FALL PREVENTION AMONG ELDERLY PEOPLE IN HOME CARE

A literature review in nursing perspective

Abstract

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Abstract

Fall prevention is one of the major issues in gerontology nursing. It raises the great concern on the public health care since the consequences of falls can be serious to patients directly and/or indirectly. However, most of the falls can be prevented by multifactorial interventions.

The purpose of this thesis is to prevent falls among elderly people who are receiving homecare by using evidence-based research. The aim of this thesis is to carry out a literature review and find out prevention of falls among elderly people with nursing perspective. Nursing roles are also mentioned in this thesis in order to raise awareness about the current situation of falls that elderly people are facing in daily life.

The study presents a literature review of scientific articles which are carefully selected by criteria and analyzed with the content analysis method. The results are presented by six generic categories, including physical exercises, home safety environment, medication, technologies, education and multidisciplinary program. Besides, the roles of nurses are mentioned to emphasize the importance of nursing responsibilities in fall prevention program for elderly people with dependency on home help services.

Keywords

Fall prevention, Nursing intervention, Home care, Elderly, Home-based fall prevention

Tiivistelmä

Kaatumisien estäminen on yksi suurimmista ongelmista vanhusten hoidossa. Potilaiden kaatumiset ovat suuri ongelma vanhusten hoidossa, koska sen seuraukset voivat olla potilaille vakavia. Kuitenkin, suurin osa kaatumisista voidaan välttää useisiin osatekijöihin puuttumalla.

Tämän opinnäytetyön tarkoitus on estää kotihoitoa saavien vanhusten kaatumisia käyttäen todiste pohjaisia tutkimuksia. Opinnäytetyön tähtäimenä on toteuttaa kirjallinen katselmus ja selvittää vanhusten kaatumisien estämisen sairaanhoitajan näkökulmasta. Sairaanhoitajien roolit ovat myös mainittu opinnäytetyössä, jotta heräisi huomio nykytilanteeseen, jossa vanhukset kohtaavat kaatumisia jokapäiväisessä arjessa. Työ esittää katsauksen tieteellisistä artikkeleista, jotka ovat tarkoin kriteerein valittu ja analysoitu sisällön analysointi menetelmällä. Tulokset on jaettu kuuteen kategoriaan, näitä ovat, fyysinen harjoittelu, kotiturvallisuus, lääkitys, teknologiat, koulutus ja yleissivistävä ohjelma.Lisäksi, sairaanhoitajien roolit on mainittu korostaakseen heidän vastuuta kotiapua tarvitsevien vanhusten kaatumisien esto ohjelmassa.

Avainsanat: Kaatumisen esto, hoitajan väliintulo, kotihoito, vanhukset, kotiin keskittyvä kaatumisen esto

CONTENTS

1   INTRODUCTION

Falls are a common phenomenon, which can occur at any age during the human life. Falls can be considered as the "loss of balance" regarding the elderly population. (World health Organization (WHO) 2007).   A fall could be understood as "an event which results in a person coming to rest inadvertently on the ground or floor or other lower level" (WHO 2018). Besides, a fall can be defined to healthcare professionals as an event, in which injuries and ill health are in consequences of it (WHO 2007).

Falls have been a global healthcare issue. Among deaths caused by accidental injuries worldwide, deaths from falls comprise the second largest percentage, after deaths resulted from the road-traffic accident. Fatal falls are likely to occur among the seniors over the age of 60 (WHO 2018.)

The age is a key risk factor of falls. The prevalence of falls among the elderly over the age of 80 is significantly higher than the one over the age of 65, which are half and one third respectively (Darowski 2008, 1-2).   In United States, fatal death rate among the elderly population rose considerably, 30 percent, from 2007 to 2016 (Centres for diseases control and prevention 2018). Besides, 37.3 million falls need to get medical interventions each year worldwide (WHO 2018). In Finland, falls consequences also have caused a considerable concern among public healthcare. About 80 percent of accidental injuries among the Finnish elderly population were caused by falling, slipping and tripping. (National Institute for Health and Welfare 2018.)

It is a fact that most of falls among the elderly occur at home or home-dwelling settings. Therefore, the definition and criteria of "safe home" are crucial. (Lundebjerg 2001, as cited in Pereira, Vogelaere & Baptista 2008, 52.)   Moreover, Bath and Morgan stated the falls happening at homes caused the highest fatal rate (Pereira, Vogelaere & Baptista 2008, 53).

Established by the needs of the social healthcare, home care is the important healthcare section. Home care is one of the several services that provide people's needs in social care support. Home care includes support in daily life, nursing work with treatment and administering medication. The major types of clients are elderly people who live alone and need help in treatment and medication as well as support in their independent living. (National Institute for Health and Welfare 2018.)

According to statistics in November 2017, there were 73 806 regular clients receiving home services in Finland. The number of customers increased by 0.4 per-cent compared with the previous year. Moreover, 56 671 (77 per-cent) of Finnish regular homecare clients are above 75 years old. (National Institute for Health and Welfare 2018.)

However, there are more and more people suffering from consequences caused by falls. One of the home care aims is to ensure patient safety when they are staying at home. Falls can occur to patients in both hospitals and homes, prevention methods are set equally in both institutes, but the significant difference is that interventions of prevention are modified to suitable with home care setting and also clients' home. (Ellenbecker; Samia; Cushman & Alster. 2008.)

The nurse's roles have been increasingly essential. One of their primary responsibilities is striving to improve the healthcare services, working as nursing professionals with evidence-based practice, making substantial contribution to prevention and management of healthcare issues. (Price 2007, 12.)

Based on mentioned facts, authors ourselves realized the importance of nursing roles in fall prevention among the elderly. Therefore, in this thesis, the authors attempt to make a literature review on evidence-based prevention of falls among elderly people who are receiving home-care services in nursing perspective.

2   FALLS AMONG THE ELDERLY

2.1   Risk factors of falls

There are lots of risk factors causing falls, they could be environmental effects, diseases, or others related factors. This section will clarify the risks which lead to high percentage of falls among elderly people. Understanding the risks causing falls may provide a better view of preventing those risks which will be listed below. There are three types of risk factors of falls including intrinsic factors, extrinsic factors and behavior factors (Boelen, Hekman & Verkerke 2013).

Intrinsic risk factors: Gender, age, chronic diseases, or poor general health could be considered as intrinsic or biological risk factors. Statistics reported that in some countries, men have higher levels of death from falls while women are facing more of non-fatal falls. In all regions, adults who are over 65 years of age, especially women have significantly higher levels of falls than younger people. (WHO 2018.) The increase of falls relates with older age, other review has showed that the risk of falls among people from 65 years old to 74 years old was 31 percent per year. With elderly who are over 80 years old, 37 percent per year was the percentage of possible risk of falls. (Ganz, Bao, Shekelle & Rubenstein 2007; Kwan & Straus 2014.)

Besides, increasing age is one of the most common risks of falls because it leads to many aspects related to the risks, for instance bad balance, poor vision, side effects of other medication use or osteoporosis. Among those, osteoporosis is considered as a major reason. The side effects of medication use could be dizziness, fatigue or palpitations which lead to bad balance, particularly when walking. In addition, poor vision may contribute to increase slightly the risks of falls among elderly people. Vision is impaired by the time the person gets older. The older the person is, the higher the risk of falls people suffer because of the visual impairment. (Kwan & Straus 2014.)

Chronic diseases and the use of medication for those diseases contribute as one reason for falls. Not every medication causes falls. Side effects of medication which lead to falls could be sedation, hypotension, slowing the pulse, etc. According to studies, sedatives and antidepressants in the medication used for anxiety and depression have a strong relation to the risks of falls. With older adults, they might be more sensitive with side effects than younger people and need lower doses. Moreover, older people have less muscle mass and water. Reduction in activity of kidney and liver which are used to eliminate medicines can result in higher effective drugs in their body. People with poor general health tend to experience falls more than others, because of more medication use, symptoms related to falls

such as confusion or dizziness, or cognitive impairment by the time of age. (Darowski 2008, 65-68.)

Extrinsic risk factors: Environmental factors could be recognized as a common reason causing falls among elderly people. The environment interacts closely with human beings in daily life, therefore, factors related to environment play a vital role in the quality of life. Unsafe environment such as bad lighting, location or floor can cause high risks of falls especially for those who are with poor balance or limited vision. Location of all barriers which hinder the way, for example bad furniture set up or improper location of the house could be a dangerous cause to falls. One of the common reasons often causing falls is a slippery floor, in which the bathroom is mostly mentioned. However, not only the bathroom, but the kitchen or living room can have a higher risk for falls too. (Boelen, Hekman & Verkerke 2013.)

In addition, along with environmental factors, inappropriate shoes selecting is considered as related aspect leading to falls. Uncomfortable footwear such as too tight, too loose, or too high shoes may cause a risk of falls. This matter should also be a consideration for nurses and care givers whether at homes or hospitals, because nurse's role is to guide and evaluate patient's well-being. Maintaining suitable footwear may reduce the risks of falls among elderly people. (Borland, Hollins & Locke 2013.)

Behavior risk factors: Behavior factors are considered as serious risks of falls. Hurrying, style of gait or physical inactivity are known as reasons leading to falls among people in daily life. Among elderly people, hurrying is not considered as a common factor, it usually happens with younger people. When people get older, they tend to walk more slowly and more in a more unsecured way. By contrast, the style of gait is a reason which leads to falls occurring frequently among the older people. Many falls are the consequence of stumbles while walking. Younger people can be more flexible in order to avoid accidents, but older people fall. That is a realistic angle which is proved by the high percentage of falls among elderly people every year all over the world. (Darowski 2008, 29-32.)

Physical exercise is a crucial key to avoid falls. It helps to strengthen muscles and maintain good balance. However, elderly people are faced with another aspect hindering the development of physical activities. It is the fear of falling. With those who have suffered from falls before, they usually do not want to repeat the experience. Therefore, they tend to limit themselves from physical activities, fear to do exercises, walk, and fear to be alone which cause many consequences of falls. (Darowski 2008, 109-111.)

2.2   Consequences of falls

Falls affect significantly every human being's daily life. Among elderly people, falls are one of the main factors causing injuries, incapacities and even deaths. It is a global healthcare issue which causes a serious concern in the public healthcare sector (World health Organization 2018.) The consequences of falls can be physical and psychological. In fact, they are related to each other. Falls even with or without injuries affect heavily the quality of life of elderly people. (Terroso; Rosa; Marques & Simoes. 2014.) Falls affect not only directly the patient, but also the family members, caregivers and society (Darowski 2008, 113-114).
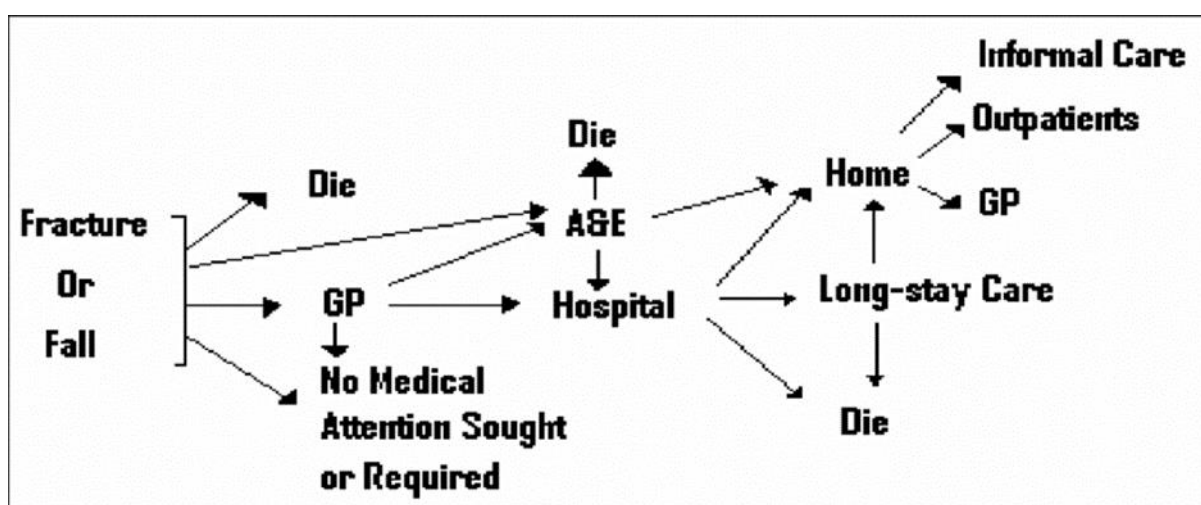

Figure 1. Pathways following a fracture or fall (Gannon, O'Shea & Hudson 2007)

Figure 1 displays more clearly the four possible trajectories following a fracture or fall. First, the most serious consequence of fall is death. Secondly, the patient may not need any medical attention. The third outcome could be visiting general practitioner, from that they can be hospitalized or visiting directly the emergency department. After that, the patient can be discharge from the hospital to home or need more rehabilitation or help in the long-stay care, or the patient can even die. Then, the patient who returns from hospital to home could be in need of informal care, outpatients or visits at general practitioners. (Gannon, O'Shea & Hudson 2007.)

Mortality: According to the statistics of the World Health Organization published in January 2018, the estimated number of people who die from falls was 646 000 globally annually, which made falls the second leading cause of death worldwide. Among the all injuries deaths, falls make up of 40% of the total. Mortality rate among the people at the age of over 65 in the United States was 36.8 per 100000 population. In Finland, the fatal rate of falls for over 50-aged male citizens was 55.4 per 100000 population, while for the same age group of female population it was 43.1. Seniors older than 65 years old had the largest number of

fatal falls in every region of the world. (WHO 2007.) Stumbles or falls was the first leading cause of deaths of accidents in 2016 among seniors, leading to deaths of 1,200 people. It accounted for more than 25 percent of men's and almost 50 percent of women's accidental deaths. Among the people over the age of 75, three in four deaths resulted from falls or stumbles. (Official Statistics of Finland 2016).

According to the figure 1 below, while the general accident fatal rate decreased dramatically from 1971 to 2016 in Finland, the death rate of falls in both women and men increased considerably in the same period of time. It means that falls accounted for the rising percentage of fatal accidents. Moreover, the mortality rate of falls in man population was higher than the one in women most of the time.
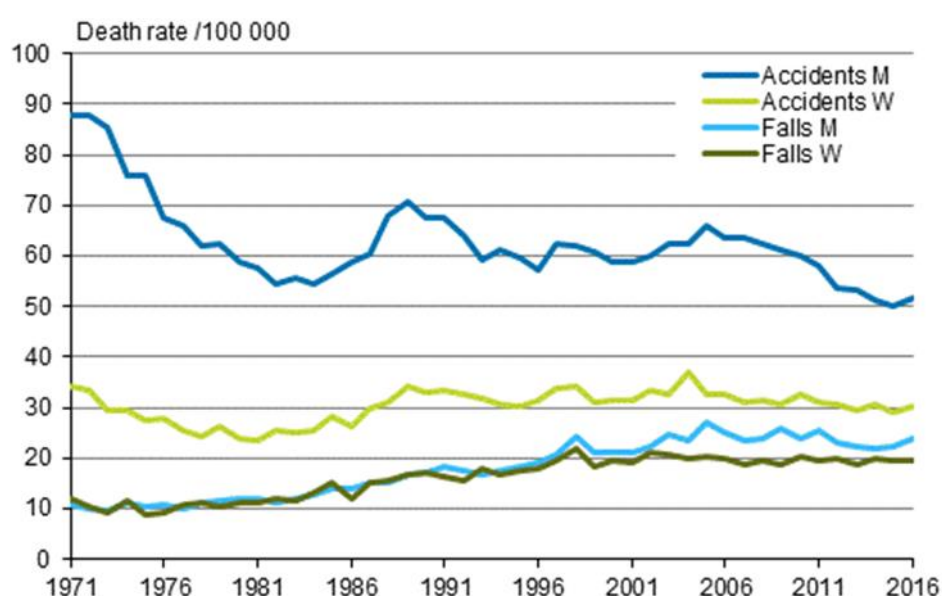

Figure 2. Accident mortality and separately deaths from accidental stumbles and falls from 1971 to 2016 in Finland (Official Statistics of Finland 2016)

Physical consequences of falls: Falls are reported to cause a large number of physical consequences for elder population. Physical consequences can be categorized into four main groups: fractures, bruises, injuries and "other" physical consequences. (Terroso et al. 2014.) Approximately 4 percent of falls lead to fractures and 11 percent of falls lead to serious injuries. (Rubenstein, Josephson & Robbins 1994; Pereira, Vogelaere, Baptista 2008.) Falls can lead to fracture in almost every part of the human skeletal system (Terroso et al. 2014). There is also a fact that the majority of hip fractures are a consequence of falls. (Guerado, Sandalio, Caracuel & Caso 2016.) The upper extremities and soft tissues make

the largest proportion in the injuries category. Laceration and dislocations are the most common in the "other" physical consequences categories. (Terroso et al. 2014.)

Psychological consequences of falls: Besides noticeable physical consequences, falls can lead to psychological problems, which can occur to a considerable number of seniors. Fear of falling is a common phenomenon belonging to psychological consequences of falls. (Alvord 2008, 3.) It can happen to someone who has or has not experienced a fall. It is reported that from 40 percent to 73 percent of elderly people having a history of falling have the fear of falling (Jung 2008.)

Fear of falling is a normal response of the body so that it makes the senior understandably cautious to prevent future falls (Murphy, William & Gill 2002; Jung 2008.) However, it can cause some negative impact on the elderly. Limited physical activities, reduced efficacy, increased institutionalization and lower quality of life can be in consequences of fear falling. (Jung 2008.) Additionally, "post-fall anxiety syndrome" is noticeably diagnosed for older adults. They may lose their self-confidence in safely moving or doing physical activities of their daily living. (Alvord 2008, 4.)

Consequences of falls for the family and care givers: Falls have severe consequences for the elderly both physically and mentally. They have a greater need to be taken care of. Following an experience of a fall, some limitations, deterioration or loss of doing physical activities are prevalent outcomes. Therefore, care givers are needed more to help them with daily activities. The family members and care givers would have anxiety of falls and a burden of care, possibly physically, psychologically and financially. (Darowski 2008, 113, 122.)

Consequences of falls for the society: Besides financial cost to fallers, falls lead to tremendous costs to the community and society. The government or health care system not only spend money on doing research of falls, but also executing fall prevention programs. Additionally, the medical costs are considerable. (Alvord 2008, 5.)

2.3 Risk assessment

Elderly people experience falls frequently in their daily life due to risks which are mentioned. By that, there are assessments of risks that nurses and professionals should take into consideration in order to decrease the prevalence of falls. Older people should be interviewed by the nurse routinely about history of falls or if they have suffered from falls in the past years. If they have experienced a fall, then more detail such as characteristics, or reasons should be taken into account. Besides, balance and gaits should be checked frequently to figure out whether they need more support in physical activities to improve strength and muscles. Besides, home hazards checking is important. Nurses and care givers should be

aware of location or barriers causing the risks of falls. (Swift & Iliffe 2014.) Due to the fact that some of medication may cause falls, older people should be assessed within 24 hours after taking medicines and re-evaluated in 3 months, and nurses should follow the risks of falls in their medication condition (Duffy 2013).

Along with physical examinations, several risk assessment tools are applied, for example Timed Up and Go Test, the Berg Balance Scale, The Short Physical Performance Battery. Risk assessment tools assess the gaits, balance and physical performances in geriatric care and could be as predictions whether patients have high risks causing falls or not. (Journal of the American Geriatrics Society 2011; Palumbo, Palmerini, Bandinelli, Chiari & Wang 2015.)

2.4   Fall prevention in nursing perspective

This thesis will focus on prevention of falls among elderly people who are receiving homecare. There are several studies including books, articles, which also discuss the same topic.

Falls occur in every type of healthcare institution including hospitals, home services, nursing homes. There are three types of falls according to the book "Preventing patient falls" which are accidental falls, anticipated physiological falls and unanticipated physiological falls. Each type has its own methods of prevention. (Morse, 2008. 9-15.)

In accidental falls, ensuring a safe environment is important. It means that all dangerous agents need to be removed. Accidental falls usually are based on the style of walking, especially with people who have abnormal gaits. By that, providing a suitable environment in order to correct the problems is essential. For instance, installed extra hand-rails on the walls, or every barriers should be relocated suitably. Anticipated physiological could be prevented by determining whether the patient is easy to fall by using Morse Fall Scale. Medication can be used to reduce confusion or balance the mental health level. Besides, physiotherapy is used as a common method in falls prevention. Physiotherapy helps to strengthen muscles, improve balance or give correct guidance of walking. In contrast with anticipated physiological falls, unanticipated physiological falls cannot be anticipated at the first time. This type of fall usually happens with epilepsy patients either younger or at old ages. Therefore, prevention of unanticipated physiological falls should be implemented after the first fall has happened. Nursing skills are important in the prevention of falling. Nurses are responsible to educate patients in order that they can implement in correct ways falls prevention such as using a helmet when walking even with a short walk to protect from a head injury in case of falling. (Morse, 2008. 9-15.)

There is another discussion about how to prevent falls in home care. Barriers which likely lead to falls should be taken into account, including slippery or greasy floors, or furniture hindering the way. Studies have reported that poor vision could be a typical reason for falls. Therefore, sufficient lighting throughout the house might help elderly people from falling down. Uniformity lights are recommended for elderly because their eyes need time to adjust to the change of light. Moreover, instructions of correct gaits, walking aid equipment such as rollator, the use of medication to help with unbalance or dizziness, ensuring the correct shoes and clothes use are considered as necessary and important methods of falls prevention at home care. In the prevention of falls, nurses and care givers play an important role. Nurses need to know what to do when falls occur and how to educate patients to prevent falls when staying home alone. Well-trained health care staff will provide and maintain a good quality of care in the community in which elderly people occupy the large quantity. (Swann, 2013.)

Based on evidence-based research in nursing perspectives, the Registered Nurses' Association of Ontario (RNAO) has provided guidelines for nurses and healthcare workers about prevention of falls in adults. According to the guidelines, many falls are preventable but some of them are not. By that, the focus of those should be on preventing injuries caused by falls and declining the regularity of falls. For nurses and healthcare workers, the benefits and risks should be taken into account when implementing the fall prevention program. Additionally, respecting patient's rights is considerable. For example, patients have rights to make decisions about interventions set at home to help preventing falls. (RNAO 2017.)

3. AIM, PURPOSE AND RESEARCH QUESTION

The purpose of this thesis is to prevent falls among elderly people who are receiving homecare services by using evidence-based research. The aim of this thesis is to carry out a literature review and find out prevention of falls among elderly people. Nursing roles are also mentioned in this thesis in order to raise awareness of the current situation of falls that elderly people are facing in daily lives.

The thesis will answer the following research question: How does the nurse help to prevent falls among elderly with dependency of home help services?

4   METHODOLOGY

4.1   Literature review and descriptive review style

A literature review is a brief summary or an interpretation of other research about a particular subject (Baker 2016; Coughlan & Cronin 2017, 8). Literature review is tackled by determining research questions, then searching for the answers of those questions by analyzing related research. A research and analysis about one particular topic using other related literature may provide new visions. They are only figured out when all literature with the same issue is reviewed together. Therefore, small information from different sources will be seen in the content of one research. (Aveyard 2014, 2.)

Literature reviews can be categorized into many types such as systematic literature review, descriptive literature review, and qualitative literature review (Coughlan & Cronin 2017, 11). The descriptive literature review has been chosen by the authors to determine prevention of falls among elderly people in homecare settings. Descriptive literature review can be known by interchangeable terms, including traditional, standard and narrative literature review. It can be defined narrowly as "which literature on a given topic was presented". However, its definition has been developed. Generally, the purpose of descriptive literature review is to give the descriptive answer by identifying, analyzing and interpreting knowledge to the chosen research questions. (Coughlan & Cronin 2017, 12-14.)

4.2   Data collection and selection

The authors used two available nursing databases for the data collection. They are Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Pubmed/MEDLINE.

Nine keywords that concern the research question were used. Authors used individual word as well as combination in order to get the most suitable results. The keywords included: ("Accidental falls" AND "Aged" AND "Gerontologic nursing"), ("Home based fall prevention" AND "Nursing"), ("Fall prevention programme" AND "Home services"), ("Home based" AND "Fall prevention"). The searching results consist of full text availability and their publication years within the last 5 years 2013-2018. The authors ourselves required that results were articles only. In addition, they are published originally in English language and relevant to our research question. Based on those requirements, inclusion and exclusion criteria of the thesis data are established and illustrated in the table 1 below.

Table 1. Inclusion and exclusion criteria for data collection.

Inclusion criteria	Exclusion criteria
• Free full text available • Language: English. • Publication year: within 5 latest years 2013-2018 • Relevance to the topic and concerning nursing perspective. • Articles	• Abstract only, full text unavailable. • The other languages. • The articles were older than 5 years old. • No relevance to the topic. • Literature reviews

Qualitative data collection method is used in this thesis. This method is effective to collect non-statistical sources of information, for example, human experiences to a subject (Ingham- Broomfield 2014). Qualitative data collection method helps researchers to get the depth of the data. In order words, it brings deeper insight and approach to data. However, it commonly remains the bias in the data collection which is hard to prevent or detect. (Ellis 2010, 43.)
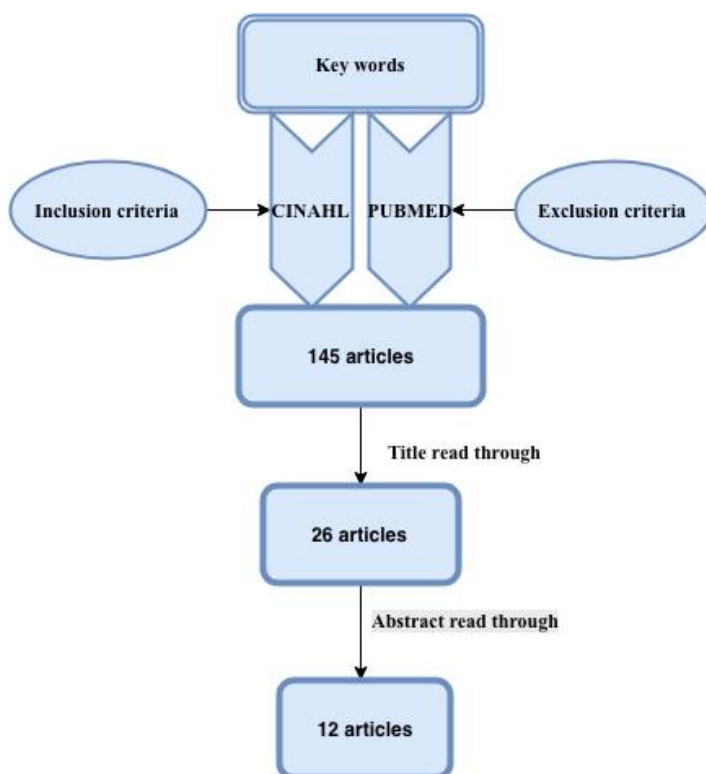
Figure 3. Data collection and selection process.

Figure 3 illustrates the process of data collection and selection. By different combinations of searching keywords in two databases including CINAHL and Pubmed, one hundred and forty-five different articles fulfilled the defined inclusion and exclusion criteria. There was a relative amount of articles which were shown repeatedly with different combinations of keywords or databases. Those articles were counted when they were shown on the first searching result only. After that, the authors decided to read through all titles of those one hundred and forty-five articles in order to eliminate irrelevant articles. Then, the result turned out twenty-six articles. In order to assure the relevance of articles, their abstracts were read through carefully by two authors. Finally, the number of selected articles was twelve. Search results are shown in more detail in table 2.

Table 2. Summary of search results.

Date of search	Data-base	Keywords	Find-ings	Finding based on the title	Selected arti-cles based on abstract
15.11.2018	CI-NAHL	'Accidental falls' AND 'Aged' AND 'Geronto-logic nursing'	25	3	1
15.11.2018	Pub-med	'Home-based fall pre-vention' AND 'Nursing'	12	4	3
20.11.2018	Pub-med	'Fall prevention pro-gramme' AND 'home services'	9	7	2
20.11.2018	Pub-med	'Home based' AND 'Fall prevention'	99	12	6

The authors decided to use reading techniques, skimming and scanning, in order to get the primary results for further analysis. Summaries of results of each article are presented in the appendices.

4.3   Data analysis

At this stage, all of the selected data is analyzed for the review. Data analysis is a process that information is organized and explained in methods to help to answer target questions. The goal for data analysis is to help researchers to understand a phenomenon by analysing the existing information and then predicting it as well as providing conclusion based on data (Cuesta 2013, 7-11.)

In this review, the method of data analysis is content analysis. According to Krippendorff (2004, 173), "Content analysis is a research technique for making replicable and valid infer-ences from texts (or other meaningful matter) to the contexts of their use". In order words, it is a scientific tool that gives the researchers new insights from the research data to understand more about their research subjects.

Generally, content analysis consists of three phases: preparation, organizing and reporting. In preparation, the unit of analysis should be defined. It can be words, phrases, sentences, paragraphs, articles. The next step is making sense of data and whole. Then, organizing is the important phase, including following steps: open coding, coding sheets, grouping categorizing, and abstraction. Selected materials were read again and important headings and notes were written down during reading. Then categories can be established freely according to content. Then grouping would reduce unnecessary or similar categories, which makes the analysis more logical and clearer. Next, abstraction describes the research in general. The last phase is reporting. This phase can be challenging when authors will interpret the data through results and findings. (Elo & Kyngäs, 2008.)

Based on understanding of the process of data analysis, two authors work together through each steps of the process and repeat again if necessary. At first, each of the authors spent a period of time to read carefully information of twelve selected articles. Then, the unit of analysis was defined as a sentence. Next, the authors attempted to do coding found information and then group together those codes. The phases of this process happened over and over again in order to assure that found information is well analyzed. Generic categories and main categories have been established. The authors group findings into six generic categories, including physical exercises, home safety environment, medication, technologies, education and multidisciplinary program. See table 4 below.

Table 4. Generic categories of fall prevention among elderly people at home

Open coding	Generic categories
• Strength • Balance • Tai Chi Chuan • Otago exercise program.	Physical exercises
• Light • Handrails • Removal hazards	Home safety environment
• High-risk medication • Vitamin D • Pharmacological intervention	Medication
• Home-Telehealth • Standing Tall set-up with computer stand • Shoes using cameras	Technologies
• Guidance in correction of vision • Guidance for patients' carers • Footwear • Raising the awareness of preventable falls	Education
• Flow information among professionals • Multifactorial program	Multidisciplinary program

Twelve articles were chosen to be analyzed to answer the research question. Each article presented different aspects, however, they all focused on how to reduce falls in older people. Several approaches to prevent falls among elderly people who receiving homecare settings will be presented by six following generic categories in the next chapter.

5. RESULTS

5.1. Physical exercises

Physical exercises have been shown as the primary intervention to lower the falls incidence and fall risks in both group and home-based elderly population (Luk, Chan & Chan 2015, 166). In particular, physical exercises are proved to produce the positive effect on elderly people receiving home help services. They are also strongly confirmed as the cost-efficient prevention method (Bjerk, Brovold, Skelton & Bergland 2017, 1-9).

To maximize the effectiveness of the physical exercises, there are some recommendations from selected articles. Firstly, the exercise is recommended to consist of several components, for example, strength, endurance and balancing training. Balance training is the most integral element in the preventive exercise program. (Luk et.al 2015, 166.) It could give the potentially beneficial effect in the long run (Fahlström, Kamwendo, Forsberg & Bodin 2018, 582). Secondly, the intensity of the exercises should be sufficient to achieve the consistent of muscle strength (Luk et.al 2015, 166.) High intensive exercises can also help to improve the seniors' activities of daily living (Fahlström et al. 2018, 582). Thirdly, sustainability and frequency of any exercise program are important to determine its effectiveness. Next, home-based physical exercise programs should be designed and assessed by physical therapists and occupational therapists (Fahlström et al. 2018, 583). Otherwise, inappropriate exercises could lead to higher risks of falling (Luk et.al 2015, 166).

Otago and Tai Chi Chuan are publically popular exercise programs designed to prevent falls among elderly (Bjerk et al. 2017, 1-4; Luk et.al 2015, 166). Otago exercise program can be described as a combination of a range of balance retraining and strengthening exercises. It includes tasks, such as standing, backward walking, stair walking, rising from the chair, rising ankle weight cuffs. It has been shown an effective intervention by both evidence and practices. One study protocol conducted a falls prevention program based on Otago exercise program with home visits and phone calls. It showed that Otago exercise program had a positive influence on home-dwelling older adults depending on the home care services. (Bjerk, Brovold, Skelton & Bergland 2017, 1-9.)

Similarly, Tai Chi Chuan is the other well-known program. It combines strengthening and balance exercises with a range of slow body movements (Luk et.al 2015, 167.) Balance retraining is important because good balance plays significant role in preventing falls or reducing the risks of falling (Fahlström et al. 2018, 582). Nonetheless, there is a doubt about the effectiveness of Tai Chi programs (Luk et.al 2015, 167).

5.2.   Home safety environment

Home environmental setting is considered as a risk factor for falls. However, only 24 percent of the interventions recommended for home safety are mentioned in the study sample. Home setting could be understood as a cost effective intervention because of low cost but high profit in preventing falls (Phelan et al 2016, 7.) By that, maintaining a home safety environment and modifications might contribute to the reduction of the risk of falls among elderly people (Luk et al 2015, 167).

It is important to consider re-modified home environment in order to reduce the risk of falls. Removing or changing the floor mats to the ones that are not slippery is necessary. Extra handrails in the areas that might be difficult for elderly people such as bathrooms, toilets, steps and stairs should be installed. Reducing glare and maintaining proper lighting in the house that suitable for older adults' vision are important (Swann 2013, 488; Luk et al 2015, 167.) Grease and oily stuff could be related to falls, especially for elderly people who are fragile. Therefore, removing or replacing those into a safe surface in the house might help to prevent from accidental falls. In addition, re-modifying furniture is one of the options to maintain a home safety environment (Swann 2013, 488.)

Safety environment at home could be compared to a health insurance for elderly people because it helps to prevent falls easily with cost benefit (Phelan et al 2016, 7). In order to make home safety environment be a well-applied option in preventing falls, nurses play an important role in guiding and providing help. Nurses can provide expert advice in safety environment settings. Nurses also should consider if a safety alarm needs to be installed in case accidents happen (Luk et al 2015, 167.) Moreover, it is recommended to check the surface of the house and the security of the handrails as well as ensure if the client can reach the toilet safely when he/she is at home alone. Besides, care staff should be trained and be ready to deal with situations when falls occur to elderly people. (Swann 2013, 488.)

5.3.   Medication

Many drugs are proved to contribute to higher risks of falls (Luk et.al 2015, 167). Psychotropic medications and antihypertensive agents, for example, sedatives, tranquillizers, diuretics, are medications which should be checked (Swann 2013, 488; Luk et.al 2015, 167). The lowest dosage of psychotropic medications should only be prescribed to people whom non-pharmacological interventions are hardly effective to. Polypharmacy is a common phenomenon among seniors. However, healthcare professional should undertake indications and side effects of those high-risk medications. (Luk et.al 2015, 167.)

High-risk medications to falls are recommended to be paid more attention. In the study sample, twenty-five percentage were prescribed medications which can increase the risk of falls. However, only twenty-one percent of these were documented to be prescribed reduction of dose or discontinuing or continue-need of high-risk medications. Additionally, one study showed that an intervention had been found to decrease or stop the high-risk medication (benzodiazepines) in forty-nine percent of study cases. (Phelan et al. 2016, 7.) Fall-risk-increasing medications should be altered in dosage or frequency, or even discontinued when the clinician examines carefully both risks and benefits (Swann 2013, 488; Luk et.al 2015, 167).

Some evidence-based medication review tools may be useful to evaluate the high risk medication. Common tools are the AGS' Beers criteria for Potentially Inappropriate Medication Use in Older Adults; Screening Tool of Older Person's potentially inappropriate Prescriptions (STOPP) (Luk et al. 2015, 167), and the Screening Tool to Alert doctors to Right Treatments (START) (Phelan et al. 2016, 7).

Among medications to reduce risks of falls, vitamin D and calcium supplements play a vital role. A study proved that with a dose of 700 to 1000 IU vitamin D per day, nineteen percent of fall rates can be reduced. Especially, patients in residential care home are recommended to take 800 IU vitamin D per day. Additionally, pharmacological interventions are needed to patients with high risk of fragility fractures (Luk et.al 2015, 167).

5.4.   Technologies

Technologies have been familiar in the modern society nowadays. In healthcare community, technologies are used as supporting tools due to their quickness and convenience. New home based technologies are applied as an intervention in the fall prevention program. Patients will receive a phone call from nurses to check for incidence of falls, diseases status and support (Bernocchi, Giordano, Pintavalle, Galli, Ballini Spoglia, Baratti & Scalvini 2018, 5.)

In addition, more interventions about technologies are developed to help elderly people. One of those interventions could be Standing Tall set-up, which includes an exercise mat, foam cushion, stepping box and tablet computer for evaluation. The reason for Standing Tall set-up to be used is to train the balance in different surfaces. This intervention provides clients evidence-based exercises to enhance good balance. (Delbaere, Valenzuela, Woodbury, Davies, Yeong, Steffens, Miles, Pickett, Zijlstra, Clemson, Close, Howard & Lord 2015, 4.)

There is another intervention that could help reducing falls when walking. It is called a camera-based line-laser obstacle detection system. It includes an RGB camera, a filter, and a line-laser. The system will be installed on the shoes. There are four alarm levels, from the highest to the lowest. The alarm will send loud messages if the person wearing the shoes in the most dangerous place, and the alarm messages will become weaker based on the level of dangerous surfaces. This method will help users know in advance how high is the level of risk factors in order to reduce falls (Lin, Yang & Shih 2017, 8-10.)

5.5. Education

Educating patients and providing information are recommended in fall prevention. Elderly people also need to be informed about the knowledge of risk factors leading to falls (Klein, Rapp, Küpper, Becker, Fischer, Büchele, & Benzinger 2014, 8.) Fall prevention programs should include patient education materials such as STEADI, which is known as a *"set of materials that provides a foundation to systematically evaluate and address fall risk"* (Phelan et al 2016, 7). Among elderly people, suitability of footwear and correction of vision are important in reducing falls. High heeled shoes, too tight or too loose shoes should be avoided because they are shown as factors causing high risk of falls. It is recommended for older adults to wear low heeled and slip resistant shoes to maintain good balance in walking (Luk et al 2015, 167.) Besides, studies have proven that many of falls are caused by vision impairment. Providing information about correction of vision is one of nurses' responsibility. Cataract surgery should be made if needed in order to enhance vision among older adults, as well as using suitable glasses, especially in outdoor activities. (Luk et al 2015, 167-168.)

Due to the fact that care givers participate closely in the care for elderly people, they also need to be educated in fall prevention program. Studies have shown that because of care givers' overprotective actions, which are over supportive and fearful of falling in clients that accidentally take away older people's independence. Thus, providing expert information for clients as well as care givers about their fall concerns is an important element that nurses should take into consideration. (Ang, O'Brien & Wilson 2018, 9-11.) In addition, raising awareness among community that falls are preventable is necessary these days due to the development of social media and technologies (Phelan et al 2016, 7).

5.6. Multidisciplinary program

A multidisciplinary pilot fall prevention program conducted in Switzerland shows the effectiveness of the home-based multidisciplinary program. It helps to receive satisfaction from the majority of all participants including general practitioners, physical therapists, home-care nurses and older adults. The involved people got more awareness of fall prevention.

There are some differences in opinions of professionals. While the practitioners and physical therapists show the concern to prevent first falls, the home-care nurses give the priority to recurrent fall prevention. Working in the interdisciplinary fall prevention program, the flow of information among the healthcare professionals is important. The information and messages should be clear and consistent. (Amacher, Zindel, Schmid, Krafft & Niedermann 2016, 8-9.)

The home-based interventions mentioned above are proven to have the more effective influence when they are components of multifactorial program. For example, physical exercises prove beneficial to the elderly at home, however, it should work with other interventions in a form of a multifactorial program. (Luk et al. 2015, 166-169.)

6. DISCUSSION

6.1. Findings

It is true that falls become a global issue in recent years. The elderly have high levels of risk factors, and suffer from serious consequences falls cause in both communities and at homes.

Risk factors of falls are age, gender, poor balance, diseases, environment and the fear of falling. These factors occur mostly in elderly people. Moreover, the consequences that falls cause are serious. According to WHO 2018, the number of people who die from falls was 646 000. The consequences of falls could be physical and psychological. Falls even with or without injuries affect heavily the quality of life among elderly people. More and more elderly people have fear of falling down, especially when they have suffered from a fall before. This can lead them to limit their daily activities or social participation. Falls can result in physical reduction due to lack of exercises, depression and feeling of hopelessness. With elderly people, rehabilitation after falls is a challenging process. The older the person is, the higher the percentage of bone damage. It also depends on how serious the fall is, but usually people still suffer from pain after rehabilitation.

The content analysis is used to analyze the twelve selected articles. Some results were found out to answer the research question of the thesis, which is "How does the nurse help to prevent falls among the elderly with dependency on home help services?"

Six generic categories were mentioned to describe prevention of falls among elderly people in homecare. It is obvious that nurses play such a crucial role. In order to apply correctly the methods of fall prevention, nurses' guidance is important. Physical exercises and home safe environment could be the easiest and the most cost-efficient methods of reducing falls. However, in order to get the effective results, clients and their family should be given expert information about the most suitable exercises based on their general health condition.

Additionally, medication and client education are important in the process of preventing falls. Clients would not know about the side effects of medication without any advice from nurses. Besides, providing good materials about correction of footwear and vision is counted as nursing responsibilities.

Finally, fall prevention could be easier if there is participation of technologies due to the development of society. A multidisciplinary program is also essential to have the optimal effect on fall prevention.

6.2. Ethical considerations

The authors studied and understood properly all ethical considerations. This thesis is done in the agreement of both authors, where information is collected and analyzed from previous research to answer the target question.

Finnish Advisory Board on Research Integrity and Helsinki Declaration are read carefully. *"Ethical principles of research in the humanities and social and behavioral sciences are divided into three areas: Respecting the autonomy of research subjects, avoiding harm, privacy and data protection"* (TENK 2019).

Ethical perspective is being considered throughout the thesis working process. The thesis brings benefits by enhancing the awareness of fall harm risks and giving own critical reviews of evidence-based ways of fall preventions.

The thesis will do no harm to the society and community. Our task is to review information based on other related literature without any fear of other authorities' reaction (TENK 2019). Plagiarism must be avoided in any action. Scientific published articles and books used in this thesis will be quoted precisely according to Thesis guidelines of Lahti University of Applied Sciences. Each of them will also be presented in truth during the research.

6.3. Reliability and validity

In this research, reliability is described as the trustworthiness of procedures. Validity is evaluated based on how well the phenomena are measured by research methods (Roberts et al 2006).

The scientific articles and books which are used in this thesis are retrieved from databases and electronic collections recommended by Lahti University of Applied Sciences. The sources used in this thesis include Cumulative Index to Nursing and Allied Health Literature (CINAHL), Academic Search Elite (EBSCO) and Pubmed/MEDLINE. They are stable and permanent research tools for doing research. Figures and statistics used for examples in this research are cited from trustworthy and reliable organizations, for example, the World Health Organization and Finnish Statistics.

Searching keywords was chosen after several tries, in order to get the most suitable information. There is a connection between the topic and keywords when searching from databases to ensure the target question is clearly answered. Selected data needs to be published within 5 years from the current year, so that it can support the validity of this research.

Many studies in nursing field use qualitative content analysis as the method of analysis. However, there has not been any systematic evaluation on the trustworthiness of this

method. (Elo, Kääriäinen, Kanste, Pölkki, Utriainen & Kyngäs 2014, 1.) There is some un-certainty when the degree of interpreting of the text appears to be different on researcher. More than one researcher is recommended to join in the content analysis process in order to achieve the comprehensively and correct interpretation (Burla, Knierim, Barth, Duetz & Abel, 2008; Elo at el. 2014, 5). Therefore, two of the authors work consistently through every phase of the analysis process as the recommendation. Moreover, the authors described carefully the process of selecting and analysis.

7. CONCLUSION

As became clear from this study, nursing responsibility is important in a fall prevention program for elderly people with dependency on home help services. This allows authors to consider and clarify the roles of nurses for the studied topic. Common methods to prevent falls along with the guidance of nurses are physical exercise, medication, education, home safety environment which are cost-effective, bring high benefit and are easy to accomplish.

Moreover, technologies and multidisciplinary program are also mentioned in order to describe the relationship between the development of society and medical community. That combination can produce effective and positive results in a fall prevention program.

The authors recommend a further study to focus on the development of a multidisciplinary fall prevention program in nursing, because the flow and exchange of information among healthcare professionals is important. The clearer information is given the better care is provided.

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APPENDICES

Authors	Title	Results
Swann J. 2013.	How to...prevent and manage falls in the care home	- Fall prevention: Remove hazards, ensure light, provide support, check correct footwear and medication, manage continently - Nurse's role: Should receive training on fall prevention, be able to observe and ready to work on the situation when client falls.
Fahlström et al. 2018	Fall prevention by nursing assistants among community-living elderly people. A randomised controlled trial.	A home based interventions with exercise programmes carried out by nursing assistants did not succeed in preventing falls. But there are positive changes in balance, daily activity and health transition over time.
Bernocchi et al. 2018	Feasibility and Clinical Efficacy of a Multidisciplinary Home-Telehealth Program to Prevent Falls in Older Adults: A Randomized Controlled Trial.	Fall prevention by using new home based technologies. Patients will receive a phone call from nurses to check for the incidence of falls, diseases status and provide support.
Amacher et al. 2016	Experiences of general practitioners, home care nurses, physiotherapists and seniors involved in a multidisciplinary home-based fall prevention programme: a mixed method study.	The fall prevention program in Switzerland received the satisfaction from the majority of all participants including general practitioner, home care nurses, physical therapists and seniors.
Bjerk et al. 2017	A falls prevention programme to improve quality of life, physical function and falls efficacy in older people receiving home help services: study protocol for a randomised controlled trial.	Proved cost-effectiveness and positive impact of Otago exercise program on elderly receiving home-help services. Fall prevention program should include both physical and psychological preventions.

Delbaere et al. 2015	Evaluating the effectiveness of a home-based exercise programme delivered through a tablet computer for preventing falls in older community-dwelling people over 2 years: study protocol for the Standing Tall randomised controlled trial	Balance training shows the effective in reducing falls in elderly people. It includes the use of tablet computer to deliver the home based balance training programme by nurses or healthcare professionals.
Ang et al. 2018	Fall concern about older persons shifts to carers as changing health policy focuses on family, home-based care	Research has shown that overprotective nurses/carers and nurses' fear of fall on clients accidentally take away client's independence. Addressing care givers' fall worry is important in fall prevention among elderly people. Providing support for clients and also carers looking after them at home.
Dillon et al. 2018	Understanding the implementation and efficacy of a home-based strength and balance fall prevention intervention in people aged 50 years or over with vision impairment: a process evaluation protocol.	Home-based strength and balance program helps the elderly with poor vision to enhance physical function independently and safely.
Lin et al. 2017	Fall Prevention Shoes Using Camera-Based Line-Laser Obstacle Detection System	A camera-based line-laser obstacle detection system is used for fall prevention. The system includes a camera, filter, line-laser and the costs are acceptable compared to others.
Phelan et al. 2016	Corrigendum: Adoption of Evidence-Based Fall Prevention Practices in Primary Care for Older Adults with a History of Falls	Recommendations for practices in preventing falls: use of 'structured visit note template' and STEADI materials, home safety modifications, and increased caution about high-risk medication and raising awareness to the public about preventable falls.

Luk et al. 2015	Falls prevention in the elderly: Translating evidence into practice.	Evidence-based fall prevention programs recommend using physical exercises, Tai Chi, home modifications, medication review, vitamin D supplement, foot and footwear, correction of vision, management of cardiovascular risks, multifactorial intervention and fracture reduction as useful ways of fall prevention.
Klein et al. 2014	A population-based intervention for the prevention of falls and fractures in home dwelling people 65 years and older in South Germany: protocol.	An intervention program based on the population with multi-strategies is presented. It has two main factors, including increased physical activities and decreased modifiable risks.