya, I think multidisciplinary approach is very important, and we have to get the physiotherapist and the occupational therapist to be involved. It is because, I think a lot of times, what people do is just physiotherapy and hospital, and then what happen in the other disciplines and patients at home nobody knows. So get the OT to be involved to find out the flow of patient at home.” –f5- [Internal medicine physician; Chinese female]

Training of fall prevention

HCPs wanted the Geriatric Medicine to be incorporated in the undergraduate and postgraduate curricula (medical, nursing, physical therapy). HCPs needed more training pertaining to fall management so that they are competent and confident to deal with the cases.

“I think a refresher course will be good, just to strengthen our knowledge and improve our skills in managing older person with falls. I think that will be good.” –i1- [Family Medicine Specialist; Chinese female]

'I think there should be more need for training in terms of how to manage these older person in all specialties.' –f3- [Internal Medicine physician; Lebanon female]

HCPs' related needs

The HCPs felt that they required sufficient knowledge and skills to manage falls among older persons at a high risk of falls. Besides knowledge and skills to manage falls, the interviewees highlighted the need to overcome HCPs' attitudes towards falls and their preventions.

Is there a need for a fall prevention intervention?

The HCPs were uncertain about giving priority to the prevention of falls. Due to inadequate knowledge and skills, some interviewees agreed that they should give priority to older persons with acute and chronic conditions. There was a lack of inter-professional communication, and the roles of HCPs from other disciplines were not recognised. The interviewees with more experience were able to offer older persons a solution rather than neglect their fall problems.

Trivialisation of falls

Some HCPs "under-assessed" falls because they did not see them as a priority or as a serious condition. As a result, HCPs only gave basic consultation without exploring the possible causes of a fall.

"We sometimes don't think about the possible causes of the fall. We just think of it as another case of a fall and then go on to the next case." –f5- [Internal Medicine physician; Chinese female]

Lack of clinical skills in managing falls

Many HCPs perceived that they lacked necessary knowledge and skills in managing falls. Some HCPs were unaware of the value of exercise in preventing falls, and that hearing problems are a risk factor for falls. Other risks like cataracts were under-diagnosed, and there were poor prescriptions of mobility aids for preventing falls.

“I would advise them not to exercise because I don’t want them to fall again.” –f12- [Primary care physician; Malay male]

“I don’t connect hearing impairment with fall, you know? I have not seen anyone fall because they are hearing impaired.” –f17- [Family Medicine Specialist; Chinese female]

“Cataract problems are under-detected for falls among older persons.” –f14- [Primary care physician; Malay female]

Lack of inter-professional communication

Some HCPs felt that they have been working independently, without having discussions with other HCPs who are involved in falls prevention. Therefore, older person with falls were rarely referred across disciplines, such as to physiotherapists, pharmacists, and occupational therapists.

“I think that there’s not much communication in our team as well as the other teams to manage the patient although it should be multi-discipline, but actually we are working on our own and we don’t really interact with each other.” –f15- [Primary care physician; Chinese female]

At times, the roles of physiotherapists and occupational therapists were poorly understood by some HCPs. As a result, some HCPs might not realise that some individuals who fell might benefit from rehabilitation, and hence they failed to prescribe these services.

“It is common that doctors here wrongly referred the patient to the physiotherapist for home visit ... that’s why they need to know the difference between the physiotherapist and occupational therapist.” –i10- [Geriatrics physiotherapist; Malay male]

What does it involve to connect older persons to a fall prevention intervention?

The HCPs felt that a referral for an older person at a high risk of falls to a physiotherapist (PT) or occupational therapist (OT) needed a concrete reason, such as fractures or physical disabilities. Thus, HCPs tended not to give a referral to older persons with minor injuries resulting from falls. Otherwise, some older persons would not be receptive to or convinced of referrals for several reasons: travelling time, distance, responsibility to take care of their grandchildren, preferring not to bother their kids or spouse, waiting time in the clinic, and lack of continuity of care. Other interviewees perceived that older persons were familiar with a primary care clinic and its staff. So, they might prefer to attend referral consultations at the primary care clinic.

Older persons’ referrals to relevant fall prevention interventions

The interviewees perceived that referring older persons to a one-stop centre for falls such as ‘fall clinic’ would be feasible. The fall clinic should be able to provide all kinds of medical assessments and treatments tailored to their fall problems. Subsequent to the medical assessments, the older persons would be referred to another department to take up a fall prevention intervention.

“So that is really good to refer older persons to an actual fall clinic where you could get them most things done to prevent falling. If you have this kind of a clinic, they can get everything done; and it will come up with a diagnosis and they can be referred to appropriate fall prevention interventions.” –f2- [Geriatrician; Chinese female]

What changes are needed in the prevention of falls?

Education on falls should be delivered to older persons prior to their involvement in a fall prevention intervention. The older persons also needed advice from their HCPs on the fall prevention interventions. In this section, the HCPs explained the effective approaches in the prevention of falls. These are the approaches:

- Falls screening
- Use of pictorial diagram/poster or video to educate old people about falls
- Advice/motivation and support by a doctor

Fall screening

The HCPs gave an idea that screening of falls among older persons should be done prior to them experiencing falls. In this attempt, they suggested the forming of a team of HCPs including paramedics to conduct falls screening among older persons.

“I think it’ll be good if we have a team, I mean actually run by a paramedic or non-doctors actually help us out to screen the patient? And for those who actually have a history of fall, then we also can do the assessment from head to toe by some questionnaire; this actually will save up a lot of doctor’s time and then once the risk factors are identified, we actually can

target to the risk factors la. So it'll save a lot of time.” –f15- [Primary care physician; Chinese female]

Use of video/pictorial diagrams to educate older persons

Fall education using videos and pictorial diagrams was also encouraged by the HCPs. The interviewees perceived that videos and pictorial diagrams could help older persons understand and interpret the medical information easily rather than using oral or written information. Besides, a pictorial diagram with an explanation or a poster can increase understanding.

‘I think pictorial diagrams with small explanation can really make a lot of difference.’ –f11- [Primary care physician; Indian male]

‘I think we need to educate patients with posters, so posters would help patient to understand about falls better.’ –f16- [Primary care physician; Indian female]

Advice by a doctor

The HCPs perceived that fall prevention advice given by HCPs were well received by older persons. However, it needed greater support from the older persons' family members.

“I think if the doctor is the one who suggests to them (patient), and there is very good rapport with the patient, most of the time the patients will say yes, that is what I feel. But, I'm not sure in the real setting. I think the patient will say yes. However, it depends on the family as we have to get consent from the them too.” –f15- [Primary care physician; Chinese female]

Needs related to caregivers

The families also play a role in assisting older persons in the prevention of falls. The older persons are dependent on transportation and financial support from the family; they rather give up following referrals or recommendations for fall prevention if they receive poor support from their families. This is an added burden to the family members.

Caregivers' barriers for older persons in the prevention of falls

The HCPs perceived that the older persons needed their caregivers' support in the prevention of falls. However, caregivers who were impatient with older persons' fall problems might make a decision to send older persons to nursing homes or reinforce older persons' dependency.

Decision to send older person to nursing homes

Some caregivers were quick to make a decision to send patients with recurrent falls to a nursing home because they encountered difficulties in caring for them.

"Once a patient has one or two falls, they (family) will put him or her in a nursing home straight away because they are unable to take care of them at home (pause)." –i8- [Geriatrician; Chinese female]

Reinforcing older person' dependency

Some caregivers were overly concerned about an older person with recurrent falls, and they were hesitant to allow the patient to walk independently. As a result, the older person became reliant on them for daily activities.

“When you ask the family to supervise the older person, the family will come and hold his hand, and they will not allow him to get down from the bed and walk from the chair without their help. So the older persons became more dependent.” –f3- [Internal Medicine physician; Lebanon female]

What is the support needed from a caregiver?

The HCPs agreed with the fact that not all caregivers would volunteer to give up their jobs and busy lifestyle to care for their older parents at a high risk of falls. However, the HCPs needed their support in helping the older persons: remind them to take medications in a timely manner, advise them to be careful, reorganise and remove home hazards, encourage them to do exercise, attend referral, and carry out self-management.

Reminder to older persons

The HCPs emphasised the families’ important role in the prevention of falls among older persons at a high risk of falls.

“The family should play a role as the older person reminder to take medication, being aware of hazards and accompanying them to do exercise.”

–i9- [Occupational therapist; Malay female]

One HCP perceived that giving fall education to the family or the maid would be beneficial. The wise families or the maid may assist the older persons in the prevention of falls.

“Full support from family is very important as what I mentioned previously that not only educating the patient but also the family members, so I think educating the family, especially those who really care, sometimes it could be

the maid, sometimes they are left at home with the maid la so maybe it's the maid that we have to educate how to help around also to prevent the falls." –

f11- [Primary care physician; Indian male]

To give information about fall history

Moreover, the interviewees perceived that it is important for the family to share the older persons' fall history, such as location, reasons, consequences and impact.

"Again, family support is important to monitor and report on fall events whenever the older persons encounter falls. The older persons are unable to retain the information until the official visits; so the family members could take charge and recall the event to the HCPs if the older persons had a fall."

–i18- [Ophthalmologist; Malay female]

"The family should be able to help with the patient's medication or with their walking? Or when we do home visit the family can follow advice from OT you know." –i6- [Rehabilitation physician; Iban female]

Summary and conclusion

In summary, for the older persons to take up fall prevention interventions, they needed the support from the older persons themselves, HCPs, the healthcare system, and caregivers. The needs assessment data were analysed to extract information on the type of fall prevention intervention that would accommodate both barriers and needs of older persons and HCPs to prevent falls among older persons with a high risk of falls. **Table 4.5** shows the themes, quotes and summary as reflected in the older persons' and HCPs' interviews.

Table 4.5 : The themes that emerged, supporting quotes and summary as reflected in the older persons' and HCPs' needs assessment study

Older persons' needs assessment study	Supporting quotes	HCPs' needs assessment study	Supporting quotes	Summary of the needs assessment
Older person related needs What are the older persons' perceived needs to prevent falls? <ul style="list-style-type: none"> • Being remindful and vigilant about environment • Exercise • Fall information 	<ul style="list-style-type: none"> • <i>"I think, being mindful of things that can make us fall, by just needing to remind ourselves of those hazards."</i> [70 years-old; female] • <i>"Yes! Exercise, is very important and you may also absorb the idea into the programme la. I think it could prevent falls."</i> [74 years-old; male] • <i>"As I said, the information on falls needs to be delivered to the older persons and their families. So that everyone can take precautions to avoid falls."</i> [66 years-old; female] 	Older person related needs What are the HCPs' perceived needs for older persons in the prevention of falls? <ul style="list-style-type: none"> • Fall information • Information on falls, their associated risk factors and consequences • Pamphlets, posters, videos, pictorial diagrams 	<ul style="list-style-type: none"> • <i>'I think pictorial diagrams with small explanation can really make a lot of difference.'</i> [Primary care physician] • <i>'I think we need to educate patients with posters, so posters would help patient to understand about falls better.'</i> [Primary care physician] 	✓ Information on falls, associated risk factors, consequences and fall preventions

Table 4.5 : Continued, The themes that emerged, supporting quotes and summary as reflected in the older persons' and HCPs' needs assessment study

<p>Healthcare system related needs</p> <p>What is the support needed from the healthcare system?</p> <ul style="list-style-type: none"> • Fall information • Vision and hearing screenings • Fall awareness campaigns • Small-group discussions • Convenient access 	<ul style="list-style-type: none"> • <i>"I have never heard about fall information anywhere in this clinic. At least should have posters or pamphlets."</i> [63 years-old; working female] • <i>"But still, distance, time and I still feel the need for convenient transportation."</i> [81 years-old; male] 	<p>Healthcare system related needs</p> <p>What are the needs for fall prevention interventions?</p> <ul style="list-style-type: none"> • Adaptive tool shop • Sufficient Healthcare providers • Adequate funding • Multidisciplinary approach to manage falls • Training of fall prevention 	<ul style="list-style-type: none"> • <i>'I think, I would like to see more participation from the PT and OT's.'</i> [Internal Medicine Physician; female] • <i>'I think that older person who need walking aids should be given the opportunity to purchase it at a very reasonable rate.'</i> [Gerontologist; male] • <i>'I think there should be more need for training in terms of how to manage these older persons in all specialties.'</i> [Internal Medicine physician; female] 	<ul style="list-style-type: none"> ✓ Fall information provided via pamphlets, awareness programme and in a small group ✓ Convenient access ✓ Involving multidisciplinary HCPs with training in fall prevention
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Table 4.5 : Continued, The themes that emerged, supporting quotes and summary as reflected in the older persons' and HCPs' needs assessment study

<p>HCPs related needs</p> <p>What are the older persons' needs from HCPs?</p> <ul style="list-style-type: none"> • Rational reasons to attend a fall prevention intervention • Falls and associated risk factors • Motivation to be involved in exercises 	<ul style="list-style-type: none"> • <i>"I think... the message should be delivered through the doctors who are very cautious of it that they must exercise in whatever conditions they are in."</i> [81 years-old; male] 	<p>HCPs related needs</p> <p>What are the perceived needs while managing falls in older persons?</p> <ul style="list-style-type: none"> • Fall screenings • Use of videos/pictorial diagrams to educate older persons • Advice by a doctor 	<ul style="list-style-type: none"> • <i>"I think screening of the older patients with a history of fall, and ..actually will save up a lot of doctor's time."</i> [Primary care physician; female] • <i>'I think, pictorial diagrams with small explanation can really make a lot of difference.'</i> [Primary care physician; male] • <i>'I think if the doctor is the one who suggested to them (patient) might have very good response from the patient.'</i> [Primary care physician; Chinese female] 	<ul style="list-style-type: none"> ✓ Fall information and the prevention delivered through HCPs ✓ Educate older person on falls information using more pictures
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Table 4.5 : Continued, The themes that emerged, supporting quotes and summary as reflected in the older persons' and HCPs' needs assessment study

<p>Caregivers' related needs</p> <p>What is the support needed from the caregivers?</p> <ul style="list-style-type: none"> • Support and motivation to attend a fall prevention intervention • Older person friendly home 	<ul style="list-style-type: none"> • <i>"I think we need motivation to carry out exercises and need support from family or spouse to buy walking stick or hearing aid."</i> –a3-[67 years-old; Malay female] 	<p>Caregivers' related needs</p> <p>What is the support needed from a caregiver?</p> <ul style="list-style-type: none"> • Reminder to older persons • To give information about fall history 	<ul style="list-style-type: none"> • <i>'The family should play a role as the older person reminder to take medication, being aware of hazards and accompanying them to do exercise.'</i> [Occupational therapist; Malay female] • <i>'The family should be able to help with the patient's medication or with their walking? Or when we do home visit the family can follow advice from OT you know.'</i> [Rehabilitation physician; Iban female] 	<p>✓ Motivation, reminder about medication and hazards, and support to older persons with a high risk of falls to attend referral sessions and fall prevention interventions</p>
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4.2 Searching, selecting and synthesising the evidences

The main aim of searching, selecting and synthesising the evidences, is to prepare the best available scientific evidence that could be used as a basis for the content of the MuFE IT. The entire procedure evaluates the effectiveness of FPEIs, simplifies the information and inputs it into the MuFE IT.

This section describes the systematic process of searching, selecting, synthesising and summarising the evidences to be used in the FPEI.

4.2.1 Searching the evidence

Ideally, information about the content and formats of FPEIs should be extracted from a systematic review or RCTs. The effectiveness of FPEIs' content and formats were evaluated directly based on the outcomes. However, a comprehensive literature search did not find any good quality RCTs that could be used to compare with these FPEI interventions' content and formats for community living older persons. The best evidences, therefore, were extracted from cohort studies and RCTs.

Moreover, none of the studies included in the review, evaluated the effects of FPEIs in the long term. These are the outcomes of the evidence search:

- Fall rate and injurious falls
- Behaviour change
- Knowledge
- Fear of falls

4.2.2 Selecting the evidence

The studies were searched using strategies explained in Section 3.2.3, and a total of 905 RCTs and cohort studies were identified. Out of the total, 885 studies were identified from databases by using the PubMed electronic search engine, and 20 studies were from reference mining through the identified literature. Of the total 905 studies, four studies were duplicate publications, 824 studies were excluded because they did not involve falls, and 51 studies did not involve FPEIs. Study selections are detailed in **Figure 4.1**.

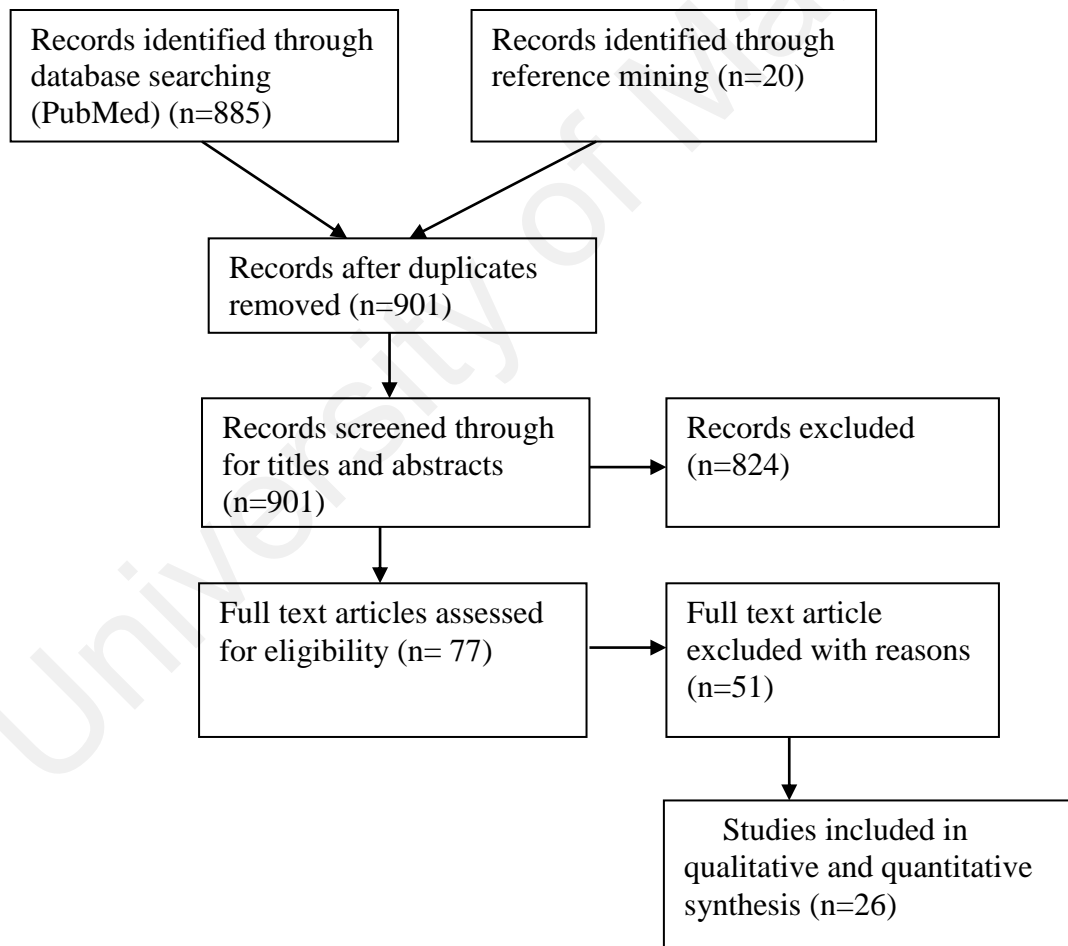


Figure 4.1 : Study selections criteria

A total of 26 studies were included in the analysis, of which one was a prospective observational study, two were pre- and post-interventions (non-RCTs), two involved qualitative analysis, and the other 21 were RCTs; they are described briefly below.

4.2.2.1 FPEIs nested in multifactorial fall prevention interventions

Eleven studies were included in the analysis to determine the effect of combining FPEIs (fall information, health education and pamphlets) with various fall prevention interventions (i.e. home visits, medication review and exercise, or combinations) related to falls, fear of fall, fall self-efficacy, and change of behaviours.

All studies included FPEI as part of the intervention arm. The participants, the older persons living in the community, experienced at least one time of fall. Eight studies evaluated the effects of FPEIs and combination of fall prevention interventions on falls (Hornbrook et al., 1994; Huang et al., 2010; Lee et al., 2013; Lord et al., 2005; Reinsch et al., 1992; Shumway-Cook et al., 2007; Sjosten et al., 2007; Steinberg, Cartwright, Peel, & Williams, 2000); one study on falls and fear of falling (Huang et al., 2011); one study on physical activity and fear of falling (Zidén, Häggbloom-Kronlöf, Gustafsson, Lundin-Olsson, & Dahlin-Ivanoff, 2014); and another study on preventive behaviours related to falls, fear of falling and fall self-efficacy (Jeon, Jeong, Petrofsky, Lee, & Yim, 2014). The interventions are described briefly in **Table 4.6**.

Table 4.6 : The effects of nested FPEIs in multifactorial fall prevention interventions on falls, fear of falls, fall self-efficacy and change in behaviours

Author/ year	Setting	Study participants	Study design	Intervention	Education content	Outcomes
1. Hornbrook et al., 1994	➤ Portland, Oregon/ Vancouver Washington	➤ ≥ 65 ➤ Total participants: 1611	➤ RCTs ➤ Control receive advice on home safety but no advice on repair ➤ 24 months	➤ 4 classes weekly, for 90 minutes. ➤ Group meetings (10 to 25 participants). ➤ Coached by health behaviourist and a physical therapist. ➤ Using slide presentations. ➤ Discussions in small group meeting on participants' fall prevention accomplishments in the past week and their plans for action in the next week. ➤ 20 minutes supervised walking 3 times per week. ➤ Home risk assessment and financial and technical aids were offered for any modification. ➤ Safety booklet on household fall hazards. ➤ Follow-ups every three months (contact participants by mail and telephone calls) for 2 years' post-randomisation.	Slide presentation + safety booklet + 90 minutes/weekly/4 classes + Group (10-25) + By health behaviourist & physical therapist	Activity participation: ➤ 60.5% attended more than 3 classes. ➤ 62% received financial assistance for home repair. Fall incidence rate ➤ Fall rates per 1000 person-years 16% lower in the intervention group (p=0.85), self-reported fall 4% lower, medical care 6.8% lower and hospitalisation fall 4.2% lower.

Table 4.6, Continued, The effects of nested FPEIs in multifactorial fall prevention interventions on falls, fear of fall, fall self-efficacy and change in behaviours

2. Huang et al., 2010	➤ Taiwan	➤ ≥ 65	<ul style="list-style-type: none"> ➤ A randomised case-controlled design with a two-by-two factorial approach. ➤ Three intervention groups and one control group. ➤ Comparing pre- and post-intervention outcome. ➤ 5 months 	<ul style="list-style-type: none"> ➤ Three intervention groups and one control group: education, Tai Chi, education and Tai Chi and control. ➤ Education by two senior nurses. The education was on falls risk factors, fall preventions, discussions. ➤ The education was delivered using videos and photos. ➤ Five teaching sessions over five months. ➤ First 10 minutes of each class was given to revision of the previous session. The final lecture summarised the entire education programme. ➤ Tai Chi Chuan was taught 3 times per week and for 40 minutes every morning by trained coaches. ➤ Follow-up after 1.5 years 	<p>Videos & photos + 5 classes/5 months + Group + By Senior nurses</p>	<ul style="list-style-type: none"> ➤ The score for risk factors after five months decreased significantly (p<0.05). ➤ The number of falls did not significantly reduce for education group after 5 months. ➤ All groups except for control had significantly reduced falls after 1.5 years' follow-ups.
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Table 4.6, Continued, The effects of nested FPEIs in multifactorial fall prevention interventions on falls, fear of fall, fall self-efficacy and change in behaviours

3. Huang et al., 2011	➤ Yi-Lan county, North-eastern Taiwan of	➤ ≥60 ➤ fulfil requirement in SPMSQ >6 ➤ mandarin	➤ A prospective randomised controlled trial ➤ Control receive no intervention	➤ Three groups: Control, cognitive-behavioural strategy (CB), and cognitive behavioural strategy with Tai Chi (CBT). ➤ The intervention groups received brochures. ➤ CB: Introduction; older person view on fear of falling (FOF); positive and negative aspects concerning FOF; associations with falls and FOF; implementation in the older persons' daily life. ➤ 8 weekly sessions (60 – 90 minutes) ➤ In a group (8 – 12 participants) ➤ Conducted by a trained nurse qualified in geriatrics and community health nursing. ➤ CBT: CB strategies with Tai chi ➤ In a group (10 – 16) ➤ 5 times a week for 8 weeks	Brochure + 60-90 minutes/ weekly/ 8 classes + Group (8-12) + By trained nurses	➤ FOF significantly reduced in CB group (P<0.01). ➤ FES significantly improved (P<0.001). ➤ Falls not significantly reduced (p>0.05). ➤ Social support and satisfaction were significantly different (P<0.001).
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Table 4.6, Continued, The effects of nested FPEIs in multifactorial fall prevention interventions on falls, fear of fall, fall self-efficacy and change in behaviours.

4. Jeon et al., 2014	<ul style="list-style-type: none"> ➤ Public health centre, rural areas of B-gun, Korea 	<ul style="list-style-type: none"> ➤ ≥ 65 ➤ older women ➤ 3 falls during the previous years (recurrent falls) 	<ul style="list-style-type: none"> ➤ Pre- and post-interventions ➤ Experimental (31) and control group (31) 	<ul style="list-style-type: none"> ➤ 12 weeks of intervention ➤ Each week contains 1 education session and 3 exercise sessions (80 minutes). ➤ The education session was information on falls (fall definition, causes of falls, consequences of falling, prevention of falls and health seeking behaviours). ➤ Group education sessions through videos and PowerPoint presentations. ➤ The exercise is based on Korean traditional dances. 	<p>Videos & PowerPoint presentations + 20 minutes/weekly/ 12 weeks + Group</p>	<ul style="list-style-type: none"> ➤ Compliance fall preventive behaviours, fall efficacy and fear of falls statistically significant with control group ($p < 0.001$).
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Table 4.6, Continued, The effects of nested FPEIs in multifactorial fall prevention interventions on falls, fear of fall, fall self-efficacy and change in behaviours.

5. Lee et al., 2013	➤ Urban cities in Taiwan	➤ ≥ 65 ➤ Encounter one or recurrent falls in the previous years	➤ Prospective, multicentre RCTs ➤ 313 (intervention group) and 303 (control group)	➤ Intervention group received exercise, health education, home modification advice, medication review and medical referral. ➤ Exercise: 50-60 minutes for 8 weeks on home exercise by physiotherapist using illustrated exercise brochure. ➤ Health education: four structured health education classes with brochure covered on fall risk, fall prevention strategies and home hazard modifications. ➤ Control only received health education brochure, medication review and medical referral. ➤ 12 months' follow-ups	Brochure + 4 classes/	➤ There was no significant difference in the rate of falls ($p=0.692$).
6. Lord et al., 2005	➤ Northern Sydney, Australia	➤ ≥ 75	➤ RCTs	➤ 12 months' extensive individualised intervention comprising exercise, strategies to maximise vision and sensation counselling. ➤ Minimal intervention group: brief advice on fall risks and recommendation for fall prevention, instruction sheet for home exercises, written advice on vision improvement.	Brief advice + recommendation + written advice	➤ There was no significant difference in fall reduction between the groups ($P>0.05$).

Table 4.6, Continued, The effects of nested FPEIs in multifactorial fall prevention interventions on falls, fear of fall, fall self-efficacy and change in behaviours.

7. Reinsch et al., 1992	➤ Senior centres at Orange County and Los Angeles	➤ ≥70 years ➤ 230 people living independently	➤ Cluster RCTs ➤ Four interventions (exercise, cognitive behavioural, exercise-cognitive, and discussion control)	➤ Cognitive behavioural intervention: 1 hour, weekly for 1 year. ➤ The 1 hour meeting covered health and safety curriculum to prevent falls, relaxation training to lower tension and fear, and videogame playing to improve reaction time. ➤ Discussion control group: Health and discussion topics mildly related to fall prevention. ➤ Monitoring falls and injury through phone calls.	Discussions & video games + 1 hours/weekly/ 1 year	➤ No significant differences in the number of falls (p=0.53).
8. Shumway-Cook et al., 2007	➤ Spokane and Pierce County, Washington	➤ ≥65	➤ RCTs	➤ Intervention groups were given exercise class 1 hour, three times a week for 12 months. ➤ Education class on fall information for 1 hour in a month was conducted by nurses. ➤ The control group received two booklets related to fall prevention.	1 hour/month + nurses	➤ There is no significant difference in fall reduction between the groups (P=0.68).

Multifaceted FPEIs

Five studies were included in the analysis to determine the effect of multifaceted FPEIs on falls, knowledge, self-efficacy and behavioural change. The multifaceted FPEIs used diverse content and formats in the intervention arm. One study evaluated the effect of multifaceted FPEI on falls (Robson, Edwards, Gallagher, & Baker, 2003); three studies evaluated behavioural change (Dapp et al., 2005; Dapp et al., 2011; Harari et al., 2008; Robson et al., 2003); one study evaluated knowledge (Hakim et al., 2007). The details of these studies are described in **Table 4.7**.

Table 4.7 : The effects of multifaceted FPEIs on falls, knowledge and change in behaviours

Author/year	Settings	Study participants	Study design	Intervention	Education content	Outcomes
1. Dapp et al 2005	➤ Albertinen-Haus Geriatric center, Germany	➤ Older person aged 60 and above	➤ Pre- and post-intervention	<ul style="list-style-type: none"> ➤ Slide presentation on information important for successful ageing (healthy ageing, active social participation and physical activity). ➤ Provided by trained (7 days) interdisciplinary team (geriatrician, nutrition specialist, physiotherapist, and social worker). ➤ 12 participants in a group session. ➤ Half-day programme, and received brochure on healthy living. ➤ After 14 days received letter of recommendation for nutrition and physical activities. ➤ Follow-ups at 6 months (successes and failure and further recommendations and took part in workshop on healthy living). 	<p>Trained interdisciplinary team + group (12) + Single half-day + 14th day received written information</p>	<ul style="list-style-type: none"> ➤ High level of acceptance for advice programme (p<0.05). ➤ Professional knowledge of the advisors in the interdisciplinary team received positive rating. ➤ Positive behavioural changes.

Table 4.7, Continued, The effects of multifaceted FPEIs on falls, knowledge and change in behaviours

2. Dapp et al., 2011	➤ Humburg, Germany	➤ Independent older persons above 60 years	➤ RCTs	<ul style="list-style-type: none"> ➤ GPs' training: bimonthly, 2 hour sessions by an experienced geriatrician. The training especially emphasised reinforcement using group sessions and home visits. ➤ HRA-O distributed to the intervention older persons. Older persons responded to their GPs by emailing the HRA-O. ➤ GPs received the report generated based on HRA-O identified risk factors. ➤ Patients encouraged discussing the report with their GPs. ➤ GPs and patients decide on ways to address the raised issues. ➤ Follow up at 6 months. ➤ Follow up after 6 months. ➤ Control group: usual care with trained GPs. ➤ Comparison group: usual care without trained GPs. 	<p>HRA-O + encouragement & discussion with GPs + Reinforcement</p>	➤ Preventive care measure at 1 year's follow-up were significant among those in intervention group (p<0.001).
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Table 4.7, Continued, The effects of multifaceted FPEIs on falls, knowledge and change in behaviours

3. Hakim et al., 2007	<ul style="list-style-type: none"> ➤ Senior centres in Scranton, Pennsylvania 	<ul style="list-style-type: none"> ➤ ≥ 60 ➤ 69 community-dwelling older adults ➤ Mean age 64.8 	<ul style="list-style-type: none"> ➤ Pre-test and post-test design 	<ul style="list-style-type: none"> ➤ Pamphlet only (PO), the PO group was given pamphlets with written explanations on fall risk factors and methods to improve home safety, perform proper body mechanics, and change personal habits to reduce fall risks. ➤ Class and pamphlets (Rockwood et al.): attended a single one-hour fall risk education class that covered the same topics as the pamphlets, but with greater detail. ➤ CP group watched a video titled Fear of Falling: A Matter of Balance to hear the opinions of other older adult peers who made modifications to decrease fall risks. ➤ The subjects were able to interact with the instructors and asked questions during the class. 	<p>Class & videos + pamphlets Single one hour class + interactions with instructors</p>	<ul style="list-style-type: none"> ➤ Subjects injured by past falls (n=22) were significantly (p=0.04) more likely to report changes than those who had not fallen or were not injured by a fall. ➤ No significant difference in knowledge of fall risk factors based on pre- to post-test scores between the 2 groups (p=0.32).
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Table 4.7, Continued, The effects of multifaceted FPEIs on falls, knowledge and change in behaviours

4. Harari et al., 2008	<ul style="list-style-type: none"> ➤ Primary care practices, London 	<ul style="list-style-type: none"> ➤ Community-dwelling older persons aged 65 years and above ➤ 2,006 (intervention = 940; control = 1066) 	<ul style="list-style-type: none"> ➤ RCTs ➤ Total of four practices were randomised ➤ Three (18GPs) (intervention) ➤ One (control-usual care) 	<ul style="list-style-type: none"> ➤ Intervention participants were mailed Distributed Health Risk Appraisal for Older Persons (HRA-O). ➤ Responses were keyed in and interfaced with the HRA-O decision support software, which generated an individualised written feedback, both to patients and their GPs. ➤ The feedback to GPs was on reinforcement. ➤ HRA-O feedback entered into pt electronic record. ➤ Identified risks were incorporated as reminder in the electronic pt record. ➤ HRA-O identified issues addressed based on GPs and pts convenient as the IT intervention purpose was to seek the impact of the intervention when embedded within routine clinical practice. ➤ GPs and practices involved 2 hour training session. 	<p>HRA-O + encouragement & discussion with GPs</p>	<ul style="list-style-type: none"> ➤ No significant differences were observed for any health behaviours or preventive care measures at 1 year's follow-ups. (P>0.05)
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Table 4.7, Continued, The effects of multifaceted FPEIs on falls, knowledge and change in behaviours

5. Robson et al., 2003	➤ Edmonton area and Alberta	<ul style="list-style-type: none"> ➤ ≥65 ➤ Community living older persons with average age of 73 (40 % more than 75 years old) 	<ul style="list-style-type: none"> ➤ RCTs ➤ Pre- and post-test design 	<ul style="list-style-type: none"> ➤ SAYGO programme ➤ Conducted by 7 retired health professionals. ➤ 90 minute group session, 2 sessions ➤ 1st session: the clients were given the client handbook (assessment on risk factors and ways to reduce the risk factors by themselves). And also a fitness video (balance and leg strength using a combination of Tai Chi and other exercises related to legs and balance strength). ➤ Begin the risk assessment using guidance from facilitators themselves and risks at home. Implement strategies to reduce risks of falls by using the handbook or own ideas. ➤ 2nd session: shared the changes that they had made and reported community hazards. ➤ 1 month post and end of the study (4 months) 	90 minutes/ 2 sessions + 7 retired health professionals Handbook + fitness video + Sharing the changes	<ul style="list-style-type: none"> ➤ Had significant reduction in risk of falling (8/9) (p<0.05). ➤ Number of falls reported in the treatment group was 17% while 23% in the control group.
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Single FPEIs

Four studies were included in the analysis to determine the effects of single FPEI on falls, knowledge and mobility. The single FPEI was evaluated in one particular fall prevention activity in the intervention arm. Two studies evaluated the effects of single FPEI on falls (Assantachai et al., 2002; Ryan & Spellbring, 1996); one study on knowledge (Sweeney & Chiriboga, 2003); another study on mobility (Smith-Ray, Makowski-Woidan, & Hughes, 2014). The details of the studies are described in **Table 4.8.**

Table 4.8 : The effects of single FPEIs on falls, knowledge and behavioural change

Author/year	Settings	Study participants	Study design	Intervention	education content	Outcomes
1.Assantachai et al., 2002	➤ Siriraj Hospital Medical School, Bangkok, Thailand	<ul style="list-style-type: none"> ➤ Older person aged above 65 years ➤ Total of 1043 older person subjects ➤ 585 in study group and 458 in control group 	➤ longitudinal follow-up study	<ul style="list-style-type: none"> ➤ Study group received leaflets containing osteoporosis and falls, nutritional intake, activity of daily living, hypertension, special sense function, cognitive problem. ➤ Free access to geriatric clinic for any health problem. ➤ All participants received postcard to inquire about falls or phone calls every two months for 1 year. 	Leaflets	<ul style="list-style-type: none"> ➤ 6.6% fall incidence in the study group. ➤ 10.1% in the control group. ➤ There is significant decrease in falls in the study group ($p < 0.0001$).
2.Ryan & Spellbring, 1996	➤ Resides in large metropolitan city and a rural setting	➤ Older women living in the community aged 65 and older (67 – 90 years)	<ul style="list-style-type: none"> ➤ RCTs ➤ Randomised into two intervention groups and one control group (each group contains 15 participants) 	<ul style="list-style-type: none"> ➤ Two intervention groups (education in a small group (7-8 persons) vs individual sessions ➤ Duration: One hour ➤ Safe devices and equipment were presented during the presentation. ➤ Telephone call monthly for three months (post-intervention). 	1 hour class + Group vs individual	<ul style="list-style-type: none"> ➤ The group (27) vs individual (14) made changes. ➤ Group had less falls (1), individual (3) and control (6).

Table 4.8, Continued, The effects of single FPEIs on falls, knowledge and behavioural change (continued)

3. Sweeney et al., 2003	➤ Galveston County Senior Citizens Centre.	➤ Older adults above 55 years who attended the Galveston County Multipurpose Senior Centre	➤ Pre- and post-test intervention	<ul style="list-style-type: none"> ➤ A multimedia-based CD-ROM entitled Making Homes Safe for Seniors ➤ Computer-generated safety messages were narrated whenever an object with an active touch point was selected. ➤ Two sessions for each senior, and they were allowed to use as much time as possible. ➤ Subjects were offered to study 3 booklets in the traditional learning group. 	CD-ROM + 2 sessions	➤ CD-ROM group increased significantly in their knowledge score from pre-test to post-test ($P<0.05$).
4. Smith-Ray et al., 2014	➤ Community centre, Chicago, USA	<ul style="list-style-type: none"> ➤ Black older adults of 65 years or older ➤ 1 self-reported fall in the last two years ➤ Intervention (23) and control (22) 	<ul style="list-style-type: none"> ➤ RCTs ➤ Pre- and post-intervention measurement 	<ul style="list-style-type: none"> ➤ 10 weeks' Computer based-cognitive training programme ➤ Classroom format (group session) ➤ 60 minutes per session, two times per week 	Computer-based cognitive training + Group + 60 minutes/twice weekly	➤ Mobility (Balance and gait) had significantly improved ($p=0.038$ and $p=0.016$).

FPEIs supported by theories

Three studies were extracted to determine the effects of supporting FPEIs with theories on falls, self-efficacy, and behavioural change.

All the studies included FPEIs with different theories as one of the intervention arms. One study evaluated the effects of FPEI supported by a theory on self-efficacy (Cheal & Clemson, 2001); one study on falls (Clemson et al., 2004); another study on behavioural change (DiGuseppi et al., 2014). The details of the studies are illustrated in **Table 4.9**.

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Table 4.9 : The effects of FPEIs supported by theories on falls, knowledge and behavioural change

Author/year	Settings	Study participants	Study design	Intervention	education content/format	Outcomes
1. Cheal & Clemson, 2001	➤ St Joseph's hospital in Auburn (a rehabilitation hospital), Australia	<ul style="list-style-type: none"> ➤ Older person aged above 65 years ➤ Total 8 (5 men; 2 women) 	<ul style="list-style-type: none"> ➤ A pre- and post-intervention programme ➤ Qualitative in-depth interviews 2 weeks prior ➤ Post-interview 4 weeks after 	<ul style="list-style-type: none"> ➤ The 'Steady As You Go' ➤ Sessions 1, 2, 6 provide information and demonstrate how to modify falls risks ➤ Sessions 3, 4, 5 give opportunity to apply the learning from Sessions 1 & 2 ➤ Session 6: age peer to provide a positive role model regarding recovery from a fall ➤ Sessions 1,2, 6: multidisciplinary presenters ➤ 2 hours once a week for six weeks ➤ Aged-care occupational therapist coordinated the programme ➤ Have incorporated self-efficacy theory of Social Cognitive Theory 	2 hours/weekly/ 6 weeks + By Peer presenter + By Multidisciplinary presenter + Self-efficacy theory	<ul style="list-style-type: none"> ➤ Self-efficacy, confidence, life satisfaction, activity participation and managing risk in fall-risk situation had increased (narrative review).

Table 4.9, Continued, The effects of FPEIs supported by theories on falls, knowledge and behavioural change

2. Clemson et al., 2004	➤ Australia	<ul style="list-style-type: none"> ➤ Aged 70 and older ➤ who had a fall in the previous 12 months and were concerned about falling ➤ 12 participants in each group ➤ 310 community residents ➤ Intervention group (n=141) 	<ul style="list-style-type: none"> ➤ A randomised trial multifaceted community-based programme using a small-group learning environment 	<ul style="list-style-type: none"> ➤ ‘Stepping On’ used a decision-making theory, adult learning principles and Bandura’s Social Cognitive Theory ➤ Demonstration of factors that contribute to risk, behaviours on reducing risk and reinforcing application, storytelling, mastery experiences & group process as a learning environment ➤ Occupational therapist ➤ Reflection and sharing after each session and planning action and homework for the next week ➤ A booster session, conducted 3 months after session seven, lasting 1.5 hours ➤ Total of 15.5 hours’ intervention constituting seven 2-hour programme sessions and follow-ups after 14 months 	2 hours/weekly/7 weeks + Demonstration + By Occupational therapist + Reflecting, sharing & planning action + Booster session + Bandura’s Social Cognitive Theory	<ul style="list-style-type: none"> ➤ 31% reduction in falls in the intervention group ➤ Used more protective behaviours (p=0.024) ➤ 41 – 59% adherence for conducting exercise in the intervention group
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Table 4.9, Continued, The effects of FPEIs supported by theories on falls, knowledge and behavioural change

3. DiGuseppi et al., 2014	➤ Colorado, USA	➤ Aged 60 and older	<ul style="list-style-type: none"> ➤ A clustered design: social marketing programme ➤ 25 control churches ➤ 26 receiving the social marketing programme 	<ul style="list-style-type: none"> ➤ Incorporate behavioural change theory ➤ The social marketing programme emphasised staying independent and building social relationships ➤ Monetary, emotional and psychological and time cost were addressed by emphasising a safe, comfortable atmosphere in the marketing material; demonstrating classes through video; offering classes at preferred schedule, coordinated through the marketing programme and subsidising the course fee. Providing classes at local recreation facilities and churches. ➤ Delivered to a group of 10 individuals for 8 weeks 	<p>Video + Written material + Group (10) + Once weekly/8 weeks + Behaviour change theory</p>	<ul style="list-style-type: none"> ➤ Those older congregants from church who received social marketing programme significantly want to join the balance classes ($p < 0.0001$).
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Tailored FPEIs

Four studies were included in the analysis to determine the effects of tailored FPEIs on behavioural change and knowledge. The tailored FPEIs were the ones provided based on fall risks assessment in the intervention arm. Two studies evaluated the effects of tailored FPEIs on behavioural change (Gopaul & Connelly, 2012; Salonoja et al., 2010; Yardley & Nyman, 2007); and one study evaluated the behavioural change and knowledge (Schepens et al., 2011). The study details are illustrated in **Table 4.10**.

Table 4.10 : The effects of Tailored FPEIs on falls, knowledge and behavioural change

Author/ year	Settings	Study participants	Study design	Intervention	Education content	outcome
1. Gopaul & Connelly, 2012	➤ Canada	<ul style="list-style-type: none"> ➤ 8 participants (6 women and 2 men) ➤ Age ranged from 61–92 years 	<ul style="list-style-type: none"> ➤ Serial case study ➤ Pre- and post-intervention with qualitative interviews and quantitative measures 	<ul style="list-style-type: none"> ➤ Photographs of rooms in their own homes with environmental hazards circled and identified as fall risks ➤ A booklet comprising a home safety checklist for fall prevention ➤ An individualised report of his/her scores for the three questionnaires and three fall-related outcome measures ➤ Visits 1 and 3 one-on-one 60-min semi-structured interviews 	Booklets with home photographs + Discussion about the hazards	<ul style="list-style-type: none"> ➤ Increased protective behaviour against falling (0/22- 13/22), self-efficacy improved compared with the baseline.

Table 4.10, Continued, The effects of Tailored FPEIs on falls, knowledge and behavioural change

2. Schepkens et al., 2011	<ul style="list-style-type: none"> ➤ Participants' home or mobility Research Laboratory at Wyne State University 	<ul style="list-style-type: none"> ➤ Aged ≥ 65 ➤ English speaking, normal vision and hearing; community dwelling 	<ul style="list-style-type: none"> ➤ Three-group randomised controlled trial ➤ Authenticity group: education tailored by displaying individualised vignettes based on lifestyle ➤ Motivation group: highlight programme goals and benefits using handouts with displaying the individualised vignettes ➤ Control group did not receive any education 	<ul style="list-style-type: none"> ➤ The intervention based on principles of ecological psychology, older adult learner characteristics, authentic learning concepts. ➤ Multimedia fall prevention (MFP) clips and vignettes based on participants' lifestyle. ➤ MFP displayed using headset in a quiet room. ➤ The participants viewing 5 pairs of vignettes. ➤ Pre-test a single, 30 minutes ➤ Conducted by an occupational therapist ➤ The PI and the participants discussed the multimedia content and verbally identified fall threats ➤ Novel video clips used for pre-testing and post-testing 	<p>Multimedia fall prevention programme + A single 30 minutes + Occupational therapy</p>	<ul style="list-style-type: none"> ➤ The motivation group engaged 94% new fall prevention behaviours. ➤ Knowledge improvement in both group interventions did not significantly differ ($p > 0.05$).
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Table 4.10, Continued, The effects of Tailored FPEIs on falls, knowledge and behavioural change

3. Salonoja et al., 2010	➤ Pori, Finland	➤ Older person aged above 65 years, sum score for MMSE ≥ 17 and living independently and had one or more falls in the past 12 months	➤ A randomised controlled multifactorial trial	<ul style="list-style-type: none"> ➤ Interview about the type, use of those drugs, diagnosed diseases. ➤ Based on interviews. the geriatrician assessed each drug and proposed necessary changes. ➤ Plans, needs and practical instruction related to the changes were discussed with each participant. ➤ 1 hour lecture about adverse effect of psychotropic and other strong anticholinergics (FRID), and counselling. ➤ The control group received one hour counselling session about prevention of falls. ➤ Baseline and after 12 months post-intervention. 	Tailored plan on the use of drugs + Geriatrician + 1 hour lecture	➤ The number of regular and irregular use of BZD decreased significantly by 35 % (P= 0.012).
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Table 4.10, Continued, The effects of Tailored FPEIs on falls, knowledge and behavioural change

4. Yardley & Nyman, 2007	➤ Southampton, UK	➤ Older person above 65 years who entered the website more than once	➤ A randomised controlled trial: evaluated tailored and non-tailored advice were compared using between-subject design	<p>➤ Website design: first explained the balance training and the benefits.</p> <p>➤ Tailored pages: consisted of questions used to tailor the advice</p> <ul style="list-style-type: none"> ○ Self-rated balance ○ Preferences of where to conduct the activities ○ Suitable activities ○ How these could improve balance <p>➤ SBT exercises recommended to all levels of self-reported balance, but presented differently to the level of strenuous of the participants.</p> <p>➤ Participants then selected the recommended activity.</p> <p>➤ Final part consisted benefits for each kind of activity to balance improvement.</p> <p>➤ Control pages: presented all of the balance activities.</p>	Tailored advice on balance problem	<p>➤ The tailored group expressed stronger intention to do recommended activities than the control group.</p> <p>➤ They found the advice more personally relevant and had great confidence that they could carry it out.</p>
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4.2.3 Primary outcomes

4.2.3.1 Falls

Eleven studies tested the effects of FPEIs as part of a multifactorial fall prevention interventions on falls (Hornbrook et al., 1994; Huang et al., 2010; Huang et al., 2011; Jeon et al., 2014; Lee et al., 2013; Lord et al., 2005; Reinsch et al., 1992; Shumway-Cook et al., 2007; Sjosten et al., 2007; Steinberg et al., 2000; Zidén et al., 2014). Eight studies showed no significant effect of FPEIs on falls; one study that evaluated the effects of FPEI in a combination with Tai Chi exercise showed a significant fall reduction among older community dwellers (Huang et al., 2010); in another study, the effects of FPEI delivered by occupational therapist, physical therapist, nurse and social worker during a home visit showed a significant fall reduction among the older participants.

Five studies evaluated the effects of multiple FPEIs on falls and other secondary outcomes (Dapp et al., 2005; Dapp et al., 2011; Hakim et al., 2007; Harari et al., 2008; Robson et al., 2003). However, the study participants, who received multiple FPEIs delivered by retired HCPs in group sessions for 90 minutes, one month apart, showed a significant reduction in falls (Robson et al., 2003).

Out of four studies, two studies evaluated the effects of single FPEIs on falls (Assantachai et al., 2002; Ryan & Spellbring, 1996); in one study, the FPEI delivered via leaflets showed a significant reduction in falls (Assantachai et al., 2002); while in another study, the FPEI delivered in a group showed a significant fall reduction compared with the effect of FPEI delivered to individual older women (Ryan & Spellbring, 1996).

Among three studies that evaluated the effects of FPEIs supported by theories, one study focused on falls (Clemson et al., 2004); the older participants, in the intervention arm that received the FPEI supported by Bandura's self-efficacy theory, showed a significant reduction in falls.

Overall, 15 out of 26 studies evaluated the effects of various FPEI designs on falls. The effects of FPEIs nested in multifactorial fall prevention interventions on intervention falls rate were evaluated, and compared with those of FPEIs in other designs. The nested FPEI, in the combination of Tai Chi exercise and home visits by inter-professionals, triggered a significant fall reduction in two studies. Furthermore, The FPEIs' long-term follow-ups of one to two years were also found effective in reducing falls among the older participants (Clemson et al., 2004; Robson et al., 2003; Zidén et al., 2014).

4.2.4 Secondary outcomes

Knowledge

Three studies evaluated the effects of FPEIs on knowledge (Hakim et al., 2007; Schepens et al., 2011; Sweeney & Chiriboga, 2003). Two studies showed significant knowledge improvement due to the effect of intervention designs; one study evaluated the effects of a single FPEI consisting of CD ROM learning, compared with the control group who read a booklet (Sweeney & Chiriboga, 2003). In another study, tailored multimedia-based learning was evaluated for knowledge improvement among the older participants in one month (Schepens et al., 2011). However, a single one-hour class covered the same topics as those in the pamphlets on knowledge yielded no significant results compared with those who received only the pamphlets (Hakim et al., 2007).

This indicates that FPEI delivery using CD ROM and multimedia benefited older persons in knowledge acquisition.

Behavioural change

A total of fifteen studies evaluated the effects of various FPEI designs on behavioural change: four studies tested the effects of nested FPEIs (Hornbrook et al., 1994; T. Huang et al., 2011; Jeon et al., 2014; Zidén et al., 2014); four studies the effects of multiple FPEIs (Dapp et al., 2005; Dapp et al., 2011; Hakim et al., 2007; Harari et al., 2008); one study the effects of a single FPEI (Ryan & Spellbring, 1996); two studies the effects of FPEIs supported by theories (Clemson et al., 2004; DiGuseppi et al., 2014); and four studies the effects of tailored FPEIs (Gopaul & Connelly, 2012; Salonoja et al., 2010; Schepens et al., 2011; Yardley & Nyman, 2007). Overall, the studies reported some changes in the behaviours in terms of an increase in protective behaviours against falling. However, one study reported no significant changes in health behaviours / preventive care among the intervention participants in a one year follow-up (Harari et al., 2008).

Nine studies evaluated the effects of FPEIs on behavioural change, delivered by FPEIs in a combination of small group (e.g. 7-8 people), healthcare professionals (e.g. nurse, occupational therapist, physical therapist, social worker and geriatrician), and using computer-based learning (e.g. PowerPoint presentation, multimedia, and video) (Clemson et al., 2004; Dapp et al., 2005; DiGuseppi et al., 2014; Gopaul & Connelly, 2012; Hakim et al., 2007; Hornbrook et al., 1994; Huang et al., 2011; Jeon et al., 2014; Zidén et al., 2014). In one study, it was found that the physical therapist encouraged the older church members to enrol in the balance class (DiGuseppi et al., 2014). In another study, it was reported that the older individuals withdrew or reduced the dose of culprit drugs after attending consultations and lectures by the geriatricians (Salonoja et al.,

2010). In another tailored FPEI, it was found that the older participants diligently removed home hazards after the interviews and recommendations from an occupational therapist, who used photographs to point out fall hazards found in their houses (Gopaul & Connelly, 2012).

Self-efficacy

Four studies evaluated the effects of FPEIs on fall self-efficacy (Cheal & Clemson, 2001; Gopaul & Connelly, 2012; Huang et al., 2011; Jeon et al., 2014). Two studies that evaluated nested FPEIs found a significant impact on self-efficacy; one study evaluated an FPEI incorporated with Korean dance (Jeon et al., 2014); another study evaluated an FPEI incorporated with Tai Chi exercise (Huang et al., 2011). On the other hand, one study evaluated the effects of an FPEI supported by a theory on self-efficacy, using before and after narrative reviews; the study evaluated and reported that the FPEI, delivered through peers, HCPs and practical means using public transportation, improved 'confidence', 'life satisfaction', physical activity participation, and 'hazards removal' among study participants, compared with the state of the pre-intervention interviews (Cheal & Clemson, 2001). Out of four studies, only one study incorporated a theory to support the FPEI's impact on self-efficacy (Cheal & Clemson, 2001). The other studies incorporated exercises and tailored home visit to give an impact on self-efficacy.

Fear of falling

Only two studies evaluated the effects of FPEIs on fear of falling (Huang et al., 2011; Jeon et al., 2014). The two studies found a significant reduction in fear of falling among older participants.

4.2.5 Incorporating the evidence into the FPEI

Information about the effects of various designs, content and format of FPEIs on falls, knowledge, behavioural change, fall self-efficacy and fear of falling, formed the evidence to be incorporated into the development of the FPEI. Although falls are the primary outcome for most of the FPEIs, many studies achieved insignificant results in fall reduction. Hence, behavioural change and knowledge acquisition outcomes found significant in most of the studies, were determined as a primary outcome of this study.

Behavioural change initiation and knowledge acquisition were common factors lacking in older people who wanted to take up fall prevention interventions. It was not a matter whether the older participants would change their behaviours or gain knowledge, but rather the factors that would trigger the process of behavioural change and knowledge acquisition. Therefore, the evaluations were conducted using qualitative interviews rather than using absolute numbers or proportions.

One important matter to be dealt with in the FPEIs is to present the outcomes in an understandable manner. The education content presented should have a balance of information and readability. In preparing the evidence for the development of the FPEI, the FPEI designs consist of nested, multifaceted, single, theory-based and tailored selected evidences based on the effectiveness of outcomes. Although the number of studies based on multifaceted and theory-based FPEIs was smaller compared with the

nested FPEIs, they reported effective behavioural change and knowledge acquisition among older persons compared with other types of studies.

Summary and conclusion

This section on searching, selecting and synthesising the evidence describes the process of literature searching, evidence synthesis and information preparation for the development of the FPEI. This is a crucial step in the development of the FPEI to provide justified, understandable information to older persons so that they can take up an informed fall prevention interventions.

The search reveals no systematic review, or RCT comparing nested FPEIs, multifaceted FPEIs, theory-based FPEIs and tailored FPEIs with single FPEI alone. Therefore, information was extracted from cohort studies or single treatment arms of RCT to determine the effects of single FPEI, nested FPEIs, multifaceted FPEIs, theory-based FPEIs and tailored FPEIs on falls, knowledge acquisition, behavioural change, self-efficacy and fear of falling. The evidences were then summarised in the form of education content and delivery before incorporating them into the development of the FPEI.

4.3 Drafting the FPEI

The next process involves the drafting of the FPEI based on the findings from the needs assessment study, evidences, theories and clinical practice guidelines (CPG). The findings from the needs assessment study and evidences form the basis of the content development, based on what the users want. The CPG provides the evidence information on the content. The flow of the drafting, pilot testing, reviewing, and revising of the FPEI are as illustrated in **Figure 4.2**.

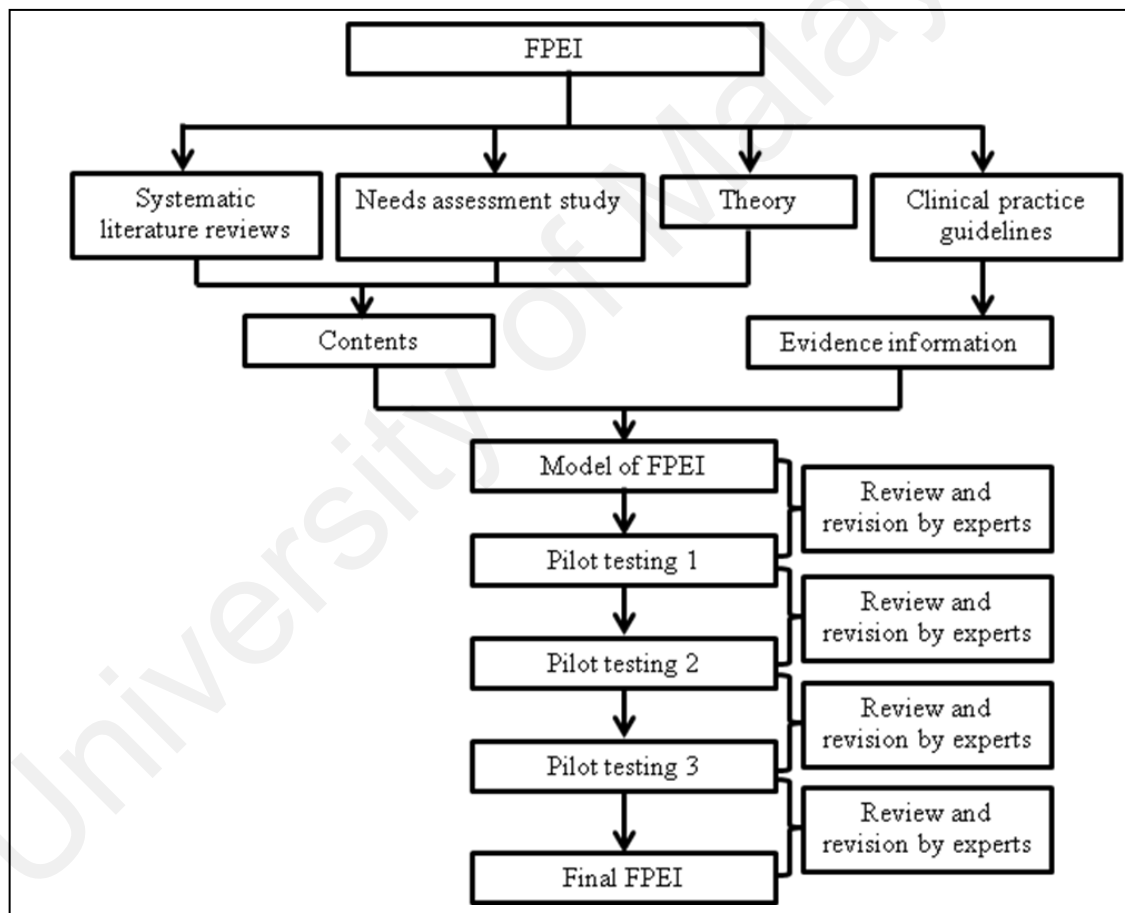


Figure 4.2: A flow diagram on the development and pilot testing of the FPEI

The draft of the FPEI was first assessed by the older persons in a pilot test, their opinions were evaluated and the feedback was passed on to the review committee. Subsequently, a consensus about the content and format was reached at a review

committee meeting. Finally, the development committee proceeded with the amendments and produced a revised draft of the FPEI ready for the next pilot testing. Different older persons participated in each pilot testing. This iterative process was carried out three times until there were no further significant changes. The final FPEI was approved by the review committee.

Therefore, the drafting-reviewing-revising process involved for each pilot testing, the following steps are described in more detail:

- Drafting of the FPEI (content and format)
- Feedback from the older persons and HCPs (interviews and questionnaires)
- Review by the review committee and reaching a consensus
- Revision of the FPEI

The UKMRC guidelines were used as a framework for the development of this FPEI. The content of the FPEI was based on the findings from the older persons' and HCPs' needs assessment study, and evidences synthesised from systematic literature reviews. The **Table 4.11** depicts the key components of background and evidence-based information that informed the FPEI. The Bandura's Self-efficacy theory and Gerogogy principle were used to format the FPEI, which was then subjected to reviews and revisions to ensure acceptability and feasibility. This section explains how the FPEI content was formed through the needs assessment study, evidences, and theories. The FPEI is divided into two main sections:

- Content

This section aims to provide the older persons with essential information about falls, the risk factors and the range of prevention interventions, and the details were incorporated from evidences, theories and the needs assessment study findings.

Table 4.11 : The key components of background and evidence-based information that informed the FPEI (Faes et al., 2010)

Key components	Sources	The information included in the FPEI
Providing information about falls	<ul style="list-style-type: none"> • Selection of information to be included about falls <ul style="list-style-type: none"> • What participants want to know about falls? • What participants need to know about falls? • HCPs needs assessments study • Older persons needs assessments study • Expert consensus 	<p>Describe the fall epidemiology</p> <p>Define fall (Lamb, Jorstad-Stein, Hauer, & Becker, 2005)</p> <p>Describe fall risks and consequences (e.g. home hazards, environmental hazards, health problems) (Campbell et al., 1989; Campbell et al., 1990)</p> <p>Brief on fall prevention interventions (e.g. walking stick, home modification visit, proper footwear, vision check, medication review) (Kenny et al., 2011)</p> <p>Describe the intervention benefits</p>
Presenting probabilities of outcomes	<ul style="list-style-type: none"> • Behavioural change theory: Bandura's Social Cognitive Theory • Adult learning theory: Gerogogy principle 	<p>Use captured photographs of fall prevention options (e.g. Tai Chi in group, cycling, gardening)</p> <p>Use PowerPoint presentation (e.g. show photographs with short descriptions below the photographs)</p> <p>Healthcare professionals advice on healthy ageing life style (e.g. healthy eating, exercising, and socialising with family)</p> <p>Allow the older participants to give opinion about the pictures and be involved in sharing their experiences with peers in the group (e.g. own fall story, fall consequences, prevention options).</p> <p>Reviewing medication and planning on medication</p>

Table 4.11, Continued, The key components of background and evidence-based information that informed the FPEI (Faes et al., 2010)

<p>Clarifying older persons' perceptions and beliefs</p>	<ul style="list-style-type: none"> • Behavioural change theory: Bandura's Social Cognitive Theory • Adult learning theory: Gerogogy principle • Information was obtained from the participants' needs assessments study: what are their views and beliefs on falls? 	<p>Use captured photographs of fall risks (e.g. cluttered toys, uneven and slippery floor, polypharmacy and consequences of taking multiple medication)</p> <p>Inter-professional play role to describe the information: allow the older persons to visualise the risks in their home and surrounding (e.g. usage of umbrella, climbing on chair or take something from higher shelves, crossing road not using zebra crossing)</p> <p>Sharing other older persons' story about removing hazards in the surrounding and home; conducting exercise; being independent</p> <p>Measuring knowledge of understanding the fall risks and fall prevention options</p> <p>Allow the older persons themselves to report about their own fall experiences, make them realise that fall is preventable (e.g. benefit of reducing dose of medication, benefit of wearing proper shoes)</p>
<p>Guidance in deliberation and communication</p>	<ul style="list-style-type: none"> • Adult learning theory: Gerogogy principle 	<p>Providing information in a flexible way</p> <p>Having fun time learning</p> <p>Using PowerPoint presentation with animation, less words, and captured photographs (modern learning way)</p> <p>Encouraging the participants to discuss questions with their inter-professionals (e.g. one-to-one consultation)</p>

Table 4.11, Continued, The key components of background and evidence-based information that informed the FPEI (Faes et al., 2010)

Presenting intervention in a balanced manner	<ul style="list-style-type: none"> • HCPs and older persons' needs assessment study <ul style="list-style-type: none"> • What information to include • How much to include • How to present it 	<p>Presenting balanced information for each fall prevention option</p> <p>Photographs featuring equal detail and format for each information</p>
Using up-to-date Scientific evidence	<ul style="list-style-type: none"> • Systematic literature review 	<p>Providing contact details to contact senior centres</p> <p>Providing references for evidences used</p> <p>Providing range of effective prevention options, and helping the older persons choose a fall prevention activity based on evidence and their needs</p>
Use plain language	<ul style="list-style-type: none"> • Adult learning theory: Gerogogy principle 	<p>Simple language used at the level that can be understood (grade 8 according to readability score (SMOG))</p> <p>Assessing the readability using readability calculation, which include SMOG readability test</p> <p>Asking users to review the booklet</p> <p>Asking review committee to review the booklet</p> <p>Helping the older persons read and convey the message to older persons</p>

- Format

The **Table 4.12** depicts how older persons are guided through FPEI by the Bandura's Self-efficacy theory and Gerogogy principle. In the Bandura's self-efficacy theory, using four key concepts: mastery of experiences (i.e. knowledge shared with the inter-professionals); social modelling (i.e. sharing experiences with peers); social persuasion (encouragement and motivation by inter-professionals and peers); psychological responses (give examples and supported by photographs). These techniques were used to improve self-efficacy throughout the MuFE IT intervention. The Gerogogy principles formed the basis of FPEI in five main key areas: Diversity (can share their life experiences with peers); Usefulness (directly useable in the prevention of falls); Modernity (support the current evidence); Activeness and independence (opportunity to be active individuals in the study process).

Table 4.12 Older persons are guided through FPEI by the Bandura's self-efficacy theory and gerogogy principles

MuFE IT	PPT;	Booklet:	IT; auditing shoes, medication & assistive devices	Sharing experiences	Discussion with IT	Follow ups	
						Phone call – 1 month	FGD – 3 months
Bandura’s self efficacy theory							
Mastery experiences			√				
Social modelling				√			
Social persuasion					√	√	√
psychological responses	√	√					
Gerogogy principles							
Diversity				√			
Usefulness		√				√	√
Modernity	√						
Activeness and independence			√				

PPT: PowerPoint Presentation; IT: interprofessional team

4.3.1 Content

The organisation of the content of the FPEI is based on the evidence information and includes the following components as detailed in **Table 4.13**. These are the main ingredients of the content:

- *PowerPoint presentation* – it provides short sentences on the purpose of the FPEI and supported by photographs; it includes four key topics: ‘what are falls and the prevention ways?’, ‘How to move safely and prevent falls?’, ‘how to prescribe medication safely and prevent falls?’, ‘How to keep home and the environment safely, and mingle in the society?’
- *Booklet* – it provides brief content of the FPEI: six safe ways in preventing falls and supported by photographs; the Otago exercise programme; medication plan; activity calendar and senior social centre contacts.

Table 4.13: Integration of evidence into the FPEI content

Articles	Evidences	Outcomes	FPEI content
Dapp et al., 2005 & Dapp et al., 2011	<ul style="list-style-type: none"> ➤ PowerPoint Slide presentation ➤ Provided by trained (7 days) interdisciplinary team (geriatrician, nutrition specialist, physiotherapist, and social worker) ➤ Group sessions ➤ Half-day programme, ➤ Brochure on healthy living ➤ Follow-ups at 6 months 	<ul style="list-style-type: none"> - High acceptance among older people - Significant behaviour change 	<p>Single visit*</p> <p>PowerPoint Presentation*</p> <p>Inter-professional team*</p> <p>Group session*</p>
Clemson et al., 2004	<ul style="list-style-type: none"> - Use of adult learning principles and Bandura's Self-efficacy theory: ➤ The 'Stepping On' programme - 2 hours, weekly for 7 weeks - Demonstrated by Occupational therapist ➤ A pre- and post-intervention programme - Qualitative interviews 	<ul style="list-style-type: none"> - 31% reduction in falls - Used more protective behaviours (p=0.024) 	<p>Qualitative interviews*</p> <p>Theories*</p>
Gopaul et al., 2012	<ul style="list-style-type: none"> ➤ Photographs of rooms in their own homes with environmental hazards circled and identified as a fall risk ➤ A booklet comprising a home safety checklist for fall prevention 	<ul style="list-style-type: none"> - Increased protective behaviour against falling 	<p>Supported by Photographs*</p> <p>Booklet*</p>
Hakim et al., 2007	<ul style="list-style-type: none"> ➤ Class and pamphlets ➤ Attended a single one-hour fall risk education class that covered the same topics as the pamphlets, but with greater detail. ➤ Using knowledge checklist pre- and post-intervention 	<ul style="list-style-type: none"> -Percentage of knowledge improved 	<p>Knowledge checklist*</p> <p>Single visit*</p>
Jeon et al., 2014	<ul style="list-style-type: none"> - Group education sessions through video and PowerPoint presentations - 20 minutes, weekly, 12 weeks 	<ul style="list-style-type: none"> - Compliance, fall preventive behaviour, fall efficacy statistically significant (p<0.001) 	<p>PowerPoint presentation*</p>
Ziden et al., 2013	<ul style="list-style-type: none"> - Physical therapy, nurse, occupational therapy and social worker coordinate senior group meetings - 2 hours/weekly/four meetings - Booklet 	<ul style="list-style-type: none"> - Significant higher falls efficacy(P<0.05) - Physical activity is significant (p<0.001) 	<p>Inter-professional team*</p> <p>Booklet*</p>

PowerPoint presentation

This is the main focus of FPEI, and it answers four key topics about fall information. The PowerPoint presentation was integrated into the FPEI as it was found effectively used in the evidences and needs, as cited in the needs assessment study.

The content of PowerPoint slides and booklet was based on the Clinical fall prevention guidelines (CPG), literature review and information as cited in the needs assessment study. To the best of our knowledge, there is no structured fall prevention guidelines found in the local setting. The national and international bodies have developed clinical fall practice guidelines to be used in the developed countries, such as UK, Canada and Australia. The PowerPoint presentation content was extracted from the evidences and information provided by the HCPs in the needs assessment study. The content addressed the objectives of the FPEI: to provide evidence-based fall prevention education intervention to the community dwelling older persons so that they would be informed of and take up fall prevention interventions.

The key topic, ‘what are fall and the prevention ways?’ was presented by the primary care physician as the contents covered these aspects: general information, such as, fall definitions, epidemiology, main risk factors; and general fall prevention strategies, such as, active ageing, proper shoes, proper walking stick and eating healthily (Appendix V). The fall definition was cited from Lamb et al. (Lamb et al., 2005); the fall epidemiology and main fall risk factors were drawn from the global report on fall prevention in older age (WHO, 2008); while content on active ageing and eating healthy was extracted from Dapp et al. (Dapp et al., 2005); and the national guideline of American Geriatrics Society/British Geriatrics Society clinical practice guideline for prevention of falls in older persons provided information on proper shoes and walking stick usage among older adults (Kenny et al., 2011).

Another key topic presented through the PowerPoint presentation was ‘How to move safely and prevent falls?’ A rehabilitation physician gave advice on these aspects: suitable physical activities and exercises; how one could stay independent in conducting common daily activities, such as cooking, gardening, watering plants and getting medication; simple stretching and balancing exercises one could conduct in the home and outdoors; ways to stay active, such as joining local Tai Chi exercise group (Appendix W). The contents were extracted from literature reviews (Dapp et al., 2005; Huang et al., 2010; Liu - Ambrose et al., 2008).

Another key topic, ‘how to prescribe medication safely and prevent falls?’ was assigned to a pharmacist (Appendix X). The contents covered these areas: common medications and health problems; effects from medications, such as the side effects, taking it wrongly and number of medications; review medication and medication planning. The contents were cited and drawn from literature reviews, HCPs’ needs assessment study and NICE national guidelines (Blalock et al., 2010; Dapp et al., 2005; NICE, 2013).

The last key topic was ‘How to keep home and the environment safely, and mingle in society?’ A lifestyle advisor, qualified in psychology and patient decision-making, covered the contents in these areas: how one could keep the home safe, such as fixing hand rails, safety tape on the curb, non-slip mat (bathroom & toilet) and good lighting (staircase & foyer); how to choose safe environment, such as, choosing unbroken pathways, beware when stepping onto a bus, and using pedestrian crossing; and how to mingle and socialise, like joining family gatherings and events, tour and catching up with friends over a cup of coffee (Appendix Y). The contents were extracted and cited from literature reviews (Clemson et al., 2004; Clemson & Swann, 2008; Dapp et al., 2005).

The needs based

As cited in the needs assessment study, videos and pictorial diagrams were used to deliver fall information provided by the HCPs. They perceived that short sentences and pictures were helpful to older people's understanding of medical terms in the learning process about fall prevention interventions. Furthermore, the HCPs also wanted pamphlets, posters or any cost-effective programmes for older persons, while the older persons cited preference for fall information in the needs assessment study.

The evidence based

The evidence found that the effects of FPEI on various types of computer-based learning, such as PowerPoint presentation, multimedia, CD-ROM, booklet and pamphlets were evaluated based on knowledge acquisition and uptake of fall protective behaviours. In one study, it was reported that the use of PowerPoint presentation to give fall information had the effect of increasing fall preventive behaviours (Dapp et al., 2005). Due to the cost constraint and a lack of resources, such as videos on fall information in the local setting, the PowerPoint presentation was used in this study.

The theory based

Barriers faced by the older persons in taking up fall prevention strategies include various perceptions about falls, a lack of resources from HCPs and the healthcare system, and a lack of support from caregivers. Therefore, the educational components in the FPEI were driven by theories. The purpose of theories was to overcome the psychological barrier, and trigger the older persons' positive thinking to adopt fall prevention strategies.

In the previous studies, FPEI that incorporated Bandura's self-efficacy theory had significantly enhanced older persons' self-efficacy to implement and sustain the fall prevention strategies. In this study, the Bandura's self-efficacy theory provided four information sources of one's self-efficacy: performance accomplishment, vicarious learning, verbal encouragement, and physiological and affective states.

According to the first source, performance accomplishment suggests that breaking the tasks into small achievable pieces may be useful, which help build up and accumulate confidence. Thus, the PowerPoint presentation content was separated into four key topics.

The Gerogogy principle based

In this section, the education content in the PowerPoint slides is explained using photographs considering older persons' learning pace. Instead of using photographs of Caucasians from the internet, the photographs of local older persons' in action were included in the PowerPoint slides; this may provide updated and practicable information to the older persons.

Booklet

The booklet summarises the overall content of the FPEI for older persons to use as a reference when they are back at home after the intervention (Appendix Z).

The booklet contents cover these areas: six ways (6S') of prevention of falls, namely safe ageing, safe home, safe medication, safe moving, safe environment and socialising; a brief description of seven simple balancing and stretching exercises derived from Otago exercise programme (Liu - Ambrose et al., 2008); medication planning template; and an activity calendar to record activities conducted to prevent falls or an event of fall.

The booklet also includes contact details of senior social centres on the last page. The contents of the booklet were extracted from various sources of literature reviews (Clemson, Mackenzie, Ballinger, Close, & Cumming, 2008; Clemson & Swann, 2008; Dapp et al., 2005; Liu - Ambrose et al., 2008). The contents were written using short sentences and supported by photographs taken in the local setting. The cover page of the booklet illustrates an older person's photograph with a happy smile in his face. A slogan, reflecting the importance of changed behaviours towards fall prevention, states "You Can Make The Change, You Can Prevent Falls!"

The needs based

As cited in the needs assessment study, the older persons informed the researchers that written information of fall prevention, such as pamphlets, leaflets, posters were absent in the primary care clinics. In general, the older participants voiced their unmet needs of written fall information. The older persons can use the booklet as a source of reference.

HCPs in the needs assessment study noted the need of pamphlets for older persons. The HCPs highlighted that the lack of fall education materials was a barrier in managing falls among older persons.

The evidence based

According to the evidence, the use of pamphlets, booklets and leaflets were found effective in knowledge acquisition and reducing falls (Assantachai et al., 2002; Hakim et al., 2007). The booklets mentioned in the previous studies were fairly comprehensive and contained falls risks information of home hazards, environmental hazards, and prevention strategies (walking aid, spectacles and proper shoes) (Clemson et al., 2004; Gopaul & Connelly, 2012; Zidén et al., 2014).

The theory based

Based on Bandura's self-efficacy theory, a sense of self efficacy is enhanced by successful experiences and weakened by negative experiences (Bandura, 1994). Thus, the older persons should be exposed to their peers who had successfully performed fall prevention activities, and benefited from them. These exposures would motivate older persons to engage in fall prevention activities. This motivation was further enhanced through incorporating in the lectures, photographs of an older man or woman exercising, which the participants can easily identify with.

The Gerogogy principle based

The older persons want directly applicable information: something they can learn that is useful in real life. The information included in the booklet is simple and directly usable, such as exercise practice, medication planning template, activity calendar and contact details of senior centres.

4.3.2 Format

This section describes the flow through of the content in the FPEI, using Bandura's self-efficacy theory and Gerogogy principles. The format of the FPEI includes single visit, inter-professional team, small group, phone call and focus group discussions.

Single visit

As cited in the needs assessment study, in particular, the HCPs preferred a single-visit FPEI to a many-visits version. Furthermore, the older persons stated that they had difficulties in attending referral sessions due to travelling problems. Hence, a single-visit FPEI was adopted as there are evidences to support the effects of FPEI using a single visit in knowledge acquisition and positive behavioural change (Dapp et al.,

2005; Hakim et al., 2007). The theories recommend a friendly learning pace for older adults, such as single visit, which saves a lot of energy and cost. The single visit includes baseline measurements, interviews and inter-professionals' lectures.

Inter-professional team

The inter-professionals comprised a primary care physician, a rehabilitation physician, a pharmacist and a social worker. However, these are the justifications for doing it in the primary care setting: the primary care plays a role in the primary or secondary prevention of fall among older persons, as many older persons seek help in the primary care after a fall (Kuehn, 2010); they also seek treatment for chronic disease in the primary care. Hence, the FPEI was conducted in the primary care, and a primary care physician was included to provide an overview of fall problems in the primary care. Evidences show that falls are rising due to culprit medications among older persons (Blalock et al., 2010). Thus, a pharmacist was included to assist older persons in the issues of the medication side effects, polypharmacy, review medications and medication planning. In the needs assessment study, the older persons' keenness in exercise was noted. To encourage the older persons to continue with their exercise activities and those who were yet to be involved in any form of physical activities, a rehabilitation physician was included to provide information about the benefits of being active and independent, by practising safe moving in the home and environment. As cited in the needs assessment study, many older persons ignored home modification advice and considered the home visits as intrusive. In previous studies, it was found that home visits by occupational therapist gave significant impact on the prevention of falls (Clemson et al., 2004; Gopaul & Connelly, 2012; Jeon et al., 2014; Zidén et al., 2014). Thus, a lifestyle advisor was engaged to provide advice not only on simple modifications that one could fix and remove in the home, but on the overall practice of

safety in the environment, and to encourage them to participate in social activities and events. The team was selected based on their qualifications and experts' suggestion.

The needs based

As cited in the needs assessment study, the older persons need to receive advice from HCPs regarding the fall prevention interventions. Similarly, the HCPs stated that the older persons would appreciate if the recommendations came from the HCPs. Moreover, the older persons perceived that they needed rational reasons to take up the fall prevention strategies, particularly from the HCPs.

The evidence based

According to previous studies, the involvement of inter-professional team had the effects on significant behavioural changes, self-efficacy and fear of falling reduction among older participants. It was found that the involvement of these HCPs from various disciplines were particularly effective: geriatrician, social worker, occupational therapist, physiotherapist and nurse (Clemson et al., 2004; Dapp et al., 2005; Dapp et al., 2011; Jeon et al., 2014; Zidén et al., 2014). The involvement of inter-professionals as facilitators had improved fall efficacy and physical activity participation among older participants, compared with preventive home visit by the occupational therapist (Zidén et al., 2014).

The theory based

The HCPs' presence as facilitators would give some psychological impact to the older persons (Bandura, 1994; Zidén et al., 2014). In the clinic, older persons spent little time with their healthcare professionals; however, more time was spent through this platform. Furthermore, the older persons can meet HCPs from different disciplines

without any referral in one single visit. In the clinic, the older persons meet these HCPs only when they get referrals; however, the appointment will be arranged on another day. As emphasised in Bandura's theory, the verbal encouragement by the inter-professionals served to encourage older person to carry out fall prevention activities. Moreover, practical advice from HCPs may motivate the older persons to carry out and maintain protective behaviours against falls.

The Gerogogy principle based

The inter-professional team proposed that the information learnt by the older persons must be reinforced by creating connections between information learnt in the PowerPoint presentation and previous life experiences. In this section, the inter-professionals basically played the role as a mediator to connect new information learnt with examples and phenomena known to the older persons. In addition, the Gerogogy principle of the sense of success is explained in this section. Considering the older persons' nature of getting tired easily, the inter-professionals team played the role by reacting positively; the inter-professionals proposed to offer praise for and recognise the older persons' progress during the programme.

Small group

The evidences found that it was advantageous to provide fall prevention education to a small group of older persons: screenings of falls could be done in a small group of older persons to avoid official peak hours; older persons could get peer support for their fall problems; older persons could interact with others and communicate their experiences and views in preventing falls. Therefore, it was agreed that the small group set up would be part of the FPEI development.

The needs based

In the needs assessment study, a large number of older persons visited the primary care every day, and the HCPs found limited time to screen and tackle older persons' fall problems. An older person mentioned in the needs assessment study that a small discussion group was preferred in learning fall information. A group setting is conducive to discussing positive and negative elements of an issue by sharing information.

The evidenced based

Small group was a common format in the previous studies as it facilitated the initiation of communication and dissemination of fall information effectively among the participants through sharing the experiences.

The theory based

The source of vicarious learning or experience was seeing one person learning from others' related behaviours; individuals who are uncertain of their capability to perform a specific behaviour may help an observer believe that he or she can possess the capabilities to perform the equivalent activities. Discussion in a group enabled the participants to communicate and share positive experiences and success of carrying out exercises. The experience shared may motivate other participants to take up some form of physical exercise on their own.

The Gerogogy principle based

When older persons share their diverse life experiences in small discussion groups, other older persons will evaluate the outcomes of their actions, and some may imitate their actions or pick up their views. Using the activeness and independence principle, an

older person actively participates in the discussion and gives feedback. This principle was applied in this section because the older persons tended to act autonomously, so their views and opinions were acknowledged and taken into consideration. In this section, another principle proposed was enjoying learning in a pleasant environment. Thus, pleasant ambience and informal atmosphere were created in this group section.

Phone calls

As the FPEI development was based on a single visit, the follow-up of one-month post-intervention was conducted through phone calls. This section proposed to remind the participants about the FPEI. These reminders were helpful and informed the older participants to take up fall prevention strategies.

The needs based

In the needs assessment study, the older persons encountered accessibility problems to attend referral consultation sessions. In previous studies, the use of phone calls was efficient in terms of delivery and receiving information from older participants. Furthermore, many studies conducted follow-ups through phone calls. The need for phone call was not raised by the older persons during the needs assessment study. However, phone calls would be used to remind or motivate the older participants. Phone calls would lighten the older person's travelling burden to hospital as the follow-ups required them only to fill up the knowledge checklist.

The HCPs also did not mention phone calls in their interviews. However, the HCPs wanted the older participants to be reminded about their medications, fall hazards and fall prevention strategies. As a result, the follow-ups through phone calls were included in this section.

The evidence based

Many previous studies used the phone-call strategy to contact older persons regarding study outcomes. Assanthachai et al., in their study, distributed leaflets to study participants, and they were contacted via phone calls every two months for fall numbers (Assantachai et al., 2002). In other studies, fall prevention education was conducted in a series of classes, so phone calls were not used except to remind the participants about their future hospital appointments.

The theory based

According to Bandura's social cognitive theory, phone calls generate some degree of psychological impact on the older persons. The verbal encouragement given through phone calls may lead to an improvement of practising protective behaviours against falls.

The Gerogogy principle based

In this section, the Gerogogy principle emphasises that the older persons need encouragement, as they tend to feel that they are incapable of learning new things and sustaining the learning momentum. They perceived that their intellectual abilities required for learning had impaired with age. Thus, the follow-ups through phone calls were included in this section to rejuvenate their thinking and learning process.

Focus-group discussion

However, some older people wanted face-to-face communication to discuss and solve problems arising after attending an intervention. Thus, a focus group discussion was included in the FPEI to find out what had been done by older participants after attending the FPEI. It had the effect of a booster visit; it enabled the participants to

recall the FPEI and what they had done after attending the FPEI and share their reasons for implementing the fall prevention strategies with other peers.

The needs based

In the needs assessment study, the participants and HCPs specifically did not raise the need for FGD. However, the participants raised the need for focus group discussion so that matters and issues related to falls could be discussed.

The evidence based

The small group was emphasised in the previous studies. The learning in small group had tremendously strengthened older persons' learning spirit ((Huang, 2011; Jeon, 2014). However, there is a paucity of studies involving focus group discussion to assess study outcomes (Dapp et al., 2005).

The theory based

The source of vicarious learning or experience is seeing or noticing others practising the behaviours; individuals who are uncertain of their capability to perform a specific behaviour may help an observer believe that he or she can possess the capabilities to perform the equivalent activities (Bandura, 1997). A focus group discussion conducted three months after attending the FPEI enabled the participants to discuss and share the benefits achieved by implementing the recommendations in the FPEI. Those who had avoided falls through the FPEI showed that this intervention was effective in helping older persons to cope with and prevent falls.

The Gerogogy principle based

This section explains the similar effects of the small group.

4.3.3 FPEI language and presentation

After creating the framework, the content was drafted based on the simple language and effective communication principles as outlined in the Simply Put document. In particular, for the booklet, the guideline highlights seven considerations in the development of the print material on health issues for a wider public:

- Where this guide fits into an overall communication plan
- Message content
- Text appearance
- Visuals
- Layout and design
- Translation
- Testing for readability

Overall development plan

This section explains only part of the overall development plan, which constitutes other important steps:

- Identifying target population and health problems
- Defining key characteristics of the target population (e.g. age, gender, reading level, mental fitness)
- Determining the key messages and how best to present them

- Choose prints as the best means of communicating the messages to the older persons.
- Disseminating the material to the users

The needs assessment study had addressed the need for fall education materials such as booklet. The target population and health problem were clearly described in the study, while the need for education material was identified in the HCPs' interviews. Prints and PowerPoint slides, the means of communication, were the preferred format based on the older persons' and HCPs' interviews. The inter-professionals team used PowerPoint slides as a method of communication.

Message content

This section helped the development committee to decide on what to say and how to say it. The Five principles were suggested to deliver the messages effectively:

Limit the number of messages

The booklet only presents information that the users need to know. Details such as fall risk factors, proper footwear, side effect of medication, eating healthy are excluded from the document. A list is limited to contain no more than six items as the users tend to forget them if there are too many items.

Tell the user what you want them to do

As the booklet is a fall education material rather a decision support tool, the instructions focus on 'do' in the fall prevention strategies, which include simple exercises. However, the content was written using concrete nouns and active voice, for example, '6S' ways to go'; 'you can make the change, you can prevent fall'.

Tell the users what they will gain from reading the material

The booklet begins by telling the users what they will gain from the booklet:

‘You can make the change; you can prevent falls’; these are the changes the users need to follow:

- Safe ageing: gives information about the healthy living choices an older person can take up to prevent falls.
- Safe medication: gives information about avoiding the culprit medications and polypharmacy practices to prevent falls.
- Safe home: gives information about recognising and removing hazards, such as cluttered toys to prevent falls.
- Safe environment: gives information about choosing unbroken pathways, beware while stepping into the bus and zebra crossing to prevent falls.
- Safe moving: gives information about simple stretching and balance exercise to be conducted in the home and in the park, which help older persons to be flexible and prevent fall.
- Socialising: gives information about healthy communication with others through the internet, family functions and friends’ gathering to keep the mind active and to prevent falls caused by unconsciousness.
- Gives seven simple and practical exercisers to be conducted indoors and outdoors.
- Helps you to organise your medication in the medication chart given.
- Helps you to discipline yourself to fill up the activity calendar pertaining to fall prevention activities.
- Gives contact details of the nearest community service centres around your residence area for weekend activities.

Choose your words carefully

The development committee of the booklet made a conscious effort to use short words (one or two syllables), sentences (3 – 6 words) and paragraphs (2 – 3 sentences). Medical and technical jargons were kept to a minimum; instead they were explained in plain language and used consistently throughout the documents.

Be sensitive to cultural differences

The booklet uses terms which users are familiar and comfortable with. For example, the booklet contains photographs captured in the local vicinities, which the Malaysian older persons are familiar with.

The booklet was reviewed by older persons with a high risk of falls and HCPs experienced in managing falls from diverse backgrounds during the pilots testing, and the content was revised accordingly.

Text appearance

Font size 12 was used for the text and size 14-18 for the headings; this was pilot-tested with older person aged between 60–83 years, and they did not encounter difficulties in reading the text. The booklet avoided fanciful and script lettering and italics.

Visuals

Two types of visuals were used in the booklet. The photographs captured in the local setting by professional photographers were used on the cover page to represent each way of 6S. The visuals of an older woman and man doing stretching and balance

exercises from Otago exercise sheet were included, providing the steps to conduct the exercise.

Layout and design

A booklet with a good layout and design is easy for the users to read and understand. It is particularly important in the context of education materials as the way information is presented may influence the readers in adopting the fall prevention strategies. This in turn will influence older persons' knowledge acquisition and behavioural change.

The layout and designs for each section of the booklet are described and justified in the following paragraphs:

- Cover page: a huge photograph of an older person resting after some work on his farm. His cheerful face, even after being active and independent at this old age, gives a strong reason for this picture to appear on the front page layout. The purpose is to create a positive impression about falls and ageing, with the slogan stating that 'You can make the change; you can prevent falls'.
- Section on 6 ways of fall preventions: highlights brief facts about falls risks and preventions ways by using photographs. All 6 ways are covered in one layout.
- Section on seven simple exercises: by using cartoon, illustrates images of an older woman and man in the way that the users can follow the steps of the exercises at home. The instructions of the exercise steps are briefly explained using simple words.
- Section on a medication plan template: illustrated by using Table insert format from the Microsoft word. The table was drawn using five rows and eight columns. Plate and spoon images were inserted to represent dinner or

lunch time. The medication plan is basically for older persons to list down and organise all their medications accordingly, based on before or after breakfast, lunch or dinner, for seven consecutive days in a week.

- Section on activity calendar for 12 months: The instructions on what to write in the space provided in the calendar are written clearly at the bottom section of each page of the calendar. The users may use this to record their fall events, hospitalisations, or any fall prevention activities, such as exercises, changing shoes, and buying a new walking stick; they can jot down details in the space provided. With all these records, it is easy for the users to report their fall events or types of fall prevention activities carried out in the past weeks or months to the researchers.
- Final section: contains contact details of the community centres located nearest to the users' residential area. Permissions have been obtained from the relevant organisations to list all these contact details in the booklet. The centres accept all walk-in bookings as it is based on first come first serve. However, the users also can make advance bookings to have any planned activities such as outdoor and indoor games, joining a city tour, or event health talks.

All the sections were compiled into one booklet, so there is no need for older persons to keep many documents.

Design to facilitate ease of reading

The following steps were taken to ensure that the layout of the booklet is easy for the users to read.

- A complete idea is presented on one page; the patients do not have to turn the page halfway through the idea. For example, on the second page, the 6 ways of fall prevention strategies are displayed on one page and is facing the exercise page.
- The photographs used in the PowerPoint presentation are also used in the booklet in order for the users to familiarise themselves with the strategies.
- Page title is included.

Readability

The national and international guidelines recommend that education materials should be written at a level that can be understood by the majority of older persons in the target group, with the readability threshold set at grade 8 using a readability test such as SMOG or Fry.

The readability of this booklet was measured using the online Test Documents Readability. The programme contains five of the most widely used formulas for assessing readability, by evaluating the minimum grade-level reading skill required for reasonable comprehension of the text.

The formula, run by the online program operating system, assumes that the text being evaluated is a running narrative. The booklet, due to its short length of description, was submitted for analysis.

Formulae

The online program analysed the sample text using the following formulae:

- Flesch Reading Ease: the lower the number, the more difficult the material.
- Gunning Fog index: considers the total number of words, words of three or more syllables, and sentences. No technical materials should score higher than 14.
- Flesch Kincaid Grade level: uses the number of words, syllables and sentences that correspond to the grade level.
- SMOG: considers the number of words, containing three or more syllables. SMOG is the strictest of all the measures as it focuses on 100% comprehension; so the result is often in a higher grade level than those of other formulae.

Results

The total numbers of words, syllables and sentences in the word documents are summarised below:

Number of characters (without spaces): 1,284.00

Number of words: 241.00

Number of sentences: 50.00

Average number of characters per word: 5.33

Average number of syllables per word: 1.73

Average number of words per sentence: 4.82

The analysis of the readability of the booklet according to the readability test is as below:

- Flesch Reading Ease: 55.9
- Gunning Fog index: 8.7
- Flesch Kincaid Grade level: 6.7
- SMOG: 8.4

Interpretations

The interpretations of the scores and education levels are summarised as below:

- The Flesch Reading Ease indicates a reading level consistent with the 9th (50-60), which is equivalent to the English year 9.
- The Flesch Grade level indicates a reading level of grade 6 to 7.
- The FOG test suggests a reading level of between grades of 8 and 9, which is well within the appropriate range for technical materials (<14).
- The SMOG formulae estimate the reading level of the document somewhere between grades 8 and 9.

The overall results suggest that a range of readability from a low grade of 6 to a high grade of 9. Although attempts were made to simplify the booklet further, the readability remains unchanged. However, the readability of the booklet is within the standard stipulated by the national and international bodies' guidelines (test score at 8th grade or equivalent).

4.4 Pilot testing the MuFE IT

In this part of thesis, results of pilot testing the MuFE IT among community living older persons are presented. The older persons' feedback was considered to further revise the MuFE IT. The reviewing and revising of the MuFE IT is an iterative process included in the pilot test 1, 2 and 3:

4.4.1 Pilot testing 1

Figure 4.3 illustrates the flow through of the MuFE IT pilot tests; showing the PowerPoint presentation time frame, no of phone calls and timing and what is covered in these calls (refer to appendix R) and the final focus group discussion (Refer to appendix S). The aim of developing the MuFE IT is to help the older persons at a high risk of falls to make an informed decision to take up fall prevention interventions. Therefore, during pilot test 1, a deliberate action was taken to make sure all the requirements were met:

- The needs of the older persons and the HCPs and evidence were incorporated into the FPEI.
- The format was guided by Bandura's self-efficacy theory and Gerogogy adult learning theory.

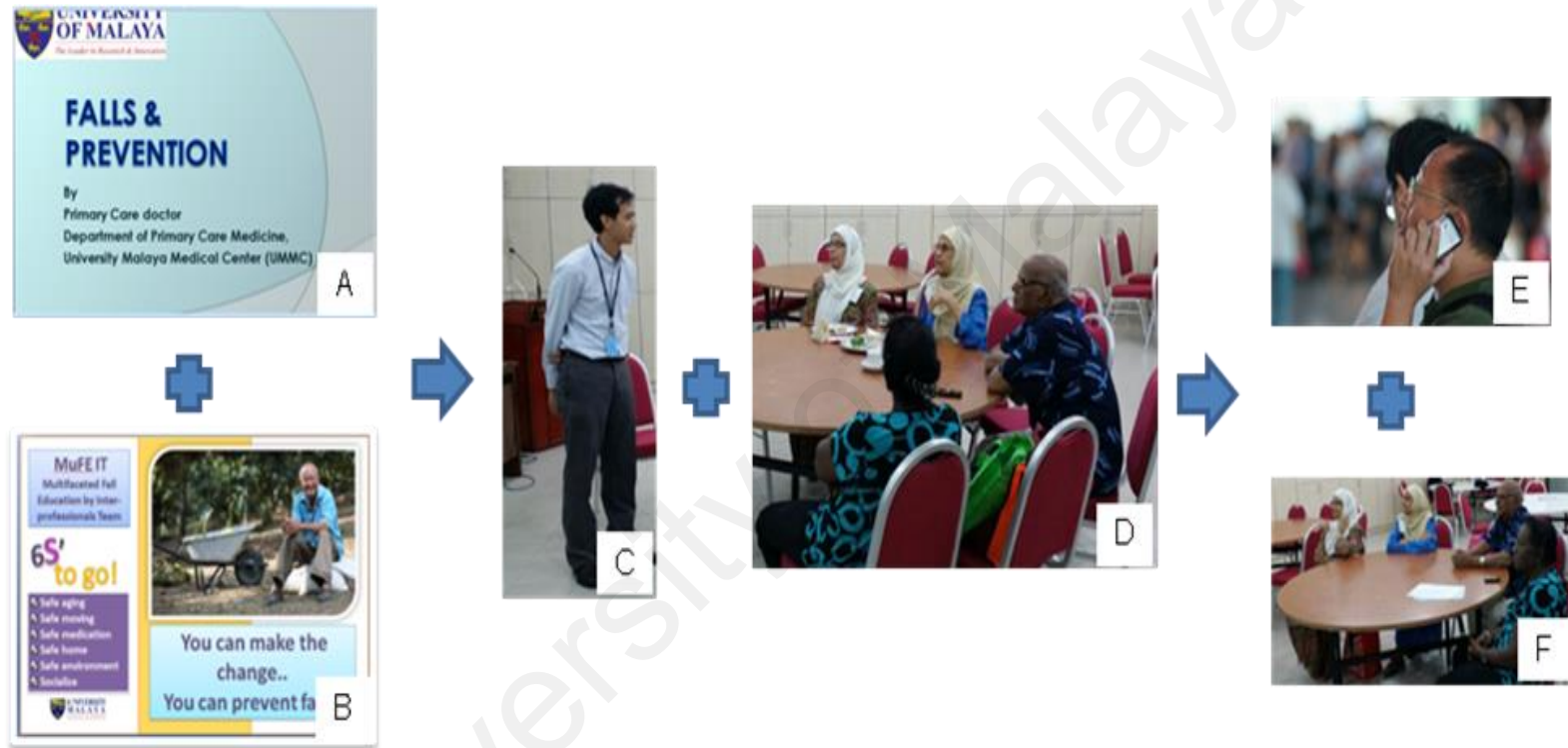


Figure 4.3: MuFE IT flows through: A: PowerPoint Presentation; B: Booklet; C: inter-professional team (30 – 50 min.); D: small group; E: Phone call follow-ups (once; 10 – 20 min.); F: Focus group discussion (once; 30 – 40 min.).

Feedback from older participants

A total of four older persons took part in the MuFE IT pilot test 1. They completed the knowledge questionnaire and were interviewed for their opinions about the FPEI immediately after the intervention. Their socio-demographic information and fall profiles are detailed in **Table 4.14**. Participants were predominantly females in their mid-70s, consisting of two Indians and two Malays. Three out of four have attained secondary education and with a good cognitive level. The participants were at different stages of taking up the fall prevention interventions; all found the MuFE IT content sufficient for basic understanding. It contains a balanced combination of information and is supported by photographs. However, all felt that the venue was not suitable for the older folks as it was located far from the main entrance. They did not encounter problems in reading the PowerPoint slides and the booklet. The participants were enthusiastic to share their experiences about FPEI with their friends and relatives. Moreover, the participants were happy with the small number of participants in the group, and the choice of a convenient time (i.e. away from peak hours). **Table 4.15** details the feedback from the participants on the FPEI.

Table 4.14 : Socio-demographic details of older participants in pilot test 1

	Participant 1	Participant 2	Participants 3	Participant 4
Age	65	72	70	81
Gender	Female	Female	Female	Male
Ethnicity	Indian	Malay	Malay	Indian
Duration of education (years)	6	16	11	13
Occupation	Home maker	Lecturer/workin g	Home maker	Retired
Falls history	Recurrent falls	Recurrent falls	Recurrent falls	One fall
Use of assistive devices	spectacles	Spectacles	NA	Spectacles/walki ng stick
Medication (types)	4	≥ 4	≥ 13	≥ 11
EQAC (≥ 6)	6.5	10	9	10
REALM (≥ 19)	19	60	60	60

EQAC (≥ 6) = score more 6 shows average to good cognitive level

REALM (≥ 19) = Score more than 19 shows average to good English terms reading level

Table 4.15 : Feedback from participants on the MuFE IT pilot test 1

Themes	Quotes
Venue	“I have already talked to you about it (chuckled). It is not conducive to me you know.” (72 years old; Malay female) “A lot of difficulties because of walking. I could walk only for a short distance, not for a longer distance.” (81 years old; Indian man)
Small group	“Not too many. This is nice.” (65 years old; Indian Women)
Inter-professional team	“Very educational. Impart a lot of knowledge to us.” (72 years old; female)
Timing	“The duration was good. More relaxing.” (70 years old; Malay female)

Feedback from Inter-professional Team (IT)

Table 4.16 details the socio-demographic characteristics of the inter-professional team. They gave similar response on the MuFE IT content and format. All the participants felt that the amount of information covered was sufficient. They also felt that the FPEI content was clear and would recommend their patients to attend it. The inter-professional team felt that the format of the MuFE IT was good because of the brief time used; timing was favourable to their busy schedule. Other than that, the inter-professional team felt that the contents of falls information in the slides and booklet were brief and appropriate to be presented within the given time of 30–40 minutes. Furthermore, they also found that the small number of participants in a small group was conducive to learning and created an atmosphere for them to give full attention. However, most felt that they did not emphasise the concepts of the theories (i.e. Bandura’s self-efficacy theory and Gerogogy) during pilot test 1.

Table 4.16 : The demographic details of the inter-professional team (IT)

	IT 1	IT2	IT3	IT4
Age	48	46	30	32
Gender	Male	Female	Female	Male
Ethnicity	Chinese	Iban	Indian	Chinese
Professional background	Primary care physician	Rehabilitation physician	Pharmacist	Lifestyle advisor
Years of experiences in managing falls (years)	10	10	5	2

Feedback from the review committee and development committee

The feedback on pilot test 1 from the older participants and the inter-professionals were discussed at the review committee and development committee meetings and the revision covered the following issues:

- There were similarities between the views of older persons and the HCPs about the MuFE IT. The older persons and HCPs were satisfied with the amount of information covered in the MuFE IT. Therefore, no further information was added to the MuFE IT content.
- The HCPs found that they were not following the concepts as stated in the theories.
- The venue was not conducive to learning for older participants.

The review committee discussed the above issues and came to the following consensus:

- The amount of information should be kept unchanged, as the older participants and HCPs found the content clear, sufficient and helpful.

- The venue needed to be changed to somewhere near to the hospital entrance, where the participants could easily access.
- There was a need to train the HCPs so that they would emphasise the concepts of the theories and follow them strictly in pilot testing 2.

Even though this group of older participants did not encounter any problem with the content and format, the review committee decided to receive further feedback from a new group of older participants until a consensus could be achieved. It was agreed to conduct pilot testing 2.

4.4.2 Pilot testing 2

A total of seven older persons took part in the MuFE IT pilot testing 2. Their socio-demographic information and fall profiles are as detailed in **Table 4.17**. Participants were predominantly female in their mid-70s, consisting of four Indians and three Chinese. Six out of seven have completed their secondary education. The group comprises of three Chinese participants; there was no Chinese participant taking part in the MuFE IT pilot test 1. The programme's contents and format were reviewed, and the changes made are as follows:

Feedback from the participants

In the MuFE IT pilot test 2, all participants had expressed feedback on the FPEI contents similar to that of the pilot test 1; the participants found that the FPEI was helpful and had a 'combination of all information'. However, there were mixed opinions about the number of the participants; one participant felt that the information should be delivered to more participants. The older participants' views on FPEI are detailed in **Table 4.18**.

Table 4.17 : Socio-demographic details of the participants in the FPEI pilot test 2

	P1	P2	P3	P4	P5	P 6	P7
Age	66	71	60	83	70	72	71
Gender	Male	Female	Female	Female	Female	Male	Female
Ethnicity	Indian	Chinese	Indian	Indian	Chinese	Chinese	Indian
Duration of education (years)	15	10	11	6	11	15	10
Occupation	Retired	Home maker	Home maker	Home maker	Home maker	Retired	Retired
Falls history	Once	Once	Once	Recurrent	Once	Recurrent	Recurrent
Use of assistive devices	NA	Walking stick	NA	NA	Spectacles	spectacles	spectacles
Medication (types)	3	4	1	9	1	4	4
EQAC (≥ 6)	10	10	10	9	10	10	10
REALM (≥ 19)	60	54	59	60	60	60	58

Table 4.18 : Feedback from participants on MuFE IT pilot test 2

Themes	Quotes
Venue	“Easy to find because we are used with this place (Family Clinic, Primary Care).” (72 years; Chinese male)
Group setting	“In small group we get more attention and better interaction.” (65 years; Indian male) “Yeah the most important is fact, is the interaction and then sharing of information.” (71 years; Indian female) “Should be delivered to more number of participants” (70 years; Chinese female)
Inter-professional team	“Presented well. Understand. They make you understand whatever they said.” (65 years; Indian male) “They don’t want to go too complicated lah.. Simple and informative.” (70 years; Chinese female) “Of course is all are connected. One leads on to another...” (72 years; Chinese male)
Timing	“Convenient, we no need to come again.” (83 years; Indian female)

The majority of the participants found the FPEI contents clear and helpful. The participants were enthusiastic about the information, and they were keen to share their new knowledge with their friends and relatives. The participants suggested increasing the number of participants because they felt that the information provided in the FPEI was very useful, and it should be disseminated to a larger number of people. Their feedback was taken into consideration.

Feedback from Inter-professional Team (IT)

In pilot testing 2, the participants had more information to share and were enthusiastic to give feedback. Additional information on exercise practices, home hazard identification, removal of hazards and enhanced social interaction, was well received and shared among the participants. In terms of the theories used, the HCPs found difficulties in applying the principles of Gerogogy and Bandura’s Social

Cognitive theory while deliberating their presentation. However, the HCPs were able to figure out their problems when the development committee briefed them on the principles of the theories. For example, the HCPs told stories to the older persons; listened to their views, and encouraged them when they got the right answers.

Feedback from the review committee and development committee

The feedback from pilot testing 2 was presented to the review committee and the development committee, and the main findings are listed below:

- In the immediate post-intervention interview, the participants commented that the MuFE IT content covered balanced information.
- A few participants suggested an increase in the number of participants.

Revision by the development committee

Based on the above findings, the development panel made the following revisions:

- The slides and booklet content were maintained as the participants agreed on the content clarity and balance of information.
- The MuFE IT should be tested in another group of older participants with a wider diversity.

4.4.3 Pilot testing 3

A total of six respondents took part in the MuFE IT pilot testing 3. Their socio-demographic information and fall profiles are detailed in **Table 4.19**. Participants were predominantly females in their mid-65s, consisting of one Indian, two Malays and three Chinese. Three out of six have completed their secondary education. There was a good mix of Chinese, Malay and Indian participants. However, the researchers encountered difficulties in enrolling more participants; many people rejected the invitation because of these excuses: fall was not an interesting subject, time constraint, knew about fall information, transport problem, health condition and no response to the phone calls. Some older persons agreed to come initially, but failed to turn up for the pilot test. As a result, out of 13 participants invited, only six managed to attend the pilot testing; hence, the number of participants that attended pilot testing 3 was one person less compared with that of pilot testing 2.

Table 4.19: Socio-demographic details of the participants in the MuFE IT pilot test 3

	P1	P2	P3	P4	P5	P6
Age	76	81	64	65	65	65
Gender	Male	Female	Female	Male	Female	Female
Ethnicity	Chinese	Chinese	Malay	Malay	Indian	Chinese
Duration of education (years)	6	11	15	15	15	11
Occupation	Home maker	Retired	Working	Retired	Retired	Working
Falls history	Once	Once	Recurrent	Once	Once	Recurrent
Use of assistive devices	NA	NA	Spectacles	NA	Spectacles	NA
Medication (types)	3	3	5	2	1	2
EQAC (≥ 6)	10	10	9	10	10	10
REALM (≥ 19)	60	60	60	60	60	60

Feedback from participants

In the MuFE IT pilot testing 3, the participants came from various cultures and education backgrounds. The participants' responses are detailed in **Table 4.20**. Overall, the participants found the MuFE IT conveyed balanced and clear information. One participant mentioned that the information delivered was common sense and repetitive. He added that he already knew about the information, and had been careful to avoid falls. Further, he commented that the MuFE IT was good for those with a lack of education (he was one of the participants who only completed year 6 education). Thus, he was a complicated participant the instructors found difficult to deal with. The inter-professionals stayed calm when the participant expressed his views. The MuFE IT is driven by theories; therefore, there was no specific answer to address his queries. This

participant should determine whether the MuFE IT information was applicable in his context. Others felt that the repeated facts in the MuFE IT provided clarifications, and they could learn at their own pace. At the end of the pilot test, the MuFE IT participants were excited to share the information with their family members and friends.

Table 4.20 : The feedback from participants on the FPEI pilot test 3

Themes	Quotes
Venue	“Not difficult because I normally come to family clinic here you see.” (76 years; Chinese male)
Group setting	“We learn from each other also. One brought up his/her issue and everybody brought some point you know.” (81 years; Chinese female)
Inter-professional team	<p>“Interact with us and ah.. things that they cannot sort of tell when you in the clinic because they have so many patients and all that they got more time, they can tell you.” (65 years; Indian female)</p> <p>“I think is good, the only thing is ah.. Maybe ah certain thing is repeated lah and common sense.” (76 years; Chinese male)</p> <p>“Repeat because they are also in a way it to... embed in our mind” (65 years; Chinese female)</p>
Timing	<p>“A bit too long for me.” (76 years; Chinese male)</p> <p>“It is a good time; in the morning is good. Is just that sometimes the problem evening time.” (65 years; Malay male)</p>

Feedback from the inter-professionals team (IT)

The inter-professionals team found the MuFE IT content balanced and informative. The only difficulty found was when dealing with a participant who commented that the information was common sense, and that he perceived that the fall prevention advice was not practical, but merely common sense to be used like any other information or advice. The team managed his feedback through sharing of other participants’ fall experiences and how they had overcome it. Later, the participants understood the rationales and benefits of the MuFE IT information. Perhaps this highlights the importance of assessing patients’ needs before recruiting them. It is important to identify patients who can benefit most from the intervention.

Review by the review panel and development panel

The feedback received from the participants and inter-professionals team on MuFE IT pilot test 3 was reported to the review committee. The review committee agreed that the iterative process of drafting-reviewing-revising had reached a 'saturation point'. It was agreed that no further field testing was necessary at this stage. A total of 17 participants, were followed up one month post-intervention through phone calls and three months post-intervention via a focus group discussion.

Summary and conclusion

In conclusion, the chapter reported the systematic development process of the FPEI and MuFE IT through a consensus obtained from the development and review committees: needs of the older persons and HCPs; searching, selecting and synthesis of the evidence and theories; drafting, reviewing, and revising the FPEI. The development of the FPEI drafts underwent three cycles of reviewing by the older persons, inter-professionals team, review committee, and revision by the development committee. The feedback received from the participants and inter-professionals was discussed and a consensus achieved prior to revision of the draft. A total of 17 participants from pilot testing 1, 2 and 3 were contacted through phone calls for one-month post-intervention follow-ups. In the three-month post-intervention follow-ups, the participants were invited to a focus group discussion in the primary care setting.

4.5 Reporting of the preliminary findings of the MuFE IT pilot tests

This section reports the preliminary evaluation results of the MuFE IT pilot tests. Seventeen participants attended the three FPEI pilot tests at the primary care clinic, UMMC. The three pilot tests were conducted over three periods of time: 6th Feb 2015, 27th Feb 2015 and 18th March 2015 respectively.

The results reported in this chapter do not aim to provide a definitive answer to the research question. Instead, these are the purposes:

- To determine how the final analysis is conducted.
- To determine the trends in knowledge acquisition outcomes and explore factors of the MuFE IT that trigger behavioural change to take up fall prevention interventions.

This chapter concludes by summarising the preliminary findings and how these findings can help improve the conduct of an RCT in the future.

The CONSORT (RCT) statements were used to guide the reporting of the results of the MuFE IT pilot testing. The reasons to use CONSORT statements are these: firstly, they provide an evidence-based approach to reporting trial findings; secondly, they give an opportunity to conduct a real RCT after the completion of this study; and thirdly, the CONSORT statements have been adopted by many journals as the consolidated standard for reporting a RCT. The CONSORT statements for RCT were first developed and published in 1996, and were revised and updated in 2001. The CONSORT statements consist of the checklist and a flow diagram to report the results of a RCT. The Experts again revised and published the CONSORT statements in 2010 (Moher et al., 2010), with clear wordings and updated current recommendations. The current guidelines are used in this thesis to guide the reporting of the FPEI pilot tests findings.

The pilot test is a fundamental phase of an intervention. A pilot test can provide information pertaining to feasibility and report the changes needed in the design of a larger study (Thabane et al., 2010). Apparently, the UK Medical Research Council's complex intervention explicitly recommended the use of pilot test prior to a larger scale study (Craig et al., 2008). In this study, the main objective of the pilot study is to examine the feasibility of an approach intended to be used in a larger scale study (Leon, Davis, & Kraemer, 2011). However, in this study, the pilot tests were conducted as part of an iterative review and revision process in the development of the FPEI. The pilot tests were conducted to determine the preliminary feasibility to be used in a larger scale study, through receiving feedback from users on the improvement and accessibility of the content. Therefore, the MuFE IT pilot tests were evaluated using qualitative interviews and quantitative methods (knowledge checklist questionnaire).

4.5.1 Participants' flow diagram

The flow diagram in **Figure 4.4** shows the participant numbers as they progressed through each stage of the study: assessment for eligibility, recruitment, intervention, follow-up and analysis. The diagram also illustrates the number of participants excluded or dropped out of the study, together with the reasons.

Out of 42 participants who were approached, 20 agreed to enrol in the study, of which 17 were allocated into 3 pilot test groups, and they completed the study (n=4 in pilot test 1; n=7 in pilot test 2; and n=6 in pilot test 3). All study participants completed the one-month evaluation; however, only 13 completed the whole three-month evaluation.

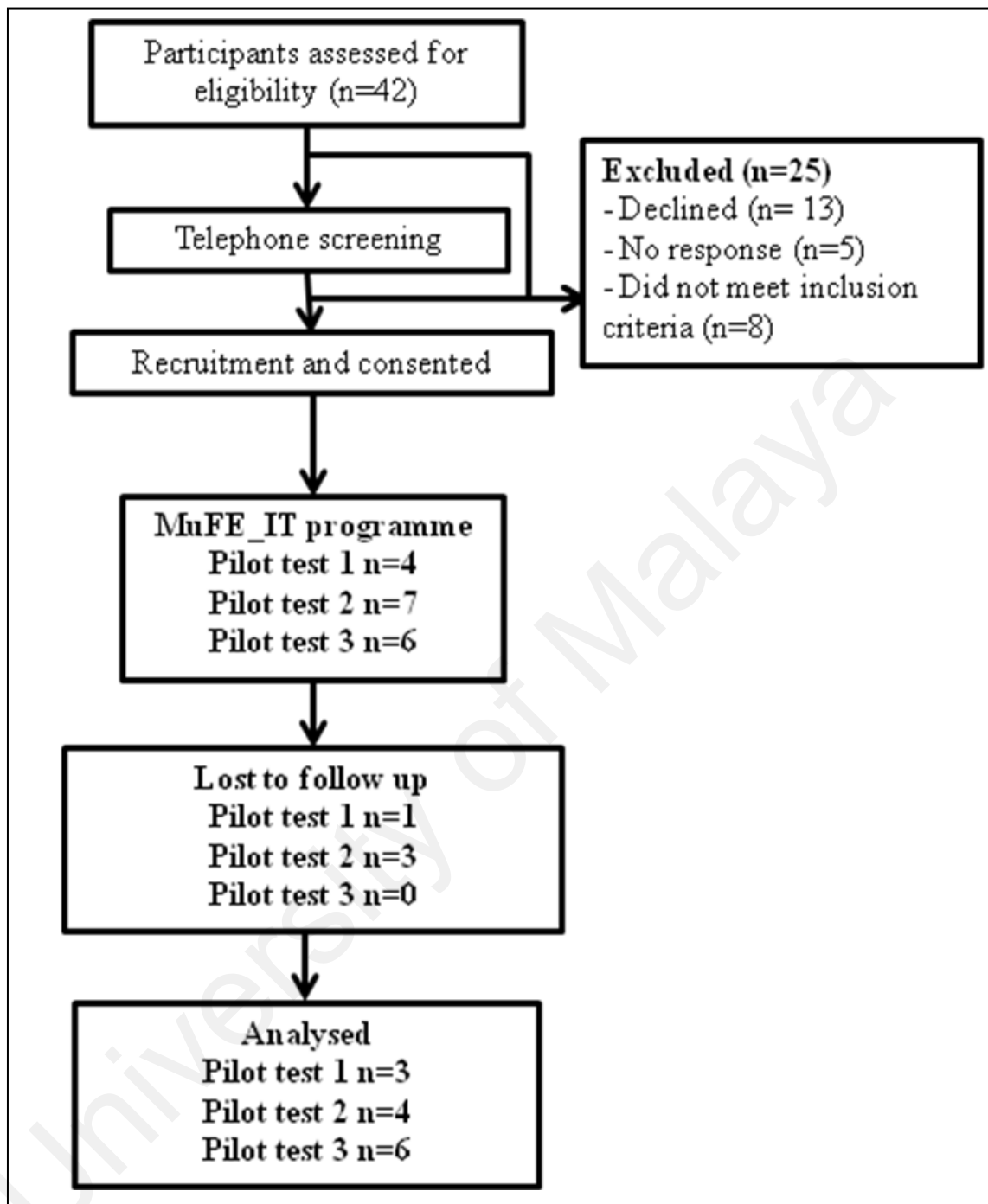


Figure 4.4 : Flow diagram of the progress of the participants through each stage of the study

4.5.2 Participants' profile details

The total number of participants of pilot tests 1, 2 and 3 were four, seven and six respectively. The older persons' adherence rates to the three-month post-intervention were 75% (pilot test 1), 50% (pilot test 2) and 100 % (pilot test 3). These are the reasons for the absence: 1 respondent from pilot test 1 was admitted to hospital (infectious disease); another two from pilot test 2 were on overseas trips with their families; and another one refused to participate. **Table 4.21** contains the baseline data of the study participants: fall history, fall related injuries, use of assistive device, medication number, older persons' cognitive assessment (ECAQ) and reading ability test (REALM). The participants' ages range from 63 to 83 years; there are more females (n=8); there is a mixture of three races (Malay = 4; Chinese = 5 and Indian = 4); some of them completed 12 years of education (n=7); some of them take > 5 types of medication (n=3); the majority of the participants use assistive devices such as glasses and walking aids (n=6).

Table 4.21 : Participants' socio-demographic details, falls profile, medication intake and usage of assistive devices

	Pilot test 1	Pilot test 2	Pilot test 3
Number	3	4	6
Demography			
Mean age (years)(range)	65 – 81	60 – 83	64 – 81
Gender			
<i>Male</i>	1	2	2
<i>Female</i>	2	2	4
Race			
<i>Malay</i>	2	0	2
<i>Chinese</i>	0	2	3
<i>Indian</i>	1	2	1
Completed education			
<i>University/college</i>	2	2	2
<i>Secondary school (12 years)</i>	1	2	4
Fall profile			
<i>Fell once</i>	1	3	4
<i>Recurrent falls</i>	2	1	2
Fall-related injuries	1	1	2
Number of medications			
<i>Taking <5 types of medications</i>	1	4	5
<i>Taking >5 types of medications</i>	2	0	1
Assistive devices (glasses or walking stick)	2	2	2

4.5.3 Participants' ECAQ and REALM scores

Table 4.22 shows the participants' ECAQ (cognitive level) and REALM (reading ability) scores. If the participants obtained a score of more than 19, this figure indicates good reading ability.

Table 4.22 : The participants' ECAQ and REALM scores

	Pilot test 1	Pilot test 2	Pilot test 3
Number	3	4	6
The range of older person Cognitive Assessment Score (ECAQ) (> 7 score for eligibility)	9-10	9-10	10
The range of Rapid estimation of adult literacy in medicine (REALM) (>19 score for eligibility)	54-60	54-60	60

4.5.4 Primary outcomes

The primary outcomes of this study are knowledge acquisition, changed behaviour and factors in the MuFE IT that trigger the behavioural change to take up fall prevention interventions among the study participants. These are the key outcomes of the preliminary evaluation of the MuFE IT. As falls analysis needs a minimum of 6 months' follow-up data, this pilot testing would not report fall analysis outcome at the time of post-intervention data collection.

4.5.4.1 Quantitative analysis: Knowledge

A total of 13 participants' scores of knowledge acquisition (mean and median) were measured at baseline, immediate post-intervention, 1-month post-intervention and 3-month post-intervention; if the participants scored 0%, it indicated that there were no correct responses; and if they scored 75%, it indicated that responses to all items were correct (Hakim et al., 2007). The same checklist was administered to all the time measurements. The knowledge acquisition scores were descriptively analysed using SPSS ver. 21. **Table 4.23** details the mean scores of the knowledge acquisition of the study participants at each pilot test. It was found that the scores of knowledge acquisition increased in the immediate post-intervention and 1-month post-intervention,

compared with the baseline knowledge acquisition scores. However, the scores of 3-month post-intervention were found reduced compared with 1-month post-intervention knowledge acquisition scores. The knowledge acquisition scores increased in the 1-month post intervention compared with other time of measurements. In one-month post-intervention, the participants' knowledge acquisition was evaluated via phone calls. Overall, the knowledge acquisition scores were found increased after attending the MuFE IT, compared with their baseline knowledge acquisition scores.

Table 4.23 : The knowledge acquisition scores of the MuFE IT participants

	Baseline	immediate post-intervention	1-month post-intervention	3-month post-intervention
Pilot testing 1 Mean±S.E (Median)	48±1.82 (47)	66.9 ± 3.96 (66.7)	67.7±4.4 (66.7)	60.6±11.2 (65.2)
Pilot testing 2 Mean±S.E (Median)	56.4±2.18 (55.3)	60.2±5.07 (58.3)	81.1±2.2 (81.1)	63.6±5.1 (63.6)
Pilot testing 3 Mean±S.E (Median)	66.7±6.3 (65.9)	70.5±4 (72)	74.2±4.3 (76.5)	72.2±5.9 (70.5)

Qualitative analysis

A total of 13 participants' views and experiences were explored three months after attending the FPEI pilot tests. A limitation of this analysis is that the participants from each pilot test received a slightly different intervention, and therefore the outcomes may be different. However, the difference between the interventions of the 3 pilot tests is rather minimal. The socio-demographics and fall profiles are detailed in Table 4.19 (Pg, 238). **Table 4.24** shows the four themes, which corresponded to the study participants' changed behaviour and factors in MuFE IT that influenced their changes, after attending the MuFE IT.

Table 4.24 : Emerged themes and categories from the MuFE IT participants’ interviews at three-month post-intervention

Theme	Categories
1. Creating knowledge	<ul style="list-style-type: none"> • Home safety and proper shoe wear • Environment safety
2. Protective behaviours to prevent falls	<ul style="list-style-type: none"> • Walking accompanied by a person • Exercise during Muslim prayer • Switch on the lights and hold handrail when using staircase • Replace old light bulbs at foyer • Organise living room furniture • Change to anti-slippery shoes • Remove bathtub
3. Reasons that triggered the behavioural change	<ul style="list-style-type: none"> • Simple and cheap • Devastating fall consequences • Shoe auditing by the primary care physician • Guidance on walking stick use • Medication auditing by the pharmacist • Benefits of physical activities • Guidance on auditing the environment • Motivation and support from peers • Rational recommendations from the professionals • Home hazards are avoidable
4. FPEI content and format issues	<ul style="list-style-type: none"> • Follow-ups • Social centre contacts • Otago exercise practice • Activity calendar use

Creating knowledge

Under this theme, two sub-themes were identified.

Home safety and proper shoe wear

The participants stated that they received sufficient information, such as home safety (e.g. cluttered toys, loose rugs, handrails in the bathroom, kitchen and stair case) and shoe wear (e.g. anti-slippery shoes, and avoid wearing sandals and worn out shoes). Before attending the MuFE IT, the participants never linked falls with home safety or shoe wear; for example, many felt that falls were caused by carelessness or it was inevitable as cited in the needs assessment study.

“Before attending the programme, I didn’t know that holding handrail, wearing wrong shoes and so on never occurred to me you know. So after attending the programme I am more aware and careful of that now.” [78 years old; Malay female; pilot testing 1]

Environment safety

The participants found that the information they received about safety when moving around in the house or other places had enlightened them to be careful in different situations: wet and slippery floors; when choosing walking pathways (e.g. cracked pathways, road humps or holes, tree roots, bunch of grasses); crowded areas; carrying too many things in the hands and stepping into the bus or motorcar. Many participants never connected fall hazards with poor environmental safety; instead, they blamed their old age and reduced capability to move around places.

“I have learnt how to prepare ourselves to move around safely in the house, garden, neighbourhood and on wet floor. It was really good; in fact I am glad that I have attended your programme.” [72 years old: Chinese female; pilot testing 2]

Protective behaviours to prevent falls

After attending the FPEI, many participants found the connections between falls and the risks factors in their surroundings. This awareness stimulates their thinking process in tailoring a protective behaviour to prevent falls. Under this theme, there are seven new preventive behaviours initiated by the FPEI participants in different circumstances. These are the new behaviours: walking accompanied by a person, exercise during Muslim prayer, switch on the lights and hold handrail when using staircase, replace old light bulbs at foyer, organise living room furniture, change to anti-slippery shoes, and remove the bathtub.

Walking accompanied by a person

One participant with vision impairment had an assistant to accompany her on her daily walks. Before attending the FPEI, this participant, after her cataract surgery, avoided walking as she was hesitant and of course scared of falling due to her previous fall history. Moreover, she also refused to be accompanied or use a walking stick, as she thought it might damage her self-image. However, three-month post-interview, she agreed she would do her daily walk with her niece or maid. This is because she realised the importance of safety while moving and exercising, and to prevent falls.

“I am more careful now. I had falls on the road and shophot areas. So I don’t walk alone now; I will have my maid or my niece to walk with me.” [76 years old; Malay female]

Exercise during Muslim prayer

Another participant stated that she did a simple stretching and balance exercise from the Otago exercise programme during her Muslim prayer (e.g. five times daily). She claimed that after sitting on the floor for Muslim prayer, it was difficult for her to stand up. Thus, she sat on a chair when she conducted her prayer. She tailored the chair exercise (sitting and standing while holding or not holding the arm of the chair) based on one of the Otago exercises during her Muslim prayer. Further, the prayer routine helped her to conduct her exercise unfailingly, five times a day. These exercises would strengthen her knee and the balancing.

“The exercise, getting from the chair without holding, yes I do that five times a day. I usually pray sitting on the chair, I cannot pray sitting on the floor. Praying time I do the chair exercise... five times a day (laughed).” [78 years old; Malay female]

Switch on the lights, and hold on to the handrail when using the stair case

Some participants admitted that they were reluctant to switch on the lights and hold on to the handrail of the staircase. In the FPEI, a section on good lighting and holding on to the handrail made them realise the high risk of falls. So, after attending the MuFE IT, they took heed of the study recommendations to hold on to the handrails and walk under good lighting, to avoid falls. They found that the study changed their thinking about the hesitance to hold on to the handrail when using the stair case.

“Last time, I never used to hold on to the banister. Now I am used to it. When I go up and down the staircase, the lights must be on, all the lightd.”[78 years old; Malay female]

Renewed old light bulbs

One participant claimed that the poor lighting condition of his home porch had cost him an injurious fall while he was looking for his cat in the dim light. The link between poor lighting and fall risks was highlighted clearly in the MuFE IT.

“Actually er..I mean, I tend to take things for granted. For example, my porch was without good light. It was spoiled quite long time ago. I thought it was ok like that. So, I continue to assume it was ok. But one day, I walked through the porch at night to look for my cat when I accidentally knocked into something and I fell. So, I mean, the programme has brought me the knowledge la... although they are all very common sense it does brought awareness la, because now I have changed a new light and fixed even more lights.” [72 years old: Chinese male]

Organise living room furniture and fixtures

In this sub-theme, two participants (husband and wife) explained their actions of reorganising and reducing the living room furniture, so there would be space for walkways; they also changed loose rugs to anti-slippery rugs. The participants never had such thought of removing or reorganising their home until they attended the FPEI; they learnt about the underlying causes of falls, such as loose rugs and narrow hallways.

“We have removed all those loose rugs, not too much furniture, move them to the side, more space created for walkways, you know.” [70 years old: Chinese female]

Change to anti-slippery shoes

One participant knew the high fall risk of wearing sandals after she had attended the FPEI; the first thing she did when she returned home was buying two new pairs of anti-slippery shoes for indoor and outdoor use. The primary care physician helped her to configure her fall problem by auditing the sandals she wore to the FPEI. The physician's action in detailing the auditing with a rational explanation enabled her to change her mind to buy new shoes.

"My problem is when I go out; I tend to fall, because I thought the road was uneven and the shopping complex with slippery tiles. After attending the programme, I bought shoes that now I always wear shoes, I don't wear slippers."

[76 years old; Malay female]

"Although I have an active lifestyle at the age of 81, the FPEI enlightened my understanding about my fall risk of wearing heels. So, now I wear anti-slippery socks and shoes whenever I go out and avoid wearing my heels."[81 years old; Chinese woman]

Remove bathtub

Two participants (sisters) related their experiences of removing the sunken bathtub from their bathroom. One of the participants explained that she realised her sister's and her risk of falls when taking shower, or when getting in and out of that bathtub. Even though the FPEI did not mention bathtub as one of the fall risks, the participant felt that the FPEI taught them to figure out the fall risk; they took action to remove it immediately.

“We have removed our bathtub. My sisters always claimed she experienced headache, and I don’t know what will happen if she is in the bathtub. Some more it is a sunken bathtub, attached, you know, quite dangerous to go in and out of that bathtub. I had a fall once in there.” [76 years old; Malay woman]

Reasons that trigger behavioural change

The participants expressed varied reasons for their changed behaviours to take up the fall prevention strategies. Although the participants have their own values and lifestyle, such as independence, good taste in designing interior home decorations and choice of walking stick, there are a few aspects of the FPEI that would trigger their thinking to take action to prevent falls.

Simple and cheap

One participant explained that she organised her furniture and removed loose rugs; she felt that was easy and cheap compared with house renovations and buying expensive rugs to prevent falls.

“I had made changes because it is simple, with less cost and less time, and I can prevent falls.” [70 years old; Chinese female]

Devastating fall consequences

Fall consequences are devastating. The participants, after attending the programme, were well informed of the risk factors and consequences, such as bone fractures in any part of the body. One participant explained, besides being careful at the park, he tried to avoid uneven pathways to protect him from a fall.

“Once you fall, you can break your hand, you can break your bone and you break your legs you know, so I become more and more aware of the need to be

careful. At the park, I am aware of the uneven walkways and I don't use that path because I don't want to fall." [72 years old; Chinese man]

"Lucky thing... I was not injured when I fell in the bathroom last time. But now I am more cautious because I know about fall, how falls can happen and the dangers to self from these falls." [64 years old: Indian female]

Shoe auditing by the primary care physician

The participants were very impressed and touched when the primary care physician audited their shoes during the FPEI. According to the explanation in the FPEI, risks of wearing worn out shoes, sandals and slippers are linked to injurious falls. Further, the close inspection and reasonable advice by the primary care physician impressed the participants, which would trigger an action to change their footwear to non-slippery shoes immediately.

"It is because I remembered in the programme, one of the doctors checked our shoes, and most of us were in slippers and sandals (laughed). He said that the sandals and slippers can cause trip, slip and fall, and toe injury." [65 years old; Malay man]

"It was so embarrassing (giggled)! The doctor held my shoes with his hands and said this is worn out already and further explained that this is a sandal type which can cause fall easily. The first thing I did after coming back from the programme was I changed my sandals to non-slippery type shoes." [65 years old; Indian woman]

Guidance on walking stick use

The participants have to overcome many obstacles to take up a fall prevention strategy, in particular the use of a walking stick. Walking sticks help balance the body while walking, but many participants refused to use it as they thought they were still young, and some of them never knew the proper way of using a walking stick. One participant appreciated the rehabilitation physician's guidance in using the walking stick appropriately; for example, raising the holder height to hip level, and stepping it along with one's footstep.

“Usually I don't take my walking stick for my morning walk; I refused it because I don't feel convenient to use it. I prefer my son to accompany me, if he wants to follow. In the programme, I was told to step it along with my own footstep and get a foldable type. Now I am practising to take my walking stick along with me for morning walk. It helps me to stay balanced even on uneven pathways. I just need to adjust its height according to my hip level and step it along with my own footstep. It helps me too when there was no one to accompany me for a walk.” [81 years old; Indian man]

Medication auditing by the pharmacist

Many participants praised the 'safe medication' session in the FPEI. The participants felt that the inspection of each participant's medication helped them to recognise their own medication. This medication inspection by the pharmacist had caused the participants to take steps in managing their medications: revise medication, stop counter medication and take meal before medication.

“The pharmacist told me that I am taking two types of drugs for gastric. So, the next day I went to a doctor and he revised the prescription. For the following visit I told my doctor about this new prescription, so he also agreed with the new prescription.”[76 years old; Malay woman]

“About that programme, to me the safe medication part really gave an impact. I became more disciplined to take my medication on time and, every time I was prescribed with a medication, I asked what the side effect is. Those days I won’t question, I thought..well if the doctor gave me, so I just go ahead. Now no more like that, take more precautions.” [65 years old; Chinese woman]

“I have avoided counter medication ever since the pharmacist told me about the consequences. I only take the prescribed medicine accordingly.” [65 years old; Malay man]

“I am taking about eleven medications. Sometimes, I forget to take breakfast before my medication. Sometimes, I totally forgot to take breakfast because I felt full after taking the medication. The pharmacist told me about the consequences of taking medication with empty stomach, now I make sure to take my breakfast before medication. I’m aware that if I don’t take breakfast and consume medication with empty stomach like last time, I can have giddiness and that can cause me to fall. Now I make sure I take my breakfast, or I wait till my breakfast is ready before taking the medications. That is how I adjust myself.”[81 years old; Indian man]

Benefits of physical activities

The rehabilitation physician confirmed that having mild muscle pain after some physical activities was normal. Further, it was recommended that the participants continued with their regular physical activities every day but in reduced volume. The

rehabilitation physician's personal confirmation about consequences of physical activities received good response from the participants; one participant started to intensify her daily walks.

"Due to my knee pain, I don't go for regular walk. I was examined by the doctor (Rehabilitation physician) during the programme, and she told me that my muscles are still strong. I am more confident now. I continue spending more time walking now, so that I can strengthen my knees and muscle." [65 years old; Chinese female]

Guidance on auditing the environment

The participants felt that the way inter-professionals kept emphasising the issues of focusing and auditing the environment captured their good attention; for example, watch out for wet floors, wires, loose rugs, staircase edges, curbs, and broken surface or holes in pathways. The participants felt that they were more alert to their surroundings after the talk.

"Usually, I am not so focus la..but after attending the programme I become more focus. I audited my environment, my home and outside. Recently, I went on a tour, where I nearly had a fall. I tripped. I started to analyse the environment there. The lighting was good, when I walked down the staircase, I recalled my previous experience of tripping even before I attended this programme and it was not because of my eyesight. I am glad the programme had taught me of the prevention strategies and finally I found it was my right knee, which is weak and gave away when I walk. So, now I am attending medical examination for the treatment." [65 years old; Chinese female]

Motivation and support from peers

The small group setting had created room for discussion and sharing of experiences among participants. In the FPEI, the participants motivated and encouraged one another, such as conducting daily exercise. One participant was encouraged by his peers to do cataract surgery as he complained of his blurry vision. In fact, that peer sharing encouraged the participant to undergo a cataract surgery and had his cataract removed.

“My activities were restricted a lot because of my poor eyesight. But after I attended the programme, I realised how good it is to be active. When I hear my peers sharing their experiences about their active participation in daily activities and exercises at the age of 81, why not me? I am only 65. But I was scared of the surgery actually, but I had removed it one month ago. Surely the appreciation goes to my group peers and this programme for creating such opportunity. Now I feel more confident to go out.”[65 years old; Malay man]

Another participant emphasised that she had enough courage to approach anyone in the scene to help her cross the road or climb the staircase. Crossing the road at the Zebra crossing or pedestrian crossing was encouraged in the FPEI to prevent falls. Some participants were enthusiastic and shared their experiences of using pedestrian crossing or seeking help from someone who intended to cross the road. This indeed played a role in urging other older participants to use pedestrian crossing or seek help from others to hold their hand to cross the road.

“Nowadays, when I cross a busy road, I don’t feel shy to ask any person who is going to cross, like I ask him/her ‘can I hold your hand, please help me to cross.’ Or when going up the staircase if there is no banister and if I see a person ‘you don’t

mind if I hold your hand' they will be stranger I don't know, I think the programme has helped me to stay confident to avoid falls."[81 years old; Chinese female]

Recommendation from the professionals

The inter-professionals' recommendation on activities such as gardening, removing loose rugs, and fixing hand rail received good feedback from the participants. One participant had changed her floor mat. The participant felt that the inter-professionals' recommendations boosted her confidence, and that led her to change the kitchen mat immediately.

"Of course I was aware the loose rugs in my kitchen would have caused my falls, but it never occurred to me you see to change that mat. I would rather say that my self-confidence has improved after attending your programme. The doctor who gave the speech on home safety really gave me the confidence. I am sure you know that I have changed the floor mats and fixed handrails in my house you know confidently, that it will prevent me from falling."[70 years old; Chinese female]

Another participant stated that the recommendation from the inter-professionals had indeed encouraged her to do her gardening. Gardening was listed as one of the recommended physical activities; it was something one could do independently while staying safe from falls.

"After attending the programme, I was motivated to do gardening (laughed). Last time I only used to watch people do gardening. Now, I have planted flower plants and trying to do more."[78 years old; Malay woman]

Being careful and focus on fall hazards

On the other hand, one participant felt the fall prevention strategies, like changing loose rugs, and fixing handrail in the bathroom or stair case, were unable to prevent one from falls. Thus, one needed to take precaution and be more careful and vigilant.

“The intervention was good and informative. However, fall is very basic and common sense and by being careful one can avoid it. I don’t think you need to fix handrail, change rugs, or avoid uneven pavement as they are difficult to avoid, you know. I have already been careful for long with these things (home hazards), I know how to live with it and I am living with it.” [77 years old; Chinese man]

Besides, another participant was delighted to inform that he had been following similar fall prevention activities as recommended in the FPEI, such as exercise and maintaining a healthy lifestyle. However, he refused to accept the fact that he should remove home hazards. He further informed that there was no guarantee one could avoid falls by removing or changing home hazards, because the older persons were aware of the presence and had lived with these hazards, and they should know how to be careful to avoid them.

“No I didn’t change anything. I am already greatly motivated to be active, to take care of my health, passion about having healthy lifestyle. However, I have just been able to confirm that whatever that I have been doing is correct. You have taught us the similar information. So, now I am confident enough to continue whatever that I was doing. It’s just I didn’t follow changing the home style because I am confident that I can avoid them.” [77 years old; Chinese man]

“The loose rugs and other things is not a new thing for us. We know how to be careful and avoid them. I don’t think it is necessary to change la. But changing this

and that something that you already used to it, is not necessary la I feel.” [77 years old; Chinese man]

FPEI content and format

The participants raised various issues regarding the FPEI content and format, such as follow-ups, social centre contacts, Otago exercises and activity calendar as given in the booklet.

Follow-ups

The study participants expressed varied opinions about contacting participants through phone calls and focus group discussions. Follow-ups are important after conducting a fall prevention intervention; they help participants to recall what they have learnt during the study, guide them to follow the recommendations, and improve knowledge in the prevention of falls. Some participants preferred phone calls; it was because phone calls enabled older participants to solve many problems without having to attend the site visits, which was a problem to them due to issues related to transportation, heavy traffic, parking, and cost. Some participants preferred discussions in a group; they could share their thoughts and solve problems through face-to-face discussions.

“It (the phone call) was convenient for me rather than attending the visit in the hospital. Now technology is there so just great.” [70 years old; Chinese woman]

“I prefer this way (home visit). Sometime with the phone, because I am still new to the phone so it is very difficult.” [76 years old; Malay woman]

"I prefer meeting and discuss like this rather than phone call. Yeah because if you don't understand you can ask directly and get some clarification, but phone I don't think it is convenient to ask many questions." [72 years old; Chinese man]

"I am still illiterate on the usage of phone, so I don't think I would like to use it." [76 years old; Malay woman]

"If I have another hospital appointment, I don't mind to drop by for this appointment but otherwise just for group discussion, I don't think I will take the trouble because it is quite troublesome to travel at this old age." [78 years old; Malay woman].

Social centre contacts

In the FPEI, the social centre contacts were included on the last page of the booklet. The senior social centres provide interesting weekend activities, such as group exercises, vacation, health talks and short courses. Involvements in these activities enable the older persons to improve their self-efficacy in the prevention of falls; mingling and socialising improve liveliness and movement in a safe environment, and they can live a happy ageing life and prevent falls. Furthermore, the older persons can occupy their weekends by attending activities organised by the centres, such as group vacation, games, talks and workshops. According to the participants, they felt that their weekends were normally occupied with the presence of their children and grandchildren, attending church activities, settling household matters, clubbing, catching up with friends and family vacation. There were also participants who never found time to contact the senior centres, while other participants found that the centres were slow in processing their application.

"I couldn't contact the social centre near my place. Another centre I contacted, no reply yet though it has been one month since I have applied." [78 years old; Malay woman]

"Saturday and Sunday usually I spend time with my children and my grandchildren you know rather than going to social centre or involved in weekend activities." [70 years old; Chinese woman]

"The phone chit chatting and travelling and meeting up with friends were part of my lifestyle during weekends and holidays. Through these, I can keep myself updated. But the social centre here quite slow moving." [72 years old; Chinese man]

"I am already involved in 6 clubs and I usually participate in the weekend activities arranged by the clubs. I used to go for tour and visits and charity functions. I don't know what is happening in the social centres." [81 years old; Chinese woman]

"I have my church activities. I am fully involved and my time is fully occupied there. I have never contacted the social centres." [65 years old; Chinese woman]

"I just do my normal work la, housework and mopping, washing and taking care of my grandson. Where got time to contact these social centres." [65 years old; Indian woman]

Otago exercises

The simple Otago exercises are illustrated in the booklet; the participants can follow the simple steps indoors and outdoors. These exercises are beneficial to improving balance and muscle strength. Some participants practised them because they were simple, easy and convenient; and they could do the exercise at any point of time, such as

during Muslim prayer. Some others felt that the Otago exercises were not robust and they preferred other exercises, such as Tai Chi, line dance, aerobics and Qigong.

“Last time, I never did exercise. Now, I do exercises follow the exercises tips given in the programme booklet. I also do sit ups during praying times, because it’s simple.” [76 years old; Chinese woman]

“This exercise given was quite simple. I have been doing all these kinds of exercise. I do a lot of line dancing; I attend line dancing classes on Tuesday and Friday. So, I do a lot of exercises in the sense that, and I do little bit of Tai Chi, you know.” [70 years old; Chinese woman]

“I have not practised those. I continue with my own routine. As I said to you, the exercises and their benefits should be highlighted. The exercises in the booklet appeared to be very passive. Very mobile seniors like me prefer to engage in robust activities for the moment.” [66 years old; Indian man]

“I do slower Tai Chi, Qigong and some other slower exercises. Sorry, I didn’t follow the one given in the booklet.” [81 years old; Chinese woman]

Activity calendar use

The participants were advised to actively write down their daily activities, including exercises, gardening, travelling, household activities, weekend activities and fall events in the activity calendar. This way of recording activities enabled the participants to improve their self-efficacy, self-motivation to have active days, and prevent further falls. Some participants did just that, while many hardly wrote anything. The reasons or excuses given are: forgotten, no time, not feeling well and no point. Some participants

felt they needed a reminder, or reemphasis the need to fill in the activity calendar during the follow-ups.

"I used that calendar to record my activities. It keeps me reminded about my activities done for that week and if I don't do, I get the urge to do. So, it keeps me reminded about my activities." [81 years old; Chinese woman]

"I use the booklet as reference only, I didn't write anything on the activity page. I got to admit this, you know." [65 years old; Malay man]

"I used to fill each and every day on what activities I do. Since the space given is little, so I write it briefly. But after sometime I stopped it. May be you need to reinforce it to us to continuously (laughed)." [78 years old; Malay woman]

"I have written thoroughly. But for the past couple of days I didn't write because I was not feeling well." [76 years old; Malay woman]

Summary and conclusion

This chapter provides a preliminary analysis of the results of the pilot tests at three-month post-intervention. Only three, four and six participants were included in the result analyses of pilot test 1, pilot test 2 and pilot test 3 respectively. Due to the small sample size, the results are not intended to be used to draw any conclusion about the effectiveness of the FPEI; rather, it is to demonstrate the use of quantitative and qualitative methods in analysing the trends of the primary outcome (knowledge) and emerging themes in the qualitative analysis.

All the participants in the MuFE IT pilot tests had increased knowledge compared with the baseline data. The scores of knowledge improvement among the participants in the three pilot tests varied; it was due to the participants' different education levels and

varying extent of involvement in the MuFE IT. Some participants still insisted that falls are a common occurrence; and it was inevitable to prevent falls through fall prevention activities. On the other hand, in the qualitative analysis, the participants took various protective behaviours to prevent falls. Some participants tailored the fall protective behaviour to their needs based on their fall risk conditions to prevent fall.

After attending the FPEI, the knowledge scores and behavioural changes among the participants were found encouraging. This implied that the participants changed their behaviours as a result of the knowledge acquired in the MuFE IT. The knowledge scores of the baseline data after attending the FPEI were not analysed using the Repeated Measure ANOVA or Pearson Correlation due to very small sample size. However, in the qualitative analysis, the themes appeared to support the scores of knowledge gained, the changed behaviours and the factors that triggered their change. Moreover, there was a trend suggesting that the participants who were involved in the MuFE IT pilot tests were more convinced of their decision to take up fall prevention strategies to prevent falls. These were some issues encountered by participants involved in MuFE IT pilot tests: some participants were so occupied with home commitments and other routine activities during the weekends that they did not contact the social centres; some participants practised Otago exercise, while some participants found it passive, and they continued with their own form of exercises. Few utilised the activity calendar and medication plan. This implied that the MuFE IT utilised both phone calls and focus group discussions for follow-ups; contacting or attending activities in social centres can be done during weekdays; and the Otago exercise can be done while watching TV or even attending long-hour meeting. Meanwhile, the activity calendar can be used as a diary. However, the three-month knowledge score dropped compared with the one-month score. This could be due to the two months gap after the first follow-up

at one month. There was only one participant who disagreed to modify the home hazards, although he agreed that the programme was informative.

In conclusion, the preliminary findings seem to suggest a favourable trend of MuFE IT in terms of improved knowledge, with reasonable uptake of fall prevention strategies; the participants' adherence rate of 100% was achieved in pilot test 3. All these were achieved within the usual period of a hospital appointment in general practice. These preliminary findings need to be confirmed with a greater sample size at a randomised trial compared with usual care.

4.6 The Final FPEI: MuFE IT

The next phase of development of the FPEI involves a randomised controlled trial (RCT) pilot test based on the UKMRC framework. The final FPEI (Figure 4.3, Pg, 217) is an end product evolving from an iterative review and the following revision processes:

- Drafting of the FPEI (content and format)
- Feedback from the older persons and HCPs (interviews and questionnaires)
- Review by the review committee and reaching a consensus
- Revision of the FPEI

The final FPEI's content comprises PowerPoint presentation and a booklet (as can be found in the appendices V-Z). The FPEI format is driven by Bandura's Self-efficacy theory and Gerogogy principle through the inter-professional team, small group, single visit, phone calls and focus group discussions.

4.6.1 Content

The FPEI content is divided into two main sections:

- PowerPoint presentation
- Booklet

PowerPoint presentation

The content remains the same after three consecutive pilot tests, as all the pilot tests feedback found the content clear and balanced. This section aims to provide essential information about falls and the prevention strategies answering four key topics: ‘What is fall and prevention?’, ‘How to move safely and prevent falls?’, ‘How to prescribe medication safely and prevent falls?’, and “How to keep home and environment safely and mingle in the society?” The key topics are divided into sub-topics with brief explanations supported by photographs captured in the local setting. An HCP was assigned to present a key topic based on their specialties; for example, a primary care physician was assigned to deliver a lecture on the key topic of ‘fall and prevention’; a rehabilitation physician on ‘safe moving and fall prevention’; a pharmacist on ‘safe medication and fall prevention’; and a lifestyle advisor on ‘safe home, environment and socialise’. The selections of information in the PowerPoint slides were determined by evidence, needs as cited in the needs assessment study, and endorsed by the review committee. The clinical fall prevention guidelines from WHO, NICE and AGS/BGS were also used as a guide and basis of the evidence information in the slides (Kenny et al., 2011; NICE, 2013; WHO, 2008).

What are falls and preventions?

This section provides information about how falls are defined and prevented using evidence based on fall prevention strategies; for example, safe ageing, using proper walking devices, wearing proper shoes, choosing proper food; conducting suitable exercises that are appropriate for body flexibility, capability, strength and balance; reviewing medication often; removing and fixing home hazards and a healthy mental state via social interaction.

The older persons have experienced falls and are experienced in managing falls. Therefore, prevention of falls among older persons needs an understanding of the root cause of their fall problems. In this section, the older persons were given a brief introduction on fall definition, main fall risk factors, and fall prevention strategies. A primary care physician facilitated this section, and these are the objectives:

- To understand that others have falls and that there is a range of risk factors why we may fall
- To recognise the importance of exercise, proper shoes, removal of home hazards, balance diet and happy ageing for preventing falls

The section started with a question, ‘What is fall?’ According to Lamb et al., a fall is defined as an unexpected event of coming to rest on the ground, floor or lower level (S. Lamb et al., 2005). Furthermore, global and local rates of fall prevalence are described using pie charts:

- Global fall rate is 30%.
- In UMMC, the Malaysian fall rate is 47%, and the rate of fall-related injuries is 60%.

In this section, the risk factors for falls are explained through a question, ‘what causes falls?’ and the answers given are home hazards, environmental hazards and medical problems. Each listed cause is explained using photographs; for home hazards the causes are poor lighting, wet and slippery floor, loose rugs/wire/cord, and cluttered toys. On the other hand, the examples of environmental hazards are crossing the road, walking in a crowded area, stepping into the bus and walking on an uneven pathway. In addition, fall risk factors pertaining to medical problems are diabetes, vision problem, hypertension/cardiovascular disease and hearing problem.

To start the discussion on fall prevention strategies, a question, ‘how to prevent the fall?’ was raised. The participants were allowed to share information and feedback, and they discussed them in the group. In this section, the value of choosing a safe ageing life was explained as the way to prevent falls. The safe ageing information was illustrated using a photograph of a happy older man resting on his farm. Psychologically, the photograph was assumed to give a positive impression to the older participants and encourage them to change behaviour to uptake fall preventions. In addition, the facilitators explained some aspects of how to choose ways of safe ageing: using proper and convenient type of walking aids for safe and easy walking, putting on proper footwear and eating a balanced diet. More explanations were given: wearing proper shoes protects feet from injury, gives comfort to the feet and stimulates good blood circulation. This can prevent a fall due to feet numbness or avoid injury resulting from a fall. For example, the body is in a state imbalance when a person wears slipper, high heels and unfit sandals; and this can be a cause of falls. The primary care physician recommended choosing shoes that could protect the feet and give balance. Eating well was explained in this manner: taking a variety of food but in small portions; including different types of food in daily diet, such as dairy products, fish, eggs, cheese, vegetables, fruits and breads. The purpose of taking a variety of food was explained: to

give energy, healthy mental and physical strength and avoid malnutrition; and with good physical strength and mental health, the older persons can avoid falls. This section also listed the types of foods that should be avoided: salt, fat, sugar and alcohol (anyone who consumes only); these unhealthy foods can cause medical problems such as diabetes, hypertension, cardiovascular problem and others, which may lead to a fall. Lastly, it ended with a photograph of an older person happy with her family members, and a tagline that stated ‘Safe ageing! You can prevent falls!’

How to move safely and prevent falls

In this section, simple and practical exercises were illustrated in the slides. In this section, some daily activities were listed: indoors such as cooking, cleaning; and outdoors such as gardening, getting medication. The purposes of this section are as listed below:

- To recognise the barriers and benefits of regular exercise and safe moving.
- To improve moving by conducting simple and practicable exercises in the home, outdoors, or joining an exercise group.

Firstly, a question, ‘what is safe moving?’ was raised in this section. The rehabilitation physician defined it as ‘keep moving with safety’, and ‘moving action is no more automatic’. Therefore, the facilitators kept emphasising safe moving as an important way to avoid falls.

Further in this section, safe moving was classified into staying independent and staying active. A photograph of an older person cooking was illustrated as a picture of staying independent. The participants were asked to give more examples of staying independent. To add to the examples given by participants, the facilitators gave other examples, such as watering the plants and gardening. The participants were encouraged

to recall a similar example of staying independent outdoors; another example was collecting their own medication from the pharmacy.

Another way to practise safe moving was staying active by conducting simple and practical indoor and outdoor exercises. For example, simple stretching and balancing exercises were explained to the participants, supported with photographs of an older woman doing exercise. However, the participants were advised to tailor the exercise to their needs based on their capability. An example of conducting simple outdoor exercises was brisk walking and stretching exercise in the park. These simple exercises were able to build muscles, improve balance, increase flexibility and enhance breathing, and relief muscle pain and sores. Eventually, the effects of exercises will show up in a stronger and healthy body that can prevent an older person from falling.

Another action of staying active was joining an exercise group. A photograph of an older person doing Tai Chi was illustrated in this section. Other types of group activities were explained: walking in a park, joining aerobics, and jogging. Lastly, the key topic on safe moving came to an end, supported by a photograph of an older person riding on a bicycle, and with a tagline stating 'safe moving, save you from a fall!'

How to prescribe safe medication and prevent falls

In this section, medication review was elaborated, as medication plays an important role in older persons who have multiple co-morbidities. However, medications taken in large quantities produce side effects, which often cause falls in older persons. Therefore, in this section, a pharmacist explained the proper way of taking medication and the possible side effects. These are the purposes of this section:

- To identify own medications
- To understand the consequences of taking multiple medications

In this section, a question arose, ‘what are your common medications?’ The session paused for a while so that the older persons could respond to the question. After listening to the older persons’ answers, the pharmacist repeated their answers while stating the examples of medications, such as blood pressure, diabetes, cholesterol, painkiller and sleeping pills that may cause falls. The side effects of medications were explained in this section. The pharmacist explained that taking multiple types of medications could lead to interactions between the medications. This caused dizziness, feeling of nausea, numbness, blurred vision, and can cause a fall. Another type of effect from medications was taking it wrongly as explained in this section. The pharmacist explained the different aspects of medication that can cause falls: taking wrong medicines, timing of medication, storage of medication, appropriate meal intake for certain diseases. In this session, the participants were encouraged to spot the chances of getting side effects from a medication and how it triggered a fall; for example, the action of taking a wrong dosage of medication, high or low, may lead to the consequences of blurred vision and dizziness, which can cause falls.

The effect of taking number of medications was explained in this section. In the slide, polypharmacy was defined as taking more than five types of medications. Taking more than 5 types of medication, especially a combination of psychotropic, antidepressant, antipsychotic, has a two-fold increased risk of falls and fractures. In this slide, the pharmacist drew the participants’ focus to what could be done for medication-related problems. The pharmacist explained the annual medication reviews with pharmacist and physician: monitor side effects and proper dosage; and avoid taking counter medication without proper prescription.

Besides reviewing the medications, the pharmacist audited the participants’ medications; the participants took part to review their own medications (mastery of

experiences). The pharmacist then suggested using a medication plan. At the end of the session, the pharmacist helped the participants to draw up a medication plan. The section explained how medication plan could help the participants to reduce the side effects and falls. The medication chart template explained the proper planning of taking medications. This way of planning enables the participants to resolve medication issues: wrong medication intake, too many medications intake, interaction between medication and side effects that can cause falls. Lastly, the section ended with photographs of an older person checking medication in a pharmacy, with a tagline stating 'safe medication can prevent falls'.

How to keep home and environment safe and mingle in society

Some examples of home hazards and the modification were explained in this section. Photographs of home hazards modification, such as, fixing handrail in the toilet and shower room, laying non-slip mat, sticking floor level indicator tape and fixing more lights were included. The environmental hazards, such as crossing road, stepping into a bus and walking on uneven pathway, were illustrated using locally taken photographs. The environmental hazards were preventable by choosing pedestrian crossing to cross the road, choosing the safe pathway, and raising legs higher to the height of the bus steps while holding the handrail. These activities of modifying fall risks help older persons to increase self-efficacy to conduct indoor and outdoor activities safely, and they were explained in this section and the objectives were:

- To raise awareness of the type and range of fall hazards in and about the home
- To be able to recognise hazards in one's own home and suggest adaptations to reduce home fall hazards.

Safe home, safe environment and social interaction are fall prevention strategies, which are covered in this section. Modifying fall risks, such as home hazards, environmental hazards and loneliness, enables older persons to prevent falls. The stable physical and psychological states are achieved through removing the fall risks.

In an example of safe home, a photograph of fixing a handrail in the bathroom was shown. The speaker drew the participants' attention to how the fixed handrail solved the fall problem. And then the benefits of fixing a handrail in the bathroom were explained, such as holding onto the hand rail while taking shower, and to sitting down and getting up from the toilet bowl. Other locations one could fix handrails were doorway, staircase and exercise area; these were explained in this section. Another example of keeping home safe was explained in this slide; fixing the slip resistance tape on the doorway, edge of staircase, and curb which could prevent falls were illustrated using photographs. The florescence coloured tapes easily distinguishable between two different edges or surface levels can assist in the prevention of falls. Fixing a non-slip mat was explained as another way of keeping the home safe. The benefit of fixing non-slip mat in the kitchen, bathroom and doorways reduces falls, improves confidence and reduces fall-related injuries; these were explained in this section. Other than that, changing to good lighting, such as fixing more lights in the porch, staircase and store were explained; the benefits of improving vision reduces fall, and providing easy access to the bathroom at night were also explained.

In this section, ways of choosing a safe environment were explained. Choosing a safe pathway, away from cracks, humps, holes, grass and lonely roads, reduces falls and improves confidence. Choosing a pedestrian crossing when crossing the road, seeking help for crossing the road when it is not safe to walk or cross, were explained in this section. Safe stepping into a bus was illustrated using a photograph of an older woman

stepping into a bus; raising legs higher to achieve the height of the steps and holding onto the hand rail and being aware of the steps heights are very much safer and can reduce falls, were shared in the group. The benefits of road crossing using the pedestrian crossing were explained; such habit reduces fall. The road users are generally attentive to pedestrians crossing at pedestrian crossing compared with those areas without pedestrian crossing. The older persons can reduce falls by choosing to cross a road using the pedestrian crossing. Being active in social life enables people to keep their mind and body healthy; this was explained in this section. A photograph of an older woman with her grandson explaining the benefits of social interaction was shown; social activities can modify her loneliness risk. Moreover, catching up with friends over the weekend gives better mental focus and stable psychological state; this was explained in this section. Social interactions with peers, friends, children and grandchildren, widen the thinking scope and reduce falls; these were explained too. Lastly, a photograph of a family having meals together was shown; such family activity brings positive vibes and motivates older persons to avoid falls.

Booklet

The booklet covers six main fall prevention strategies, simple stretching and balance exercise (Otago exercise), medication planning template and activity calendar. The booklet also encloses the community senior centres' contact details. Each component justification is given in Section 4.3. The booklet was prepared as a review of key messages of the FPEI. It is handy as all the documents are compiled in one booklet. The organisation of the content of the booklet is in such a way that it guides the older persons to go through the contents and they can share with their friends or relatives. This is encouraging and will help in them in learning the fall prevention strategies.

In the booklet, six fall prevention strategies are explained: safe ageing, safe moving, safe medication, safe home, safe environment and socialising. The simple six fall prevention strategies are explained using photographs: safe ageing and staying happy by using proper footwear, walking stick, spectacles and hearing aids; safe moving by conducting simple stretching and balance exercise and staying active; safe home by checking home hazards (e.g. wire, toys, lighting and slippery floor) and modifying the home (e.g. non-slip floor mat, hand rails & good lighting); safe medication by reviewing medication with a pharmacist for its side effects and over prescriptions; safe environment by choosing safe pathway, safe stepping into the bus or motorcar and using pedestrian crossing; socialising by sharing and seeking information (e.g. internet, social network, exercise group); and participating in leisure activities and social functions.

In the second part of the booklet, seven examples of simple exercises are explained with short sentences. This information was adopted from OTAGO's seven selected simple and practical exercises: head movement; sit to stand with armrest; sit to stand without arm rest; calf-raises and hold; side hip strengthening; back knee strengthening; and ankle movement.

In another section of the booklet, a template of medication plan is included for the participants to fill in their own medication schedule. By doing this, the participants are able to recognise the type of drug and the timing it should be taken. This may reduce overdose and missed medication.

An activity calendar of 12 months of the year 2015 is included in the booklet. The participants can use the activity calendar to write any activities that they have conducted every day; for example, cleaning, cooking, gardening, simple exercises (as advised in the exercise chart), contacting community centres for weekends activities, attending social functions, events, joining exercise groups and seeking help for falls.

Lastly, the contact details of senior community centres, activity centres and the FPEI development committee are included on the last page of the booklet to encourage and motivate the participants to contact them.

4.6.2 Format

The content of the FPEI is driven by Bandura's self-efficacy theory and Gerogogy principles to provide convenient learning environment to older persons. To fulfil the key concepts of the theories, evidence findings and needs as cited in the older persons' and HCPs' needs assessment study, an inter-professional team, single visit, small group, phone calls and focus group discussion were involved in the conducting of the FPEI.

The facilitator's role (inter-professionals team)

The HCPs were selected from different specialties to cover the key topics of the PowerPoint presentation. The selections of the inter-professionals were based on the older persons' first entry to a primary care clinic and further referral to other specialties. Firstly, an older person will meet a primary care physician; and then he is referred to a rehabilitation physician for advice on exercise; then to a lifestyle advisor for home, environment and social care advice; and lastly an older person will see a pharmacist. The older persons were properly guided through comprehensive PowerPoint content on each key topic. Through this phase, the older persons were exposed directly to the HCPs' role, and they might accept referrals to these specialties, such as rehabilitation and occupational therapy. The HCPs reviewed and revised their slides on key topics, and they attended a briefing on how to conduct quality facilitating using theories. The key principles of the Gerogogy and Bandura's self-efficacy theory were explained to the facilitators during the briefing; the key messages include being good listeners, well organised, positive and knowledgeable about falls prevention. They attended the

briefing before every pilot testing. Moreover, the facilitators' role was central to the functioning of the programme. After their session, feedback was provided, focusing on what worked and what they could do differently next time.

The falls are caused by multiple fall risks, such as home hazards, environmental hazards and medical problem. Therefore, the HCPs who are experts in that field of fall risks were selected to deliver the PowerPoint presentation. In this case, a primary care physician was chosen because he was in charge of screening older persons' fall problems and making appropriate referrals; the rehabilitation physician was chosen in this section because the older persons with physical impairments were sent to him or her for coaching on proper way of movement. This is the reason why a rehabilitation physician was chosen to deliver a section on safe moving and preventing falls. The pharmacist was an important person in supplying medication with whom older persons were constantly in contact. The pharmacist was responsible to describe the dose, timing and side effects of the drugs prescribed by the physicians. Therefore, a pharmacist was chosen to deliver the section on safe medication. Lastly, a lifestyle advisor was selected to deliver the older persons' social lifestyle. Though medical factors could cause older person s' falls, their social life was given attention in this section. The lifestyle advisor gave talks on general modification in the house; at the same time, the older persons must be aware of the environmental conditions when conducting outdoor activities; they should also be involved in networking with friends and activities organised by senior social centres.

Small group

A small group allows participants to have dynamic sharing and interaction with other participants and the speakers; the participants were encouraged to ask questions, and they were asked questions in return. The speakers gave practical examples in the context

of the individuals' personal situations; there was authenticity in personal experiences, and that provided a basis for building a trusting relationship between the speakers and the participants. In addition, the participants paid more attention when they were addressed directly. Drawing the participants step-by-step into a conversation has an empowering effect that promotes the desired 'self-efficacy'.

Phone call

In this section, phone calls were used to contact study participants for follow-ups. The researcher was assigned the duty to contact study participants at 1-month and 3-month post-intervention. The knowledge of the participants contacted at 1-month post-intervention was assessed using the knowledge checklist with 66 questions and answer was 'yes' or 'no'; the questions were related to fall risks and fall prevention strategies in the house, environment, medication and medical problems. The duration of a phone call was between 10 and 20 minutes for each participant.

Focus group discussion

In this section, a focus group discussion (FGD), an intended part of this intervention was formed to get feedback from the study participants immediately, and 3 months after attending the FPEI pilot test and as part of data collection of the assessment. The FGD provided group interaction, which encouraged participants to explore and clarify individual and shared perspectives. In-depth interviews were conducted with those participants who were unable to join the focus group discussion. The attendance to the FGD was not obligatory, but participants were offered an opportunity to discuss their experiences they had while acting on the intervention recommendations that were emphasised during the MuFE IT intervention. Successes and failures were discussed in terms of self-reporting. In some conditions, visit experience helped participants to

improve self-efficacy to express their experiences while taking up fall prevention activities. The visit 1, acted as a repeated stimulus for intervention participants to update the intervention recommendations.

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CHAPTER 5: DISCUSSIONS

This chapter aims to summarise and explain the key findings from the development of the FPEI and its preliminary evaluation. At the end of this chapter, the limitations and strengths of this study are discussed.

The outline of this chapter is as follows:

- Interpretation and implications of the key findings
- Limitations and strengths of the study

5.1 Research questions

1. How to develop an FPEI based on needs, evidence and theories for community-dwelling older persons with a high risk of falls?

It is feasible to use the UKMRC framework to develop the FPEI based on users' needs, evidence and theories; the framework inclusive of an iterative development process forms the basis of choice of research methods and evaluation. Again, the evidence provides an evidence-based guidance for the FPEI content development; the older persons' needs form the basis of the selection of the fall prevention intervention, and the theories (Bandura's Self-efficacy theory and Gerogogy principle) provide a theoretical framework to guide the flow and format of the FPEI.

2. What is the acceptability of the MuFE IT in improving the knowledge and behaviours among older person with a high risk of falls?

Based on the preliminary results of the MuFE IT, knowledge acquisition and behavioural change improved compared with the baseline data. The changed behaviours and the underlying reasons were qualitatively evaluated after three-month post-

intervention. The reasons that triggered the participants' decision to take up fall prevention strategies were demonstrated during the FPEI: simple and cheap; devastating fall consequences; shoe auditing by the primary care physician; medication inspection by the pharmacist; importance of physical activities; focusing on the surroundings; motivation and support from the peers; and recommendation from the professionals.

5.2 Interpretation and implications: key findings from the needs assessment study

5.2.1 Uptake of fall prevention interventions: gaps in information needs

The need assessment study found that the older persons lacked the knowledge about falls and fall prevention strategies, and they were keen to know more about the fall prevention interventions. Information is essential for older persons to take action to prevent falls, a strategy which they need to tailor to their own circumstances to avoid fall-risks in the surroundings. In the study, it was observed that the information provision did not match the needs of the older persons. Details of the fall prevention strategies, such as home modification, exercise, medication review, were often not discussed with the older patients who did not report the falls. When the HCPs decided to discuss the fall prevention strategies, they tended to exceed the time limit; and hence they avoided discussing the rationales behind each fall prevention intervention because there was insufficient time. This observation suggests that the older persons might have to take action to prevent falls with less information or take up uninformed fall prevention strategies.

There are a number of possible explanations to this:

- HCPs are concerned that detailed descriptions of the fall and fall prevention interventions might take up too much consultation time.

- HCPs themselves might not be familiar with fall prevention interventions and therefore, would have difficulty in explaining the interventions and rationales of taking them up. This was observed in the needs assessment study when the HCPs tended to advise the older persons not to conduct exercises as they were afraid that they might fall.

These findings concur with the previous studies, which found that older patients want more information from the HCPs (Dickinson, 2011; Jagnoor, 2014), but they do not get the information they need (Jones et al., 2011; Kalula et al., 2011). Another study highlighted the difficulties for older persons to obtain adequate and appropriate information to meet their needs and they cited these reasons: HCPs' underestimation about falls or patients' ability to cope with fall information; time constraints; and HCPs' lack of knowledge and skill about fall and fall prevention interventions (Chou et al., 2006).

5.2.2 Barriers and opportunities to take up fall prevention interventions

In the needs assessment study, there were multiple layers of barriers that hindered HCPs and older persons from participating in the fall prevention interventions.

Older persons' beliefs and culture

In the needs assessment study, the older participants revealed various beliefs about falls: they often gave credit to God's grace or luck for not sustaining more serious injuries; falls were trivial and inevitable in the old age; and falls were related to fatalism. Others were concerned about the lack of predictability and potentially serious consequences of falls. Views on falls among the older participants were consistent with those reported by previously published studies: falls occur because of God's will

(Horne et al., 2009); falls are part of ageing and inevitable (Horne et al., 2009; Stevens, Noonan, & Rubenstein, 2010; Yardley, Donovan-Hall, et al., 2006); falls are not a serious problem and that doctors are too busy to be bothered about their fall experiences (Dickinson et al., 2011); falls are associated with destiny or punishment (Horton & Dickinson, 2011); and they are reluctant to report falls (Hughes et al., 2008; Jagnoor, Keay, Jaswal, Kaur, & Ivers, 2014). This may explain why there is poor reporting of falls by older persons. Older persons only report falls to doctors when injuries are serious (Horne et al., 2009; Horton & Dickinson, 2011). This demonstrates that the perception of falls as an inevitable part of ageing is a universal concept, which crosses cultural borders. While underreporting of falls is a common feature, the underlying motives may vary across cultures. The participants felt that falls were a trivial matter and were not worth troubling others with. This is in contrast with the findings of other studies which had suggested that older persons intentionally concealed falls due to concerns regarding potential repercussions of being placed in institutional care (Dickinson et al., 2011). Few older Malaysians currently live in institutional care centres, as there is a societal expectation for adult children to care for their parents and other childless older relatives within their home environment (Forsyth & Chia, 2009; Poi et al., 2004). This scenario may change rapidly in the next two decades in view of the demographic transition that we are experiencing: the population is rapidly ageing and there is a rapid reduction in family sizes.

Stigma around falls and assistive devices are another obstacle for HCPs in managing falls. Older persons feel embarrassed about falling and stigmatised because of their falls, and they prefer to hide their weakness as a result (Horton & Dickinson, 2011). This finding is common among older Chinese people. Older Chinese people in Hong Kong declined to use walking aids because they viewed them as a bad omen and a reflection of poor self-identity (Kong, Lee, Mackenzie, & Lee, 2002). In contrast, older persons in

Western culture, specifically Italian Canadians, were acceptable to the use of aids when they really needed them or their physicians prescribed their use (Aminzadeh & Edwards, 2000). Perhaps, there is an ethnic or cultural difference in terms of stigma related to the usage of walking aids. Hence, fall prevention messages should focus on positive health and social benefits, such as improving balance and maintaining independence and social support from friends and family as facilitators to use a walking stick (Stevens et al., 2010).

Another key finding highlighted in the needs assessment study was advice for older persons on making significant house interior changes, which may not be possible due to inadequate space and house structure. In previous studies, many individuals viewed home modifications as unnecessary and intrusive, and they disliked changing loose rugs and fixing rails by toilets (Clemson, Cusick, & Fozzard, 1999; Krusea et al., 2010; Simpson et al., 2003). Older women felt that a rail would interfere with the functional use of space in a small toilet area. Further, they may have rejected the idea of home modification, not only to maintain their autonomy but also to maintain control over their home (Clemson et al., 1999). However, they might accept such modifications if home visits or recommendations were mediated by their general practitioners (Simpson et al., 2003). Therefore, HCPs may need to be the coordinator of care and engage older person in making decisions about home hazard modifications.

Seeking traditional home remedies for fall-related injury or symptoms

In this study, the older persons interviewed used traditional home remedies and saw traditional healers to address their injuries, with then no consideration for seeking medical attention for subsequent fall prevention. They only sought conventional treatment from medical doctors if the pain from their injuries persisted. In a qualitative study, older Chinese individuals with high risk of falls living in England also described

a preference for Chinese and herbal medicines and seeking medical advice in their native country rather than attending an English hospital (Dickinson et al., 2011a). The rationale underlying this health-seeking behavior in terms of avoidance of conventional treatment remains unclear. One possible reason may be that older individuals were more comfortable with the traditional remedies which they were far more familiar with, and had been passed down through generations within their families (Calhoun et al., 2011). Their view of modern medicine may also be that shrouded by a fear of the unknown, or they may avoid modern medicine simply due to concerns about the financial implications or poor accessibility (Child et al., 2012). Healthcare expenditure among our older population remains mainly out-of-pocket (Ambigga et al., 2011). While access to healthcare is now free for older individuals at Ministry of Health facilities, this is vastly oversubscribed and many would choose to avoid these facilities due to a perception of that the care provided is of poor quality (Forsyth & Chia, 2009).

Receptive to exercise

Many older persons in this study accepted that physical exercise reduced the risk of falls and were already trying various forms of exercises such walking, Qigong, Tai Chi, line dancing and aerobics. They realized that attaining old age is associated with increased vulnerability to muscle weakness and brittle bones, and would undertake exercise to combat the deterioration. Further, in the needs assessment study it was also revealed that involvement in either group or home exercises were preferred. In contrast, in one survey almost half of the older respondents from Manchester UK reported their unwillingness to consider group based strength and balance exercise (Yardley et al., 2008b). Weather, alongside lack of interest, poor health, depression, weakness, fear of falling, shortness of breath, and low outcomes expectation had been cited as barriers to acceptance of exercise interventions (Forkan et al., 2006). Exercise intervention as part

of a falls prevention programme should perhaps take into account the preference for group or home-based exercises rather than those based in a health centre, for instance. Furthermore, weather conditions in Malaysia differ with its equatorial climate being rather permissive of year-round outdoor group activities. The benefits and implementation of interventions using group-based, culturally appropriate exercises, such as, Tai Chi should therefore be evaluated specifically in our setting in future studies.

Logistics problems

One issue highlighted in the study was that older persons perceived difficulties with long waiting time and transportation led to some participants' reluctance to accept recommended interventions. In a previous qualitative study, primary care providers identified that the access difficulty from home to medical care limited the older person's ability to attend physical therapy referrals (Chou et al., 2006). This could be due to the limited availability of shuttle services in the hospital for older persons. The public transportation system in Malaysia has not kept pace with its rapid development, with point-to-point transportation being underdeveloped. Subsidized or affordable door-to-door transportation for the older person with reduced mobility remains limited, and is not easily accessible. Hospital shuttle services for those who are unable to navigate long hospital corridors in our now supersized healthcare facilities of 1000-2000 bed capacity currently do not exist. Structured falls referrals schemes may also help overcome the long waiting times currently associated with hospital-based treatment.

5.3 Supporting older persons in participating the fall prevention interventions: A challenging task for HCPs, healthcare system and caregivers

5.3.1 Needs for information

As cited in the needs assessment study, older persons lacked information on the falls and the fall prevention interventions. They wanted fall prevention education to be delivered to them so that it could give them the awareness and enabled them to be engaged in fall prevention activities.

HCPs support

In the needs assessment study, the older persons wanted guidance from the HCPs to support them to participate in the fall prevention activities. They wanted the HCPs to provide them with sufficient information and rational reasons of each fall prevention intervention. In order to meet these older people's needs, the HCPs have to be equipped with the necessary knowledge about fall and fall prevention interventions and effective communication skills to deliver them to the older persons.

However, in the needs assessment study with the HCPs, there was wide variation in their knowledge and skills to support older persons to participate in the fall prevention interventions. There are several possible reasons for this. Firstly, the HCPs' training in fall prevention varies from one discipline to another; Geriatrician who advised on the prevention of falls tended to have received better training than a primary care physician. Secondly, falls and fall prevention interventions among older persons were not part of medical curriculum until recent years; the HCPs support their older patients based on their clinical experience. It could be the reason why HCPs trivialise the fall circumstances and do not recognise that there are balance exercises that are effective in

preventing falls. In one study, HCPs were unaware that they should routinely address fall risk evaluation and management as they would in other acute medical problems (Chou et al., 2006). Tinetti et al. explained that HCPs encountered difficulties in assessing falls in older persons who suffered from other chronic diseases (Tinetti et al., 2006). Greater priority was also usually given to managing chronic diseases, such as coronary heart disease, cancer, and diabetes (Sinnott, Mc Hugh, Browne, & Bradley, 2013), compared with falls. This could be due to the HCPs' lack of knowledge and skills to treat falls while also managing their patients' co-morbidities.

The HCPs should be supported with training and skills even during their undergraduate and postgraduate studies to manage falls (Poi et al., 2004). Thus, the undergraduate and postgraduate curricula (medical, nursing, and allied health professionals) need to be revised so that current and future generations of HCPs develop skills to assess and manage falls among older persons. The variation in knowledge and skills means that older patients may be receiving sub-optimal support to help them to participate in the fall prevention activities.

In the national and international guidelines, a document was provided to guide the development of a fall prevention intervention among community living older people at a high risk of falls (Kenny et al., 2011; NICE, 2013; WHO, 2008). According to the guidelines, fall prevention education should be provided to explain the effective evidence of fall prevention intervention to the older persons who experienced fall once or recurrent or with concern about fall problems. The older persons should be equipped with necessary knowledge about the falls, fall risk factors and evidence-based fall prevention interventions. Furthermore, the guidelines highlight the gap in evidence-based fall prevention education intervention (FPEI) and the needs to create awareness among older persons about falls and the evidence-based preventions strategies (Kenny

et al., 2011). Child et al. identified a vast number of barriers to implementing fall prevention interventions in the general practices (Child et al., 2012). In fact, the study highlights that the older persons and the HCPs' engagement/involvement in the fall prevention activities were not satisfactory. In addition, it remains uncertain whether education translates into clinical practice.

Besides the need for fall prevention education for older adults, most of the HCPs in this study also lacked knowledge and skills in the fall prevention interventions. A qualitative study, exploring the general practice of primary care physicians in the UK found similar training needs (Chou et al., 2006). Although the participants attended an educational visit, they were still concerned about time constraints, confidence in performing the task, and adequacy of the support system when practising fall prevention interventions. This could be due to the limited availability of forum or conferences on fall problems in the hospital for HCPs. The healthcare system in Malaysia has not kept pace with its rapid emerging of the problem, with updates on fall information being overlooked. The benefits and implementation of fall prevention guidelines should be constantly disseminated to the HCPs.

How much the HCPs know about fall prevention interventions and how skilful they are in supporting older patients in the prevention of falls may also affect the implementation of the FPEI in general practice. To use the FPEI effectively, the HCPs not only need to know the facts about falls and fall prevention interventions, they also must be able to communicate the information accurately and in a balanced manner. In addition, one needs to explore and address the older persons' concerns and expectations.

Caregivers' support

HCPs perceived poor support from caregivers as one of the barriers in managing falls. For instance, some families make spontaneous decisions to admit their parents to nursing homes after they have had recurrent falls. However, this may be due to caregivers' work obligations and an inability to care for their parents at home (Forsyth & Chia, 2009). In this study, some caregivers were overly concerned about falls, reinforcing dependence in the older person and inadvertently increasing the risk of muscle weakness and frailty. Therefore, caregivers should be educated about the importance of fall prevention, and they should pass on reports about falls to physicians so that recurrent falls and injuries can be prevented (Chou et al., 2006).

Healthcare system support: Fall education materials

HCPs indicated that the healthcare system in our setting lacked fall education materials, such as booklets, pamphlets, posters, or videos to educate older persons on fall prevention. To date, fall prevention education is delivered to older persons verbally. In one study, the older persons informed that the verbal advice is non-specific and impractical (Yardley, Donovan-Hall, et al., 2006). The idea of giving out leaflets pertaining to fall prevention is intended as reinforcement of fall prevention education to the older persons (Clemson & Swann, 2008). In previous studies, pamphlets, leaflets and booklets were found to be effective in reducing falls and improving knowledge among older persons living in the community (Assantachai et al., 2002; Gopaul & Connelly, 2012; Hakim et al., 2007). Therefore, a structured evidence-based fall education material, such as booklet or pamphlet, is needed in the primary care practice in Malaysia.

5.4 Interpretation and implication: key findings from the development of the FPEI

Although the FPEI was developed based on needs, evidence, and theories, there are numerous challenges faced and tackled by the researchers during this development process. The key issues are described and discussed in the subsequent sections, and they include these aspects:

- Balanced information about falls and fall prevention interventions
- Reflection on the design and delivery of the FPEI
- Challenges and opportunities in searching, selecting and summarising data and information to ensure that only relevant and appropriate facts are incorporated into the FPEI.

Finding new approaches or adapting the conventional approaches to make the final FPEI acceptable and feasible to be used in the primary care.

5.4.1 Balanced information about fall and fall prevention interventions

In the context of primary care, for instance, the older patients may not want to use a walking stick at an early stage of ageing; however, the HCPs feel that the use of walking aids enables the older patients to protect them from a fall. However, the older patients might not use the walking aids and came back for follow-ups after six months. Therefore, this implies that clear and balanced information about falls and fall prevention interventions should be provided to the older persons at a high risk of falls; and at the same time, their views are taken into consideration. This study, therefore, aims to develop a fall prevention education intervention (FPEI) to provide balanced information on falls and fall prevention interventions, gathered through evidence and supported with older persons' experience and views.

The pilot test revealed that the HCPs were more conservative and did not follow the theories when delivering the FPEI content. During the presentation, it was found that the HCPs tended to focus on the delivery of the content, rather than allow the older participants to share their views on the points elaborated by the HCPs. This finding further supports the need for an FPEI that is balanced and supports the notion of ‘older person expertise’ in the fall prevention intervention. This FPEI was therefore designed based on the theories, taking into consideration older persons’ views of and concern about falls.

5.4.2 Reflection on the design and delivery of the FPEI

The design and development of this FPEI was based on the UKMRC complex intervention development framework (Craig et al., 2008). The UKMRC framework has highlighted common steps in the development of FPEI, which include these elements: needs assessment, literature review of the available evidence and modelling which involves an iterative process of review and revision. However, reviewing the FPEIs used in the trials included in the Cochrane Review (Gillespie et al., 2012) has revealed a lack of literature in documenting the development process of the FPEIs. In addition, there is limited evidence on how the development process and the delivery of FPEI might have an impact on the older persons’ knowledge and outcome (Gillespie et al., 2012). However, there is not yet an attempt by the Cochrane to update the evidence document.

In this study, a changed behaviour or not taking up a fall prevention intervention by an older person at a high risk of fall tends to change over time. Many older persons did not change over a single visit. The FPEI was not designed to help older persons to change in a single visit. Instead, it aimed to provide balanced information about falls, fall risks and evidence-based fall prevention interventions. The FPEI was delivered to a

small group of older participants, and indeed it encouraged the older participants to be active and give their feedback; inspected the older persons' risks for falls, e.g. shoes and medication; assessed their knowledge; conducted follow-ups via phone call; and discussed the older persons' feedback and action taken three months after attending the FPEI in a focus group discussion. HCPs facilitated the sessions but did not overtly encourage the participants to take up the fall prevention interventions, i.e. exercise. In addition, the older patients were encouraged to share the information provided in the FPEI and booklet with their family members, relatives and friends. During the subsequent visits, one month's follow-up through phone calls and three months' follow-up via focus group discussion were to assess their knowledge and explore the actions taken to prevent falls and what had triggered their actions.

The measurement of the outcome was made at three points: immediately after the first visit, one month and three months after the first visit. In this thesis, the outcome of the follow-ups, namely knowledge acquisition, behavioural change and reasons for the behavioural change, were evaluated using a mixed method.

Proactive imagination

The FPEI was not designed to provide explicit 'proactive imagination' or a way to weigh up different attributes of the falls and the prevention activities. However, information about falls and fall prevention interventions was briefly described in the FPEI content, which allowed the older participants to recall their own fall experiences, and how they should have effectively prevented them from using the evidence-based fall prevention intervention. In addition, there were sections in the PowerPoint presentation that postulate these questions: (1) 'what are falls?' (fall definition); (2) 'what are the fall-related risks' (what causes the fall); (3) 'how to prevent the falls?' (the evidence-based fall prevention interventions); (4) 'how to move safely?' (the evidence-

based fall prevention interventions); (5) ‘how to prescribe medication safely?’ (the evidence-based fall prevention interventions); and ‘how to keep away hazards in the home?’ (the evidence-based fall prevention interventions). The description and explanation to these photographs reinforced and aims to provide balanced information and imagination for older persons to understand what it would entail if they take up actions as prescribed in the FPEI.

Other methods used in the FPEI to help cultivate proactive imagination were peer sharing of fall experiences; they helped the older participants to imagine how they would feel if they faced similar falls problems or consequences, and how the situation would be if the fall prevention intervention were applied in each fall situation (Clemson et al., 2004; Dapp et al., 2005). Narratives of one’s experiences were more appealing than information presented as a written statement. Older persons’ personal experiences may also help to illustrate how people have tailored a protective behaviour and provide a range of views from different sources. In one study, the older persons reported that “word of mouth” was a key strategy for exchanging information (Vivrette, Rubenstein, Martin, Josephson, & Kramer, 2011). However, sharing experiences have their limitations. It requires the researchers to present the stories in a balanced manner, and this can be a challenging task. However, in previous studies, the mastery of stories and experiences were used to support the FPEIs (Cheal et al., 2001; Clemson et al., 2004; Dapp et al., 2005; Gillespie et al., 2012). The Bandura’s (expectancies) and Gerogogy (diversity) and some evidences in the community-based fall prevention programmes, have emphasised that the developers of the FPEIs need to use sharing of experiences in a group setting. In view of these strengths and limitations, the FPEI utilised small groups to support the older persons in the prevention of falls.

5.4.3 Developing the FPEI: challenges in searching, selecting and synthesising information

Two types of information were used to form the content of the FPEI:

- Older persons' needs for fall prevention interventions
- Effective evidence for fall prevention interventions

Incorporating older persons' needs into the FPEI

Older persons' needs are fall information, patient-friendly healthcare system, rational recommendations from HCPs, and caregivers' support. Addressing all these needs in the FPEI is essential to meet older persons' needs. Interviews with older persons and HCPs provided information of 'what' to include in the FPEI; this is a challenging task.

In previous studies, FPEIs focused on providing fall information about healthy ageing and fall prevention interventions, which emphasised the 'information' needs (Assantachai et al., 2002; Reinsch et al., 1992; Vivrette et al., 2011). However, there is growing evidence that older people do not change behaviour only based on the information they receive (Clemson et al., 2004). Other considerations, such as the availability of healthcare services, HCPs, and caregivers' support, may also influence older persons to take up fall prevention interventions. It is, therefore, crucial that these older persons' needs are addressed in the development of the FPEI. The FPEI can achieve this by addressing these needs explicitly as part of the content or format.

Information about fall prevention interventions: challenges in searching, selecting and synthesising information

This is the first step towards providing effective evidence. Data are often extracted from research findings of systematic reviews or individual studies and presented to older patients in an understandable way and systematic format. In the context of education intervention, PowerPoint presentation, systematic reviews, individual research findings, or RCTs provide the effective evidences. However, the researchers encountered several issues while searching for information about the fall prevention interventions.

Paucity of research studies comparing different fall prevention interventions

There are four main fall prevention interventions: 'home hazards modification', 'remove culprit medications', 'exercise', and 'healthy ageing' (i.e. walking aid use, proper foot wear, eating well). Searching the literature systematically did not reveal studies comparing these fall prevention interventions, and there are several possible reasons for this.

Screening constrains

Older persons at a high risk of falls who require fall prevention interventions usually have poor fall control; they do not seek fall prevention interventions or report falls to HCPs. According to the national and international fall prevention guidelines, it is recommended that the older patients' fall problems should be prevented by providing the evidence-based fall prevention intervention. In clinical trials, it is unacceptable not to provide fall prevention interventions to older patients at a high risk of falls. However, in practice, older patients may choose against taking up fall prevention interventions

because of concerns or they are rarely screened for falls (Chou et al., 2006; Jones et al., 2011; Wenger et al., 2003).

Bias in RCTs

Recent studies involving fall prevention interventions evaluated the effectiveness of different types of fall prevention interventions or combinations of fall prevention interventions (multifactorial fall prevention interventions), rather than comparing different types of fall prevention intervention based on reduced falls. Most of these studies have published their protocols for an RCT; however, too long a time was taken to publish the good results. Another possible explanation was publication bias; for example, exercise, which is likely to have negative outcomes, was not reported in the literature.

Therefore, a systematic literature review was conducted to provide the evidence needed for the FPEI, and data were extracted and summarised from one of the intervention arms of RCTs or cohort studies.

Variations in evaluation were reported

The research findings reported in the publications may not be available or presented in the manner that could be used in the FPEI. A systematic review, on the reporting of the fall prevention interventions, highlighted the lack of information on the side effects and safety information mainly from RCTs (Hopewell et al., 2016). Other methods, such as epidemiological studies, should be considered routinely in the reporting of the prevalence and consequences.

In addition, there are variations in the outcomes, in particular how reduced falls are reported. For example, some studies report 'fear of falling' as 'concern over the fall', while others report it as 'fall self-efficacy'. Similarly, 'reduced fall' can be reported either as 'number of fall per 1000 person-year' or 'proportions of older persons experiencing fall over a year'. Both outcomes offer different information; however, it all depends on what older persons want to achieve.

In this study, the knowledge gain and behavioural change were used as the primary outcomes; it is because the majority of older persons had varying degrees of experiences and views about falls and the fall prevention interventions. It is not an issue of whether the older persons will change behaviour, but rather 'what information' or 'why change'.

Lack of evidence in important fall prevention intervention outcomes (knowledge)

In the hospital, it is common for healthcare professionals to educate their patients during consultation about fall prevention intervention as an important way of preventing falls. This is based on a common tactic that understanding the fall prevention interventions helps to improve preventive measure and avoid injuries attributed to falls. However, the literature reviews found that negligible studies reported using knowledge to avoid fall risks as a primary or secondary outcome. Recognising fall contributing risks and associated fall prevention interventions are often reported as fall knowledge, and they form part of the overall assessment.

In the FPEI, main fall risks and fall prevention interventions were included and presented to the older persons; the participants were even asked to share their experiences whether they had faced any of the risks and used the prevention activities. Although evidences were lacking, 'fall risks and fall prevention interventions' were included in the FPEI, as the HCPs routinely give this advice. However, future RCTs

should routinely assess older persons' knowledge to avoid fall risks and application of fall prevention interventions as part of the outcome measures.

Balance between accuracy and acceptability when summarising data

The summarised evidences incorporated into the FPEI are often simplified to ensure the older persons could understand the information. For instance, when presenting the fall epidemiology using a pie chart, a clear picture would be given describing the proportion of people who had fallen in the global and local contexts. Instead of presenting it as 'number of older person experiencing fall per 1000 person–year', the information was recalculated in the form of percentage of people who experienced falls over a year. The choice of whether to summarise 'fall risks and the fall prevention interventions' as one entity or to present them as one entity or individual risk and types fall prevention interventions, was explored during the review and revision process of the pilot testing. It was decided that there would be four sessions to elaborate on general fall and prevention information, exercise, medication, and safe home and environment; the older participants preferred this arrangement, and more detailed prevention activities were discussed.

In summary, information included in the FPEI, such as older persons' needs, HCPs' needs and research evidence may not be readily available to the developer; hence, this may require the developer to conduct a systematic review. Moreover, data in the scientific journals are often presented in the format that cannot be understood by the older persons. They are, therefore, unsuitable to be used in the FPEI. Modifications are necessary to simplify the evidence to ensure readability. However, this process often leads to loss of the accuracy in the evidence; and hence, any modification of evidence should be explained and justified when developing an FPEI.

5.4.4 Developing the FPEI: Making it acceptable and feasible to be used in the primary care

During the development of the FPEI, three issues emerged from the iterative process of drafting-reviewing-revising, and they are related to language and presentation of the information in the FPEI.

- Balance of information
- Communication of information
- Clarity of information

Balance of information

The balance of information in the FPEI is affected by the amount of information included on fall risks and the fall prevention interventions; the structure of the information is presented (order and the position of the information); and the phrase and words used to describe the information are also presented. The HCPs and older persons found that the information provided in the FPEI was clear and ‘all in one’.

The simple education using leaflets with follow-up calls did not reduce fear of falling compared with the usual care for older persons who fell and sustained wrist fracture (Rucker et al., 2006). One latest systematic review and meta-analysis on fall education intervention for older persons during and after hospitalisation, emphasised that the use of intensive face-to face education with multimedia material, in preference to provision of written information alone or brief amount of interpersonal contact, effectively reduced fall rates (Lee et al., 2013). One current RCT, the home-based cognitive behaviour programme consisting of seven structured sessions with review of the previous sessions (except the first session), a discussion and formulation of the

personalised action plan by trained community nurse, showed significant lower concern for falls (Dorresteijn et al., 2016). Simple education, such as written information or brief interpersonal contact, may not be effective compared with the structured balance information with close follow-ups; the latter method was effective to achieve the changes. This raises the issue of how valid and reliable the delivered information in the education intervention is.

In a study the peer educators perceived that the effectiveness of delivering fall prevention education is determined by an education resource that is up-to-date and at an appropriate level of comprehension (Khong, Farrington, Hill, & Hill, 2015). This opinion posed a challenge to the organisations that they should take into account the comprehension level of education delivered and update it periodically.

In this study, the participants were the older population of Malaysia, whose learning has been shaped through experiences that are indeed rich and robust. This could be the reason why the study participants felt that the information given in the FPEI was common sense. In one qualitative study, it was found that the Malaysian older adults learnt through informal methods and experiences; for example, through social interaction and that much of it was spiritual and religious in nature (Merriam & Mohamad, 2000). Thus, the information for the FPEI should be obtained from people of the older population.

To ensure 'balance information' of the FPEI, attempts should be made to include the following:

- Widely searched information that is related to the local older population's lifestyle and culture or learning.
- Reviews of the information about falls and the prevention that addressed the needs of the local older population.
- Use of photographs and videos to illustrate how a local older person faces and handles a fall and its prevention, so that the older persons will feel the familiarity of the local environment and context.
- For each fall prevention intervention, besides oral presentation, a hands-on or practical session of how to identify the risks and the prevention should be conducted.
- Reemphasising and asking questions about the currently delivered information should be practised, which will benefit the participants.

Communication of information

In this FPEI, the education content was communicated to the older participants using theories, concept of storytelling and sharing the information by the inter-professionals team (vicarious learning). It was carried out in a variety of ways and settings: in a fun learning environment; with reinforcement; learning at own pace; the information learnt is directly usable; encouraged to be actively involved; and respecting their views (Formosa, 2002). There is an increasing recognition that adult learning principles are important so that older participants can accept the concept of learning and its objectives; for example, how falls occur and how to apply the fall prevention interventions to prevent falls. This probably explains why many studies involved in fall education are not successful, as they failed to incorporate the adult learning principles. As reported by

Formosa, (2002), it is not fair to educate older persons using the common pedagogy principle, when the older persons already understand the concepts through life's rich experiences. Therefore, the education information should be presented using the Gerogogy principles. This study has yielded different outcomes in communicating the information, which has influenced some to take up actions to prevent falls.

In one study, the use of Gerogogy enabled similar learning outcome among older persons in a combined-age learning group, picking up new professional skills. The study found that the older persons did well in the test and training, with similar results shown by the younger participants in the group (Tambaum, 2015). The aim of this FPEI, however, is to help older persons to be informed about falls and the fall prevention interventions. This was achieved by ensuring that constant applications of the Gerogogy principle were integrated while communicating the information.

In this study, the older persons had difficulty in understanding the association between the number of medications and risk of falling; this was resolved after the pharmacist conducted an inspection of the medications consumed by the older participants. This highlights the influence of a combination of auditing and communicating information to the older persons in understanding the risks.

Clarity of information

The purpose of clarity is to help older patients recognise that their beliefs and culture play an important role to change behaviours. It helps older patients to determine which fall prevention intervention and its attributes are important to them, and they share their beliefs to the HCPs. In this study, explicit balance information was used to help older persons to weigh the differences and importance of each fall prevention intervention in their context. However, in the interviews, some older patients revealed that the

information on fall risks and the preventions were ‘common sense’; therefore, no behavioural changes were made as they were used to living in such environment for a long period of time. They knew the risks and how to prevent them; especially removing loose rugs, fixing a handrail or holding onto a handrail. The older patients believe that handrails are only fixed in the hospital and not in their homes. The difficulty was when they asked the HCPs to clarify the information about handrails. The HCPs would normally explain or clarify the matter by telling a story about other peers’ successful experience of fixing a handrail. Therefore, accuracy of clarifying information and its impact on each older participant need to be weighed.

Format of the FPEI

The FPEI was delivered by an inter-professional team to a small group of older participants; the content of the FPEI was based on the feedback from the older persons’ and HCPs’ needs as cited in the needs assessment study. The FPEI content was presented using PowerPoint presentation and a booklet. The FPEI was also delivered in other formats, such as CD ROM, digital video, multimedia presentation and peer education by patient expert, trained nurse, physiotherapist, or geriatricians. Increasingly, the developers prefer web-based or computer-based FPEIs. There are strengths and limitations in using a PowerPoint presentation and booklet as discussed below.

These are the reasons for a combination of PowerPoint presentation and booklet in the FPEI:

- During the pilot study, both HCPs and older persons found the combination acceptable. Furthermore, in this study, HCPs needed to deliver the PowerPoint presentation during the FPEI session. The booklet was used for discussion during the FPEI session, and the older persons were allowed bring it home. The combination was therefore considered a more practical option.
- Both were portable; PowerPoint presentation could be done anywhere using a computer, and the booklet does not require any equipment (CD/CVD players or computers).
- The target population consists of people aged above 60 years, and they have different education levels; most of them prefer to use the booklet, and they are generally less familiar with use of computers and the internet. However, this preference is changing and should be reviewed in the future.

The following are the limitations:

- The contents of the PowerPoint presentation and booklet require constant reviewing based on guidelines of the international and national bodies, including WHO, NCOA, NICE and AGS/BGS, while the content of a web-based FPEI can be updated with online information. Therefore, updated versions of the PowerPoint presentation and booklet may not be easily available to the target population, and that may hinder wide dissemination to the users.
- Printing and reprinting the booklet using a colour printer may be costly. In comparison, developing a PowerPoint presentation often can be done by oneself and there is only a one-time payment for the software in the initial

phase. The maintenance and updating of the PowerPoint slides require less cost than reprinting the booklets.

- Web-based or computer-assisted PowerPoint slides allow data to be copied or collected; the information can be summarised and sent out digitally as feedback to the older persons and the HCPs. Booklets do not have this advantage.

In conclusion, based the reasons outlined above, the web-based FPEI definitely has its advantages. However, developing web-based fall information is very complex and requires vast resources, which is beyond the available resources for the project. Therefore, development of a combination of PowerPoint slides and booklet is the most viable option of this study.

5.5 Interpretation and implication: key findings from the preliminary results of the FPEI

In this section, the argument about the outcome measurements of the FPEI, and the tension between ‘acceptance’ (knowledge) and ‘translation of education into practice’ (behavioural change) will be discussed. This will be followed by a discussion of recruitment issues and the presentation of the preliminary results. The preliminary results were based on a small sample size and should be interpreted with caution; nevertheless, the outcomes indicate that the FPEI is effective. The preliminary results will be discussed below.

5.5.1 Outcome measurements

Knowledge and behavioural change

The outcomes of FPEIs have been a topic of debate. Currently, researchers who are evaluating the effectiveness of FPEI often use reduced falls as the major outcome (Clemson et al., 2004). The definitions of falls vary. The Kellogg International Working Group defines *fall* as an unintentional event that results in a person coming to a rest on the ground or another lower level; excluding coming to rest against furniture, wall, or other structures. While, Lamb et al. define fall as an unexpected event of coming to rest on the ground, floor, or lower level (Lamb et al., 2005).

Although the term fall is widely used in FPEIs, the concept is evolving, and some researchers and policymakers have yet to accept it as a 'gold standard' for evaluating the interventions, particularly in terms of health education assessments. The use of knowledge and behavioural change as an outcome was, therefore a pragmatic choice.

In this study, knowledge was measured as the marker for the acceptance of the information delivered via the FPEI; it is because in this study, it not only evaluates whether the FPEI helps older persons to make informed behavioural change, it is also designed to determine whether there is any impact on the knowledge after receiving the FPEI. For example, is there knowledge improvement associated with the participation in the FPEI? The study hypothesis is that with an informed and evidence-based FPEI, an older person at a high risk of falls is more likely to take action to prevent falls. However, in this study, although there are trends in knowledge improvement, the sample number has led to no significant change in knowledge. One study with 69 older adults achieved no significant difference ($p=0.34$) between groups for knowledge post-tests (Hakim et al., 2007). Similarly, in another study, the fall knowledge change among

older persons at post-test was not significant, with 38% feeling knowledgeable after receiving the fall prevention recommendation (Laing, Silver, York, & Phelan, 2011). However, it is possible that the intervention would not lead to any significant change in knowledge; or perhaps the fall problem worsens due to a delay in deciding on the action to take to prevent falls.

In addition, the sample size in this pilot testing is small; a total of 17 participants were enrolled, which represented four, seven and six in each pilot testing respectively. The number was smaller than that required to detect the difference of the knowledge level of (0.5%) in the repeated measures of ANOVA.

In conclusion, although the use of knowledge remains debatable, this study was a pragmatic one aiming to elicit whether there might be significant clinical benefits from the use of the FPEI in usual general practice.

Behavioural change measurement: the argument

In one study, self-efficacy was determined as the core factor for initiating and maintaining behavioural change (Stretcher, 1986). It measures the degree of self-efficacy faced by older persons when taking a course of action (in this case, understanding an evidence-based fall prevention intervention). It also measures the attributes that contribute to the self-efficacy, such as how informed are older persons regarding the fall prevention interventions; how clear are the older persons with the importance of each of the interventions; and the support they receive. Finally, it also assesses how effective the behavioural change is by finding out whether the person is satisfied with and adheres to the action taken.

There are strong evidences that interventions based on behavioural changes directed at the individual effectively reduce fall risks (Campbell et al., 1997). In addition, a study also suggested that exploration of behavioural and environmental risk strategies helps older person to recognise their risks (Cheal & Clemson, 2001). This may contribute to improving risk management and therefore reduces fall risks despite increased exposure. However, there are some continuing debates about whether the behavioural change should increase when faced with increased concern about falls in the situation when there is an increase in fall incidents. It has been suggested that by knowing more about the risks and benefits of taking up the fall prevention interventions, the concern about falls may increase, at least in the initial stage of taking action towards the fall prevention (Dorresteijn et al., 2016). Despite some uptake of fall preventions and the recommended fall advices, some want to change behaviour as they perceived that their susceptibility to falls are lower (Gopaul et al 2012). Hence, it is limiting the transferable change in behaviour towards the prevention of the falls.

In the context of giving information about evidence-based fall prevention intervention, older persons in this study were explored to indicate their reasons for behavioural change after attending the FPEI. It was hypothesised that by inspecting the shoes and medication, the older persons would have obtained realisation about the risks and therefore, the older persons would be more informed about the fall prevention interventions (i.e. change shoes), their risks and consequences, be more aware of what they want; and express whether they need more support. In this case, the fall prevention recommendations by HCPs can provide more rational information and be tailored to the older persons rather than if only the booklets alone were distributed.

In the preliminary qualitative analysis, the older participants were reported to be contented with the FPEI, and they certainly would disseminate and share the

information gained with their spouse, friends, family and relatives, despite significant actions taken to address their fall risks. However, although this finding is suggestive of increased consideration, the sample size was too small in the pilot testing to arrive at a definitive conclusion.

5.5.2 Recruitment issues; who should be recruited?

According to NICE guidelines, AGS/BGS clinical fall prevention guidelines and WHO, older persons with a high risk of falls, who experienced fall at least once in the past 12 months, should be advised to take up fall prevention activities, and this also applied to community-dwelling older persons who have yet to experience fall and have concern about falls (Kenny et al., 2011; NICE, 2013; WHO, 2008). In this study, the inclusion criteria for older participants reflects those older people at high risk of falls and who will potentially benefits from the MuFE IT. Furthermore, the target group consisted of independent people aged 60 years or over (according to Malaysian ageing criteria), with no cognitive problems or special care needs, who were living in their residence. However, while recruiting older persons for the pilot tests, it was clear that in the primary care clinics, the older person with fall problems were identified after explorative conversation, rather than during routine follow-up visits or via auditing the medical records. Hence, the older participants were at a high risk of falls, have no difficulty in mobility, and young-old.

In this study, however, those for whom there was no record of having been made aware of the need for fall prevention interventions were identified and invited to participate; for some participants, the HCPs themselves have felt that the fall prevention education is necessary for them, and recommended them to the researchers. It appears that different older persons reacted differently to the information disseminated about participation in the FPEI. The limitation of this approach is that the researcher might

have influenced older persons' preferences and perceptions prior to their involvement in the FPEI. However, the older persons were given the priority to decide whether to attend the intervention and select the date of intervention to attend.

As the FPEI is an educational intervention and the implementation of the intervention is to ensure optimal use of the FPEI in the general practice, it was decided to incorporate the FPEI into the routine clinical care pathway; older persons were invited to participate in the FPEI only after consensus with their HCPs was achieved regarding the need for fall education.

5.5.3 Evaluating the FPEI: does it help to change behaviour?

Increased uptake of fall prevention strategies among FPEI attendees

The FPEI attendees had initiated reporting their behavioural changes after attending the FPEI. Following the attendance at the FPEI, participants demonstrated many changes in behaviours; they took initiatives to identify appropriate strategies for reducing fall risks; their confidence increased, and they felt safe moving around. This shows that participants' knowledge about risks had increased, and they knew how to minimise the risks with evidence-based fall prevention interventions. The older participants practised some protective strategies to prevent falls: keeping company for daily walk, exercising during the Muslim prayer, holding onto the staircase railings, switching on the lights, replacing old lights, reorganising home furniture, using anti-slippery shoes and removing bathtubs. Similarly, in a qualitative study, the study participants, guided by booklet, implemented numerous behavioural changes after attending subsequent interviews regardless of their home hazards (Gopaul & Connelly, 2012).

The researcher explored the reasons behind the changes in the context of culture and beliefs. These are the reasons discovered that motivated the changes: strategies are simple and cheap to implement; prevent devastating fall consequences; shoe and medication inspections by the HCPs; understand the positive consequences of the physical exercises; reinforcement and recommendation by the professionals; and motivation from the peers. However, this is the first study to ascertain the reasons that triggered the behavioural changes. In other studies, the priority was given to the outcome measurement rather than the reasons behind the outcome. In this study, the reasons were identified and evaluated to further improve the content of the FPEI.

The incorporations of Bandura's self-efficacy theory and Gerogogy principles in the FPEI are the key factors that distinguish the FPEI of this study from other designs. The combination of the two theories is by far one of the most successful features of the FPEI to increase knowledge and report behavioural changes. In previous studies, Bandura's self-efficacy theory played an efficient role in the 'steady as you go' and 'stepping on' FPEIs, to bring out the self-confidence and to improve mobility and balance among community-dwelling older persons (Cheal & Clemson, 2001; Clemson et al., 2004; Dorresteyn et al., 2016). In the previous studies, the FPEIs that incorporated adult learning principles were found successful in improving the older adult learners' characteristics (Schepens et al., 2011), and the participants had shown greater knowledge gain; the principle of cognitive restructuring (Dorresteyn et al., 2011) had the effect of reducing concerns about falls, and there was a significant reduction in the activities of avoidance (Dorresteyn et al., 2016). In previous studies, practical sessions were included in the FPEIs, such as exercise, visit to parks, shopping at local shopping centres, travel using public transport via train and public bus, crossing the streets, and walking down the staircase. Although no outing sessions were provided in this study, the participants were technically exposed to the shoes and medication inspections;

photographs were used to demonstrate local peers conducting exercise; and PowerPoint presentation and booklet were used to show the process of home modifications. These efforts have the equivalent effects of equipping the older participants to improve their knowledge and carry out some informed behavioural changes.

Limiting uptake of fall prevention strategies

Although the FPEI provided information about the uptake of fall prevention strategies, there was one participant who believed that at this old age, he was susceptible to fall but perceived that home modifications were avoidable and common sense. In one mixed evaluation, it was reported that some participants did not agree with the home modification advice; they believed that due to their old age, they would fall anyway (Gopaul et al 2012). In this case, with the in-depth knowledge, the older persons could take appropriate steps to address the risk of falls in their home.

Therefore, the findings from this study suggest that the participants, in general had increased the uptake of fall prevention strategies and were likely to follow through with the recommendations and advice, regardless of whether they had attended the FPEI. There are several possible explanations for this observation:

- The older persons with a high risk of fall have experienced falls in the previous 12 months. Most of them would have addressed their falls by some form of fall prevention strategies after their fall to avoid further falls.
- There is good rapport between the older persons and their HCPs in general practice. The older persons would have received health education and counselling from the HCPs, such as fall risks, fall consequences, and fall prevention strategies.

Older persons' long-term experiences of living with fall problems and their relationship with the HCPs probably explain why there was increased uptake of fall prevention activities in the population of this study. It is uncertain whether this observation is generalisable to other chronic diseases or in other healthcare context; it needs to be tested.

The behavioural change; uptake of fall prevention strategies

One potential effect of the FPEI is its ability to provide basic knowledge and some reasons to take up informed fall prevention strategies. In this qualitative exploration, fewer participants were passive with no changes done after attending the FPEI. On the other hand, many participants changed their behaviours after attending the FPEI; some participants who were already involved with fall prevention activities increased their exercise intensity and became proactive after attending the FPEI. These findings are consistent with those found in other studies; a narrative review revealed improved self-efficacy and activity participation (Cheal & Clemson 2001; Gopaul et al 2012); 94% of the intervention participants engaged in and initiated new preventive behaviours (Schapen et al 2011); the fall rate was reduced to 31% and participants significantly used protective behaviours ($p < 0.05$) (Clemson et al 2004); the fall concerns were significantly reduced, and the fall prevention activities were sustained for 12 months (Dorresteijn et al 2016). Even though the Cochrane review reported inefficiency of five education-based fall prevention intervention studies in reducing falls, those studies merely focused on health risk appraisal for older persons, which included broad health information dissemination and other chronic diseases (Gillespie et al., 2012).

Therefore, the preliminary results seem to suggest that the FPEI has helped the participants to obtain logical reasons to conduct the fall prevention activities. Although the FPEI is helpful in facilitating referral recommendations for fall prevention

interventions, some older person may prefer a more direct approach and receive recommendation advice directly from the HCPs. It is, therefore important for the HCPs to ascertain the preference of participation for education intervention among older patients during the consultation (Salonoja et al 2007; Gopaul et al 2012).

Knowledge

The older participants' knowledge score improved, three months after attending the FPEI compared with the baseline score (pilot testing 1: 12.6%; pilot testing 2: 7.24% ; pilot testing 3: 4.55%). The participants' knowledge score achieved the highest level during one month-post intervention, but dropped slightly during the third month of evaluation. Similarly in one study, the knowledge score improved from pre-test to post-test (7%); however, the result showed no significant difference between groups (Hakim et al 2007). In another study, greater knowledge gain was shown at post-test, 1 month after attending the programme (Schaphen et al 2011). In this study, the results indicated that knowledge gained during intervention was unsustainable after 1-month post intervention. Perhaps these factors play a role in keeping the older person's knowledge restrained: the recommendation provided by repeated contacts (phone calls), social interaction, incentives and physician's recommendation (Ray et al., 1997).

The study also noted that some participants tended to select fall risks, and the prevention strategies listed in the knowledge checklist are merely based on their own fall experiences. They tended to uncheck the list if they had not experienced the type of fall risks or fall prevention strategies as listed in the questionnaire. Some still found difficulty in translating the knowledge they had gained during the FPEI into practice. In other studies, the practical sessions were found to improve activity participation among the participants who were exposed to real scenario of fall risks and appropriate

prevention strategies (Clemson et al 2004; Cheal & Clemson et al 2001; Dorresteijn et al 2016).

The aspects of the FPEI that trigger the behavioural change

There were remarkable differences in the behavioural change among the participants three months after attending the FPEI. The qualitative explorative study was used to explore the potential reasons underlying the informed uptake of fall prevention strategies. The participants revealed these reasons for their behavioural changes: simple and easy; fall consequences are devastating; shoe and medication inspection by the professionals; knowing about the exercises; reinforcement, repetition and recommendation by the professionals; support and motivation by the peers. In the previously published studies, these are the common reasons to take up the fall prevention strategies: fall consequences are devastating (Jagnoor, et al 2014); education, motivation and support from peer educators (Peel & Warburton, 2009); and recommendations from the health professionals (Dickinson et al., 2011). Although the fall prevention education was delivered in a group setting, individualised attention was given to each participant during the inspection; it produced a high impact as the majority participants changed shoes to the non-slippery type; the physician was very particular about the types of medication for every consumption, and the pharmacist reviewed the medications; and participants started to use walking aids at their convenience. In this study, this practical approach spurred the older persons to take up fall prevention strategies. A prospective study has shown that simple education alone is ineffective in reducing the incidence of falls (Rucker et al., 2006). The education-based fall prevention intervention does not lead to a reduction in falls, as the older persons have a more proactive approach to preventing falls (Hanley et al. 2011).

The study participants stated that reinforcement and recommendations from the inter-professionals in the programme about the home hazards were the reason for them to take these actions: modify lighting and replace light bulbs at the porch, fix hand bars in the bathroom and change floor mat to the non-slippery type. Although the older persons reported many barriers to adhering to prescribed home modifications, they accepted the recommendation advice if it was made by an authorised person or the physicians (Bunn et al., 2008; Dickinson et al., 2011a). Thus, the influence, particularly from the multidisciplinary HCPs, was important in reinforcing the idea about the necessity of removing home hazards both at the individual level and at the societal level.

As a result of the explanation about simple exercises, being independent and active in the house and outdoors, the study participants were informed about importance of safe moving. The study participants reported that they learnt a lot about conducting an exercise in a safe and dynamic way; consequently they were motivated to take up indoor exercise and other outdoor activities. In a previous study, exercises-based fall prevention interventions were found to effectively reduce falls among older persons (L. Gillespie et al.). Despite the effectiveness of exercises in reducing falls, the older persons faced adherence problems, such as ageing defect (Calhoun et al., 2011; Horne et al., 2009; Yardley et al., 2008), fear of falling (Resnick et al., 2014), discomfort due to pain and shortness of breath and other medical problems (Pohl et al., 2015). For older persons, the exercises can therefore be tailored based on their physical capability; but, it is difficult to measure individual ability to conduct exercise during consultation or with physiotherapy referral. In the previous studies, education was merged with exercise intervention, which effectively reduced the fall number (Huang et al 2010; Huang et al 2011). Hence, it is important to impose exercise through education before the older persons incorporate it into their everyday routine.

5.6 Strengths and limitations of the study

There are several strengths and limitations in the development and preliminary evaluation of the FPEI.

5.6.1 Strengths of the study

The strength of this study lies in the fact that the UKMRC framework was used in the development of a fall prevention intervention; it involved exploration of both older persons' and HCPs' needs using in-depth interviews, focus group discussions, and expert's consensus.

Firstly, the needs assessment study allows the researcher to develop a fall prevention intervention that is tailored to the current needs and proactive views of the older persons in the primary care setting. This study employed purposive sampling, where the participants were selected based on attributes, which might have an impact on the development of the intervention. The strength of the FEPI pilot tests lies in these factors: selection of the older participants to ensure that they have experienced fall problems; were at the age of above 60s; a good mix of gender and ethnicity; were with or without complication of co-morbidities and socio-economic level. Similarly, the HCPs who participated in the FGDs and IDIs were sampled purposively and those included had these characteristics: were from different disciplines, had experience in managing falls; and work in UMMC. These HCPs provided in-depth understanding of the barriers to managing falls from different perspectives.

Secondly, in this study, 16 older persons and 20 HCPs were interviewed; their views reflected differences in the perceptions between disciplines, men and women, and the three ethnic groups. Recurring themes kept showing up during the interviews; and the

interview sessions ended when there were no more new themes emerging. The researchers' team agreed that the data had reached the 'saturation of themes'. The strength of this study lies in the needs assessment analysis, which is rich and robust for the development of the FPEI. In addition, several barriers were uncovered by HCPs while managing falls at the time when there were no structured guidelines for fall prevention in Malaysia. Hence, the findings of this study may be useful in the development of structured guidelines for fall prevention in Malaysia and in other developing countries.

In addition, the strength of this study lies in the body of literature on the effectiveness of the FPEIs, a topic very few studies have looked into (Smith et al., 2010; Ory et al., 2015). The construction of the FPEI content was based on effective fall prevention evidences. Moreover, the pilot tests and preliminary evaluation of the FPEI draft enabled the iterative revision of the FPEI; due to the constant drafting and revising of the FPEI, the data were 'triangulated', the results of which improve the credibility of the development and implementation of the FPEI.

Furthermore, the study's strength can also be seen in the use of different participants for interviews in the needs assessment study and evaluation. The same participants were interviewed for iterative evaluation of the intervention. Collecting data from the different participants for the needs assessment and evaluation may provide an opportunity to capture a wider range of views and feedback, in comparison with interviewing the same participants. In the FPEI preliminary evaluation, the same participants were tested with the FPEI, which provided endorsement and feedback on the content of the FPEI. The same participants were interviewed, and this may allow the participants to justify their views or comments on the content selected for the FPEI. They indeed helped to iteratively review and revise the content of the FPEI. This further

improved the acceptability of the FPEI and the feasibility of implementing the FPEI in the general practice.

5.6.2 Study limitations

There are several limitations in this study. The limitations are as described in the following paragraphs.

Sample size and transferability

Firstly, the sample size of the FGDs and IDIs was small, and it comprised 20 HCPs and 16 older persons from UMMC. Some disciplines, such as rehabilitation physician, occupational and physiotherapists, were represented only by a single participant. This may limit the transferability of the study. Furthermore, the group size of one of the FGD was small ($n=4$), and this may affect the group dynamics. However, this study's findings are not representative, but they aim to maximise the diversity within the study setting (Kitzinger, 1995).

Secondly, the participants in this study were recruited from a single hospital; hence, the healthcare system barriers as a potential factor for the poor uptake of fall prevention interventions cannot be further explored. The interviews were conducted in the hospital where the participants were recruited; hence, the environment may have influenced them to give socially desirable responses, despite being informed that their responses would not affect their medical care and confidentiality was assured.

The researcher did not interview close acquaintances or colleagues to avoid potential bias in participant responses. Moreover, no member checking was conducted in this study to obtain participants' feedback on the study findings. Nevertheless, this study has revealed important insights into the factors that may influence the implementation of

complex interventions in our cultural setting, in terms of its many similarities to the existing studies, culturally unique perspectives on the use of traditional remedies, and the difficulties in accessing modern medical treatment. This information will be invaluable in the implementation of effective fall prevention strategies specifically and other complex multifaceted interventions in the management of chronic disease among our older population in general.

Lastly, the participants did not include those with learning difficulties, cognitive impairment, and physical impairment. Thus, the findings are not transferable to those who reside in East Malaysia or people with mental disability and with poor English literacy. The data could be 'transferable' only when other settings are very similar to the study setting (Patton, 1990).

Limitations of the evidence used in the FPEI

The systematic literature review was conducted to identify the effective FPEIs, and it was limited by the scope of the search; firstly, only English language publications in PubMed were included in the review. This may result in the omission of other research studies relevant to this review. Secondly, only the PubMed database search engine was utilised to search for the evidences. Future updates of the evidence should therefore, include other databases such as CINAHL, PsycInfo and EMBASE; non-English literature should also be included.

Limitations in the preliminary evaluation of the FPEI

The older persons who did not respond to the invitation may have been a potential source of bias as they may have a different profile, fall history, and perceptions. In the

preliminary evaluation, some of the participants who responded positively to the invitation did not appear for the interviews due to several reasons: not contactable, transportation problems, unwell, and not interested with falls. However, in this study, attempts were made to maximise the response rate through these means: HCPs' and staff nurses' recommendation, study flyers, and researcher's personal approach at the primary care clinic of UMMC. In this case, selection bias was inevitable as the selection of eligible participants was performed by the HCPs, staff nurse and the researcher. However, as this was a pragmatic intervention, the HCPs selected the participants who really did have a concern about their fall problems.

Small sample size

The limitation of the study lies upon the low recruitment rate, which resulted in a small sample size. It was due to several reasons: fewer reporting of fall problems among older persons; perceptions that fall is not a medical issue, inevitable, and an ageing problem; and no time to spare to attend the interventions. Thus, older persons were mainly recruited through HCPs' and nurses' recommendations in the clinic. The HCPs in the clinic recommended older persons who had a prior discussion about fall problems with them. Perhaps, there is a need to recruit older participants from outside the primary care clinic, including the governmental and non-governmental community organisations. In addition, seeking support from paramedics to explain and distribute the study flyers to the older patients may improve awareness of the FPEI and in turn may improve the recruitment.

The preliminary evaluation was based on a small number of participants. The participants in the last FPEI pilot test were less than expected. In the previous pilot test interviews, the participants suggested more participants be included in the group session. However, the participants' turnout was lower compared with the recruitment

number at the last minute of the event; there was no choice, and the pilot test was carried out using a smaller number of participants. Thus, the aim of reporting the preliminary evaluation findings of the FPEI pilot tests was to demonstrate how the analysis was conducted and to identify any trends in the results which may have an impact on the conduct of the study. This analysis was not intended to make conclusions about the effectiveness of the FPEI.

Furthermore, the Delphi and nominal group techniques were not employed in the research study. It is because the iterative revision of the FPEI involved constant drafting and revising and the data were ‘triangulated’, the results of which improve the credibility of the development and implementation of the FPEI.

Language

The medium used for the FPEI was English. Those older persons who can read and write in English were recruited in this study. However, Malaysia is a multi-lingual society, where at least four main languages, namely English, Malay, Chinese, and Tamil are used among the Malaysians. Thus, English illiteracy limits participation of older persons in the FPEI.

Emphasis on the older persons’ needs

This FPEI attempts to identify and support older persons’ needs for fall prevention interventions. These needs include information, health care, HCPs’ and caregivers’ related needs. Although these needs have been explored to varying degrees in the FPEI, there is relatively more emphasis on the information, health care, and HCPs’ needs compared with the caregivers’ needs. According to the NICE guidelines, the older persons at a high risk of falling and their caregivers should be offered the fall information together, such as measures to take to prevent falls, how to stay motivated to

conduct exercises, and how to cope if fall occurs (NICE, 2013). However, the researcher tried to circumvent this problem by providing a booklet to each participant, who later can share the FPEI information with their caregivers.

Need for HCPs training

The delivery of the FPEI was facilitated by a multidisciplinary team to the older participants. Therefore, before the pilot test, the inter-professionals were trained how to facilitate the FPEI to the older participants. The researcher conducted the training with each inter-professional using self-developed PowerPoint slides. Thus, this may have limited consistency in delivering the FPEI. The delivery of the FPEI is consistent in such a way that even if different persons deliver the FPEI, it should be able to obtain the same study outcomes. Hence, there should be a structured inter-professionals training, which includes quality facilitating manual, structured PowerPoint slides and the scripts.

CHAPTER 6: CONCLUSIONS

In this study, the review confirms the limited work in Malaysia and other developing countries. Strengths include that this study explored limitations for health professionals as well as older people to engage in fall prevention, and the suitability of the UKMRC framework in the development of intervention. One of the novel innovations of this work is the choice of the adult learning principle Gerogogy to provide a conceptual underpinning for MuFE IT an education focused intervention. The importance of Bandura's strategies for enhancing self efficacy continues to be included in health behaviour models and is as well important in the intervention. Hence, this study findings were important and the development of the MuFE IT specific to a developing country like Malaysia should focus on a future RCT with the hope ultimately of reducing the burden of falls in Malaysia.

6.1 It is feasible to develop an FPEI based on needs, evidence and theories

The FPEI was developed based on the iterative process of information searching and synthesising; drafting; reviewing and revising through pilot tests; and assessment of its preliminary acceptability. This study found that to improve uptake of safety behaviours, it is important and feasible to develop an FPEI based on the needs of the older persons and HCPs, evidence-based information and underpinnings of the theories. In addition, paying attention to the content and format of the FPEI ensures that it is a balanced and effective model. As a result, the FPEI fulfils the needs of the users and ensures that the older persons are well informed of falls and the strategies; it tailors the fall prevention interventions relevant to their context.

6.2 Preliminary findings suggest that the FPEI helps to improve knowledge and uptake of informed fall prevention activities

The preliminary findings of the FPEI pilot tests suggest these benefits: after their involvement with the FPEI, the older persons were more knowledgeable, confident, motivated, and increased their uptake of fall prevention activities. Overall, the results indicate that the FPEI gives the users reasonable justifications to take up the evidenced-based fall prevention interventions.

6.3 It is feasible to implement the FPEI in a primary care practice

The FPEI users only need to pay a single visit to the primary care practice, where the trained inter-professionals facilitate the dissemination of the content of the FPEI. The flexibility of delivering it in one visit meets the needs of the older persons and HCPs. In addition, only one facilitator is required in the primary care practice to implement the FPEI and deliver it to the patient in a single visit.

6.4 It is feasible to use the theories and UKMRC framework to develop and evaluate the FPEI

In this study, Bandura's Self-efficacy, Gerogogy theories and UKMRC framework were employed in the development of the FPEI. This helped the older persons to learn the lessons according to their own pace. The UKMRC framework helped to link the process of development with evaluation of a complex intervention. Both frameworks are essential to guide the development and evaluation of the future FPEIs.

In conclusion, this study highlights the need for a fall prevention education intervention (FPEI) among community dwelling older persons at a high risk of falls. The FPEI, developed based on needs, evidence and theories, was used to provide

information about the evidence-based fall prevention interventions. The preliminary findings suggest that the FPEI improved the knowledge of older persons about falls and the strategies; it helped them to tailor the fall prevention interventions to their own needs, without prolonging the consultation hour in the primary care practice.

6.5 Recommendations

In this section, the following key recommendations are made:

- Provide information to older persons about evidence-based fall prevention interventions;
- Improving the development of the FPEI;
- Improving the evaluation of the FPEI; and
- Future research in the area is warranted

6.5.1 Provide information to older persons about the evidence-based fall prevention interventions

There is a significant gap in providing the FPEI to older persons who are at a high risk of falls in the primary care practice. Although the FPEI may help to partly bridge this gap, specific strategies are required to address these needs.

Need for HCPs' training to provide information about evidence-based fall prevention interventions

There is a need for HCPs in the primary care practice to be trained in the evidence-based fall prevention interventions. The HCPs who are competent in providing evidence-based fall prevention interventions and managing falls among older persons are able to provide reasonable information to the older patients. Currently, there is a wide practice variation of how fall prevention interventions are provided in the hospital.

A collaborative fall network between the primary and secondary care can help to improve the primary-care HCPs in managing falls among older persons at a high risk of falls, including providing the evidence-based fall prevention interventions. In UMMC, there is a need to establish a fall network between the practices in the hospital and the fall specialists. The network may conduct regular clinical meetings where the fall specialists provide clinical advice to the primary-care HCPs in managing older persons' falls. The fall specialists, physiotherapists, occupational therapists and the rehabilitation physicians and nurses can also support the fall network.

Strategies to overcome older persons' perceptions of the fall and its preventions

One main barrier to providing the information of evidence-based fall prevention interventions was the older persons' views on falls and the preventions. Several strategies can be used to overcome this barrier. Firstly, the information about the evidence-based fall prevention interventions is considered part of the clinical consultation; this will prevent the delay in providing the information in a separate process. The information should be conveyed to the older patients when they reveal their fall risks, such as balance problem, knee pain and dizziness. Secondly, the older patients can be provided with a fall education booklet. This again, should be done in the early stage of the fall problem, so that the older patients are aware of the fall risks and the preventions strategies. Some evidence-based fall prevention interventions may be rejected by the older patients, such as the use of walking aids and referrals to physiotherapist or rehabilitation physician; this may hinder the older patients from realising the convenience and advantage of using a proper walking aid and the benefits of physical therapy. Thirdly, a peer support group can be helpful; the older patients who have used the evidence-based fall prevention interventions and experienced falls,

should share their experiences with the older persons who are resistant to adopting the fall strategies.

Approaches to provide social support to take up evidence-based fall prevention interventions

Social support plays an important part in influencing older persons to accept the information provided regarding the evidence-based fall prevention interventions, and the hospital should identify and address their needs. HCPs should enquire about the social relations and the support they receive from their family. The HCPs should also offer to provide joint consultations with the older patients' family or carers. Families can provide the necessary support and motivate the older patients to take up the evidence-based fall prevention interventions, such as exercise, use of walking aids, and reviewing medication. One approach is to invite a reliable family member to attend the FPEI together with the patient and explore the evidence-based fall prevention interventions.

Providing infrastructure to ensure the older patients' needs are met

As cited in the needs assessment study, HCPs felt that the FPEI was useful in providing structured-based fall prevention interventions. For example, the HCPs can record the key aspects of the fall prevention interventions they have discussed with older patients. This will ensure comprehensive support for the older patients and that all their needs are addressed. In addition, the older patients can be provided with a 'checklist', such as a knowledge checklist to be completed routinely, which can help them improve their knowledge. Furthermore, the older patients can be contacted through phone calls, a minimum of one time, before their next appointment, which will help them to identify their unmet needs.

Inter-professional practice is needed to provide consistent fall prevention intervention discussions

Due to practice variation, the older persons might receive conflicting fall advice from the HCPs. It is, therefore, important for the HCPs to have inter-professional communication and agree on a fall prevention strategy for older persons at a high risk of falls. One approach is to use the concept of inter-professional practice, which advocates that the HCPs learn from and with each other to provide patient-centred care. This provides a platform for the HCPs to adopt common approaches in providing the evidence-based fall prevention interventions.

The FPEI: a communication tool

The FPEI can be a communication tool between HCPs and older persons. This will ensure that accurate and balanced information is being delivered to the older patients by the HCPs in a consistent manner and older patients' views are considered in the discussion to uptake evidence-based fall prevention interventions. However, this would require the key opinion leaders in falls to participate in the development, evaluation and implementation of the FPEI.

6.5.2 Improving the development of the FPEI

This FPEI and the evaluation process were developed based on the theories and UKMRC framework. Both frameworks complemented each other in the development process; however, there was a lack of evidence of the validity, reliability and generalisability of the development process. Although the theories outline the explicit recommendations of the principle, they do not provide guidance on how to operationalise the recommendations. The UKMRC, on the other hand, proposes specific methods for developing and evaluating complex interventions. However, these

proposals are generic in nature and require further elaboration and application in the context of fall prevention interventions. In addition, few FPEIs describe the use of theories in the process of operationalising the development of FPEIs. Thus, the theories used as the basis of the development and evaluation of the FPEIs need to be identified in the systematic review, such as Cochrane Review for future development of the FPEIs.

Another effort in the development of the FPEI is reporting the research findings in a format friendly to older patients, so that the information can be understood by the lay public.

Furthermore, issues pertaining to implementation of the FPEIs, such as PowerPoint and booklet, inter-professionals training on quality facilitating using Bandura's self-efficacy theory and Gerogogy principle, and half-day FPEI, should be resolved and conveyed, and later used routinely in the practice.

6.5.3 Updating the FPEI

There have been more evidence-based fall prevention interventions available since the development of FPEIs back in 1992. The NICE guidelines for the clinical fall prevention have been revised (NICE, 2013), and the American Geriatrics Society and British Geriatrics Society have updated the clinical practice guidelines for fall prevention intervention (Kenny et al., 2011). In addition, the World Health Organisation (WHO) has more updates for fall preventions among community dwelling older persons (WHO, 2008); a more recent systematic review is warranted to update the evidence of the efficacy of the fall prevention interventions.

6.5.4 Future research

Dickson et al. has identified common challenges faced by older persons (including Asian and Chinese population) for fall prevention interventions: lack of referral, behaviours, beliefs, and context (Dickinson et al., 2011). Some of these challenges faced by older persons may explain the barriers confronted by HCPs in our study, such as lack of knowledge and training in educating older persons about falls and their preventions, motivating older persons to exercise, assessing risk for falls, and reinforcing older person's efforts towards changing behaviours and beliefs about falls. Therefore, it is pertinent for the healthcare system to provide HCPs with the latest knowledge and training in fall preventions, so that they can educate older persons to prevent falls and help them maintain their efforts of preventing falls effectively.

This topic warrants more research to uncover other factors that could influence poor fall management among HCPs. In addition, exploring views from HCPs and older persons from other clinical settings, particularly the North and East Coasts of Peninsular Malaysia and East Malaysia, is also vital to provide comprehensive understanding about issues pertaining to poor fall management. In addition, exploring views from caretakers and healthcare organisations would also provide insights into HCPs' barriers to cooperating to manage falls. This would allow triangulation of data from multiple sources, which may help to develop structured clinical guidelines for fall preventions and evidence-based fall prevention interventions, in the local context.

This study adds to the limited literature on the development of evidence-based fall prevention education intervention for increasing falls knowledge and improving behaviour change to reduce fall risks and uptake informed fall prevention strategies among older persons at high risk of falls. It also has implications for future research on conducting a randomised controlled trial to evaluate the effectiveness of the MuFE IT

intervention and how it could be implemented in the primary care setting to reduce fall rates. Also recommend that future efforts examine the effectiveness of this MuFE IT and other evidence-based programmes as it relate dose-response (half a day attendance) and other class characteristics (e.g. group size, workshops). Additionally, there is also suggestion for that these self-reported measures be complimented with clinical measures (e.g. time-get up & go, stand to sits, falls behaviour change (FaB) and Fall efficacy (FES-I)) to validate findings of this study. In addition to validating these findings with functional variables, future research should investigate the relationship between MuFE IT, cost variables, quality of life and healthcare utilisation to examine the emergence of any systematic difference across the socio-economic background.

The study has contributed to our knowledge of the development of evidence-based fall prevention education intervention for older persons at high risk of falls, living in their own residence at a primary care setting and helped in understanding the comprehensiveness of the merging provisions of the needs assessments, best evidences and behaviour theories and adult learning principle. The widespread dissemination of such programme through primary care practice and Aging and Health Network can help to improve public health by reducing older persons' fall risks and positively impacting on overall health and quality of life.

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LIST OF PUBLICATIONS AND PAPERS PRESENTED

Original research articles

Loganathan, A., Ng, C., & Low, W. (2016). Views and experiences of Malaysian older persons about falls and their prevention—A qualitative study. *BMC Geriatrics*, 16(1), 1-10.

Loganathan, A., Ng, C., Tan, M., & WY, L. (2015). Barriers faced by healthcare professionals when managing falls in older people in Kuala Lumpur, Malaysia: a qualitative study. *BMJ open*. doi: 10.1136/bmjopen-2015-008460

Conference Proceedings

Annaletchumy L., Ng, C.J., & Low, W.Y. 2013. Do healthcare professionals managed falls in older people: A qualitative inquiry. Proceedings of the 20th IAGG World Congress of Gerontology and Geriatrics, S463 (*ISI/SCOPUS Indexed Publication*)

Conference presentations

Oral presentations

Annaletchumy Loganathan, Ng Chirk Jenn & Low Wah Yun, 2013. How do Health Care Professionals Manage Falls in Older People? A qualitative Inquiry presented at The 20th IAGG World Congress of Gerontology and Geriatrics; International Association of Gerontology and Geriatrics. 24-27th June 2013. Coex, Seoul Korea.

Annaletchumy Loganathan, Ng Chirk Jenn & Low Wah Yun, 2013. What do Healthcare Professionals Need to Improve Falls Management in Older People? A qualitative Needs Assessment Study presented at The 9th Malaysian National Geriatrics Conference, The Institute of Health Management Bangsar. 19-21st Sept 2013. NIH Bangsar, Kuala Lumpur

Poster presentations

Annaletchumy Loganathan, Ng Chirk Jenn & Low Wah Yun, 2014. Older people's views and experiences About Falls and Its Prevention: A Qualitative Study. Presented at the Wonca Asia Pacific Regional Conference; The World Organisation of Family Doctors, Nurturing Tomorrow's Family Doctors; 22-24 May 2014. Bornoe Convention center, Sarawak

Annaletchumy Loganathan, Ng Chirk Jenn & Low Wah Yun, 2014. What do older faller's want for a fall prevention intervention programme? A qualitative needs assessment study. Presented at the 46th Asia Pacific Academic Consortium For Public Health Conference: Evolution of Public Health in the Asia Pacific Region; 17-19 October 2014; Hilton, Kuala Lumpur.