Community pharmacist-led

falls risk evaluation

A thesis submitted in partial fulfilment

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Dedication

I dedicate this work to my family and the Almighty God.

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Abstract

Older people are more likely to suffer fall-related injuries because of the multiple medications they take. Community pharmacists may screen older people with medications that increase the risk of falls and contribute to preventing potential harm through a collaborative approach. The study aimed to determine community pharmacist interventions to identify older persons at increased risk of falls because of medication use and refer them to physicians within a collaborative practice. A literature review of community pharmacy-based medication-related fall risk assessment studies was conducted. The characteristics of each tool used were compared, and a consensus on a final tool that may be applied in practice was determined through a focus group discussion. Subsequently, this identified tool was applied to screen the medication lists of 200 anonymised older persons in a community pharmacy setting. Data analysis determined the prevalence of fall risk-increasing drug (FRID) use in older adults and the feasibility of tool application. A second focus group discussion was undertaken following the piloting of the tool in the community pharmacy. The objective of the second focus group discussion was to confirm the procedures to be recommended for the application of the tool in the community pharmacy setting.

The literature search generated 26 articles on the topic. Further screening resulted in ten studies utilising three fall risk assessment tools. The consensus from the focus group was to use the Medication Fall Risk Score tool. The mean age of the patients in the study was 75 years (SD=7). Almost all patients (94%, n=188) were prescribed one or more

FRIDs. According to the tool criteria, 36% (n=72) of patients were at high risk of falls, requiring review by a healthcare professional. Of the 128 prescribed medications, 43% (n=55) were considered FRIDs. Most FRIDs identified belong to the medium risk group (55%, n=30). Antihypertensives (n=260) and diuretics (n=96) were the most frequently prescribed FRIDs in the population. From the second focus group discussion, the proposed toolkit outlines the following inclusion criteria as part of the fall risk evaluation service: (1) Older persons aged 65 and over, (2) those with one or more antihypertensive medications, and (3) with one or more high fall risk drugs. When adopting these criteria, of the 200 anonymised patient medication lists reviewed, 22 were classified as high fall risk individuals when the tool was used. The study provides a toolkit that could be implemented within a community pharmacy practice to identify older persons at high risk of medication-induced falls through a medication review, prompting a collaborative approach between community pharmacists and physicians.

Keywords: fall risk increasing drugs, falls, older persons, community pharmacy

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FRID	Fall risk increasing drug
MFRS	Medication Fall Risk Score
POYC	Pharmacy Of Your Choice
STEADI	Stopping Elderly Accidents, Deaths & Injuries
STOPPFall	Screening Tool of Older Persons Prescriptions in older adults with high fall risk

Chapter 1

Introduction

1.1 Background

Falls are unanticipated events that result in a person unwittingly coming to rest on the ground, floor, or a lower level (Lamb et al., 2005). Worldwide, falls are considered a significant public health concern, especially in the older population. As people age and become frailer, there is an expected increase in the frequency of falls and fall-related injuries[1]. In the United States of America, unintentional falls were the most common reason for non-fatal emergency department visits in 2020 across all age groups. Older people aged 65 years and over experienced the most unintentional falls, almost 42% of all fall cases[2]. With these statistics, public health authorities and researchers are finding ways to limit the incidence of falls and injuries caused by falls through various preventative programs.

1.2 Burden of falls in older people

Older people make up a large and increasing percentage of the European population. According to the Malta National Statistics Office, in 2021, the highest increase in the overall population was seen in older people in the past seven years. Notably, persons between 70 and 79 years old were reported to have the most considerable population

[1] World Health Organization. WHO global report on falls prevention in older age [Internet]. 2008 [cited 2022 Dec 9]. Available from: https://www.who.int/publications/i/item/9789241563536

[2] Centers for Disease Control and Prevention. Leading causes of nonfatal injury report [Internet]. National Center for Injury Prevention and Control. 2020 [cited 2022 Dec 9]. Available from: https://wisqars.cdc.gov/nonfatal-leading

growth in the Malta region. Similarly, the most significant rise in the Gozo and Comino region was among people aged 90 years and over[3].

As people grow older, there is an increased risk of falling and suffering injuries from falling (Tinetti, 2003). Approximately 30% of community-dwelling older people over 65 years experience falls (Deandrea et al., 2010). In the European Union (EU), there is an average of 35.85 fall-related deaths among people aged 65 years and older each year from 2010 to 2012. The number of fall-related hospital visits in the older population in the EU is estimated to be 3.7 million annually[4]. Based on Malta's Mortality Registry in 2013, the average age of people dying from falls in the country was 79.8 years for men and 84.4 years for women. In the same timeframe, 46 deaths were attributed to unintentional falls. Of these, 28 were men, and 18 were women. Compared with the statistics in 2012, there was an increase of 12 deaths attributed to falls. In the Maltese government's Annual Mortality Report in 2019, 44 people died because of falls, 24 men and 20 women[5]. The increased morbidity and mortality linked to falls in older persons in Malta highlight the need to create strategies to reduce or prevent unintentional falls[6].

[3] National Statistics Office. Regional statistics Malta [Internet]. 2021 [cited 2022 Dec 9]. Available from: https://nso.gov.mt/themes_publications/regional-statistics-malta-2021-edition/

[4] European Stakeholders Alliance for Active Ageing through Falls Prevention. Active ageing through preventing falls: Joint declaration by ESA on falls [Internet]. 2015 [cited 2022 Dec 9]. Available from: https://www.eurosafe.eu.com/uploads/inline-files/Joint%20Declaration_Sept%202015.pdf

[5] Directorate for Health Information and Research. Annual mortality report [Internet]. 2019 [cited 2023 Apr 14]. Available from: https://healthservices.gov.mt/en/dhir/Pages/Registries/deaths.aspx

[6] Directorate of Health Information and Research. Annual mortality report [Internet]. 2013 [cited 2022 Dec 10]. Available from: https://healthservices.gov.mt/en/dhir/Pages/Registries/deaths.aspx

Malta's National Strategic Policy for Active Ageing for 2014-2020 recommends that government entities address falls in older persons by creating prevention programmes. In acute and long-term health facilities, every effort should be made to create a safety culture during the storage, preparation, dispensing, prescribing and administration of medications. This safety culture can be established by creating and auditing comprehensive policies and standard operating procedures and developing and implementing quality improvement measures founded on best practice guidelines[7].

1.3 Frailty and falls

In a systematic review, there is evidence that falls are associated with frailty in older persons (Fhon et al., 2016). Older persons are more likely to fall when weak, have poor balance, and have an aberrant gait. These factors are all important parts of physical frailty. Due to their reduced functional reserve capacity to maintain position, balance, and coordination, as well as their greater susceptibility to stresses like accidents, indications of sickness, or adverse drug reactions, frail older persons may be at significant risk of falling (Kojima, 2015).

Frailty is a condition of diminished physiologic reserve leading to a vulnerable state and increasing the risk of adverse health outcomes when exposed to a stressor in older persons (Lee et al., 2020). Frailty is a vital risk factor for mortality in older people. The

[7] National Commission for Active Ageing. National strategic policy for active ageing 2014-2020 [Internet]. 2014 [cited 2022 Dec 10]. Available from: https://activeageing.gov.mt/wp-content/uploads/2021/05/ActiveAgeingPolicyEN.pdf

risk for mortality is increased with an increasing number of observable frailty traits (phenotype) and physiological deficits (Shamliyan et al., 2013). Frailty is also related to many other outcomes, such as disability, falls, fractures, worsening mobility, loneliness, lower quality of life, depression, cognitive decline, dementia, hospitalisation, and nursing home admission (Hoogendijk et al., 2019).

Polypharmacy has been established to cause frailty in older persons. A network of connections through which drugs possibly cause frailty include drug-drug interactions, drug-disease interactions, and potentially inappropriate medications. It is suggested that reducing polypharmacy may prevent and manage frailty (Gutiérrez-Valencia et al., 2018). Multiple medications have been associated with falls in older persons, but a more critical link is attributed to the type of medications taken rather than polypharmacy. Polypharmacy can be beneficial to the patient when the proper medications are chosen. Fall risk-increasing drugs are more known to cause falls than the number of medications a person takes (Hammond and Wilson, 2013).

1.4 Medications and falls

In our ageing society, multimorbidity is very common and frequently results in prescribing multiple drugs to older people. There is no internationally accepted agreement on the meaning of polypharmacy until today, making it difficult to compare its prevalence in various studies (Pazan and Wehling, 2021). Ongoing attempts are being undertaken to refine the definition of polypharmacy and shift the emphasis away from

the number of medicines and toward their appropriateness, effects, and therapeutic outcomes in older patients. Even though it is often dubious to accumulate medications over extended periods of time, doing so could be necessary to treat individuals with severe, persistent, and many disorders. Hyperpolypharmacy and polypharmacy may not always indicate a worse state of health (Guillot et al., 2020).

The properties of drugs change with ageing, resulting in an altered response to drug therapy in older people. With ageing, there is an increase in a person's total body fat, together with a corresponding drop in lean body mass and bone mineral density (St-Onge and Gallagher, 2010). These modifications extend the half-life of lipid-soluble drugs such as long-acting benzodiazepines, antipsychotics, and antidepressants. As a result, many medications may have prolonged activity, which raises the possibility of side effects (Mangoni and Jackson, 2004). Frail older people who are malnourished or have lost much weight are in a similar situation. When older patients with low body weight are prescribed standard adult drug doses, they are at more risk of potential toxic effects (Chau and Ratnaike, 2003).

The total body water is reduced in older people, affecting the apparent volume of distribution for medicines such as lithium, diuretics, and digoxin. Dose reductions are necessary to prevent toxicity with these medicines (Cusack, 2004). Serum albumin levels are frequently low in older individuals who are frail or malnourished. A decrease in serum albumin concentration leads to an increase in the biologically active free fraction of the medication. Highly protein-bound medicines, such as valproic acid and phenytoin,

may theoretically cause increased side effects in older people with low serum albumin levels (Hutchison and O'Brien, 2016). As people age, changes occur in the cellular, organ, and system reserves. These changes in individual older patients can vary according to genetics, lifelong lifestyle choices, and the environment.

In addition to age-related changes, co-morbidities, such as arthritis, stroke, diabetes, hypertension, heart disease, and dementia, frequently prevalent in older people, also add burden due to illness-specific impairments. The effect of this co-morbidity on an older patient's therapeutic response is also possible (Gnjidic et al., 2017). The medications taken by older people for chronic health conditions largely contribute to an increased risk for falls. A longitudinal study in England revealed that one-third of the population using five or more medications was significantly associated with a 21% increased fall rate over two years (Dhalwani et al., 2017). Fall risk-increasing drugs (FRIDs) are medications that have been related to an increased risk of falling. FRIDs are defined differently, although they typically include benzodiazepines and nonbenzodiazepine hypnotics, antipsychotics, antidepressants, and opioids. Certain cardiovascular medicines and hypoglycaemic drugs may be included less regularly (Hart et al., 2020).

1.5 Falls prevention and public health

Based on statistics, falls significantly impact society's overall health, especially in the older population. The World Health Organization (WHO) highlights the role government

agencies hold in establishing policy-making infrastructure, collaborating to set targets, and overseeing efforts to reduce falls and fall-related injuries[8]. A study in 2022 conducted a systematic review of government policies published from 2005-2020 coming from different countries regarding fall prevention. Governments around the world are pushing for community-based fall prevention through various policies at both national and local levels. However, how countries view this issue as a public health priority is mixed, evident in the financing of fall prevention programs. Only 12% of the policies reviewed in the study specified a budget to finance the policy, limiting the resources allocated for the programs. The study recommends that governments should use an evidence-based approach to fall prevention policy determination to reduce the burden of falls (Natora et al., 2022).

In Europe, the European Commission funded the Prevention of Falls Network Europe (ProFaNE), a thematic network of experts from around Europe aiming to improve the quality of life of older persons by consolidating and disseminating good practices regarding falls (Skelton and Todd, 2007). A global expert task force on falls in older adults was installed in 2019 at the first World Congress on Falls and Postural Stability in Malaysia to come up with a standardised international clinical practice guideline for falls prevention and management, incorporating current and evolving evidence in falls research (Montero-Odasso et al., 2021). In 2022, the task force released the new clinical practice guideline that strongly recommends (Grade 1C) using a validated, structured screening and assessment instrument to recognise FRIDs when conducting a medication

[8] World Health Organization. WHO global report on falls prevention in older age [Internet]. 2008 [cited 2022 Dec 9]. Available from: https://www.who.int/publications/i/item/9789241563536

review targeted at fall prevention. They further elaborate that before prescribing any potential FRIDs to older people, a person's current and prior fall risk should be considered (Montero-Odasso et al., 2022).

The WHO released a technical package to guide practitioners, policy developers, researchers, and advocacy groups to aid them in preventing falls and fall-related injuries[9]. Efforts to avoid falls will help accomplish three crucial sustainable development goals: make sure that everyone lives a healthy life and promotes well-being at all ages (Goal 3); encourage equitable, sustainable economic growth, decent work for everyone, and employment (Goal 8); and create inclusive, secure, robust, and sustainable cities and human settlements (Goal 11). WHO acknowledges that there are several distinct types of falls, and there is no "one size fits all" strategy for fall prevention that works for everyone at every stage of life or in all industries or nations. However, important emerging principles apply to populations across the life course and in various settings, such as promoting and enabling lifelong physical activity, reducing environmental risks, and enforcing laws that support cultures and environments of safety. To guarantee that falls are a constant concern for governments, companies, healthcare facilities, educational institutions, and homes, WHO highlights the need for champions for change in this area.

[9] World Health Organization. Step safely: strategies for preventing and managing falls across the life-course [Internet]. 2021 [cited 2023 May 5]. Available from: https://www.who.int/publications /i/item/978924002191-4

1.6 Falls risk evaluation

It is vital to have a rapid, reliable, and effective screening tool to check for fall risk in older individuals. In a study from the United States, researchers recommended that an appropriate fall risk assessment tool should have the following characteristics: high specificity, sensitivity, and interrater reliability; explicitly written procedures; similarity of the patient population to the one in the developed tool; reasonable time to administer the instrument; and established triggers on when to start intervening. These criteria are applicable regardless of the healthcare setting (Perell et al., 2001).

Most tools proposed in assessing fall risk have been developed for use in the acute hospital setting, where older people are typically presented with many different factors that expose individuals to the risk. Researchers proposed that no ideal tool can be used in all scenarios due to the multifactorial nature of fall risk. Assessment by healthcare professionals should be applied to determine the most applicable to that setting (Strini et al., 2021). Since different settings have different limitations and capabilities, fall risk assessment measures are modified to fit the needs of the healthcare unit. Depending on the requirements of the assessment tool, it can be done by healthcare professionals like physicians, nurses, and pharmacists. A review of the different fall risk assessment tools used in the primary care setting included the following: Timed Up and Go (TUG) test, Gait Speed test, Berg Balance Scale, Performance-Oriented Mobility Assessment, Functional Reach test, and falls history. Five of the six tests involved physical tests requiring the patient to perform a specific task to determine if they are fallers. Results

of the study revealed that none of the fall risk assessment tools had enough predictive performance. The suitable way to assess a person's fall risk in the primary care scenario is to ask patients about their fall history. Asking a person for fall risk factors requires less time, no need for equipment, and less additional training (Meekes et al., 2021).

The American Geriatrics Society and the British Geriatrics Society jointly propose annual screening for the risk of falls in adults 65 years and older. The group stated that drugs are regularly linked to an increased risk of falling. Psychotropic medications and polypharmacy have the strongest fall risk connections (Drootin, 2011). It is advised in the updated Beers Criteria for inappropriate medicine use that all prescribed and over-the-counter medications must be examined, with a focus on tapering or stopping medications that do not have a compelling rationale or for which the potential risk outweighs the benefit (Fick et al., 2019).

Antidepressants, antipsychotics, antiepileptic medications, opioids, benzodiazepine receptor agonists, and antihypertensive agents are a few examples of drugs that may result in sedation, confusion, or orthostatic hypotension. Drugs that may interact with alcohol use must also be examined. There are resources available to help prescribers cease or reduce the dose of drugs that increase the risk of falls and help patients transition off such medications. Non-pharmacologic approaches are available for patients who are reducing their usage of insomnia drugs, such as cognitive behavioural therapy and advice on good sleep hygiene (Croswell and Shin, 2012).

1.7 Pharmacist-led falls risk evaluation

The promotion of fall prevention is a shared responsibility of everyone in society. European citizens, all government entities, local communities, healthcare professionals, families and carers, researchers, non-government organisations and the private sector have their roles to play. There should be a whole society approach to addressing the problem of falls[10]. Since medications are common culprits in causing falls among older people, pharmacists can be instrumental in assessing fall risk. During transitions of care, falls and fall risk is elevated (Stitt et al., 2011). Pharmacists in inpatient and outpatient settings can provide fall risk-reducing services due to their extensive knowledge of medication therapy management. Community pharmacists are among the most accessible healthcare providers, regularly interacting with people with long-term health conditions (Milosavljevic et al., 2018). In Malta, patients entitled to free medicinal treatment typically get their supply of medications from community pharmacies participating in the Pharmacy of Your Choice (POYC) scheme every eight weeks. There is an opportunity for community pharmacists to flag a patient's fall risk and refer them to physicians for further evaluation. It is ideal for patients to use only one pharmacy in the outpatient setting. This allows the community pharmacist to have a complete overview of the patient's medications and conduct a comprehensive medication therapy review, including a fall risk assessment (Fritsch and Shelton, 2019). An extensive medication review conducted by a pharmacist may include a review of age-related physical changes,

[10] World Health Organization Regional Office for Europe. Health 2020: a European policy framework and strategy for the 21st century [Internet]. 2013 [cited 2022 Dec 29]. Available from: http://www.euro.who.int/pubrequest

making the older person more predisposed to drug-drug and drug-disease interactions and adverse drug events, which may increase the person's chances of falling (Karani et al., 2016). With the increasing burden on the healthcare system due to an ageing population and the concomitant rise in the prevalence of chronic diseases, a clear shift toward a more comprehensive public health role for pharmacists is seen to be happening (Laliberté et al., 2013). An interprofessional approach to preventing falls has been proven to enhance the overall health and well-being of people who experienced a fall. The role of each healthcare team member should be clearly defined, as this service would be an additional workload to their current positions in the system (Banez et al., 2008).

1.8 Economic impact of falls

The United States provide extensive data on medical costs related to fatal and non-fatal falls. In 2015, it was estimated that costs associated with falls were $50 billion, with fatal falls attributed to $754 million (Florence et al., 2018). By 2030, the number of fatal falls among older persons is projected to reach 100,000 per year, costing $100 billion (Houry et al., 2016). Direct medical costs because of falls include fees for hospitals and nursing homes, physicians and other healthcare professionals, rehabilitation services, medical equipment use, and prescription medications[11]. A study focusing on the economic implications of inpatient falls in New York and Massachusetts in the United States

[11] Centers for Disease Control and Prevention. Cost of older adult falls [Internet]. 2020 [cited 2023 Apr 20]. Available from: https://www.cdc.gov/falls/data/fall-cost.html

showed that the average cost of a fall per patient amounted to $62,521, with direct costs amounting to €35,365. The authors projected that by implementing the Fall Tailoring Interventions for Patient Safety (Fall TIPS) program, an evidence-based fall prevention program, there would be a nationwide annual cost savings of $1.82 billion (Dykes et al., 2023).

In the European context, a review of data from The Netherlands from 2007 to 2009 revealed that medical costs for a fall incident in older persons aged 65 years and over were estimated to amount to €675.4 million yearly. The mean costs per fall were €9,370, with costs higher for females (€9,990) compared to men (€7,510). It was also shown that as people grow older, the expenditures associated with the fall incident also increase (Hartholt et al., 2012).

1.9 Fall risk and COVID-19 pandemic

The COVID-19 pandemic was associated with deteriorated fall outcomes in older persons. Since people have less physical activity due to fear of contracting the disease, it increases their fall risk. In a study conducted in the United States, those who spent less time on their feet were likelier to report one or more falls. The risk of having fall episodes was more significant for people with worsened mobility and who were socially isolated (Hoffman et al., 2022). Another study shows that because of extended immobilisation of COVID-19 patients, home isolation because of government lockdown measures, and the high muscle loss risk, fall assessment is imperative during the COVID-

19 pandemic. They also suggest implementing alternative measures rather than in-person evaluation (Falchetti et al., 2021).

The number of physician visits declined during the surge in COVID-19 cases (Osawa et al., 2021). As a result, healthcare providers rarely review the patient's pharmacologic treatments. Although telehealth services are available, some older persons may have limited abilities to avail of the service. Maltese health authorities even made some changes to how government-provided medicines are dispensed. During the pandemic, the government implemented a paperless system where the patient does not need a controlled drug prescription to be dispensed with a narcotic or psychotropic drug (Magro, 2021). This change in policy means that the patient can take controlled substances for months with no review from a physician, including fall risk increasing medications like benzodiazepines.

1.10 Aims and objectives

The study aimed to identify possible community pharmacist interventions to flag older persons at increased risk of falls due to medication use and refer them to a physician within a collaborative practice. The objectives of the study were: (1) To identify a practical fall risk evaluation tool for use in community pharmacy practice; (2) To determine the prevalence of fall risk-increasing drug use among older adults; and (3) To propose the integration of a fall risk medication evaluation service into community pharmacy practice.

Chapter 2

Methodology

This chapter describes the series of methods employed in the study to determine potential community pharmacist interventions in detecting medication-related fall risk in older people. It contains the research setting, design, and procedures necessary for conducting the study.

2.1 Research setting

The study was conducted in a private community pharmacy in the northern harbour district of Malta, participating in the Pharmacy of Your Choice (POYC) scheme. The POYC scheme is a nationwide pharmaceutical service in Malta that provides free medications to entitled patients through community pharmacies[12]. The identified pharmacy represents a typical community pharmacy providing various pharmacy and clinical services to older persons in ambulatory care. The pharmacy caters to different age brackets, with its POYC clientele mostly comprised of older adults. Some long-term care facilities are nearby, where ambulatory residents get their POYC medications from the pharmacy. Focus group discussions with a panel of professionals were held in two sessions at different time points through the video conferencing platform Zoom.

[12] Ministry for Health. Pharmacy of your Choice [Internet]. 2023 [cited 2023 Jun 23]. Available from: https://healthservices.gov.mt/en/poyc

2.2 Research design

The study followed a mixed qualitative and quantitative research design. Figure 2.1 shows the process flow employed in the study. After securing the necessary authorisations, the study progressed through three stages: tool identification, tool application, and toolkit development.

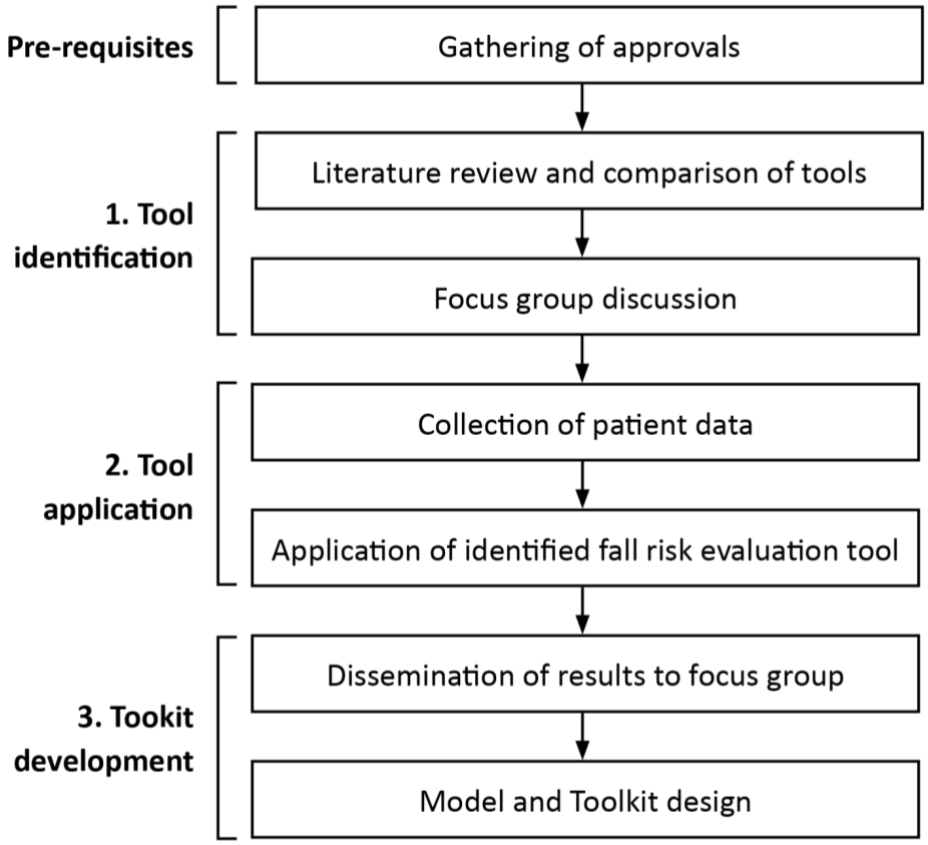

Figure 2.1 Flowchart of the study design

2.3 Tool identification

Various journal articles relating to pharmacy-based fall risk evaluation were identified utilising three research databases: PubMed by the United States National Library of Medicine, Hybrid Discovery (HyDi) by the University of Malta, and Google Scholar by Alphabet Inc. Search strings used in the initial search in June 2022 were (1) falls risk AND assessment AND pharmacy, and (2) “falls risk assessment” AND “community pharmacy”. Research studies that do not include a medication review component or contain tools that are not publicly available were excluded. The individual studies were reviewed to determine the characteristics of each tool and to gain ideas on how to implement a fall risk assessment in the community pharmacy. The common tools used in the studies were listed, and the characteristics of each were compared. A summary table was created comparing the various tools based on their rating scale, screening criteria, features, time of application, and method of use.

A focus group discussion was conducted with a panel comprised of two consultant geriatricians and three doctors of pharmacy who are working in the community setting to discuss fall risk assessment in the community pharmacy setting. During the conversation, the focus group was asked, among others, about the advantages and disadvantages of conducting such service, any hurdles that may be experienced during the execution of the evaluation, and how best to structure the tool in a way that would be beneficial for the pharmacist assessor, the physician, and the patient. After

considering several factors, the focus group agreed on the best tool to use for the study. The focus group discussion results compiled through a thematic analysis were considered in the tool application stage and in making the toolkit's design.

2.4 Tool application

After the instrument was selected, the researcher used the tool to assess the anonymised patient medication lists, determine the prevalence of fall risk increasing drug use, and identify the sample population's fall risk profile. A sample of 200 anonymised POYC medication lists of patients registered within one private community pharmacy from July to October 2022 was included in the study. Only the anonymised medication lists of individuals 65 years and older were included using a purposive sampling technique. Patients undergoing oncologic treatment were excluded from the study as this would amplify the frailty condition and may provide erroneous conclusions. Age, sex, medication list, and dose frequency were supplied by the managing pharmacist to the researcher after acquiring them from the patient's POYC medication profile. Each patient was assigned a code to maintain anonymity during the entire duration of the study. The data collected from the study is stored in a password-protected computer, accessible only to the researcher. All information from this study shall be deleted within one year from the submission of the dissertation. The demographic information, such as the gender and age of the patients included in the study, was identified. Utilising the identified tool, the patients' fall risk scores and fall risk profile and the FRID prescribing

profile were determined through descriptive statistics. Microsoft Excel for Mac Version 16.70 was used for all statistical analyses.

2.5 Toolkit development

A proposed model and toolkit were developed and used during a second focus group discussion. The proposed toolkit consisted of criteria for when the fall assessment should be undertaken as a guide to prioritise interventions. During the second focus group discussion, the statistical data gathered during the tool application was disseminated back to the members of the initial focus group to clarify specific details, such as inclusion criteria and details on physician referral, which served to create the proposed toolkit for the service. The focus group was also tasked to perform the medication-related fall risk assessment using the toolkit to get first-hand experience in using the tool. The focus group members were informed that they would be timed to determine how many minutes it would take to perform the entire assessment. The focus group carefully critiqued each part of the proposed toolkit to determine possible problems encountered when applied in actual practice. The feedback from the focus group was used to refine the toolkit found in Appendix 3. The proposed model for a community pharmacist-led medication-related fall risk evaluation service for older persons was also presented to the focus group so they could provide feedback.

2.6 Approvals

The research has been registered with the University of Malta Faculty of Medicine and Surgery Research and Ethics Committee (MED-2022-00089). Once the final tool to be used in the study was identified, permission was requested from the original author of the journal article where the tool was first used. Permission was also sought from the managing pharmacist of the community pharmacy where the study was conducted. Details of all approvals are shown in Appendix 1.

Chapter 3

Results

This chapter describes the results gathered during the tool identification, focus group discussions, tool application, and data analysis.

3.1 Tool identification

During the literature search, 26 articles were retrieved from journal databases using the pre-determined search strings. Further screening through an individual journal article analysis showed that 16 identified articles did not include a medication review, were not conducted in a pharmacy setting, or the tool was not publicly available. The ten remaining studies utilised three standard fall risk assessment tools, which were then accessed, and their characteristics were analysed. The order in retrieving articles and relevant studies is shown in Figure 3.1.

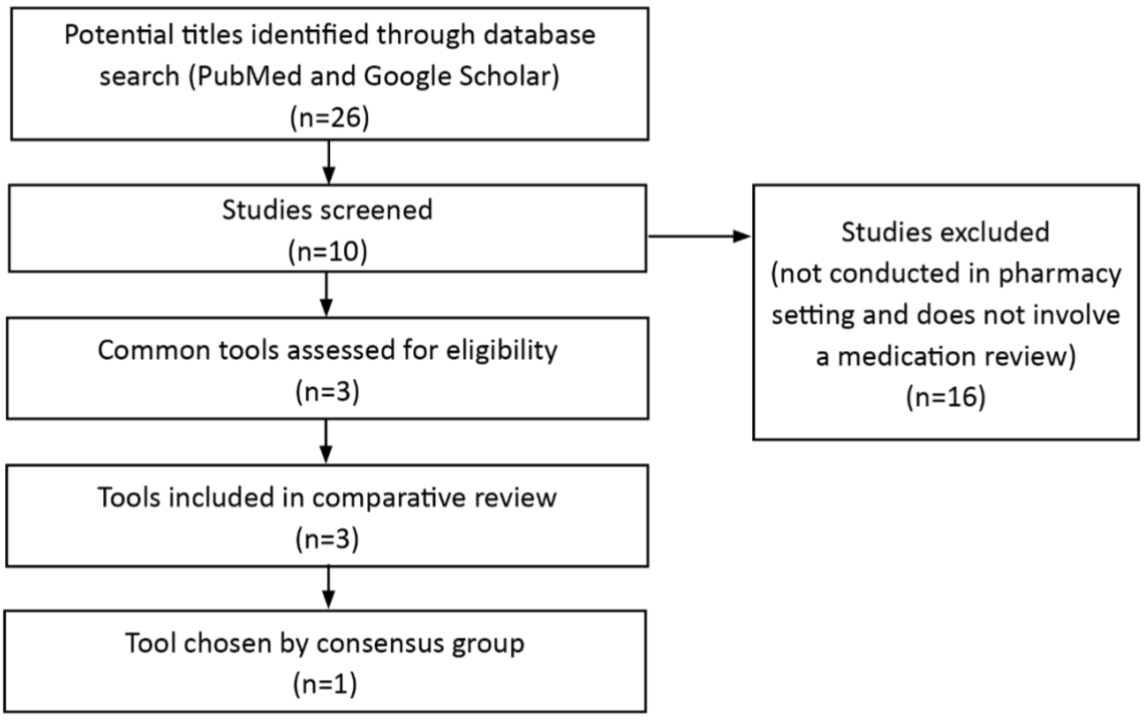

Figure 3.1 Tool selection flowchart

3.2 Comparison of prospective tools

The three prospective tools which underwent a comparative analysis were the following: (1) Stopping Elderly Accidents, Deaths & Injuries (STEADI) developed by the United States Centers for Disease Control and Prevention (Ferreri et al., 2020), (2) Medication Fall Risk Score tool (MFRS) initially developed for the Mercy Health Center in Oklahoma City in the United States (Beasley and Patatanian, 2009), and the (3) Screening Tool of Older Persons Prescriptions in older adults with high fall risk (STOPPFall) by the European Geriatric Medicine Society Task and Finish Group on FRIDs (Seppala et al., 2021). Table 3.1 shows the comparison of the three tools. Based on its features, STEADI does not provide a score for a person's medication-related fall risk. It mainly focuses on the patient's fall risk based on physical manifestations. The MFRS tool scores the medication-related fall risk based on each drug's potential to cause a fall. A higher numerical value is given for a drug with an increased fall risk. The total score for all drugs in a patient's medication list is determined. Once it reaches the determined threshold, a patient must be referred to a healthcare professional such as a physician. The STOPPFall mainly serves as an aid for healthcare professionals in deprescribing drugs with high fall risk potential. It provides decision trees for 14 drug groups to help conclude whether to deprescribe the fall risk-increasing drugs. Regarding the screening criteria, STEADI is more specific than the two other tools since it requires the older person to be 65 years or more and either take four or more chronic medications, one or more high risk medications, or a patient presented with an acute fall incident. All three tools are conducted through self-report. Professional knowledge and judgment of the pharmacist

Table 3.1 Comparison of prospective fall risk evaluation tools

Tool Name	Rating	Screening criteria	Features	Time of application	How to use	Involves medication review
STEADI (Ferreri et al., 2020)	Low risk – Answers "No" to 3 key questions Moderate risk - At least one "Yes" response to essential questions and passing physical tests High risk - Failing the tests, reporting several falls, or having a hip fracture	Older persons aged 65 years or more taking 4 or more chronic medications or one or more high risk medication or anytime a patient presents with acute fall	Does not score risk according to medications but according to physical manifestation of fall risk. Pharmacist needs to identify medications increasing fall risk	Multi-step process: Depends on patient risk criteria	Self-report + performance	Yes
Medication Fall Risk Score (Beasley and Patatanian, 2009)	Score of more than 6 means a higher risk for falls, necessitating medication fall risk evaluation	No mention of patient inclusion criteria	Medications classified by risk level and provides corresponding point value: 3 - high risk, 2- medium risk, 1 - low risk. Score of 6 or more suggests referral due to higher risk for fall. This must be accompanied by a recommendation by the pharmacist to the physician	Depends on patient medication list	Self-report	Yes
STOPPFall (Seppala et al., 2021)	Does not involve a rating scale	Older persons. Does not mention specific age range	Provides decision trees per drug group that aid users in deprescribing	Depends on patient medication list	Self-report	Yes

or another healthcare professional are needed to perform all tools. While the MFRS tool and STOPPFall rely primarily on a patient's medication list, the STEADI requires actual patient interaction where a pharmacist may ask questions about fall history and gait problems. Because of this, it may take longer for the STEADI compared to the other tools as it involves a multi-step process.

3.3 Focus group discussion on tool development

The list of themes and codes identified during the focus group discussion is shown in Table 3.2. The focus group deemed that establishing a community pharmacist-led fall risk assessment service presents several advantages. The service is another opportunity to prevent untoward incidences such as falls among older persons through medication use reviews, thereby improving the patient's overall quality of life. The focus group recognised that hurdles might need to be overcome. Professional relationships between pharmacists and other healthcare providers like physicians may need strengthening. On another aspect, patients may perceive the service negatively. Respondents noted that some patients might think removing some of their medications due to therapeutic optimisation may lead to a less effective regimen and impede their ability to make decisions regarding their health. The focus group highlighted the need to educate patients regarding their medications and the importance of conducting such medication reviews to improve their health and prevent adverse events.

Before commencing the fall risk evaluation service, the respondents noted several systemic problems that the present Maltese healthcare system is experiencing. They cite a disconnect in the healthcare system where there is no single healthcare provider gatekeeper, which would ideally compile a patient's healthcare data and make sense of it to prevent untoward incidences such as drug interactions due to therapeutic duplications. Primary care providers also ensure continuity of care, promote early disease detection and prevention and improve health literacy as there is better communication. Discussions on the characteristics of an ideal fall risk evaluation tool were also mentioned. A simple, straightforward tool that can be done quickly would be preferred in implementation as the community pharmacist already has many tasks to be accomplished. There was also a mention of the possibility of incentivising service providers conducting the service. Doing this would entice more pharmacists to complete the fall risk assessment service. The discussants considered the training of professionals working the service an essential component. Although pharmacists already know about falls, medicines use review, drug interactions, and adverse effects, additional education may be needed to refresh the professional. Lastly, the focus group highlighted the need for a structured method once this service is implemented. A direction in the form of a toolkit, standard operating procedures or guidelines must be set to create a harmonised approach to the medication-related fall risk evaluation.

After presenting the different tools to the focus group and the comparative analysis conducted, they weighed in on what tool needed to be used in the pilot assessment. The focus group chose to use the MFRS tool because it determines the actual risk of the patient based on a rating scale. The respondents also mentioned that it is the easiest to

perform and can be accomplished quickly. Community pharmacists are already burdened with many tasks in the pharmacy, so the time it takes to accomplish the medication-related fall risk assessment is a high priority in choosing the ideal tool. They indicated that the other tools might also be a reference for pharmacists when creating a referral note to physicians or other healthcare professionals.

Table 3.2 Themes and codes generated during the focus group discussion

Themes	Codes
Advantages of the service	• Improved quality of life • Interactions as opportunities to review medications • Preventing any untoward incidence
Possible challenges in execution	• Healthcare provider relationships • Need for patient education • Patient autonomy • Patient behaviour on deprescribing
Requisites before starting the service	• Addressing systematic problems • Characteristics of an Ideal tool • Incentivising service providers • Providing training and resources • Structured approach in conducting service

3.4 Medication Fall Risk Score tool

The Medication Fall Risk Score tool, shown in Appendix 2, was initially developed for a hospital in Oklahoma, USA, to determine fall risk by only reviewing the patients' medications. After compilation of various literature sources, the fall risk-increasing drugs were categorised based on their adverse effect profile: high, medium, or low risk (Beasley and Patatanian, 2009). Numeric values are given to each medication class, with 3 points (high risk) assigned to opioid analgesics, antipsychotics, anticonvulsants, and sedative/hypnotics; 2 points (medium risk) assigned to antihypertensives, cardiac drugs, antiarrhythmics, and antidepressants; and 1 point (low risk) assigned to diuretics. Points are summated to calculate the medication fall risk score. A score of 6 or more shows that a patient is at risk of a medication-related fall (Silva et al., 2019).

3.5 Demographic profile

Table 3.3 shows the demographic profile of the patients in the study. The mean age of the patients was 75 $\pm$ 7 years, ranging from 65 to 96 years. There were more female patients (n=107) in the study. The age category 70 to 74 years (n=59) had the highest number of patients, followed by the 75 to 79 years (n=44) age group.

Table 3.3 Patient demographic information

(N=200)

Demographic characteristics	Frequency (%)
Gender	
Female	107 (53)
Male	47 (93)
Age (years)	
65-69	43 (22)
70-74	59 (30)
75-79	44 (22)
80-84	26 (13)
85-89	17 (9)
>90	11 (6)

3.6 Fall risk profile

Table 3.4 shows the range and mean score of the patients analysed using the MFRS tool. Scores varied depending on how many fall risk increasing drugs they had on their medication lists and the level of fall risk of the drugs prescribed to the patients.

Table 3.4 Descriptive statistics of scores generated using the MFRS tool

(N=200)

Range	Mean	SD
0-24	5	3.6

Table 3.5 shows the number of fall risk increasing drugs in the patient medication lists. Almost all (n=188, 94%) of the patient's medication lists contained one or more fall risk increasing drugs.

Table 3.5 Fall risk increasing drugs in patient medication lists

(N=200)

Patient category	Frequency (%)
Without fall risk increasing drug	12 (6)
With one or more fall risk increasing drug	188 (94)

Table 3.6 shows the patient's fall risk based on the Medication Fall Risk Score tool criteria. Most patients (n=128, 64%) were at a high risk of falls, meaning they scored six or more during the evaluation. These patients require further review by a healthcare professional.

Table 3.6 Patient fall risk based on the Medication Fall Risk Score tool

(N=200)

Patient category	Frequency (%)
Without high fall risk	128 (64)
With high fall risk	72 (36)

Table 3.7 shows the extent of fall risk-increasing drug prescribing. Of the 128 medications prescribed to 200 patients, 43% are considered fall risk increasing drugs.

Table 3.7 Prescribed fall risk increasing drugs and non-fall risk increasing drugs

(n=128)

Drug type	Frequency (%)
Fall risk increasing drug	55 (43)
Non-fall risk increasing drug	73 (57)

Table 3.8 shows the risk category of the prescribed fall risk increasing drugs. Most of the fall risk increasing drugs, around 55%, belong to the medium risk classification. These are drugs which cause orthostasis and impaired cerebral perfusion. Thirty-eight percent of the prescribed fall risk increasing drugs belong to the high risk group. These drugs cause sedation, dizziness, altered balance, and impaired thinking.

Table 3.8 Prescribed fall risk increasing drugs by risk category

(n=55)

Drug risk category	Frequency (%)
Low risk	4 (7)
Moderate risk	30 (55)
High risk	21 (38)

Figure 3.2 shows the distribution of the prescribed fall risk-increasing drug classes. Antihypertensives, diuretics, cardiac drugs, and antidepressants were among the sample population's most frequently prescribed fall risk increasing drugs. Antihypertensives were the most prescribed drug class.

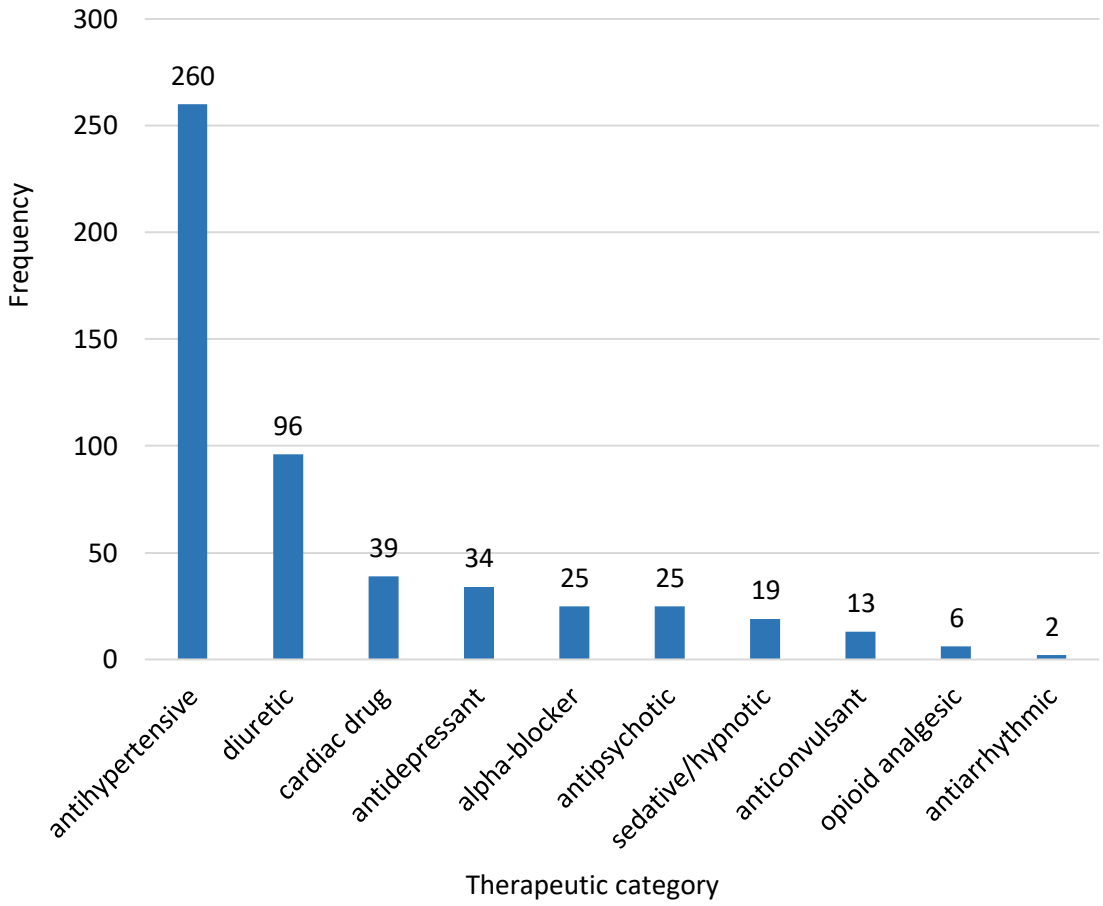

Figure 3.2 Frequency of FRID prescribing across therapeutic classes

3.7 Developed toolkit

The instrument used during the tool application phase was presented to the initial focus group, who gave suggestions to fine-tune the specific details of the toolkit. Members of the focus group mentioned that because the tool is easy to accomplish, it would also be easy to implement in the community pharmacy setting. When presented with sample medication lists, the focus group only took two to three minutes to complete the fall risk evaluation. However, since it is a basic tool for flagging high fall risk individuals, it may not be as thorough in providing further details. The focus group emphasised the importance of employing the pharmacist's clinical judgment during patient assessment. According to the focus group, the tool shall only serve as a starting point in identifying a patient's fall risk. Other confounding factors must also be considered in developing an evidence-based assessment. The fall risk assessment allows the pharmacist to perform point-of-care tests, which are necessary to be conducted, such as checking a patient's blood pressure. The pharmacist may also consider the patient's history of falls and the appropriateness of the treatment before referring them to the physician.

The focus group also discussed the inclusion criteria when conducting the service. They agreed that 65 years would be a good start for reviewing people for fall risk, meaning the services focus on older adults. The focus group agreed that the number of medications a patient took did not contribute to a patient's fall risk. A person with only two medications may still be at a high risk for falls if both drugs are classified under the high risk category, with a score of three for each. The focus group raised concerns that

including patients with antihypertensive medications may be too broad of a group. Further discussion with the focus group led to the realisation that a community pharmacist can quickly intervene in patients with antihypertensives because a pharmacist can check for possible orthostatic hypotension within the community pharmacy setting. This rationalisation was also in connection with the result in this study that the FRID most prescribed to older adults are antihypertensives.

To gain more information before referring a patient to a physician, the focus group suggested requesting additional information, such as having a fall episode last year and checking for the patient's blood pressure level at the time of evaluation. The discussants also suggested conducting the service annually for high fall risk older individuals. All the information discussed during the focus group discussion was considered in refining the toolkit.

Chapter 4

Discussion

4.1 Falls risk detection and healthcare system burden

By assessing a person's fall risk, many fall-related effects, such as a deterioration in the quality of life, loss of independence, pain, or even mortality, are avoided (Aladul et al., 2021). Falls and fall-related injuries not only cause a burden to the individual but also put pressure on the healthcare system. In a study, almost one-quarter of people who suffered injuries from falls used healthcare services and more than one-third of the patients examined suffered functional decline post-fall. It also concluded that modifiable risk factors such as medication use and depression might have been addressed to prevent patient falls (Stel et al., 2004). Due to finite resources in any healthcare system, people with a higher risk of experiencing falls must be prioritised in receiving interventions.

Results in this study showed that almost all patients reviewed were taking one or more fall risk increasing drugs. However, this does not mean all patients are at a high fall risk and need further assessment. Data analysis revealed that most patients did not have a high fall risk when the Medication Fall Risk Score tool was used to screen their medication lists, even though most had at least one fall risk-increasing drug. Approximately half of the medications prescribed to patients have a high fall risk potential.

When the prescribed fall risk increasing drugs were stratified, 38% of the medications were considered high risk. Patients prescribed these high fall risk medications may be

more prone to sedation, balance, and cognitive issues. Global cognitive impairment increases the risk of major fall-related injuries from moderate to high. Memory retention, flexible thinking, and self-control are all examples of executive function. Research has linked executive function impairment to an increased risk of falling. Most crucially, mild executive function impairment can exist among individuals who are otherwise healthy and functioning well, conferring a threefold rise in fall risk (Muir et al., 2012).

When the therapeutic categories of the fall risk increasing drugs were summarised, antihypertensives emerged as the most frequently prescribed drug group. The top five drug classes identified in the study were antihypertensives, diuretics, cardiac drugs, antidepressants, and alpha-blockers, which belong to either low or medium risk classification. This means that most drugs prescribed do not possess a high risk potential for falls. In a study reviewing antihypertensive use among older persons, antihypertensive medicines were not linked to an increased risk of falling. Patients on angiotensin-converting enzyme inhibitors had a significantly reduced chance of injurious falls, but calcium channel blockers had a lower risk of all falls than non-users. Higher dosages of these classes were associated with a reduced risk of falling. Participants who used calcium channel blockers had higher cerebral blood flow than those who did not. Increased antihypertensive medication doses are not associated with increased falls in healthy community-dwelling older individuals (Lipsitz et al., 2015).

A clinical pharmacy service's primary objective is addressing drug-related problems, preventing their occurrence, and optimising treatment to achieve the best possible medication safety for the patient (Mansur, 2016). Pharmacists play an essential role in promoting medication safety by participating in medication management services such as medication reconciliation and medicines use review (Leguelinel-Blache et al., 2014). This study highlights the potential for community pharmacists to expand their role from ensuring the appropriate dispensing of medicinal products and medical devices to ensuring the patient's treatment is optimised based on their conditions. Present systems in Malta enable community pharmacists to collaborate with other healthcare providers to ensure sound therapeutic decisions. POYC and the Chamber of Pharmacists in Malta in March 2023 collaborated to launch the Medicines Use Review program, where community pharmacists are required to biannually evaluate the patient's medications and check for possible adverse drug effects and drug interactions. Any information the pharmacist deems essential in optimising the medicines will be communicated to physicians or other appropriate professionals. This study's medication-related fall risk evaluation may serve as an additional service which could be incorporated into the Medicines Use Review program. The community pharmacist regularly reviews patients with a higher risk of falling and may avoid untoward incidences and injuries. Pharmacists must maintain open lines of communication with patients, their families, and caregivers to adequately advise them about the discovered fall risk and how to resolve concerns. While administering medications take up only a small portion of a caregiver’s work time, medication-related stress was reported in more than half of responses from caregivers in a study conducted in the southwest United States (Travis et al., 2000). Caregivers, especially those aiding cognitively challenged persons, should be educated on the

importance of medication adherence, proper administration, indication, and dose, as well as identifying side effects and therapeutic outcomes (Campbell et al., 2012).

As with any service, conducting a fall risk assessment poses many challenges to all key stakeholders. Healthcare professionals already have many tasks in their primary responsibilities. Community pharmacists taking the main responsibility for executing the risk evaluation may feel that this additional service may take much time from their hectic workload. Community pharmacists frequently have additional responsibilities beyond assuring the proper dispensing of pharmaceuticals, including managing the pharmaceutical establishment. They also provide rational stock inventory, cash management and proper record-keeping systems, to name a few. With this, the present study considered the time it takes to conduct the service. It ensured the tool was easy-to-use, required little time from the assessor, and needed only basic knowledge from the pharmacist to perform the task.

Interprofessional collaboration is vital in executing a service which involves health. Research suggests that interprofessional collaboration may enhance healthcare procedures and outcomes (Zwarenstein et al., 2009). Communication between community pharmacists and physicians has always existed. Pharmacists regularly interact with prescribers to ensure that rational drug therapy are provided to patients. Since the start of the Medicines Use Review in Malta, pharmacists can report suspected inappropriate therapy to physicians either through a direct telemedicine line or by leaving a recommendation in an online patient database. The study emphasises the

participation of physicians in assessing the patient extensively after receiving the information from the pharmacist that the person is at a high fall risk. After performing the risk evaluation and conducting their investigations, such as blood pressure monitoring and fall history taking, pharmacists must fill in a physician referral form to inform physicians of the need for review. Pharmacists must ensure that the referral note is professionally written and indicates that the pharmacist is willing to collaborate to improve patient outcomes.

Deprescribing fall risk increasing medications is one method of preventing falls, particularly in the older population. Deprescribing alone does not significantly reduce the rate and risk of falls and fall-related injuries, so it should not be used as a sole strategy (Lee et al., 2021). Generally, recommendations for preventing falls strongly emphasise screening older adults at high risk of falling for risk factors, such as medication use (Drootin, 2011). Identification of FRIDs is crucial because it is the foundation for potential FRID deprescribing as part of the multifaceted fall prevention strategy (Seppala et al., 2019). The current study emphasises the importance of using a community pharmacy review as a springboard for patient and professional discussions about how to tailor drug therapy best to prevent falls and injuries caused by falls. In addition to taking the patient's history and conducting additional reviews by other healthcare professionals, the medication-related fall review may be one of many tools used to determine the patient's overall fall risk. The combined efforts of every healthcare team member may significantly improve the quality of life for older people living in the community. Deprescribing medications that increase fall risk is difficult for several reasons. Deprescribing is more effectively implemented when inadequate

interprofessional communication and insufficient documentation are addressed in the healthcare system (Kalim et al., 2022). Although there has been significant progress in enhancing interprofessional collaboration, this might not reach its full potential due to infrequent interactions between healthcare professionals confined to their bubbles. Community pharmacists should ensure that medical professionals participate in the review process as they may offer additional, vital information that will aid in making sensible decisions. The medication-related fall risk evaluation also allows pharmacists to advance their clinical expertise to refer patients to other healthcare providers with up-to-date, scientifically supported recommendations.

4.2 Application of fall risk evaluation model in practice

Figure 4.1 shows the proposed model for the community-pharmacist-led fall risk evaluation service. This adopts a patient-centred approach where all considerations made within the patient's drug treatment respond to the patient's needs, values, and preferences (Bau et al., 2019). Surrounding the patient are three main concepts necessary in implementing a fall risk evaluation service in a community pharmacy. The first component is the pharmacist performing their professional and clinical role in assessing a patient's treatment regimen. A pharmacist needs to employ their clinical judgment on the needed tests to confirm fall risk and whether there is a need to refer a patient with a high fall risk to a physician.

The pharmacist must maintain patient confidentiality and consistently implement data protection measures. The second component highlights the need for the participation of the entire healthcare system to promote fall risk prevention. Interprofessional collaboration enables clarity of roles and clear and effective partnership in caring for older persons with chronic health conditions, improving patient care quality (Baxter and Markle-Reid, 2009). Government institutions are crucial in crafting and implementing fall prevention strategies across the healthcare system. Health policies related to fall prevention should be regularly reviewed, considering current evidence, and integrating these into existing policies. The third component involves a structured fall risk assessment, allowing the pharmacist to effectively identify a person's fall risk. A rational, robust, and easy-to-conduct fall risk assessment tool in the community pharmacy enables the pharmacist to evaluate confidently, enable clinical decision-making, and provide recommendations for referral and further screening.

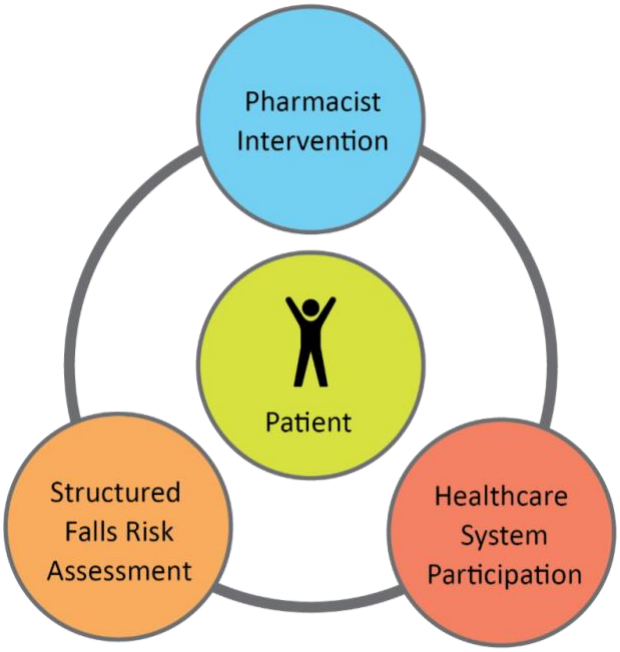

Figure 4.1 Patient-centric model on community pharmacist-led falls risk evaluation

Incorporating additional inclusion criteria allowed a targeted approach to identifying older individuals who are candidates for a pharmacist-led falls risk review. Figure 4.2 shows the number of individuals qualifying for each screening criteria and the number of individuals identified to have a high fall risk after utilising the MFRS tool. Of the 200 anonymised older persons aged 65 years and over admitted to the study, only 163 took at least one antihypertensive medication. Upon further screening, only 24 individuals were prescribed at least one high fall risk medication and were candidates to be reviewed by the pharmacist for their medication-related fall risk. There were 22 patients out of the 24 screened, identified to have had a high fall risk using the MFRS tool (scored at least 6 points). Potential fall-related injuries can be prevented through the service rendered by the community pharmacist reviewing the patient and flagging the patient to other healthcare providers, such as physicians.

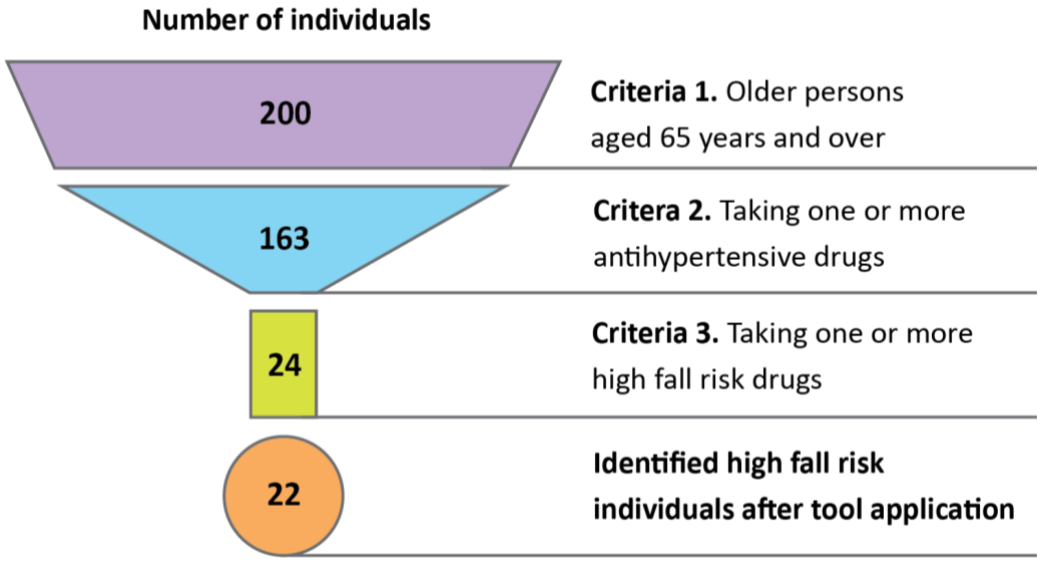

Figure 4.2 Patient screening

Four studies conducted in different countries were identified to acquire information on the mean costs of falls per patient following fall-related injuries. Table 4.1 compares the costs for falls per case in various countries. Costs saved for the 22 high fall risk individuals identified in the study using the MFRS tool were calculated. The identified studies were done in different timeframes with varying methodologies, but this preliminary analysis shows how much individuals, insurers, and governments spend on fall-related injuries when they are brought into healthcare institutions. Among countries, The Netherlands had the highest cost per case while Australia had the lowest. When these data were applied to the results of the present research, it is estimated that the National Health Service would save €89,298 to €206,140 in potentially managing 22 high fall risk individuals when a medication-related falls risk evaluation service is implemented in the community pharmacy setting.

Table 4.1 Cost of falls in different countries

Country	**Mean cost of fall per case**		**Cost for 22 high fall risk individuals**
	Local currency	Euro*	
The Netherlands (Hartholt et al., 2012)	€ 9,370	€ 9,370	€206,140
USA (Burns et al., 2016)	$ 9,463	€ 8,818	€193,996
China (Su et al., 2021)	¥ 44,788	€ 5,908	€129,976
Australia (Morello et al., 2015)	A$ 6,669	€ 4,059	€89,298

**Based on currency conversions from 28 May 2023*

4.3 Strengths and Limitations

The study provides a practical evaluation of the medication-related fall risk in the community pharmacy setting, which can easily be implemented, considering that it does not entail much time and expertise. The study exposes the community pharmacist's clinical contribution by providing tools to detect fall risk, provide avenues to intervene, and collaborate with other healthcare professionals to avoid fall-related injuries. Involving physicians in the focus group discussion improved the toolkit's reliability by providing a different perspective from their experience handling patients with fall-related injuries.

A weakness of the study was that the implementation was undertaken on a small population of older persons in one Maltese locality. Although the study locale is representative of a typical community pharmacy, variances in data may be observed when tested in other localities. The study mainly focused on analysing the anonymised medication lists provided by the community pharmacy. It did not involve patient interviews regarding their concerns about falling and experiences with fall-related injuries. While physicians were involved during the focus group discussions, the study might not have fully revealed the physician's experience in being referred with a patient with a high fall risk based on the assessment conducted by the community pharmacist. The study featured an estimate of the economic impact of falls and fall-related injuries in various countries, but it could not show the local scenario as there was no publicly available data in Malta at the time of writing.

4.4 Recommendations

A study to be conducted in different pharmacies situated in various localities in Malta may be performed to assess further the feasibility of implementing the community pharmacist-led falls risk evaluation toolkit in actual practice. Testing in a larger older patient cohort may show gaps that must be addressed in improving the existing toolkit. Patients' experiences with falls and fall-related injuries may be gathered and analysed to understand further the relationship between the use of high fall risk medications and the occurrence of fall events. This exercise may show the number of older persons developing falls and fall-related injuries from the medicines they are taking, and researchers can relate this experience with their theoretical fall risk based on the toolkit. Further research may also be conducted to identify physician experience in participating in community pharmacists' medication-related fall risk evaluation service. Physicians may be able to validate if the service provides added clinical value as they can access and analyse more patient information. The interprofessional dynamic between physicians and pharmacists regarding fall risk assessment may also be reviewed and assessed to identify the benefits it creates in strengthening pharmacist-physician collaboration. Research on the economic impact of falls and fall-related injuries in the Maltese healthcare system may be conducted to provide an overview of the severity of the public health problem and provide government authorities with tangible financial data that could promote initiatives for more fall prevention measures. A longitudinal study measuring direct and indirect costs attributed to falls and fall-related injuries across periods, whether retrospectively or prospectively conducted, is vital in accurately depicting the scenario.

4.5 Conclusion

This study provides insights into the fall risk increasing drug use among older people. It proposes a model and toolkit that could be implemented within a community pharmacy setting to identify older persons at high risk of medication-induced falls through a medication review and intervene within a collaborative practice between community pharmacists and physicians.

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Appendices

Appendix 1 Approvals

Ethics approval

L-Università ta' Malta

John Robert Omandac <john.omandac.19@um.edu.mt>

The status of your REDP form (MED-2022-00089) has been updated to Acknowledged

1 message

form.urec@um.edu.mt <form.urec@um.edu.mt> 3 May 2022 at 11:27
To: john.omandac.19@um.edu.mt

Dear John Robert Omandac,

Please note that the status of your REDP form (MED-2022-00089) has been set to *Acknowledged*.

You can keep track of your applications by visiting: https://www.um.edu.mt/research/ethics/redp-form/frontEnd/.

This email has been automatically generated by URECA. Please do not reply. If you wish to communicate with your F/REC please use the respective email address.

Approval from managing pharmacist

Janelle Bianca Mary
Managing Pharmacist
Brown's Pharmacy Hamrun

01 June 2022

Dear Ms Mary,

Good day! I hope this email finds you well.

I am John Robert Omandac, a Doctorate in Pharmacy student from the University of Malta. Currently, I am working under the supervision of Professor Lilian M Azzopardi and Dr Marise Gauci for my dissertation entitled, "Community pharmacist-led falls risk evaluation". The aim of this study is to determine if it is possible for community pharmacists to flag older persons at increased risk of falls due to medication use and refer to physician within a collaborative practice.

I am writing this letter to respectfully ask your permission to conduct this study in your community pharmacy. A targeted sample of 300 anonymised medication lists of patients registered within the Pharmacy of Your Choice scheme of your pharmacy shall be included in the study. A selected tool will be used to assess anonymised patient medication lists for appropriate medication use and patient's risk of falls. Each patient shall be assigned a code to maintain anonymity in the entirety of the study.

Should you require further information, please do not hesitate to contact me at john.omandac.19@um.edu.mt.

I look forward to working with your pharmacy and I sincerely hope for your consideration and approval.

Best regards,

John Robert Omandac
Doctorate in Pharmacy Student
University of Malta

Approved:

Date: 02 June 2022

Approval from tool author

L-Università ta' Malta

John Robert Omandac <john.omandac.19@um.edu.mt>

Request for permission to use tool

2 messages

John Robert Omandac <john.omandac.19@um.edu.mt> 10 October 2022 at 07:56
To: burl.beasley@omes.ok.gov

Burl Beasley, DPh, MPH, MS Pharm
Director of Pharmacy Services
Oklahoma Health Care Authority
Oklahoma City, Oklahoma

Dear Mr. Beasly,

Good day!

I hope this email finds you well.

I am John Robert Omandac, a Doctorate in Pharmacy student from the University of Malta, Republic of Malta, Europe. I am conducting a study for my dissertation entitled, "Community pharmacist-led falls risk evaluation". The research aims to determine community pharmacist interventions to identify older persons at increased risk of falls due to medication use to be able to refer to physicians within a collaborative practice.

During my literature review, I had the opportunity to read your research on "Development and Implementation of a Pharmacy Fall Prevention Program" published on Hospital Pharmacy. After reviewing several tools which may be used for the study, we deemed that the Medication Fall Risk Score tool you developed would be a good tool to be implemented in the study I am working on.

In this regard, may I request permission from you to use the Medication Fall Risk Score tool in my study?

Thank you very much and hoping to hear from you soon.

Best regards,

John Robert Omandac
Doctorate in Pharmacy student
University of Malta

Burl Beasley <Burl.Beasley@omes.ok.gov> 10 October 2022 at 15:16
To: John Robert Omandac <john.omandac.19@um.edu.mt>
Cc: "Patatanian, Edna" <edna.patatanian@swosu.edu>

Greetings John,

Yes you have permission to use the Medication Fall Risk score from our paper in your study.

Good day!

Burl Beasley | Director of Pharmacy |p.405-717-8852 | EGID | omes.ok.gov

[Quoted text hidden]

Appendix 2 Data collection sheet

Medication Fall Risk Score Tool

Adapted from Beasley B, Patatanian E. Development and Implementation of a Pharmacy Fall Prevention Program. Hosp Pharm 2009;44:1095–102. https://doi.org/10.1310/HPJ4412-1095

Score	Risk Level	Drug Class	Comments
3	High	Narcotic analgesics, antipsychotics, anticonvulsants, benzodiazepines (including non-benzodiazepine sedative-hypnotic drugs)	Sedation, dizziness, postural disturbances, altered gait and balance, impaired cognition
2	Medium	Antihypertensives (including alpha-blockers), cardiac drugs, antiarrhythmics, antidepressants	Induced orthostasis, impaired cerebral perfusion, poor health status
1	Low	Diuretics	Increased ambulation, induced orthostasis

Total score≥ 6 - Higher risk for fall; needs further assessment or referral

Assigned Patient Number:	**Review Date:**	
Medication Generic Name	**Drug Class**	**Score**
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
	TOTAL	

Appendix 3 Community Pharmacist-led Falls Risk Evaluation Toolkit

Purpose: To determine a person's medication-related fall risk, which shall serve as a basis for action and possible referral to another healthcare provider.

Scope: This covers falls risk evaluations conducted by a community pharmacist for POYC patients meeting the criteria:

1. 65 years or more
2. Has at least one antihypertensive medication
3. Has at least one high fall risk medication

Roles and responsibilities: The community pharmacist shall make sure that the following are accomplished:

1. Ensure professional conduct and patient confidentiality
2. Keep appropriate documentation, adherent to current data protection laws
3. Determine a patient's medication-related fall risk
4. Conduct necessary additional investigations
5. Refer to other healthcare professionals if the need arises

Materials: Medication Fall Risk Score Tool

Procedures:

1. Ensure that the patient inclusion criteria are met.
2. Inform the patient that a medication-related fall risk evaluation shall be conducted.
3. Review shall be conducted based on the patient's POYC medication list. If other medicines are also taken, these may also be included in the review.
4. Utilising the Medication Fall Risk Score Tool, assign a unique patient number to refer to for future reviews. Write the review date in its corresponding box.
5. List all medications taken by the patient.
6. Provide a fall risk score for each medication based on the tool.
7. Compute the total score by adding all scores.
8. If a patient has a score of 6 or more, the patient has a high fall risk and should be referred to a physician.
9. After conducting necessary investigations to confirm a fall risk, fill in the physician referral form.
10. Inform the patient to give the referral form to the physician on their next check-up or visit.
11. Conduct the review biannually for high fall risk patients.

Records to be kept: Medicines use review log

Definitions:
POYC – Pharmacy of Your Choice Scheme

References:
British National Formulary
STOPPFall Tool

Prepared by: John Robert Omandac, Pharmacist

Original Issue: April 2023

Medication Fall Risk Score Tool

Adapted from Beasley B, Patatanian E. Development and Implementation of a Pharmacy Fall Prevention Program. Hosp Pharm 2009;44:1095–102. https://doi.org/10.1310/HPJ4412-1095

Score	Risk Level	Drug Class	Comments
3	High	Narcotic analgesics, antipsychotics, anticonvulsants, benzodiazepines (including non-benzodiazepine sedative-hypnotic drugs)	Sedation, dizziness, postural disturbances, altered gait and balance, impaired cognition
2	Medium	Antihypertensives (including alpha-blockers), cardiac drugs, antiarrhythmics, antidepressants	Induced orthostasis, impaired cerebral perfusion, poor health status
1	Low	Diuretics	Increased ambulation, induced orthostasis

Total score≥ 6 - Higher risk for fall; needs further assessment or referral

Assigned Patient Number:	**Review Date:**	
Medication Generic Name	**Drug Class**	**Score**
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
	TOTAL	

Physician Referral Form

Dear physician,

Good day!

On initial assessment, the patient is at a high fall risk due to the medications taken. In particular, the following medicines may cause an increased risk for falls:

☐ **Tick if the patient had at least one fall episode in the past year**	**Blood pressure level:**

May I suggest a review of the patient's treatment?

If you want to discuss the details of this assessment, you may reach me through: _____

Thank you very much.

Regards,

_____
Pharmacist
Reg No. _____

Appendix 4 Dissemination

Abstract presented during the Malta Geriatrics Conference 2022

Community pharmacist-led falls risk evaluation

John Robert Omandac, Marise Gauci, Lilian M Azzopardi
Department of Pharmacy, Faculty of Medicine and Surgery,
University of Malta, Msida, Malta

Introduction

Older people are at higher risk of suffering fall-related injuries due to multiple medications. As one of the most accessible health professionals, community pharmacists may screen medication lists of older people to detect fall risk and prevent potential harm. This study aims to determine community pharmacist intervention to identify older persons at increased risk of falls due to medication use and refer to physicians within a collaborative practice.

Methods

A tool to assess an older person's fall risk is determined through focus group discussion supported by literature review. The selected tool is applied to screen the 'Pharmacy Of Your Choice' medication list of anonymised older patients in a community pharmacy during July to October 2022. Data analysis determines the prevalence of fall risk-increasing drug use in older adults and the feasibility of tool application. Feedback is given to the focus group to design a framework for a medication fall risk evaluation service for older persons in the community.

Results

A literature review of medication-related fall risk assessment studies generated 26 articles. Studies which did not involve the community pharmacy setting and tools which were not publicly available were excluded. The ten remaining studies utilised three fall risk assessment tools: STEADI, Medication Fall Risk Score, and STOPPFall. The characteristics of each tool were compared. During the focus group discussion, a consensus will be reached for tool selection in terms of relevance and feasibility for application in the study setting.

Conclusion

This study elucidates the use of fall risk-inducing drugs in older people and provides a framework that could be implemented within community pharmacy practice to identify older persons at risk of medication-induced falls for medication review.

Abstract accepted for the European Society of Clinical Pharmacy
Autumn Symposium 2023

Community Pharmacy - Pharmaceutical care
ESCP23SY-1383

COMMUNITY PHARMACIST-LED FALLS RISK EVALUATION

John Robert Omandac*[1], Marise Gauci[1], Lilian M. Azzopardi[1]
[1]Department of Pharmacy, Faculty of Medicine and Surgery, University of Malta, Msida, Malta

Background and Objective: Older people are at higher risk of suffering fall-related injuries due to multiple medications. Community pharmacists may screen older people to identify drugs that increase the risk of falls and contribute to preventing potential harm through collaborative practice. The study aimed to determine community pharmacist interventions to identify older persons at increased risk of falls due to medication use within a collaborative approach.

Method: A literature review of community pharmacy-based medication-related fall risk assessment studies was conducted. The characteristics of each tool used were compared, and a consensus on a final tool for application in community practice was determined through a focus group. The identified tool was applied to screen the medication list of 200 anonymised older persons in a community pharmacy practice. Data analysis determined the prevalence of fall risk-increasing drug (FRID) use in older adults and the feasibility of tool application. After disseminating the results to the focus group, a community pharmacist-led falls risk evaluation framework was developed.

Main outcome measures: Prevalence of fall risk-increasing drug use in a community pharmacy setting, Framework for service implementation

Results: The literature search generated 26 articles on the topic. Further screening resulted in ten studies utilising three fall risk assessment tools. The consensus from the focus group was to use the Medication Fall Risk Score tool[1]. The mean age of the patients in the study was 75 years (SD=7). Almost all patients (94%, n=188) were prescribed one or more FRIDs. According to the tool criteria, 36% (n=72) of patients were at high risk of falls, requiring review by a healthcare professional. Of the 128 prescribed medications, 43% (n=55) are considered FRIDs. Most FRIDs belonged to the medium-risk group (55%, n=30). Antihypertensives (n=260) and diuretics (n=96) were the most frequently prescribed FRIDs in the population. The inclusion criteria for framework implementation were identified as (1) older persons aged 65 and over, (2) with one or more antihypertensive medications, and (3) with one or more high fall-risk drugs.

Conclusion: FRID use among older people was frequent in the sample population. The study provides a framework that could be implemented within a community pharmacy practice to identify older persons at high risk of medication-induced falls through a medication review within a collaborative approach between community pharmacists and physicians.

References: 1. Beasley B, Patatanian E. Development and implementation of a pharmacy fall prevention program. Hosp Pharm 2009;44:1095–102. https://doi.org/10.1310/hpj4412-1095