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Norwegian University of Science and Technology

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Doctoral thesis

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Thesis for the Degree of
Philosophiae Doctor
Faculty of Medicine and Health Sciences
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NORSK SAMMENFATNING

Bakgrunn

Forskning viser at en tredjedel av hjemmeboende eldre over 65 år, og halvparten av de eldre over 80 år, faller minst en gang årlig. Fallskader fører ofte til langvarige smerter og uførhet, og er en av de ledende årsakene til død hos eldre. De underliggende årsakene til fall er ofte sammensatte, men høy alder, ulike sykdommer og nedsatt kognitiv funksjon øker risikoen for fall. Fallrelaterte legemidler gjerne omtalt som FRIDs, fra det engelske Fall-Risk-Increasing-Drugs har også vist å ha en signifikant betydning for fallrisiko. FRIDs omfatter psykofarmaka, men også enkelte legemidler som påvirker hjerte- og karsystemet. I Norge har prosjekter med legemiddelgjennomganger i tverrfaglige team, bestående av leger, sykepleiere og farmasøyter, blitt etablert i mange kommuner. Resultater fra disse gjennomgangene har vist at mange eldre ikke har en optimal legemiddelbehandling. Hyppig rapporterte legemiddelrelaterte problemer fra slike tverrfaglige legemiddelgjennomganger er overmedisinering, undermedisinering og manglende monitorering av legemidlenes effekt. Det er imidlertid lite kjent hva de ulike profesjonene som har deltatt i tverrfaglige legemiddelgjennomganger har lært ved å delta. Det er også lite kjent om forskrivere og pasienter relaterer bruk av FRIDs til risiko for fall og hvilke følger oppfatningene får for forskrivning, bruk og oppfølging av legemiddelbehandling med FRIDs.

Hensikt

Den overordnede hensikten med denne avhandlingen var å undersøke hvordan både helsepersonell og eldre legemiddelbrukere opplever oppfølging og håndtering av legemiddelbehandling, med særskilt fokus på fallrealterte legemidler. De tre studiene hadde til hensikt:

1) å utforske om fastleger knytter legemiddelbruk opp mot fall hos sine eldre pasienter, samt hvilke faktorer som påvirker forskriving og seponering av FRIDs (Studie I),

2) å utforske hvordan hjemmeboende eldre som bruker FRIDs oppfatter egen fallrisiko og hvorvidt de relaterer dette til legemidlene sine (Studie II),

3) å beskrive hva leger, sykepleiere og farmasøyter har lært ved å delta i tverrfaglige legemiddelgjennomganger i primærhelsetjenesten i inntil to år (Studie III).

Metode

I denne doktorgraden benyttes utelukkende kvalitative forskningsmetoder: Semistrukturerte fokusgruppeintervjuer i Studie I og Studie III og individuelle intervjuer i Studie II og Studie III. I Studie I deltok 13 fastleger fordelt på to fokusgrupper. I Studie II ble 14 hjemmeboende eldre FRID-brukere i alderen 66-97 år intervjuet individuelt. I Studie III deltok 13 sykepleiere og 2 farmasøyter fordelt på 5 fokusgruppeintervju mens 2 farmasøyter ble intervjuet individuelt per telefon. Systematisk tekstkondensering ble benyttet for å analysere transkriberte lydfiler av de digitale lydopptakene. Alle studiene ble utført i Midt-Norge i tidsrommet 2013 til 2016.

Resultater

Fastleger og eldre legemiddelbrukere anser ikke bruken av FRIDs som en fremtredende risikofaktor for fall. Fastlegene uttrykte også en usikkerhet på om forskrivningsendringer av FRIDs resulterte i forbedring eller forverring av pasientens helsetilstand. Andre faktorer som ble sagt å påvirke forskrivning og avslutning av FRID-behandling var manglende retningslinjer for multisyke eldre, tidspress under konsultasjonen, forskrivningspress fra pasienter og mangel på klinisk informasjon om pasienten. Legene fornyet vanligvis reseptene på FRIDs uten endring, med mindre pasientene fortalte fastlegen at de var svimle eller at de hadde hatt en fallepisode.

De eldre på sin side reflekterte lite over om legemiddelbruken var relatert til fall eller svimmelhet. De uttrykte, nesten uten unntak, at de stolte på legen og legemiddelbehandlingen legen ga. Svimmelhet eller ustøhet, tolket de gjerne som generelle aldringstegn, og ikke som potensielle bivirkninger av FRIDs. Derimot rapporterte flere eldre om problemer med å gjøre seg forstått når de skulle forklare legen om mulige bivirkninger.

Gjennom å delta i tverrfaglige legemiddelgjennomganger over tid, sa sykepleierne at de lærte å tolke og knytte pasientens symptomer til effekter og bivirkninger av legemidler. Farmasøytene ble mer oppmerksomme på sykepleiernes avgjørende rolle for å overbringe utfyllende klinisk informasjon om pasienten, slik at de som kliniske farmasøyter skulle kunne gi bedre og mer individbaserte råd. Når de tre profesjonene lege, sykepleier og farmasøyt jobbet sammen i team, opplevde sykepleierne at farmasøyten utfordret legene på annen måte enn måte enn om bare sykepleier og lege foretok legemiddelgjennomgangen. Sykepleierne mente at farmasøytens tilstedeværelse

bidro til at legen må reflektere og argumentere over tidligere terapivalg på en mer utførlig måte.

Konklusjon

Fastlegene oppfattet ikke FRIDs som en fremtredende risikofaktor for fall hos eldre pasienter, og det var vanskelig å forutsi om forskrivningsendringer av FRIDs resulterte i bedre behandling. Det opplevdes derfor tryggere å fornye gjeldende resept uten endring. Eldre hadde lite kunnskap om at FRIDs kunne være relatert til svimmelhet og fall, og de knyttet heller svimmelhet og fall til aldring og andre ytre faktorer. Hverken lege eller legemiddelbruker ser for seg at FRIDs kan være problematisk i forhold til fallrisiko og dermed tar ingen ansvar. Oppfølgingen av legemiddelbehandlingen for FRIDs blir dermed reaktiv. Ut over det rent faglige, lærte farmasøyter og sykepleiere mye om hverandres roller ved å delta i tverrfaglige legemiddelgjennomganger. Sykepleierne fikk økt bevissthet om egen rolle og ansvar i oppfølging av legemiddelbehandling. Både sykepleiere og farmasøyter opplevde at legemiddelgjennomgangene i tverrfaglige team utfordret legens rolle, spesielt når legen måtte revurdere sine tidligere terapivalg under selve møtet.

Kandidat: Hege Therese Bell

Institutt: Institutt for samfunnsmedisin og sykepleie

Veiledere: Professor Anne Gerd Granås, School of Pharmacy, University of Oslo

Professor Aslak Steinsbekk, Institutt for samfunnsmedisin og sykepleie, NTNU

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SUMMARY

Background

Research shows that one third of home-dwelling elderly above 65 years, and half of those above 80 years fall at least once a year. Injuries caused by falls often lead to longstanding pain and disability, and are one of the leading causes of death in elderly. The underlying causes of falls are multifaceted, but advanced age, certain diseases and cognitive impairment increase the risk of falls. Fall Risk Increasing Drugs (FRIDs) have also shown a significant impact on fall risk. FRIDs mainly comprise psychotropic drugs, but also include some drugs affecting the cardiovascular system. In Norway, projects of inter-professional medication reviews performed by team of physicians, nurses, and pharmacists have been established in many municipalities. Results from these medication reviews have shown that many elderly do not receive optimal medication therapy. The most common drug related problems reported from such inter-professional medication reviews are: unnecessary drugs; need for additional drugs; and lack of monitoring of effect. Little is known, however, of what the different professionals participating in inter-professional medication reviews learn. Little is also known about whether prescribers and patients relate the use of FRIDs to the risk of falls, and what consequences this might have for the prescribing, use and the follow up of FRIDs.

Aim

The overall aim of this thesis is to investigate how both health personnel and community-based elderly drug users perceive medication therapy management, with a distinct focus on FRIDs. The three studies were intended to:

1) explore the situations in which GPs associate drug use with falls among their elderly patients, and the factors influencing prescribing and cessation of FRIDs (Study I);
2) explore how home-dwelling elderly FRID users perceive their fall risk and how they relate this to their drug use (Study II) and

3) describe what nurses and pharmacists perceive to learn from participating in inter-professional drug reviews in a primary health care setting for up to two years (Study III).

Methods

For this thesis a qualitative methodology is used exclusively. This involved semi-structured focus group interviews in study I and study III, and individual interviews in study II and study III. In study I, 13 general practitioners (GPs) participated, distributed over two focus groups. In study II, 14 home-dwelling elderly FRID-users between 66 and 97 years were interviewed individually. In study III, 13 nurses and two pharmacists participated in five focus group interviews, while two pharmacists were interviewed individually by telephone. Systematic text condensation was used to analyse the transcribed audio files from a digital recorder. All studies were conducted in Central Norway in the period from 2013 to 2016.

Results

GPs and elderly both said they did not perceive the use of FRIDs as a prominent risk factor for falls. The GPs also spoke of an uncertainty about changing prescriptions of FRIDs to whether the change would result in an improvement or worsening of the patient's health condition. Other factors said to affect prescribing or cessation of FRIDs were: lack of suitable guidelines for multi-morbid elderly; time constraints during consultations; patient's demands for prescriptions; and lack of clinical information of the patient. The GPs usually renewed the prescriptions of FRIDs without change, unless the patients reported dizziness or a fall episode.

The elderly reflected less about whether their drug use was related to falling or the experience of dizziness. They expressed, almost without exception, that they fully trusted their physicians and the medication therapy given by their GP. Dizziness and/or unsteadiness were generally perceived as signs of aging, rather than as potential side effects of FRIDs. There were, however, elderly FRID users reporting that they struggled to get their point across when contacting their physician about a potential side effect.

Through participating in inter-professional medication reviews over time, the nurses said to learn how to interpret and link the patient's symptoms to the drugs in use – both effects and side effects. The pharmacists responded to the nurse's crucial role in providing clinical information about the patient, so that as clinical pharmacists, they could provide better and more individual-based care. When the three professions of physician, nurse and pharmacist worked together as a team, the nurses perceived the pharmacists as challenging the physicians in other ways than when only nurse and physicians performed the medication review. The nurses said the pharmacist's presence forced the physician to reflect and argue for their previous medication therapy choices in a more comprehensive manner.

Conclusion

The GPs did not perceive FRIDs as a prominent risk factor for falls in their elderly patients, and it was difficult to predict whether change in the prescribing of FRIDs resulted in better treatment outcomes for the patient. It was therefore perceived, as being safer to renew the current prescription of the FRID. Elderly FRID users had little knowledge of whether FRIDs could be related to dizziness or risk of falls, and they instead related dizziness and fall risk to aging and other external factors. Neither the GP nor the elderly FRID user consider FRIDs to be problematic in relation to fall risk and therefore take no responsibility. The medication therapy management of FRIDs is therefore reactive. Beyond learning the skills, pharmacists and nurses also learned a lot about each other's roles when participating in inter-professional medication reviews (IMR). The nurses became more aware of their own role and responsibility in medication therapy management. Both nurses and pharmacists perceived medication reviews in inter-professional teams as challenging the physician's role, especially when the physicians had to reassess their previous choices of therapy during the IMR.

ABBREVIATIONS

ACE- inhibitors	Angiotensin Converting Enzyme - inhibitors
ADE	Adverse Drug Event
ADR	Adverse Drug Reaction
CME	Peer-continued Medical Education groups
DDD	Defined Daily Dose
DRP	Drug Related Problems
FRIDs	Fall Risk Increasing Drugs
GP	General Practitioner
IMM	Integrated Medicines Management
IMR	Inter-professional Medication Review
IP	Inappropriate Prescribing
LIMM	Lund Integrated Medicines Management
MTM	Medication Therapy Management
MTMS	Medication Therapy Management Services
NAFALM	Norwegian Research School in General Practice
NORGEP	Norwegian General Practice Criteria for assessing potentially inappropriate prescriptions to elderly patients
PILs	Patient Information Leaflets
PIM	Potentially Inappropriate Medication
PIP	Potentially Inappropriate Prescription
PPO	Potentially Inappropriate Omission
SSRI	Selective Serotonin Reuptake Inhibitor
START	Screening Tool to Alert to Right Treatment
STC	Systematic Text Condensation
STOPP	Screening Tool of Older People's Prescriptions
TCA	Tricyclic Antidepressant

LIST OF INCLUDED PAPERS

The thesis is based on the following three papers. Each paper is referred to by Roman numerals in the summary section of the thesis. The papers in their full format are attached as appendices at the end of the thesis.

Paper I: Bell, H.T., Steinsbekk, A., & Granas A.G. (2015). Factors influencing prescribing of fall-risk-increasing-drugs to the elderly: A qualitative study *Scand J Prim Health Care,*33(2): 107-114. doi: 10.3109/02813432.2015.1041829

Paper II: Bell, H. T., Steinsbekk, A., & Granas, A. G. (2017). Elderly users of fall-risk-increasing drug perceptions of fall risk and the relation to their drug use - a qualitative study. *Scand J Prim Health Care, 35*(3), 247-255. doi:10.1080/02813432.2017.1358438

Paper III: Bell, H. T., Granas, A. G., Enmarker, I., Omli, R., & Steinsbekk, A. (2017). Nurses' and pharmacists' learning experiences from participating in interprofessional medication reviews for elderly in primary health care - a qualitative study. *BMC Fam Pract, 18*(1), 30. doi:10.1186/s12875-017-0598-0

1 INTRODUCTION

1.1 Leading up to the thesis

For more than ten years, the community pharmacy was my workplace. At the pharmacy, I was in direct contact with elderly users of prescription medications such as Fall Risk Increasing Drugs (FRIDs). My tasks were to provide information of appropriate drug use, and to explore and improve the customer's knowledge and use of drugs, as well as examining their experience when taking their medicines. The work also involved regular contact with physicians, both GPs and hospital-based, discussing prescription errors and the information given to the patient. It was during this time, especially when I struggled to communicate with a customer or a physician, that I began to reflect upon how differently two individuals can perceive the same phenomenon, and how this might affect the flow of information. My focus as a pharmacist then slowly shifted from being strictly prescription-centred to becoming more interested in the larger picture of how appropriate medication therapy is managed for community-based elderly patients.

I have had for many years the pleasure of teaching pharmacology and appropriate medicine management to different health personnel and their students, such as the storage and safe handling of drugs. This teaching experience motivated me to study pedagogics and contributed to my interest in understanding how people perceive information and how they learn. During the year of pedagogic studies, my interest in qualitative studies increased, especially in the different theories of how knowledge is constructed.

My interest in clinical pharmacy and inter-professional collaboration came as a result of a one-year course in clinical pharmacy that I took as part of my PhD education at NTNU. This involved completing a compulsory number of inter-professional medication reviews at a hospital ward or at a nursing home. I had the pleasure to work with physicians, nurses, patients and other health personnel in a small nursing home. This experience made me even more aware of the challenges in medication therapy management for the community-based elderly due to fragmentation and shift in level of care.

The PhD-position at HiNT was on interprofessional collaboration in primary health care and gave me the opportunity to investigate FRIDs and fall risk. Shortly after I started the PhD, however, my father was diagnosed with a disease that strongly affected his balance. As his next of kin, I assisted him while visiting the GP, the specialists at the hospital, at the pharmacy, and later, regularly visiting him at the nursing home. Through this experience, I had the perfect opportunity to observe how information was given, how my father perceived it, how he responded to the drugs he was given, how he perceived the effects and side effects, and also how the health personnel at the hospital and later nursing home managed the medication therapy given to him.

1.2 The structure of the thesis

In this thesis I present a general background in Chapter 2, and then present the aims and the different qualitative methods used in the three published papers that constitute this thesis in Chapters 3 and 4. The summary of the results and discussion of methods used in the three papers are presented in Chapters 5 and 6, respectively. In Chapter 7, I discuss the main findings and discuss in greater depth the roles of both health personnel and patients in regard to the medication therapy management of FRIDS in primary health care. In Chapter 8, I present an overall conclusion, and in Chapter 9 and 10, I suggest implications for practice and future research.

In the section “Drug use in the elderly” within Chapter 2, I focus on why medication therapy management and appropriate drug use in elderly patients is important. There is an increasing elderly population who use a significant number of medicines. Aging and age-related physiological changes that affect medicine use in addition to the concepts of frailty, multi-morbidity and polypharmacy will be explained. I examine why inappropriate drug use makes the elderly patient more exposed to adverse drug events and adverse drug reactions such as falls. At the end of the section, I focus on tools developed to enhance appropriate prescribing in the elderly, and also describe some of the barriers found which prevents the use of such tools. I also introduce the concept of de-prescribing of medicines.

“Falls and Fall Risk Increasing Drugs” is the section where I examine in detail the different risk factors for falls, and particularly the role of FRIDs. I underline the importance of focusing on fall-related injuries showing the magnitude and many consequences of falls for both the individual and society, such as reduced quality of life and loss of independence for the individual, and the significant economic burden falls in the elderly create for society. Since the underlying cause of a fall is multifaceted, a brief mention of other risk factors for falls apart from FRIDs is important; for example, old age, cognitive impairment, and immobile lifestyle. Since FRIDs are the focus of this thesis, however, what FRIDs are and how they increase fall risk will be described in greater detail. Research on the association of FRIDs and fall risk has shown different results, and the association between psychotropic drugs and fall risk is more pronounced than for cardiovascular drugs. In addition the complexity of risk factors for falls among elderly leaves rooms for uncertainty as to how to best manage the medication therapy of FRIDs for this group of patients.

Medication therapy management is a wide term, the broad definition of which is a group of services aiming to optimize therapeutic outcomes for individual patients. The term may include: appropriate prescribing; individual assessment of the therapy according to the condition being treated such as inter-professional medication reviews; the management of drug dispensing in various environments; and patient education and participation, including the patient’s compliance and knowledge of drugs. In the section “Drug management for the elderly in primary health care”, I further define and explain the term medication therapy management. I also delimit the scope of the term for this thesis, being the health personnel’s perception of the prescribing, assessing and reviewing of the drug treatment, and the medicine user’s knowledge and perception of their medication use. The organization and challenges of primary health care will also be briefly described, as well as some of both the benefits and obstacles of inter-professional collaboration on medication therapy management in primary health care. With the aim to prevent drug errors, systems for medication reconciliation and inter-professional medication reviews (IMRs) have been developed. IMR will be further

defined, and at the end of the section the way IMRs are understood and operationalized in Norway will be described.

According to the Oxford Dictionary (Oxford University Press, 2017) a *drug* is a medicine or other substance, which has a physiological effect on the body while a *medicine* is a drug or other preparation for the treatment or prevention of disease. In this thesis, the focus is on preparations for the treatment or prevention of disease, however, the term drug and medicine will be used interchangeably as in the literature. The term General Practitioner (GP) is used for the primary care physician when not specified otherwise.

The appropriate use of FRIDs is a challenge that is acknowledged, but how these challenges should be met is open for debate. My wish is therefore for this thesis to be a valuable contribution into this debate.

2 BACKGROUND

2.1 Medicine use in the elderly

2.1.1 Demography and prevalence of medicine use among elderly

The World Health Organisation (WHO) defines an elderly person as someone aged 65 years or older (WHO, 2002a). An ageing population is one of the greatest social and economic challenges facing Europe, and will have a considerable impact on different health and care requirements (Eurostat statistics explained, 2015). In particular, those aged ≥85 years are going to have the greatest impact on the health care system due to many being frail and in acute need of health care services (Koda-Kimble et al, 2009).

In Europe, the share of the population aged 65 years and above is expected to increase from 19 per cent in 2015 to nearly 30 per cent by 2060 (OECD/EU, 2016). In 2015, 28 per cent of all persons older than 80 years in the world lived in Europe. By the year 2050, the number of people in this age bracket is projected to more than triple worldwide (United Nations, 2015). Women at the age of 65 years are expected to live longer than men at the same age within the EU, with a life expectancy of an additional 21.1 years and 17.7, respectively (Eurostat statistics explained, 2015). Of these years, an average of 8.6 for women and 8.5 for men are expected to be free from disability, but there are internal differences between countries (Eurostat statistics explained, 2015).

The number of elderly as a share of the working-age population, the old-age dependency ratio, was an average of 23.7 in the EU in 2015. This ratio differed between countries ranging from 17.3 in Ireland to 32.0 in Italy, while Norway was rated at 23.3. There were also differences within countries with the highest numbers of elderly in rural and remote regions (Eurostat statistics explained, 2015). The old-age dependency ratio affects whether we have sufficient healthcare professionals to provide continuous and comprehensive care of the aging population in the future. A reduced workforce will lead to the demand for health care delivered in primary care systems to increase, although the prevalence of functional disability of the elderly is expected to reduce (OECD/EU, 2016).

The prevalence of medicine use in the elderly is high. To calculate and to compare medicine use within and between countries, WHO developed a system called Defined Daily Dose (DDD). The term describes the average daily dose for a drug used for its main indication (i.e. not used off-label) in adults (WHO, 2016a). In 2011, people older than 65 years represented 21 per cent of all medicine users in Norway; however, they consumed 47 per cent of the overall DDD of dispensed prescription drugs (The Norwegian Institute of Public Health, 2012). Similar prevalence studies of medicine use in England showed that people ≥60 years, accounting for 23 per cent of the population, were dispensed 60 per cent of all prescription items (Patterson et al., 2014). These prevalence studies conclude that the elderly, expectedly, consume more medicines than younger people do.

2.1.2 The perception of aging and age-related physiological changes affecting medicine use

Mark Twain once said "Age is an issue of mind over matter. If you don't mind, it doesn't matter." (Quote Investigator, n.d). But is this really true? When asked, those between 60 and 96 years associated older age with physical and mental decline. They did not, however, necessarily think of themselves as *old,* except in periods when experiencing physical decline (Clarke &Warren, 2006). There seems to be a distinction between "being old" and "feeling old" (Nilsson, Sarvimaki, & Ekman, 2000). Those who felt old expressed a fear of helplessness and of being unable to manage their life situation (Nilsson et al., 2000). To maintain independence, it was important for the elderly to perceive their body as still going strong. In addition, they emphasized the importance of enjoying life while being older, and to adapt and preserve their capacities in spite of physical decline (Santamaki Fischer, Altin, Ragnarsson, & Lundman, 2008).

Aging changes the anatomy and physiology in all humans, which lead to a loss of functionality and a failure to maintain homeostasis under physiological stress (Mangoni & Jackson, 2004). The decrease in functional reserve therefore makes the elderly more susceptible for illness or decline (Crome, 2003). There are, however, significant inter-

individual differences in age related change in the cardiac, renal and neuroendocrine systems (Mangoni & Jackson, 2004). From a pharmaceutical perspective, aging changes the pharmacokinetic and pharmacodynamic responses to drugs. An example is a decreased proportion of body water, and a relatively increased proportion of body fat (Jansen & Brouwers, 2012). This is important when elderly take fat-soluble drugs such as diazepam where dosage has to be reduced by 25-50 per cent of the normal dose (Felleskatalogen, 2017). The liver size and blood flow to the liver is reduced in addition to a decreased renal function (Jansen & Brouwers, 2012).

Further more, the elderly often have an increased sensitivity to drugs (Mangoni & Jackson, 2004) due to the loss of active cells and brain atrophy. Medicines with anticholinergic properties are particularly notorious for inducing mental 'fuzziness' and confusion in older patients (Koda-Kimble et al, 2009). Thus a combination of pharmacokinetic and pharmacodynamic change calls for increased awareness in the medical management of elderly patients. The understanding of relevant pharmacokinetic and/or pharmacodynamic changes are of particular importance for health personnel involved in the treatment of frail elderly, especially for those patients with many diseases or for those taking many medicines concomitantly.

2.1.3 Frailty, multi-morbidity and polypharmacy

Frailty describes a state of increased vulnerability in the elderly that lead to a poor maintenance of homeostasis after exposure to minor stress such as an infection (Fried et al., 2001). The prevalence of frailty in community-dwelling people ≥ 65 years in Europe is found to be 17 per cent. Prevalence is higher in women with 21.0 per cent, compared to men with 11.9 per cent (Santos-Eggimann, Cuenoud, Spagnoli, & Junod, 2009). Frailty can be defined using the following criteria: weight loss; exhaustion; physical activity; walk time; and grip strength. Frailty is associated with conditions such as cardiovascular disease, pulmonary diseases, and diabetes. In addition, there is a higher likelihood for frailty in higher age (Fried et al., 2001). Frailty increases the risk of falls, delirium and disability, and often increases the frequency of hospital admission and the need for long-term care (Clegg, Young, Iliffe, Rikkert, & Rockwood, 2013). Although

frailty is distinct from multi-morbidity, the concepts are likely causally related (Fried, Ferruci, Darer, Williamson, & Anderson, 2004; Saum et al., 2017),

The WHO defines multi-morbidity as "the coexistence of two or more chronic conditions in the same individual" (WHO, 2016b). Multi-morbidity is progressively more common with ageing (Barnett et al., 2012; Fortin, Stewart, Poitras, Almirall, & Maddocks, 2012). In a cross-sectional study of 314 medical practices in Scotland, 64.9 per cent in the age group 65-84 years were multi-morbid with a mean number of co-morbidities of 2.6. Multi-morbidity increased to 81.5 per cent for those 85 years or older, with a mean number of co-morbidities of 3.62 (Barnett et al., 2012). Multi-morbidity appears to be prevalent in both genders and across age-groups, even in the affluent and relatively equitable Norwegian society (Tomasdottir et al., 2013). The reasons for multi-morbidity are multifaceted. Improved diagnostic capabilities, an ageing population, and an increase in individual prevention efforts may all contribute to an increase in the number of diagnoses per person (Starfield, Hyde, Gervas, & Heath, 2008). In addition, an increased number of people will be diagnosed when disease definitions are extended, such as when lowering the HbA1c threshold in the definition of diabetes mellitus 2 (Moynihan et al., 2013). The use of several disease-specific guidelines makes the multi-morbid elderly patient more inclined to polypharmacy. Boyd et al illustrated this fact in a hypothetical 79-year-old female with five different diseases. If treated in line with all disease specific guidelines she would be prescribed 12 individual medicines (Boyd et al., 2005).

According to a Cochrane review on improving the appropriate use of polypharmacy for older people, around 30 per cent of older people use more than five medicines at the same time (Patterson et al., 2014). Attempts to define the term *polypharmacy* in the literature have been plentiful. Polypharmacy can be defined as either an increase in the number of medicines one person is taking, or defined as the use of more medicines than medically necessary (Maher, Hanlon, & Hajjar, 2014). The actual number of drugs ranges from three to more than 10 in different studies (Kann, Lundqvist, & Luras, 2015; Storms, Marquet, Aertgeerts, & Claes, 2017). For this thesis, the Rollason and Vogt definition is used, which defines polypharmacy as four or more drugs taken

concomitantly (Rollason & Vogt, 2003). This definition was also used in two recent Cochrane reviews on appropriate use of polypharmacy in older people (Cooper et al., 2015; S. M. Patterson et al., 2014). The consequences of polypharmacy are potentially adverse drug events (ADEs) such as falls (Zia, Kamaruzzaman, & Tan, 2017), and non-adherence or drug interactions (Cooper et al., 2015). Polypharmacy is associated with fall risk when including one or more Fall-Risk-Increasing-Drugs (FRIDs) (Zia et al, 2017; Ziere et al, 2006). Drug treatment of the elderly must therefore be closely assessed and monitored (National Institue for health and care Excellence (NICE), 2016).

2.1.4 Inappropriate prescribing and adverse drug events/reactions

Adverse Drug Events (ADEs), is defined by the WHO as "any untoward medical occurrence that may present during treatment with a medicine but which does not necessarily have a causal relationship with this treatment." (WHO, 2002b). This is different from adverse drug reactions (ADRs), which the WHO defines as "a response to a medicine which is noxious and unintended, and which occurs at doses normally used in man." (WHO, 2002b). ADEs describes a broader scenario compared to ADRs since they also include harm caused by errors in prescription, administration or monitoring of medication therapy, as well as patient non-adherence (Salvi et al., 2012). In a systematic review focusing on adverse events as a cause of hospitalization in older adults, Salvi et al refer that the odds of being hospitalized for ADE/ADR problems is four to seven times higher in older adults compared to younger (Salvi et al., 2012).

Since inappropriate medicine use is a major health care issue for the elderly population, there is a focus on inappropriate prescribing (Onder, van der Cammen, Petrovic, Somers, & Rajkumar, 2013). Inappropriate prescribing encompasses both potentially inappropriate medications (PIMs) and potential prescribing omissions (PPOs) (O'Connor, Gallagher, & O'Mahony, 2012). In a systematic literature review on potentially inappropriate prescribing in community-dwelling older people across Europe, Tommelein et al found an estimated overall prevalence of 22.6 per cent (Tommelein et al., 2015). Anxiolytics, antidepressants, nonsteroidal anti-inflammatory and anti-rheumatic medicines were the drug groups most involved. Inappropriate

prescribing of benzodiazepines and z-hypnotics (Neutel, Skurtveit, & Berg, 2012) and long-term use of benzodiazepines of more than six months for the elderly is common (Kurko et al., 2015).

In Norway, prescribing of anticholinergics and benzodiazepines was significantly reduced when home-dwelling, multi-morbid older adults were acutely admitted to a hospital. The geriatric ward discontinued potentially inappropriate medicines more frequently than other medical wards (Kersten, Hvidsten, Gloersen, Wyller, & Wang-Hansen, 2015). In a study comparing inappropriate prescribing for older people admitted to an intermediate-care nursing home unit and hospital wards, however, inappropriate prescribing was not reduced during stays at the intermediate-care nursing home unit, which are specially designed for these patients (Bakken, Ranhoff, Engeland, & Ruths, 2012).

Several barriers have been found that undermine the adherence of physicians to clinical guidelines in primary care, e.g. knowledge of the guidelines, attitudes towards the guidelines, and behavioural barriers such as lack of time, lack of resources or patient factors (Cabana et al., 1999; Milos, Westerlund, Midlov, & Strandberg, 2014). The likelihood that recommendations would be followed has been found to increase when they are easy to follow, supported with discussions of benefits and harm, and when the effects could be seen quickly (Burgers et al., 2003). For the elderly with high prevalence of frailty, multi-morbidity and polypharmacy, combined with higher risk for ADRs and ADEs, inappropriate prescribing becomes a challenge.

2.1.5 Tools for enhancing appropriate prescribing for the elderly

To ensure appropriate prescribing for elderly patients, several tools have been developed to support physicians in prescribing decisions. Examples of such tools are STOPP/START (O'Mahony et al., 2015), Beers Criteria (American Geriatrics Society, 2015), the Norwegian NORGEP (Rognstad et al., 2009) and the NORGEP-NH (Nyborg, Straand, Klovning, & Brekke, 2015) for nursing home residents.

STOPP/START recognizes the dual nature of inappropriate prescribing and comprises both the STOPP list, which focuses on potentially inappropriate medications (PIMs), and the START list with potential prescribing omissions (PPOs) (O'Mahony et al., 2015). The aim of STOPP/START is to provide explicit and evidence based knowledge to help the prescriber assess and review medications for their elderly patient by functioning as a decision support (Dalleur, Feron, & Spinewine, 2014). The list contains specific sections. The section K in the STOPP list lists those drugs, which increase the risk of falls in older people (O'Mahony et al., 2015). In addition, the STOPP Frail list was published in 2017, which has criteria for the use of medicines in frail older adults with limited life expectancy (Lavan, Gallagher, Parsons, & O'Mahony, 2017).

The Beers Criteria (American Geriatrics Society, 2015) has had restricted applicability to European patients as while many medicines have marketing authorisation in the United States of America (USA), they do not in Europe. In addition, the Beers does not list PPOs. The STOPP criteria are found to slightly outperform the Beer criteria when predictive validity of the three outcomes – ADEs, all-cause emergency department visits, and all-cause hospitalization – were compared for a cohort of elderly above 65 years of age in the USA (Brown, Hutchison, Li, Painter, & Martin, 2016). STOPP/START also identified more instances of potential major clinical relevance (Boland, Guignard, Dalleur, & Lang , 2016).

NORGEP (Rognstad et al., 2009) is developed for GPs in Norway when they prescribe medicines to patients above 70 years of age. This tool has a relevance-validated 36-item list of explicit criteria for potential pharmacological inappropriateness. Adding on to NORGEP, the NORGEP-NH was developed for de-prescribing in frail elderly nursing home patients with limited life expectancy (Nyborg et al., 2015).

Facilitators and barriers to minimize potential inappropriate prescribing among GPs vary, e.g. fear of unknown consequences of change, beliefs, attitudes, knowledge, skills, and behaviour (Anderson, Stowasser, Freeman, & Scott, 2014). A qualitative study of GPs' views on the use of prescribing tools such as, for instance, the STOPP/START, revealed that even though GPs had heard about the prescribing tools, very few had used

them on a regular basis. The tools were perceived more as a reminder than for hands-on application. A major barrier to the active use of STOPP/START was that they were not integrated or interactive with the computer prescribing system (Dalleur et al., 2014).

In addition to a focus on appropriate prescribing, there is also an increased focus on unnecessary health care such as over-diagnosis and over-treatment (Moynihan, Doust, & Henry, 2012). In 2002, BMJ had a theme issue covering "Too Much Medicine?" (Too Much Medicine, 2002) and later they initiated a campaign with the same name where they focus on de-prescribing, the raise of awareness and solution of too much medicine (The BMJ's campaign, 2017).

2.1.6 De-prescribing of inappropriate medicines

De-prescribing has been defined as "the process of withdrawal of an inappropriate medication, supervised by a health care professional with the goal of managing polypharmacy and improving outcomes." (Reeve, Gnjidic, Long, & Hilmer, 2015). Several factors make de-prescribing challenging, such as patient-related factors, system-related factors, or physician-related factors (Bain et al., 2008).

From the patient perspective, having medication prescribed is a familiar intervention. Many patients might also be psychologically attached to their medicines, and therefore their willingness to discontinue their medication therefore plays a role. Discontinuation of medicines might be disconcerting to the patient, and they might feel abandoned by their physician (Bain et al, 2008). On the other hand, 89 per cent of elderly patients ≥65 years were willing to try drug cessation if their physician thought it appropriate. This might, however, represent a hypothetical willingness since their responses were to a questionnaire (Reeve, Wiese, Hendrix, Roberts, & Shakib, 2013). In a randomized controlled trial of de-prescribing it was difficult to recruit participants, with approximately one-third of potential participants refusing participation where the main reason given for non-consent was refusal to stop medication (Beer, Loh, Peng, Potter, & Millar, 2011).

When viewing de-prescribing from the system-related perspective, it has been found that there seem to be a dominance of triggers for prescribing and weak priming for de-prescribing (Nixon & Vendelo, 2016). There is a paucity of data about de-prescribing since data may only be available from less robust findings in observational or retrospective studies. Due to the lack of double-blind, randomized discontinuation phase trials, much uncertainty remains regarding the proper duration of therapy and method of discontinuation (Bain et al, 2008).

Looking at the physician-related barriers, clinical guidelines do not focus on de-prescribing of drugs and therefore make it difficult for GPs to argue for their decisions when initiating de-prescribing of medicines (Nixon & Vendelo, 2016). De-prescribing is often empiric (Bain et al, 2008) and there is a cognitive constraint against de-prescribing among prescribers (Nixon & Vendelo, 2016). There are few de-prescribing tools, and there is a need for lists or handbooks directly addressing discontinuation of medicines, which can contribute to diminish insecurity experienced by the GP in these situations (Nixon & Kousgaard, 2016). Reeve et al suggest a five-step cycle of de-prescribing focusing on engaging the patients throughout the process, but there is still a lack in the evidence base on how to conduct de-prescribing (Reeve, Shakib, Hendrix, Roberts, & Wiese, 2014).

A review of medication withdrawal trials in people ≥65 years of age, however, showed that when discontinuing antihypertensive drugs, 20-85 per cent of the patients did not recommence antihypertensive drugs over a period of four to 260 weeks, with no significant withdrawal syndromes noted (Iyer, Naganathan, McLachlan, & Le Couteur, 2008). When discontinuing medicines, 37 per cent of psychotropic drugs and 97 per cent of benzodiazepines could be safely withdrawn without any withdrawal syndromes or adverse drug withdrawal events. Nearly 60 per cent of all the patients' drugs were eligible for discontinuation, when the feasibility of discontinuation was explored in elderly multi-morbid patients using both psychotropic and cardiac medicines (Garfinkel & Mangin, 2010).

In this section I have shown why medication therapy management in the elderly is important by focusing on demography and prevalence of medicine use, age-related physiological changes affecting drug use, and consequences of inappropriate prescribing. I have also discussed tools for appropriate prescribing, and the concept of de-prescribing and factors found to affect these processes. In the next section, I will examine the different risk factors for falls, and particularly the role of Fall Risk Increasing Drugs (FRIDs).

2.2 Falls and Fall Risk Increasing Drugs (FRIDs)

"She was doing impressively well, he said. She was mentally sharp and physically strong. The danger for her was losing what she had. The single most serious threat she faced was not the lung nodule or the back pain. It was falling." (Gawande, 2014).

In this section the different risk factors for falls and particularly the role of FRIDs will be discussed. The WHO define a fall as "an event, which results in a person coming to rest inadvertently on the ground or floor or other lower level." (WHO, 2017). There are, however, many different definitions of a fall in the literature.

2.2.1 Dizziness and falls in the elderly – frequency and consequences

The frequency of falls in the elderly population appears to vary between countries. Approximately 30 per cent of community-dwelling elderly over 65 years (Ambrose, Paul, & Hausdorff, 2013; Gillespie et al., 2012) and 50 per cent older than 80 years of age experience a fall at least once a year (Ambrose et al., 2013; National Institute for Health and Clinical Excellence (NICE), 2013). Of these, 25-50 per cent fall two times or more (Ambrose et al., 2013). The advanced elderly, those above 85 years, have higher rates of recurrent falling (Peel, 2011). The frequency of falls increases with age and frailty level, and people living in nursing homes fall more often than those living at home (Ambrose et al., 2013; WHO, 2007). Fall incidence in nursing homes is reported to be around three times higher than in the community (Cameron et al., 2012).

Dizziness increases the risk of falls (Schlick et al., 2016), and 10 per cent of GP consultations by elderly patients during a single year were regarding dizziness (Stam et

al., 2016). In a longitudinal cohort study, 17.8 per cent aged 60-80 years and 31.0 per cent aged above 80 years, had experienced dizziness during the previous three months (Olsson Moller et al., 2013).

Falls in the elderly are important due to the various consequences of falls, both for the individual burden such fall injuries have and for the costs to society. Examples of the human costs of falling are in the nature of a reduced quality of life such as distress, pain, and loss of confidence in managing daily tasks (National Institute for Health and Clinical Excellence (NICE), 2013). Falls can also cause comprehensive emotional and psychological effects for their family members since the elderly might lose the ability to live independently, lose mobility, and experience anxiety (Huang et al., 2012). On a societal level, the consequences of falls are increased need for health care services such as admission to hospital, and institutional relocation (Huang et al., 2012; Stevens, Corso, Finkelstein, & Miller, 2006). In the elderly, falls represent the leading contributor to the economic burden of injuries (Heinrich, Rapp, Rissmann, Becker, & Konig, 2010). Due to demographic changes and a higher proportion of elderly in the population, this burden will increase within many developing countries (Eurostat statistics explained, 2015).

So what are the most common consequences when the elderly fall? Many fall-related injuries are minor such as bruising, abrasions, lacerations, strains and sprains. Around 10 per cent of falls, however, result in a fracture (Gillespie et al., 2012). In addition, approximately 10 per cent of the community-dwelling elderly above 75 years are significantly injured when they fall (Tinetti, Speechley, & Ginter, 1988). Fractures to the hip (neck of femur) is the most common injury, but head injuries also contribute significantly to the burden of injury by being more severe, need more intensive care and by contributing to excess mortality (Peel, Kassulke, & McClure, 2002). Women are more likely to fall than men, and they also experience greater difficulty in recovering from fractures, mainly due to higher prevalence of osteoporosis and poorer lower body strength. Differences in levels of activity might also explain the gender differences. Men, however, have higher rates of fatal falls in all age groups, and a higher incidence of fall-related head injuries. (Peel, 2011; Peel et al., 2002).

In addition to the human burden of falls, the economic burden for society is tremendous. A systematic review by Heinrich et al found that the national fall-related costs were between 0.85 per cent and 1.5 per cent of the total health care expenditure (Heinrich et al., 2010). A total of 24,190 fatal and 3.2 million non-fatal injuries were found in a recent USA study estimating fall-related medically treated incidences for elderly above 65 years. The total medical costs were estimated to be USD 637.5 million for fatal and USD 31.3 billion for non-fatal injuries (Burns, Stevens, & Lee, 2016). In the United Kingdom (UK), falls are estimated to cost the National Health Service (NHS) more than £2.3 billion per year (National Institute for Health and Clinical Excellence (NICE), 2013). In Norway, the costs associated with a hip fracture in the first 12 months after the injury is estimated to be approximately 562 000 NOK per patient (Hektoen, 2014).

2.2.2 Risk factors for falls

The underlying causes of falls are multifaceted (WHO, 2007). Even though the main focus in this thesis will be on drug or medication induced falls, a brief mention of the other main risk factors for falls is necessary. A fall is often caused by a combination of factors, which are often categorized as person specific/intrinsic, or environmental/external. The categorization varies between different studies (Ambrose et al., 2013; Huang et al., 2012; Karlsson, Vonschewelov, Karlsson, Coster, & Rosengen, 2013). Person specific factors are old age, female gender, ethnicity, postmenopausal status, height, low body mass, cognitive impairment, musculoskeletal diseases, arthritis, gait and balance disorders, sensory impairments, postural hypotension, history of previous falls and the use of FRIDs (Karlsson et al., 2013). Environmental risk factors are living in nursing homes, immobile lifestyle, malnutrition, loose rugs, slippery and uneven floors and outdoor surfaces, poor lighting, electrical cords, stools without handrails, and unsuitable footwear (Karlsson et al., 2013).

Community-dwelling elderly are found to recognize the exterior factors, but do not necessarily perceive themselves as being susceptible to falling (Braun, 1998). Elderly patients, however, say they recognize and reflect upon their own risk of falling when

experiencing alarming episodes, when sharing mutual experience, receiving information of fall risk through public information, or that they gradually grow insight (Pohl et al., 2015).

2.2.3 What are FRIDs and how do FRIDs increase fall risk?

Van der Velde et al were the first to introduce the acronym FRID in 2007 for the term Fall Risk Increasing Drugs (van der Velde, Stricker, Pols, & van der Cammen, 2007). FRIDs comprise psychotropic drugs (Hill & Wee, 2012), which are drugs that affect brain activities like mood and behaviour (Rang, Dale, Ritter, & Moore, 2003). The fall risk increasing psychothropic drugs include the drug classes antidepressants, benzodiazepines, antipsychotics, hypnotics and anxiolytica (Hartikainen, Lonnroos, & Louhivuori, 2007; Hill & Wee, 2012; Huang et al., 2012; de Groot et al, 2013).

In addition to psychotropic drugs, FRIDs also include some vasodilator drugs. These entail the cardiovascular drugs that reduce cardiac filling pressure and vascular resistance (Rang et al., 2003), e.g. alpha-1 receptor blockers, calcium channel blockers, long-acting nitrates, ACE inhibitors, and angiotensin I receptor blockers (Aronow, 2009; Verhaeverbeke & Mets, 1997; de Groot et al, 2013).

Due to the previously mentioned age-related physiological changes, the elderly are more susceptible to an increased fall risk when using FRIDs. The way FRIDs increase the risk of falls is complex and depends on the group of drug. The medication-related fall risk is dependent of the drug's pharmacokinetic and pharmacodynamic properties e.g. elimination half-life and the characteristics of medication use e.g. dose strength and duration of medication use (Chen, Zhu, & Zhou, 2014). Below are examples of effects:

- Antihypertensive drugs predispose elderly to develop symptomatic orthostatic hypotension (Aronow, 2009) that can endanger cerebral perfusion, and by this, cause fall and syncope (Lipsitz et al., 2015; Verhaeverbeke & Mets, 1997).
- Diuretics may cause volume depletion and vasodilators may cause reduction in systemic vascular resistance and venodilation (Aronow, 2009).

- Antipsychotics can cause sedation, extrapyramidal side effects and orthostatic hypotension (Hill & Wee, 2012).
- Antidepressant drugs can cause anticholinergic side effects, sedation and extrapyramidal side effects. The newer antidepressants like Selective Serotonine Reuptake Inhibitiors (SSRIs) have also been found to suppress bone density (Hill & Wee, 2012).
- Anxiolytics and hypnotics have been shown to cause protracted daytime sedation (Hill & Wee, 2012; Mets, Volkerts, Olivier, & Verster, 2010), and to influence cognition (Hill & Wee, 2012), in addition to balance and steadiness (Mets et al., 2010).
- The benzodiazepines in particular also slow thought, reaction time and increase confusion and delirium (Hill & Wee, 2012; Huang et al., 2012; Shuto et al., 2010).

2.2.4 The association between fall risk and the different FRIDs

In a literature review on risk factors for falls, the author concluded that a typical FRID such as psychotropic drugs increase the risk of falling by 47 per cent in older adults living in the community. Those taking two or more psychotropic drugs had a further increased risk of falling (Ambrose et al., 2013). Benzodiazepines have been associated with falls and fall-related fractures. Fall risk increases if the patient has a new prescription issued (Hartikainen et al., 2007), has sudden increases in dose (Huang et al., 2012), has long-term use (Hartikainen et al., 2007; Huang et al., 2012), or in the concomitant use of several benzodiazepines (Huang et al., 2012). There has also been found an increased risk of falls if the patient uses either long-acting (Ambrose et al., 2013) or short-acting benzodiazepines (Huang et al., 2012). The argument that short-acting benzodiazepines (short pharmacokinetic half-life) are less associated with fall risk does not seem to be true, indicating an association regardless of half-life (Hartikainen et al., 2007).

Tricyclic Antidepressants (TCA) and SSRI are also associated with falls or fractures. The increased risk of falling compared to no treatment varied from 1.2- to 6-fold when

antidepressants were used. The risk was elevated in long-term use, and was dose-dependent (Hartikainen et al., 2007). Other studies support this, and showed an increased fall risk when using SSRIs (Ambrose et al., 2013) and TCAs (Woolcott et al., 2009). According to Huang et al, the use of the newer antidepressants such as SSRIs do not reduce the risk of falls and hip fractures compared with the older classes of antidepressants, i.e. TCAs (Huang et al., 2012). Typical and atypical antipsychotic drugs are associated with an increased fall risk, despite the atypical antipsychotics having fewer extra-pyramidal side effects (Huang et al., 2012).

As to be expected, sedatives and hypnotics are associated with an increased fall risk (Woolcott et al., 2009). In a review of the effect of hypnotics on body balance and standing steadiness, Mets et al found that single dose administration of z-hypnotics (zopiclone) significantly impaired body balance in a dose-dependent manner (Mets et al., 2010). The effects of hypnotic drugs on body sway were significantly more pronounced in elderly subjects compared to the younger adults. The effect was more profound when using higher dosages, shorter time between intake and waking up during night, and after combining the hypnotic with alcohol or other drugs. After repeated use, the patients may develop tolerance to the effect the drug has on standing steadiness. This tolerance, however, develops slowly, is contingent on the type of hypnotic, and may not be present in patients who use hypnotic drugs on an as-need basis. Falls and hip fractures are still more common in chronic users of hypnotic drugs compared to non-users (Mets et al., 2010). Also, an increased risk of falls is significantly associated with the initial use of hypnotic agents, and with zopiclone in particular (Shuto et al., 2010). There is strong evidence in the literature to conclude that psychotropic drugs are associated with increased fall risk in patients.

The evidence in the literature on whether cardiovascular drugs increase the risk of falls is inconsistent. According to a meta-analysis from 1999, associations between falls in older adults and the use of cardiovascular drugs were weak. The cardiovascular drugs investigated were digoxin, type 1a anti-arrhythmic drugs, and diuretics (Leipzig, Cumming, & Tinetti, 1999). In a more recent meta-analysis, diuretics were not associated with an increased fall risk (Woolcott et al., 2009). In their cohort study from

2014, Tinetti et al concluded that antihypertensive drugs are associated with an increased risk of serious fall injuries in older adults, particularly in those who had experienced a prior fall (Tinetti et al., 2014). Lipsitz et al, on the other hand, concluded in their observational study that patients using ACE inhibitors and calcium channel blockers had a decreased 1-year risk of falls, compared to participants who do not use these drugs (Lipsitz et al., 2015). This suggests that there is a difference between the classes of antihypertensive drugs and their association on increased fall risk. Association to fall risk is also affected if the patient is initiating medication therapy, or is on long-term treatment. Butt and Harvey conclude that the evidence to support an increased risk of falls and fractures is higher during the initiation of antihypertensive therapy in the elderly, and that chronic use of certain anti-hypertensives may have a decreased risk of falls and/or fractures (Butt & Harvey, 2015).

In this section (2.2) I have charted why a focus on falls is important due to many consequences for the individual, his or her family, and for society as a whole. FRIDs as a risk factor for falls have been described in greater detail since this is the focus of this thesis. Few studies have examined the mechanisms behind how GPs perceive the assessment of on-going drug treatment for their elderly patients, and their considerations of prescribing and discontinuation of medication. Unnecessary repeat prescribing is common (Ostini, Jackson, Hegney, & Tett, 2011), and discontinuation of drugs can be complex and ambiguous, and therefore rarely done (Nixon & Kousgaard, 2016). Little is known, however, on how much knowledge both prescribers and patients hold on FRIDs and how this might affect the prescribing, the patient's use, and how the medication therapy is assessed and reviewed.

In the next section (2.3) I define and explain the term 'medication therapy management'. I also delimit the scope of the term for this thesis as being the health personnel's perception of the prescribing, assessing and reviewing of the drug treatment, and the medicine user's knowledge and perception of their medication use.

2.3 Medication therapy Management for the community-dwelling elderly

One strategy for reducing adverse events including falls is medication therapy management services. In the USA a profession-wide consensus in 2005 defined Medication Therapy Management Service (MTMS) as "a distinct service or group of services that optimize therapeutic outcomes for individual patients. MTMS are independent of, but can occur in conjunction with, the provision of a medication product." (Bluml, 2005). In such services, physicians, pharmacists, and other health professionals jointly monitor the complete drug regimen of patients with complex treatments. The service is a continuous follow-up that includes assessment such as gathering information on the patient's health status and medication experience, developing a care plan, and monitoring goals of therapy and medication therapy problems, in addition to evaluating patient outcomes and whether the goals of therapy are met.

The concept of medication therapy management is relatively unknown in Norway. Pharmaceutical care and the concept of medication reviews, however, seem more common in Norway and other Scandinavian countries. The concept of medication review is not unified, and the understanding of it varies (Cipolle, Strand, & Morley, 2012). Anchored in how the Norwegian primary health care system is organized, I have chosen to delimit Medication therapy Management (MTM) in this thesis as: the prescribing and follow up by the GP; the elderly medicine user's understanding and perception of their drug treatment; and inter-professional medication reviews as performed in the Norwegian Patient Safety Programme "In safe hands" initiated by the Norwegian Ministry of Health and Care Services. (The Norwegian Ministry of Health and Care Services, 2011). All these concepts are described below, a short description of primary care and how the Norwegian primary health care system is organized.

2.3.1 The organization and challenges of medical primary care

In this thesis, I relate to the 1978 Alma-Ata Declaration's definition of primary health care as "first level of contact for the population with the health care system." (Declaration of Alma-Ata, 1979).

The GP is the entry point for patients to medical treatment in some health care system, like the Norwegian one, where they act as a gatekeeper to secondary care. There are essentially two modes of medical primary care provision by GPs across the European countries. Solo practices, where the GP works alone as physician are predominant in countries such as Denmark and Germany, while group practices where GPs work together with other GPs and other health professionals, mainly nurses and other specialists, are more common in other countries such as Sweden, Finland and the UK (OECD/EU, 2016). In Norway, both solo and group practices are common (The Norwegian Medical Association (NMA), 2016). In other parts of the world, family health teams are more common in primary care where pharmacists and other health care personnel are also members of inter-professional teams (Bajorek, LeMay, Gunn, & Armour, 2015; Goldman, Meuser, Rogers, Lawrie, & Reeves, 2010; Patterson et al., 2015). In Norway, the municipal authorities must provide primary health and social care for the community-based elderly population. GPs in either solo or group practices set up contracts with the municipality for providing care for a set number of people living in the municipality (Regulations on Regular General Practitioner scheme in the municipalities, 2015). For the elderly the medical service comprise to levels; home-care service provided to people living in their own home or in residential care facilities and institutionalized medical services for elderly in nursing homes (Act on municipal health and care services, 2011). The elderly receiving home-care service receive their medical services from the GP (Regulations on Regular General Practitioner scheme in the municipalities, 2015) while the elderly in nursing homes receive their medical services from a physician related to the nursing home (Regulations for nursing homes, 1989).

To err is human. And within health care, errors do occur. One strategy to ensure safe health care has been to establish patient safety programs aiming to reduce the number of

adverse events in primary and secondary care. Examples of such programs are the Scottish patient safety programme (NHS Scotland, 2017), and the Norwegian Patient Safety Programme "In Safe Hands" initiated by the Norwegian Ministry of Health and Care Services. "In Safe Hands" has 12 focus areas targeting secondary and primary care (The Norwegian Ministry of Health and Care Services, 2011). Three of these focus areas aim to reduce adverse drug events: appropriate medicine use in nursing homes, appropriate medicine use in home based health care, and medication reconciliation. Inter-professional collaboration and a close cooperation with the patient are central elements for each focus area. The municipalities' participation in the Patient Safety Programme, while highly recommended, is voluntary.

2.3.2 Inter-professional collaboration in primary health care

Many elderly patients are treated within primary care including those who are vulnerable to drug discrepancies that can lead to medication errors. Complex care needs and frequent changes of caregivers who see the patient within primary care makes information transfer difficult and challenging. Additionally, elderly patients often shift between the primary and secondary care levels (Coleman, Smith, Raha, & Min, 2005). Inter-professional collaboration is therefore of utmost importance to ensure that errors do not occur. Inter-professional collaboration is defined as integrative cooperation of different health professionals, and the blending of complementary competences and skills (Samuelson, Tedeschi, Aarendonk, de la Cuesta, & Groenewegen, 2012).

In primary care, inter-professional collaboration can improve professional effectiveness and quality of practice when facing limited resources (Supper et al., 2015). Collaboration is often hampered, however, due to a lack of geographical proximity of the different team members in primary health care (Xyrichis & Lowton, 2008). Several facilitators and barriers to collaboration have been identified by participants in primary health care, such as opportunities to improve quality of care, lack of awareness of each other's role, and lack of systems to share information about the patients (Supper et al., 2015).

The structure of the team is important, and it has been found that shared facilities, smaller teams with occupational diversity, regular meetings, clarified leadership and stable team participants promote collaboration (Xyrichis & Lowton, 2008). Shared communication tools such as connected electronic health records and messaging systems may also facilitate collaboration (Denomme, Terry, Brown, Thind, & Stewart, 2011). On the other hand, unclear mandates and roles for the participating professions can impede inter-professional collaboration. In addition, a perceived hierarchy within the collaborating group, and a different view on how to perceive and prioritise patient care, can also hinder collaboration (Supper et al., 2015).

In 2015, the Norwegian Ministry of Health and Care Services introduced the concept of primary health care teams in the white paper "The primary health and care services of tomorrow – localised and integrated" (Ministry of Health and Care Services, 2015). The core of the primary health care team should be the GP, a nurse, and administrative personnel. The team may also involve other health personnel, but this is not specified. The white paper states that the establishment of such a team requires legislative and financial management changes.

2.3.3 Inter-professional medication reviews

Systems for medication reconciliation and inter-professional medication reviews (IMRs) have been developed to prevent medication errors and reduce inappropriate prescribing to patients. IMRs represent an example of inter-professional collaboration in primary care (Garfinkel, Ilhan, & Bahat, 2015). Within the pharmaceutical profession, IMRs have had an increased profile over the past two decades. The Pharmaceutical Care Network Europe (PCNE) defines medication reviews as "a structured evaluation of a patient's medicines with the aim of optimizing medicines use and improving health outcomes. This entails detecting drug related problems and recommending interventions" (Pharmaceutical Care Network Europe (PCNE), 2016). During a medication review, the therapeutic efficacy and benefit-harm are evaluated for each drug in relation to the individual patient and the conditions treated (Christensen & Lundh, 2016). In primary health care, especially in home based care, medication

reconciliation is seen as an essential exercise prior to the medication review, to ensure that the review is made on the actual drugs in use (Shiu et al., 2016).

How one performs an inter-professional medication review in primary health care varies both between and within countries. One example is described in the toolbox of the "In Safe Hands" Programme (The Norwegian Ministry of Health and Care Services, 2011). This example is based on the Integrated Medicines Management model (IMM-model), originally developed in Northern Ireland (Scullin, Scott, Hogg, & McElnay, 2007). The IMM-model used in Norway is a modified and adapted version of the Swedish LIMM-model (Hellström et al., 2011). The health professions involved in a medication review based on the IMM-model are a physician, a nurse and a pharmacist (The Norwegian Ministry of Health and Care Services, 2011). In short, the process consists of four main steps: collecting observational and clinical data about the patient; performing a medication reconciliation based on one or more sources of drug information; performing a drug review in a team; and lastly, documentation of changes and follow-up of any observations of the patient after changes have been made to the prescribed medicines (The Norwegian Ministry of Health and Care Services, 2011).

In Norway, medication reviews are legally anchored in two legislations. The legislation for GPs states that for patients using four or more drugs, the GP can perform medication reviews from a medical point of view, when considered necessary (Regulations on Regular General Practitioner scheme in the municipalities, 2015). This legislation, however, neither indicates the frequency of medication reviews, nor how to perform the medication review. Legislation enacted for drug management in institutions states that the institution must ensure that a medication review takes place at the time of admission of patients to the nursing home, as well as an annual review (Medicines management regulations for businesses and health professionals who provide health care, 2008). Neither of these two statutes requires that the medication review is multi-disciplinary.

Inter-professional medication reviews implemented in accordance with the LIMM-model and performed by physicians, nurses and pharmacists, have reduced drug-related problems and improved quality of prescribing in primary health care (Modig, Holmdahl,

& Bondesson, 2016). Medication reviews, as a part of a multi-factorial falls risk assessment and management program, has been statistically proven to have a significant beneficial effect on the risk of falling and the monthly rate of falling (Chang et al., 2004). A gradual tapering of psychotropic drugs has been found to reduce falls (Hill & Wee, 2012), especially when involving the family physicians and their patients (Gillespie et al., 2012). Delivering a medication review service for outpatients in primary care, however, requires resources (Holland et al., 2008).

From a clinical pharmacy prespective, evidence that medication reviews require resourses is when pharmacists perform home visits to patients (Lowe, Raynor, Purvis, Farrin, & Hudson, 2000). In addition, performing medication reviews are hampered by the fact that the community pharmacist lacks access to patient medical records (Hazen et al., 2015). Pharmacists who lack knowledge of clinical pharmacology and reasoning skills can also be a constraint when IMRs are performed in primary care (Hazen et al., 2015).

Existing research on IMRs have mainly focused on the outcome on the intervention of medicine related problems (Modig et al., 2016), or the collaboration process (Bajorek et al., 2015). Less is known, however, on what the participating professionals perceive they will learn from participating in IMRs in primary care, and whether this is thought to have an impact on the quality of the drug treatment in the elderly.

3 AIMS OF THE STUDY

The overall aim of this thesis is to investigate how both health personnel and community-based elderly drug users perceive medication therapy management, with a distinct focus on FRIDs. This is done by investigating the following specific aims:

- Explore the situations in which GPs associate drug use with falls among their elderly patients, and the factors influencing prescribing and cessation of FRIDs (Paper I).

- Explore how home-dwelling elderly FRID users perceive their fall risk and how they relate this to their drug use (Paper II).

- Describe what nurses and pharmacists perceive to learn from participating in inter-professional drug reviews in a primary health care setting for up to two years (Paper III).

4 METHODS

This thesis consists of three qualitative studies. Semi-structured focus group interviews (Malterud, 2012a) were used in Paper I and Paper III, and semi-structured individual interviews were used in Paper II (Kvale & Brinkmann, 2010).

Qualitative research methodology is a systematic and reflexive strategy suitable when the aim is to explore how meanings of social and cultural phenomena are perceived in the individual's natural context (Malterud, 2001b). Qualitative research methods are also used when the aims are to study diversity and nuances of a phenomenon (Malterud, 2011). Since the aims in all three studies were to explore the participants' own experiences and perceptions, qualitative methodology was deemed to be the most suitable method (Malterud, 2012b).

Qualitative research methods involve various strategies for systematic collection, organization and interpretation of textual material acquired from dialogue or observation (Malterud, 2001b). In semi-structured qualitative research interviews, knowledge is constructed in the interaction between the interviewer and the interviewee by the use of an interview guide consisting of open-ended questions on the topic of interest (Kvale & Brinkmann, 2010).

Focus group interviews have the advantage that participants can express their opinions and experiences, listen to the views of others, and clarify their views in ways that are not possible in one-to-one interviews. Focus groups are useful to examine work place cultures and professional values. One can explore different types of common experiences and gain insight into the narratives used within the group (Kitzinger, 1995). According to Malterud, individual interviews are often preferred when the topic of interest is sensitive or personal (Malterud, 2011).

The aim of the three studies in the thesis was to understand and gain knowledge on social phenomena, and how the world is perceived from the informant's perspective (Kvale & Brinkmann, 2010). This phenomenological perspective represents an

understanding where human experiences are considered valid knowledge. The knowledge is both partial and situated, and the researcher is an active participant in the development of knowledge (Malterud, 2001b). Systematic text condensation (STC) is used to analyse the transcripts. The method described by Malterud is an elaboration of Giorgi's psychological phenomenological method (Giorgi, 1997). Malterud argues that systematic text condensation is suitable for descriptive transversal analysis of phenomena, and that it is used in the development of new descriptions and terms. STC analysis is explorative, descriptive and based upon empirical data. It should reflect the experiences of the participants as expressed by themselves, rather than exploring any possible underlying meaning (Malterud, 2012b). In an explorative analysis, the ambition is not to report the whole range of phenomena, but to present selected patterns relevant for the study aim (Malterud, Siersma, & Guassora, 2015).

The effect the researcher has on a study has been more acknowledged in qualitative research compared to quantitative research. In qualitative research, the nature of knowledge is closely tied to the researcher since knowledge is constructed in the interaction between the researcher and the interviewee, but also during the analysis of the material. Attention is therefore given to describe the background and position of the researcher, background and positions that contribute to the researcher's preconceptions (Malterud, 2001b).

In this thesis, the research team consisted of my two supervisors and me in Paper I and II. In Paper III, two additional researchers are co-authors. I hold a Master's degree in Pharmacy from 1997, and also hold a one-year full-time diploma in pedagogic studies from 2012. I have worked five years in a hospital pharmacy and ten years in four different community pharmacies, six of those years as the chief pharmacist. One of my supervisors (AGG) is both a pharmacist and Professor in Social and Clinical Pharmacy, with broad experience in pharmacy practice research and inter-professional collaboration on medication review. The other supervisor (AS) is a sociologist, and Professor of Behavioural Sciences in medicine and health research. Both supervisors have extensive experience in qualitative research methods. The co-authors in study III

are a Professor (IE) and an Associate Professor (RO) in Nursing, both with extensive experience in research on elderly patients.

4.1 Sample, recruitment and settings

The sampling strategy is closely related to the validity of the findings (Malterud, 2001b). A purposeful sample is the sample with the best potential to illuminate the aim of the study (Malterud, 2011), and the researcher should therefore be especially knowledgeable about or experienced with the phenomenon of interest (Palinkas et al., 2015).

4.1.1 Paper I – Focus groups with GPs

The intention was to recruit General Practitioners with experience in prescribing FRIDs to elderly patients. There were no exclusion criteria, except from the experience of prescribing to elderly people being a mandatory requirement. The participants were selected to ensure variation in gender and length of experience, and also to represent different GP offices.

Purposeful sampling was used to contact existing GP education groups. In Norway, GPs are required to attend medical education groups (CME) of peers for a minimum of six hours, at least three times per year (The Norwegian Medical Association (NMA), 2008). The first CME group was recruited by word-of-mouth through a PhD candidate who also works as a GP. The second CME group was recruited through the pharmacist employed in the municipality where the study took place. She introduced me to a chief medical officer who invited me into his CME group.

Table 1 summarises the characteristics of the 10 male and three female GPs in the two focus groups. They practiced at 11 different GP offices, and all GPs had experience with prescribing FRIDs to elderly patients. Work experience ranged from seven to 36 years. All except one held a specialization diploma in general practice.

Table 1 GP characteristics attending the focus groups in Paper I

	Focus Group 1 N= 5 GPs	Focus Group 2 N= 8 GPs	Total N= 13 GPs
Female (n)	1	2	3
Years as GP (range)	7-11	11-36	7-36
Specialist in general practice	4	8	12
Specialist in another medical discipline	1	1	2
Number of different GP offices represented in the focus group	5	7	11*

* One GP in Focus Group 1 and one in Focus Group 2 worked at the same GP office. Two GPs in Focus Group 2 worked at the same GP office.

4.1.2 Paper II – Individual interviews with elderly FRID users

The intention was to recruit home-dwelling elderly patients who used at least one FRID. There were no other exclusion criteria, except that the participants had to be able to take part in an interview and to be able to give consent. To ensure variation in the sample, informants who had been in contact with the health care service because of a fall were included. I included elderly patients regardless if they had reported a fall or symptoms of dizziness to the GP. In addition, I endeavoured to include both genders, as well as a range of ages from 65 and above. In addition, I attempted to recruit informants prescribed different drug classes of FRIDs.

I used several approaches and purposeful sampling to recruit participants through the following methods:

- A pharmacist working at the orthopaedic department at the University Hospital talked to eligible patients and handed out information letters about the study.
- The study was presented at the municipality unit for Health and Social Care in addition to a senior association in the municipality.
- Participants were recruited through personal networks.

The information letter invited potential participants to contact me by telephone or e-mail. The recruitment of new participants continued in parallel to interviews and analysis. Recruitment was stopped when it was considered that further empirical data did not add any new information (Malterud, 2012b).

In total, seven women and seven men were interviewed. Six men and two women lived with a spouse. The number of FRIDs taken ranged from one to four for both men and women. Women were generally prescribed more drugs than men, with an average of 7.4 medicines for women, and 4.7 medicines for men. Details regarding age, incidence of dizziness or fall injuries, and medication use and drug classes of FRIDs are described in Table 2.

Table 2 Characteristics of the home-dwelling elderly patients interviewed in Paper II

	Number
Female	7
Male	7
Age range women in years (mean)	79 – 97 (87)
Age range men in years (mean)	66-85 (76,7)
Handling medicines themselves	12
Reported dizziness or fall injuries	8
No dizziness or fall injuries	6
Range of all medicines taken for women (mean)	3-14 (7.4)
Range all medicines taken for men (mean)	2- 9 (4.7)
Range all FRIDs taken by women (mean)	1-4 (2.4)
Range all FRIDs taken by men (mean)	1-4 (2.3)
Drug classes FRIDs	β-blockers (5), A II-blockers (5), Ca-blockers (5), Diuretics (5), z-hypnotics (4), Anti-depressive (3), ACE-inhibitors (2) and α-β-blockers (1)

4.1.3 Paper III – Focus groups with health personnel

The intention was to recruit health professionals who had participated in inter-professional medication reviews in primary health care, either in nursing homes or home-based care. Except for the requirement to have IMR experience, there were no exclusion criteria. To ensure a representative sample of health personnel, we recruited participants from smaller and larger municipalities, and participants with varying length of experience with IMRs, and with experience from both nursing homes and home-care service.

This study population, which I recruited participants from, was part of a larger study group. The overall aim of the larger study was to survey and investigate to what extent the introduction of learning networks, i.e. inter-professional teams in nursing homes and home care services, would lead to better interaction and dissemination of knowledge regarding drug treatment and medicine management in primary health care, and whether this resulted in more appropriate medication use for the patients (CHRIStin-ID: 519679). The larger study consisted of four sub-studies, each with separate aims and study questions.

To recruit eligible participants, the inter-professional teams from the 11 municipalities that had participated in the patient safety program in the county were contacted by e-mail, and later by telephone. The whole team, or only parts of the team, could volunteer to participate. All 13 nurses and two pharmacists were recruited in this manner. Two additional pharmacists were recruited by contacting the hospital pharmacies in the region with contracts for performing IMRs in the selected municipalities. The GPs and other physicians who had taken part in IMRs in the selected municipalities were invited on equal terms as the other two professions, however none responded to the invitation.

Table 3 provides an overview of where the nurses and pharmacists work and their experience with IMR. The 13 nurses represented four different municipalities in the region, five different nursing homes and two different home-care service units. The four pharmacists represented two different hospital pharmacies and one community pharmacy. All pharmacists had Master degrees in Clinical Pharmacy in addition to their

Master degrees in Pharmacy, with the exception of one who held a one-year course in clinical pharmacy. Of the 17 participants, three of the nurses had performed IMRs exclusively *without* a physician present.

Table 3 Characteristics of nurses and pharmacist participating in focus groups* in Paper III

	Nurses (n=13)	Pharmacists (n=4)
Working in nursing homes	8	-
Rural municipality	5	3
Urban municipality	3	4
Working in home-care service	5	-
Rural municipality	2	-
Urban municipality	3	-
≤1 year experience of performing IMR in primary health care	5	1
>1 year experience of performing IMR in primary health care	8	3
Experience of performing IMR in hospital	-	3
Experience of performing IMR *with* a physician present	10	4
Experience of performing IMR *without* a physician present	3	3

* Two of the pharmacist had individual phone interviews.

4.2 Data collection

A semi-structured interview guide was used in each study to ensure that the participants discussed the same topics, and that all aspects of the aim were covered. The interview guide was developed by doing a literature review, my own insight on the topic, and through discussion with the supervisors and co-authors. The participants were encouraged to share examples from their own practice. Follow-up questions were used to encourage the participants to elaborate on details, to achieve clarity, and to maintain focus on the subject (Kvale & Brinkmann, 2010).

4.2.1 Paper I – Focus groups with GPs

Data collection for Paper I took place during May and June 2013. The two focus group interviews with GPs were conducted at a location chosen by the participants and led by myself. There was no additional moderator during these focus group interviews. The interviews were digitally recorded and transcribed verbatim, and lasted 61 and 72 minutes, respectively. See Appendix 1 for the interview guide for this study.

The GPs were informed that the subject for the focus group interview was medication use in elderly patients, focusing on drugs that can increase the fall risk in this group. They were encouraged to share their views and experiences of prescribing FRIDs. The main questions were: "In which situations do you associate medication use with falls among elderly patients above 65 years of age? Which factors influence your prescribing and cessation of FRIDs?" Since the participants were not familiar with the term "FRID", examples of drug classes were given.

4.2.2 Paper II – Individual interviews with elderly FRID users

Data collection for Paper II took place between May 2013 and October 2014. I interviewed the 14 elderly patients in their homes. The interviews were digitally recorded and transcribed verbatim, and they lasted from 21 to 87 minutes (mean 38).

The participants were informed that the overall theme for the interview was their medication use, and their perceived fall risk or dizziness. The semi-structured interview

guide, which was developed as described for Study I, entails open-ended questions and can be found in Appendix 2. The participants were encouraged to speak about the medicines they use to ascertain their knowledge of their medications. The participants were also asked open-ended questions about any experience of dizziness or falls, and whether they associated this with their medications. The questions asked were "Do you associate the use of your medicines with dizziness and falls? Please explain." I also asked if they could recall if they had received information from their GP about fall risk with their medicines.

4.2.3 Paper III – Focus groups with health personnel

Data collection took part between October 2014 and February 2016. The five focus group interviews lasted from 73 to 89 minutes. There were three focus group interviews consisting of nurses only but from nursing homes and home care services, and two with nurses from different work places and a pharmacist. The two telephone interviews with two pharmacists lasted 21 and 23 minutes, respectively. I led the focus group interviews and the telephone interviews. One of the co-authors (RO) mentored the five focus group interviews.

The interview guide (Appendix 3) on what professionals expect to learn from participating in inter-professional medication reviews was developed in collaboration with the co-authors (RO and IE) on Paper III. The questions in the interview guide were also discussed with the research group of experienced clinical and academic nurses who were involved in the larger study (CHRIStin-ID: 519679). The supervisors AGG and AS were not involved in the development of the actual interview guide, but were involved in all following parts of analysis and discussion.

4.3 Data analysis

The transcripts from the focus groups and interviews were analysed using a thematic approach based on Malterud's Systematic Text Condensation (STC). STC is a descriptive approach suitable for a systematic and thematic cross-case analysis of phenomena for the development of new descriptions and terms (Malterud, 2012b). The analysis is conducted stepwise in an iterative four-step process:

Step 1 - Total impression: The analysis starts with making four to eight preliminary topics based on a total impression of the data. At this stage preconceptions are bracketed, and the researcher attempts to encounter the data with an open mind and a strong awareness of the participants' voices. After reading the full text from a bird's-eye perspective, preliminary themes are identified by the researchers, who then negotiate and discuss disagreements. The discussion may provide adjustment of the labels of the preliminary themes.

Step 2 – Identify and sort meaning units: In the second step, the researcher systematically reviews the transcripts to identify and sort parts of text called meaning units that may elucidate the study question. After identifying the meaning units, they are classified and sorted into categories potentially related to the preliminary themes in Step One. This step, where the names and features of the preliminary themes are massaged, is called coding. Coding often take place in several stages and themes can be both split and merged.

Step 3 – Condensation: Each theme is then thoroughly examined and divided into subthemes. A condensate is then written for each of these subgroups. A condensate is an artificial quotation maintaining the original terminology used by the participants, and is a combination of the content from all meaning units in the subtheme.

Step 4 – Synthesizing: In the last step, an analytic text is produced for each subgroup based on the condensates. In this step, the text is re-conceptualized and the synthesized results reflect the validity and wholeness of their original context. Descriptions and

concepts of the phenomenon of interest are developed, grounded in the empirical data. This is presented as a narrative, using language as close as possible to the original wording of the participants. Finally, the transcripts are systematically searched for data that might challenge the conclusions. Table 4 shows an example of the analytic process from study II to illustrate each step of the analytic process for two of the preliminary themes.

Systematic Text Condensation was used as the analysing method in all three studies, for both focus groups and individual interviews. When analysing the focus group studies (Study I and III), we chose to use events that could highlight the phenomenon of interest across the focus groups when choosing preliminary themes (Malterud, 2012a). In Study I, both focus group interviews were analysed simultaneously. In study III, we started the analysing process after the first three focus groups were conducted. In all three studies, the authors had a minimum of three meetings to discuss steps 1 and 2 of the analysis.

In the following, the analysing process of Study II will be described in more detail as an example of the analysing process. The analysis started after one or two interviews had been executed. I read and noted down the transcripts to get a full overview of the data. The impressions and notes were then discussed with the two supervisors. Based on the discussion, it was then decided to expedite and accentuate the questions in the interview guide before the next interviews. This was also done in Study III with all authors. Interviews were then conducted until no new themes were identified. Based on an overview of the data (as described in step one above), four to eight preliminary topics were produced according to the aim of the study. I then sent the three most comprehensive transcripts from Study II to my supervisors. The themes and subthemes were then discussed, with focus on how each member understood the content and meaning of the themes, and whether and how they related to the research aim.

Table 4 Example of analytic process from the interviews of elderly patients in Paper II

1. Preliminary theme	2. Identifying and sort meaning units	3. Condensation	4. Synthesizing	Final theme
Perception of fall risk	*Well, no I haven't actually fallen and beaten myself (..) I slipped and fell because (...) it was due to the slippery surface....* *...but it can also be my glasses, because those glasses do not suit me.*	My fall risk is not a particularly prominent challenge, but if so it is because of slippery surface, weaker muscles or my worsening eyesight.	Elderly patients acknowledge many of the other fall risk factors.	Other risk factors perceived as more prominent
Don't want the responsibility	*I take it as it is. It is after all ascertained that I should take these* *No, I guess I get the information I need, but maybe I should have asked more questions (...) I have just accepted it, because I fully trust my GP. I do not have an opinion (...) because that is up to the GP to decide. It is his responsibility.*	I guess I need these drugs to function and when the GP prescribes it I guess he does it for a reason. Actually, I do not have any interest in my medications. I have a GP I really trust. He is well educated.	Do not have many expectations of any additional information and are quite satisfied with the information given by the GP.	I trust my physician when it comes to medicines

During the analysis of the data in Step Two of the Malterud method, I also presented the meaning units and condensations as illustrated in Table 4 at a research group meeting, where my NTNU supervisor (AS) is the leader. This research group on patient education and participation consists of several nurses, a physiotherapist, two sociologists, an anthropologist and a pharmacist, along with myself. The themes and interpretations of the interviews were discussed critically, reflecting upon the commonalities and differences within and across the themes. These presentations took place for all three studies, and gave valuable input into how the themes were finally split and merged in Step Two of the analysis. The themes were then refined and renamed, and some selected for further attention.

To validate the analysis in Step Four, a thorough review of all original transcripts was conducted to ensure that all points of significance were reflected in the results and that misconceptions were avoided. Citations that illustrated the analytic text most accurately were selected and further discussed and endorsed by the supervisors. Based on the condensed text in Step Three and the selected quotes, a content description of each theme was made. Each description was based upon what the data indicated about the selected aspect of the phenomenon, and was presented under different headlines.

To contextualize the citations, they were marked with gender and years of experience (Paper I), gender, age and whether they had experienced dizziness or fall injuries (Paper II), and with profession and years of experience of performing IMRs (Paper III).

4.4 Ethical considerations

The studies were conducted in accordance with the Declaration of Helsinki (WHO, 2001). All three studies were approved by the Regional Committees for Medical and Health research Ethics of Central Norway, study I and II No: 2012/2163 and study III No: 2014/1140. Participants were provided with written and oral information about their respective studies. The participants were informed that participation was voluntary, and that they could withdraw from the study at any time without need for an explanation. Written informed consent was obtained from the informants before the interview was conducted. The informed consent sheets for all studies are in Appendix 4.

Extra care was taken to ensure that participants were comfortable with the interview situation. Interviews were conducted at a place of their choice. The focus groups took part in meeting rooms, and 13 of 14 elderly patients were interviewed in their homes. An effort was made to ensure that all participants felt at ease, and that they did not feel forced to participate or to answer all questions.

The digital recorder was locked in at a safe place and only available to me until the audio files were transcribed. The digital voice files were deleted from the recorder as soon as they were transcribed. To protect the identity of the participants, each participant were assigned a number in the manuscript, and no names were transcribed.

5 SUMMARY OF MAIN RESULTS

5.1 Paper I: Factors influencing prescribing of Fall Risk Increasing Drugs to the elderly: a qualitative study

Thirteen GPs with experience of prescribing to elderly patients participated in this study. The main finding was that the GPs did not immediately perceive the use of FRIDs to be a prominent factor for falls in their elderly patients. After elaboration, antihypertensive drugs and their orthostatic hypotensive side effects were mentioned by the GPs as a potential challenge. If the GP did not perceive a medical indication for a change such as from a patient or a discharge letter, it was common practice to renew any prescription without assessing the drug treatment.

If a patient had fallen or presented with dizziness symptoms, however, the GP would consider stopping or changing the dose. This external impetus for change could come from a patient, a next-of-kin or a hospital discharge letter. Through receiving an impetus for change, the GPs stated they became aware of drugs with time becoming inappropriate due to physiological age-related changes in the elderly patient. The initiation of a new FRID was also a situation where medication use was associated with falls. A thorough examination of the patient was therefore necessary.

Short time set aside for consultations and lack of suitable guidelines for the multi-morbid elderly were said to influence the prescribing of drugs in general. This led to reluctance to change an apparently appropriate drug treatment. However, the electronic prescription system and the multi-dose drug dispensing system gave the GP a better overview of medications in use, and by this an opportunity to reflect on the prescribing. A high workload in the GP office, such as elderly patients presenting with multiple issues during consultations, were said to result in too little time for each medical concern. Little time was therefore spent on renewal of prescriptions of FRIDs.

Uncertainty about how changes in dose of FRIDs would influence the patient's disease affected both the prescribing and the cessation of FRIDs. The GPs found it easier to remove medicines the patient did not like to take, and which had side effects that were

more prominent, such as antihypertensive or contra psychotropic drugs, which the patients were psychologically dependent on or emotionally attached to. The GPs also found it easier to examine and explain dizziness caused by antihypertensive medicines compared to psychotropic drugs. It was also unpleasant to refuse a patient's request for sleeping tablets, and it drained the GPs of energy to say no. Complimentary health information from next-of-kin was appreciated when given, since it promoted the basis for the decision-making process.

5.2 Paper II: Elderly users' of Fall-Risk-Increasing-Drugs perceptions of fall risk and the relation to their drug use – a qualitative study

A total of 14 home-dwelling elderly FRID users, aged 66-97 years, were interviewed. The participants did not use the words "risk of falling", but rather spoke of dizziness or unsteadiness. None of the participants were familiar with the term FRIDs, or had any particular awareness that FRIDs could make them feel dizzy or affect their balance. They therefore spoke about their medications in general when they answered the questions in the interview guide. Other risk factors for falling were perceived as more prominent than medication use, such as a number of diseases, slippery floor surfaces, and declining muscle strength. Some did not perceive that they had any particular risk of falling. When asked to elaborate on the answer, however, they gave examples of how they adapted their everyday life through showing more caution when changing position, especially out of bed and on stairs. When asked whether they discussed these episodes of dizziness or unsteadiness with their GP, the participants said they held back from contacting their GP. The reason given was that the GP was seen as being too busy, but also the perception that they were only allowed to raise one problem at each GP consultation.

Some elderly started to suspect their drug affected their balance after experiencing repeated symptoms of dizziness or fall episodes. Examples given included having a hangover feeling the morning after using a sleeping pill, or nearly fainting when bending down to tie a shoe when using an antihypertensive. Only one informant could

recall his GP advising him about dizziness as a side effect of the FRID, and regularly asking him if he felt dizzy. Most patients said that they always read the patient information letter (PILS). Information about effects and potential side effects of the medication could create worry, raising questions in the patients' minds regarding how safe the medicine was to use. Participants noted that awareness of the possible link between the medicine and dizziness or falls could be derived from two pathways. One pathway involved the patient reading the PIL and then subsequently becoming aware of their increased dizziness. In the second pathway, patients noticed increased dizziness while taking the medication first, which was then confirmed for them by reading the PIL.

Knowledge about what their medications were prescribed for varied. Some patients had misconceptions or little knowledge about their medical treatment. Others could elaborate with detailed knowledge about their drugs.

Some of the participants fully trusted their GP, and explained this trust by stating that GPs are well educated and therefore trustworthy when it came to prescribing the appropriate medications. Written instructions on the pharmacy label were perceived to be sufficient information to take the medicines accurately. They therefore had few expectations of any additional information about their drugs. There were participants who felt rejected by their GP when presenting with a physical effect that they suspected might be caused by their medication. They felt that the GP either did not understand what they tried to explain, or that the GP refrained to make any changes, arguing there were no alternative drugs or other treatment options. The participants perceived this as being rebuffed, and they were not always satisfied with the answer from the GP or the reasons given. There were also participants who simply gave up on resolving their symptoms.

5.3 Paper III – Nurses' and pharmacists' learning experiences from participating in inter-professional medication reviews for elderly in primary health care – a qualitative study.

A total of 13 nurses and four pharmacists were interviewed about their learning experiences while participating in inter-professional medication reviews (IMRs). The nurses represented five different nursing homes and three home care service units, while the pharmacists represented two different hospital pharmacies and one community pharmacy. Both professions said to learn more about each other's role when performing IMRs together. After taking part in IMRs, the nurses perceived the pharmacist as acting less as a controller of their drug management routines and more as being a supportive partner who could provide advice and guidance on appropriate medication use for elderly patients. In particular, the nurses appreciated the pharmacists' knowledge in drug monitoring of laboratory values, e.g. digoxin as a tool to ensure appropriate medication use. The pharmacists, who did not meet the patients in person, said that they had become more aware of how dependent they were on the clinical information of the patient provided by the nurses, such as onset of pain and type of pain.

Medical records were commonly incomplete. An important learning for the nurses taking part in IMRs were an increased awareness that all health personnel involved in care for the patients must have access to full medical records with diagnoses, indications and drug doses for all prescribed medicines. In addition, they highlighted that a clear focus on medicine management is an important role for nurses. For them, this was an important learning outcome from IMRs. Examples of what they had learnt include the need for more comprehensive documentation of medicine management routines in the daily work, and the importance of maintaining an updated list of drugs in use at all times. With such an updated list of drugs, they could get a more complete and documented overview of the patient's medical situation, which enabled patient observations of the medicine's effect and side effects. Nurses working in home care service talked about the importance of medication reconciliation that ensured an accurate and updated list.

When all physicians, nurses and pharmacists were present at the IMRs, the nurses perceived the pharmacist as someone who could challenge the physician's role as the prime medicine expert. Through posing other types of questions, comments and solutions, the pharmacist was said to stimulate the physician to reflect upon previous medicine prescribing choices, and in some instances, to argue for the current medication regime. The three nurses that performed IMRs without having a physician present did not compliment the pharmacist in the same way.

The nurses felt awkward when they had to do medication reviews on patients based on information from other nurses. It was perceived as challenging to convey patient information. Good cooperation with nursing assistants or other care workers was perceived as important when collecting necessary information on the patient's function level and behaviour. This was especially important in home care service, because nurses usually spend only a short time with patients.

A stronger knowledge of pharmacotherapy also made the nurses more observant and able to interpret patient's symptoms linked to medicines – both effects and side effects. With time, the nurses said they became more curious and critical towards the medical treatment, and therefore addressed more questions to the physicians and pharmacists. The acquired awareness of linking patient's symptoms and medication in use was able to be transferred to other patients who were not yet part of IMRs. An example given was nurses beginning to assess medication therapy at an earlier stage in long-term pain treatment. Participation in IMR with both pharmacist and physician present were noted to heighten the nurses' awareness on drug treatment as a whole, and to contribute to the perception of more individual care.

The pharmacist perceived the medication reviews as unsatisfactory if the nurse did not provide sufficient clinical information. If the nurse did not know the patient, the pharmacist was unable to tailor recommendations of the pharmacotherapy for the patient. With time, the pharmacists also better understood why the physicians did not always accept their theoretically grounded suggestions. This was due to the physician's greater knowledge of the larger totality of the patients' situation than the pharmacist.

The pharmacists also noted that they learned less when performing IMRs without the physician. They did, however, appreciate the nurse's contribution during the medication review, but found it unsatisfactory not being able to discuss and argue their case directly with the physician. After the establishment of IMRs, the pharmacists also experienced an increase in telephone and e-mail inquires from both physicians and nurses regarding medication therapy questions.

The nurses and pharmacists jointly perceived the discussions during IMRs and especially the disagreements as important to achieve a better quality of medication therapy for the patients. To have to argue your case during the IMRs was particularly highlighted as contributing to learning by both professions.

6 DISCUSSION OF METHODS

In this chapter, I will discuss the methods used. I will first discuss the choice of a qualitative design and give reasons why focus group interviews and individual interviews were chosen in the respective studies. I will then focus on the reliability and validity of the studies by discussing reflexivity, transferability and interpretation and analysis.

6.1 Choice of design and data collection

6.1.1 Focus group interviews, Paper I and Paper III

Focus group interviews are appropriate when the aim of the study is to collect common experiences in environments where people work together, or when investigating experiences of a group of health personnel (Malterud, 2012a). This is the reason focus groups were chosen for Paper I and Paper III. We aimed for the group process and the different forms of communication to reveal dimensions of understanding that are less easily accessible in one-to-one interviews (Kitzinger, 1995).

In the study of General Practitioners (GPs) (Paper I), established CME groups were recruited and the participants in the focus groups therefore knew each other beforehand. To use established groups simplified the recruitment process and contributed to the relaxed and free-speaking environment. All participants contributed to the discussion, and there was no indication of dominant personalities impeding participation from all of the interviewees during the discussion. One cannot, however, exclude the possibility that any former disagreements may have limited discussion the participants knew would cause disagreements or even hamper future collaboration.

The participants in the inter-professional medication review (IMR) study (Paper III) had all participated in the same patient safety course. During the recruitment process we also aimed to recruit from participants who had performed IMR together. The focus groups, however, consisted of both representatives from the same team as well as from other teams. The participants in the respective focus groups were all from the same

municipality, except for one focus group that represented two small municipalities, which often co-operated. The participants therefore knew each other in advance, something that contributed to the free-speaking environment. Also in this study, however, one cannot exclude the possibility that any former disagreements may have limited discussion the participants knew would cause disagreements or even hamper future collaboration.

The transcription of the focus group discussions confirms that all participants contributed during the interviews, some more, some less. The impression from the seven focus groups in Paper I and III were that the research questions presented were thoroughly answered in a relaxed and free-speaking environment. The individuals shared challenging situations, with patients or colleagues, and the various participants did not always agree upon how the different situations were solved. The impression was, however, that they still showed each other respect. If we had used individual interviews in these two studies, this could have enabled restrained individuals to raise their voices and to go into greater depth of their experience.

6.1.2 Individual face-to-face interviews, Paper II

The individual face-to-face interviews were chosen as a method for interviewing elderly patients. In research interviews, the power relation is asymmetrical in favour of the interviewer (Kvale & Brinkmann, 2010). In order to enable the participants to feel free in expressing themselves, the patients were given the option to be interviewed in their own homes. Only one chose to be interviewed outside the home.

Elderly often need longer time to express their thoughts. The research questions about medication use and any dizziness experienced or falls in particular are also of a private nature, and it was considered inappropriate to hold a focus group interview on this topic. In addition, hearing disability could also hinder the group dynamics and dialogue in a focus group. Difficulties in sustaining attention, with working memory process and with divided attention, have been found to be challenges when the elderly participate in focus group discussions (Barrett & Kirk, 2000) One should not, however, disregard the

fact that focus group interviews of elderly patients might have allowed group members to build on one another's experiences, potentially enriching the material.

6.2 Reliability and validity of the study

Regardless of method, research should be a systematic and reflexive process. This requires alertness in all steps such as design, data collection and analysis to ensure the study's reliability and validity. It is important to assess the quality of the research, and I describe below how I assessed the quality of the data collected in terms of reflexivity, transferability, interpretation and analysis, as outlined by Malterud (Malterud, 2001b). During the research process, I aimed to establish and exploit meta-positions in all steps. This requires continual referral between literature, formulation and modification.

6.2.1 Reflexivity

Reflexivity can be understood as an attitude of attending systematically, at every step of the research process, to how the researcher and the methodological choices affect the construction of knowledge (Malterud, 2001b). The background and the position of the researcher will affect all steps in a study from choice of topic to the conclusion and presentation of findings. By acknowledging that knowledge is partial and situated, the researcher therefore needs to identify preconceptions brought into the project, since this will affect the knowledge created.

The researcher needs to be aware of previous personal and professional experiences and therefore strive to bracket such preconceptions (Malterud, 2001a). I hold a Master of Pharmacy degree and a one-year diploma in pedagogical education. I also have additional education in clinical pharmacy, and I have participated in inter-professional medication reviews in nursing homes. This background assisted me when developing all three interview guides, as well as during the interviews to obtain the maximum richness of the collected data by formulating complementary follow-up questions, and to understand and recognize the answers given. One cannot, however, ignore that this can

also have caused a lack of awareness to new perspectives or nuances affecting the interpretation of the data (Malterud, 2011).

The involvement of multiple researchers can strengthen the design of a study by increasing the understanding of complex phenomena (Malterud, 2001b). Throughout the three studies, several researchers have contributed to all steps of the process and by this, strengthened the results' consistency and credibility. The two supervisors have followed the project thoroughly and contributed with reflection and discussion by sharing viewpoints, mitigating any potential lack of awareness on the part of the researcher. The research group at NTNU where one of my supervisors and I are members, has also actively participated in validating the findings through their additional perspectives on study design, analysis and interpretation of data. The active participation of this research group forced me to consider critically my point of view and to sometimes reconsider my conclusions, all of which strengthen the study design and ensured valid interpretation of the results. I have also been a member of two national research schools, The Norwegian Research School in General Practice (NAFALM) (University of Oslo, 2017a) and the Norwegian PhD School of Pharmacy (NFIF) (University of Oslo, 2017b). In these two networks, I have presented and discussed my material in all three studies with other PhD candidates and senior researchers. The input given led me to reflect upon whether my interpretations were logically sound or not. All papers have been presented orally at international congresses before being published, which facilitated input from a broader audience testing the communicative validity of the results (Kvale & Brinkmann, 2010). An overview of these presentations is to be found in Appendix 5.

The thirteen GPs (Paper I) may have perceived me, being a pharmacist, as someone with an interest in judging their performances on their knowledge of FRIDs. This could have hampered the dialogue and thereby influenced the data richness. The GPs, however, gave a fair representation of actual opinions, even those that could be perceived as reflecting negatively upon them, such as renewing prescriptions without assessing the treatment.

During interviews with elderly patients, I emphasized that I was there by virtue of being a researcher and not as a pharmacist per se. There were, however, some situations where the participants expressed a wish for a pharmacist's opinion on medicine related questions. This was resolved by postponing the issue until the interview was finished and the digital recorder was switched off. None of the participants had a personal relationship with me, which may have limited the issues shared. The variation in data regarding knowledge of medicines and explanations given for experienced unsteadiness or dizziness from the patients were considerable, however, suggesting this had no negative influence. The fact that I am a pharmacist might have prevented the patients from criticizing the local pharmacy or the health care system. Additionally, they might not have wanted to offend me as a guest in their homes and thereby moderated their answers. Despite these limitations, others have found that patients report that Patient Information Leaflets (PILs) are perceived as frightening reading, and that patients report that they do not have knowledge about side effects from the medicines they are taking (Herber O.R., 2014; Modig, Kristensson, Troein, Brorsson, & Midlov, 2012; Olsson Moller et al., 2014). This suggests that my position did not limit the validity of my studies.

I did not know any of the participating nurses in study III, but three of the four pharmacists were known to me professionally. My professional role as a pharmacist, however, was not mentioned by any of the participants during the interviews. Similarly, my experience of performing IMRs in nursing homes, as well as my experience as a community pharmacist regularly communicating with GPs and elderly patients about appropriate medications use, may have affected the conversations in all three studies.

Co-author RO was a moderator during the focus group interviews in study III. She is an Associate Professor in Nursing with broad experience in geriatric nursing. Although her main role was to moderate the interviews, she had an important role in supporting the social interaction and conversation (Malterud, 2012a). This was in contrast to Study I where I did not use a moderator. By reflection, it may have been an advantage to use a moderator also in study I, as it was the first time I performed this type of interview. The

two focus group interviews, however, were judged as having given good and relevant data.

6.2.2 Transferability

Transferability relates to whether the study investigates what it intended to and the scope of the people and topics that the findings cover (Malterud, 2001b). In all studies we strove for a diverse and relevant sample, thus illuminating a broader spectrum of the phenomena (Malterud, 2011). The limits to the transferability are the characteristics of the samples themselves, which now will be discussed.

One aspect of validity is to seek participants with knowledge of the phenomena of interest (Malterud, 2011). The GPs (Paper I) had experience in prescribing FRIDs to elderly patients, and in the other two studies, the participants used FRIDs (Paper II) and had performed IMRs (Paper III), respectively. In addition, to embrace diversity of the phenomena we strove to include participants with variation in gender, years of experience and location (Paper I); variation in age, experience of falling or dizziness, gender and type of FRID (Paper II); whilst in the last study we searched for participants from all professions, working in both nursing home and home care service in addition to geographical variation (Paper III).

All three studies have limitations regarding transferability, however. These limitations may have affected the richness of the data and by this, the transferability. In Paper I, the GP participants came from one city in Norway. In addition, there is always a reason to question whether saturation was reached, that is, where additional data no longer provides new knowledge (Malterud, 2011). In an explorative study, however, the ambition is not to cover the whole range of phenomena, but to present selected patterns relevant for the study aim. The results in Study I demonstrated diversity in the GPs views of FRIDs and factors influencing the prescribing of these drugs. In addition, the findings are supported by other studies on GPs' perspectives of discontinuation of drugs and repeated prescribing (Nixon & Kousgaard, 2016; Ostini et al., 2011). We therefore

argue that the findings on factors affecting prescribing of drugs to elderly patients are likely to be transferable to other patient groups or groups of physicians.

All participants volunteered for the study, and therefore may have had an interest in the subject. Lack of participants with low interest in, or neutral to, the subject may affect the transferability of the findings due to limitations in the diversity of the perspectives. More than half of the elderly patients had experienced dizziness, unsteadiness or a fall injury. They lived independently at home, however, without receiving any home-based health care. It is therefore important to emphasize that the results do not necessarily embrace the frailest of elderly patients living at home who receive home care services, or those who do not manage their medications themselves. Our sample might therefore represent a healthier selection of elderly patients compared to those living in nursing homes or receiving home-based health care. We should therefore be aware of possible selection bias. The participants may have been more relaxed and felt able to speak more freely in their own homes, which may have led to a high quality of dialogue.

There were no physicians recruited to the focus in Study III, even though they had participated in IMRs. There is therefore a need for further studies to explore the physicians' perspective on IMRs. This is without doubt a limitation to transferability of the results.

The participants taking part worked in rural municipalities and not in cities. Inter-professional collaboration in primary health care is affected by the geographical proximity of the participants (Xyrichis & Lowton, 2008), which may affect the transferability of the findings. On the one hand, rural municipalities often have greater physical distances between different professionals. On the other, there are smaller and fewer units of care, which often facilitates meetings between participants despite not working at the same site. The thirteen nurses also outnumbered the two pharmacists in the focus groups, which may have prevented the pharmacists from critically evaluating the nurses. In turn, the pharmacists had more experience of performing IMRs in teams, and it was therefore likely that their perceptions represented a wider perspective. The results resonated well with other research findings, such as the importance of role

clarity, experiences of professional development and a feeling of collegiality on becoming one of the team members (Makowsky et al., 2009; Pottie et al., 2009). This supports external validity of the study on IMRs.

6.2.3 Interpretation and analysis

There are several approaches to systematic analysis of qualitative data dependent on the research question, material and choice of analytical style. One can have an intuitive analysis where the researcher develops the most important aspects; a data based analysis where the researcher identifies units in the text, forming a basis for data-developed categories; or a theory-based analysis where the text is organized according to pre-existing theoretical categories (Malterud, 2001a). Systematic Text Condensation (STC), which is closest to a data based analysis, was chosen as the method for analysis of the data in this thesis (Malterud, 2012b). STC is an elaboration of Giorgi's phenomenological principles and was chosen as it is a method suitable for thematic analysis of meaning and content of data across cases. The real-world experiences are acknowledged as valid knowledge, which is situated, partial and positioned (Malterud, 2012b). STC was therefore well suited for the development of descriptions about experiences and knowledge, which were the aims of our studies.

In order to provide a clear description of the procedure from how the analysis moves from the raw data (transcripts) to the findings (themes or codes), I use data from study III to demonstrate how codes were developed during data analysis. The STC has four steps as described in chapter 4.3 Data analysis: Step 1 - Total impression; Step 2 – Identify and sort meaning units; Step 3 – Condensation; and Step 4 – Synthesizing. Figures 1, 2 and 3 below illustrate how the data analysis for all studies took place. I particularly want to highlight the data analysis in Step 2 - Identify and sort meaning units. This is an iterative process, involving sorting parts of text called meaning units with the aim of clarifying the study question. The units are classified and sorted in relation to the preliminary themes in Step 1. This coding results in preliminary themes, which take place in several stages. Below I illustrate in Figure 1, 2 and 3 how the themes can be both split and merged.

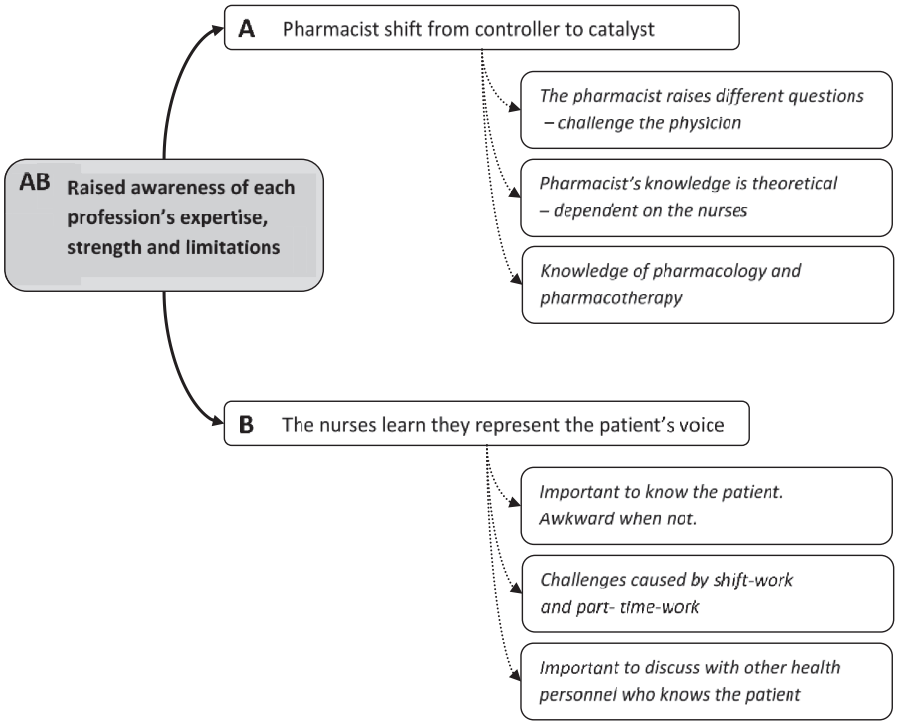

Figure 1:

- How one theme AB "Raised awareness of each profession's expertise – strength and limitations" (Figure 1) is split in to the two new themes,
- How themes are renamed, split, and also removed from Figure 1 to Figure 2.

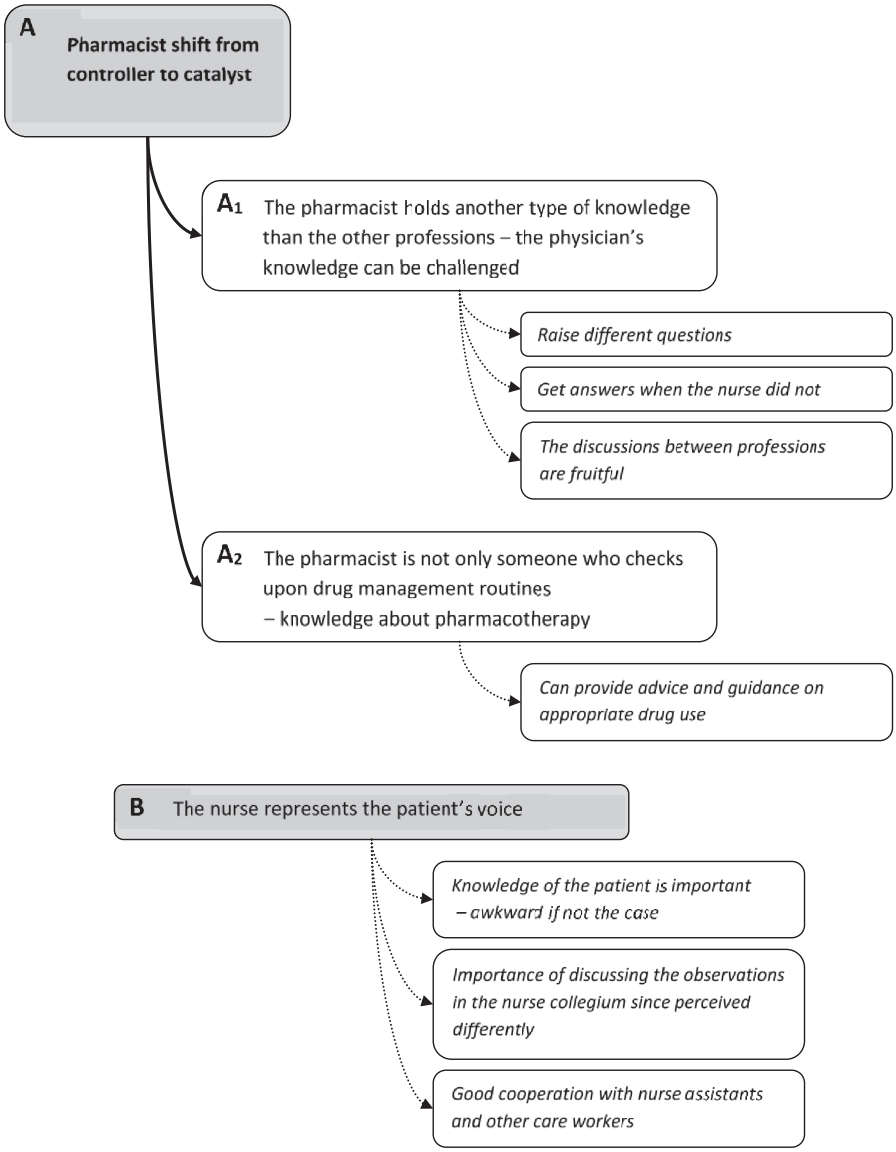

Figure 2:

- How the names of themes A and B in Figure 1 have been adjusted in Figure 2,
- That theme A has been split into subthemes A_1 and A_2.
- In the step from Figure 2 into Figure 3 the names of each theme A and B have been further adjusted into A "Challenge the physician's role" and B "Important detail about each patient" respectively.

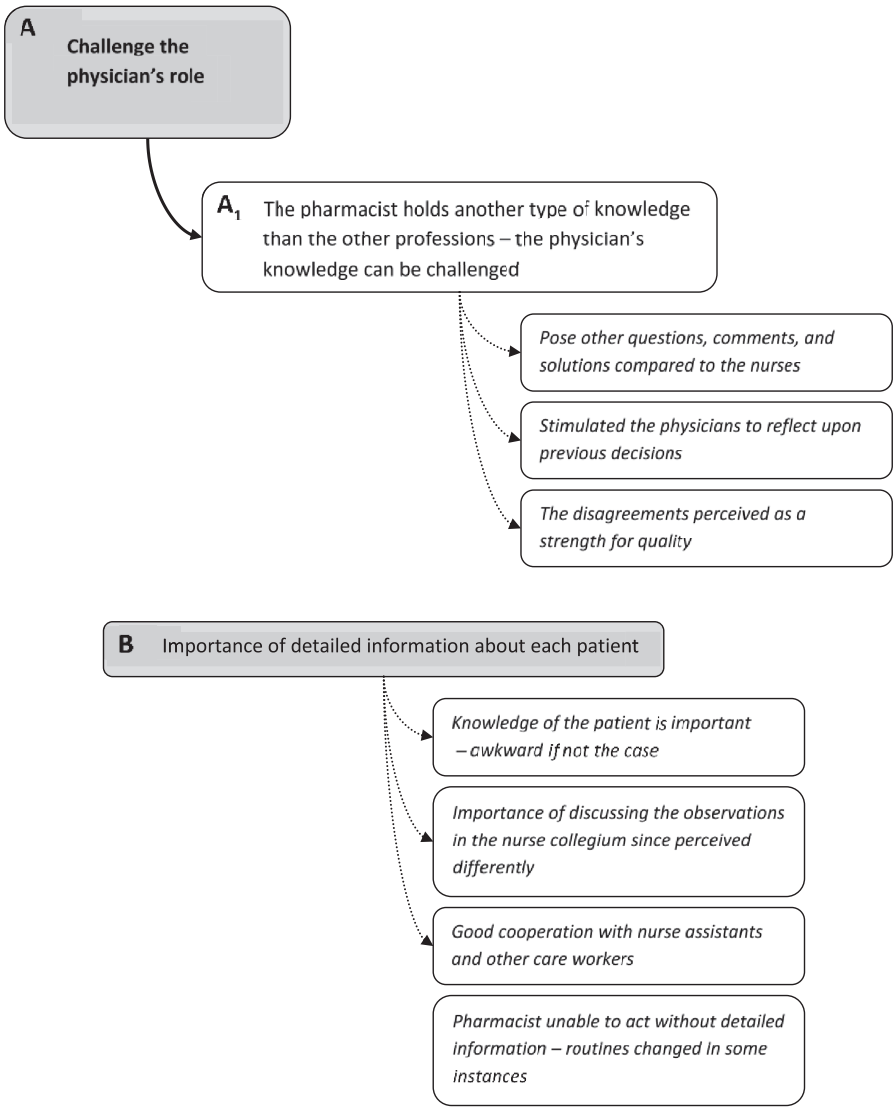

Figure 3:

- How the subtheme A_2 "The pharmacist is not only someone who checks upon drug management" from Figure 2 has been removed from theme A as shown in figure 3. This was done as the theme no longer fitted within this main theme.

In accordance with the iterative four-step analysis of STC, the analysis of the data was conducted stepwise in each interview, moving back and forth between reading literature, collecting data and analysing the data. There was also an interval between the first three focus group interviews and the last two focus group interviews (Paper III) allowing for initial analysis and re-adjustment of the interview guide based on the themes arising in the previous interviews. This was also done in the study of the elderly medication users (Paper II).

Due to participant availability, it was not possible to analyse the first interview before the next one in the first study (Paper I). This may have prevented the expression of subtle nuances of the phenomena, and by this the quality of the data. To avoid misconceptions, however, the transcripts in all studies were read and re-read throughout the analytic process, in addition to being discussed with the supervisors and other researchers.

7 DISCUSSION OF MAIN FINDINGS

The main theme in this thesis is medication therapy management in community-based elderly patients with focus on Fall Risk Increasing Drugs (FRIDs). It is a significant topic for discussion, and it has been challenging to decide what to include from the discussions in the individual papers, and where to draw the line on topics beyond the core discussions in the three papers. The discussion chapters start with a brief summary of the main results. I will then discuss the roles of the various actors regarding medication therapy management of FRIDs for the community-based elderly in Norway today: the general practitioners (GPs), the elderly FRID user (the patient), the nurses, and the clinical pharmacists. Finally, I will discuss the use of inter-professional medication reviews (IMRs) in primary health care as a tool to prevent medication related falls in community-based elderly patients.

7.1 Summary of main results

The findings in this thesis have revealed several potential shortcomings regarding how FRIDs are managed in community-based elderly patients today. GPs (Paper I) and patients (Paper II) have little awareness and knowledge of FRIDs, and therefore they do not perceive the use of FRIDs as a prominent risk factor for falls. GPs renew prescriptions without assessing the medication treatment unless patients specifically tell them they have fallen or feel dizzy (Paper I). Due to little knowledge of side effects, however, patients interpret dizziness as symptomatic of aging and not as a possible side effect of medication (Paper II). In addition, the elderly do not want to "bother" their GP, or they struggle to articulate perceived medication related problems. Altogether, this prevents the GP from receiving relevant clinical information about the patient, which could be used to ensure appropriate medicine use or to adjust prescribing of FRIDs (Paper I). Nurses (Paper III) who participated in IMRs for home-based elderly patients receiving home-care nursing and in nursing homes can supplement the GPs knowledge with important and complementary patient information. Nurses reported that participation in IMRs taught them how to interpret and link patient's symptoms to medications in use.

The GPs (Paper I) said they lack and did not use de-prescribing tools, and that they were reluctant to change FRIDs because they were uncertain about the health outcome for the patient resulting from such changes. They also perceived pressure from the patients to prescribe, in particular sleeping tablets. According to the findings in the IMR study (Paper III), inter-professional medication reviews where all three professions- physician, nurse and clinical pharmacist - met and discussed the medication therapy could challenge the GP to reflect upon and review previous medication therapy choices which would otherwise not have taken place. Clinical pharmacists reported that they were dependent on the nurses to bring forward sufficient clinical information of the patient for the pharmacists to be able to contribute meaningfully during the IMRs.

7.2 The role of GPs and patients in medication therapy management

7.2.1 Lack of awareness of FRIDs as a fall risk factor among GPs and patients

Lack of knowledge and awareness of FRIDs as a risk factor for falls amongst both GPs (Paper I) and the elderly patients (Paper II) led to a 'wait and see' attitude that could prevent or inhibit precautions when elderly people use FRIDs. Not only lack of communication, but also miscommunication between the GP and the elderly FRID user, contributed to a status quo where prescriptions were renewed without the medication therapy being assessed or reviewed.

Lack of knowledge and awareness of medications among prescribers such as the recommended dosage of the drug may have undesirable consequences, and also lead to lack of awareness towards clinical practice guidelines (Cabana et al., 1999; Lugtenberg, Zegers-van Schaick, Westert, & Burgers, 2009). Unnecessary repeated prescribing is common (Ostini et al., 2011) and medicines for elderly patients are rarely discontinued (Nixon & Kousgaard, 2016). Both of these issues increase the risk for polypharmacy and inappropriate prescribing. The lack of awareness of FRIDs as a risk factor for falls (Paper I), hinders the GPs ability to be alert and to take precautions. This lack of awareness of FRIDs as a risk factor therefore contributed to the GPs adopting a passive role to stopping medications or adjusting dosages, unless the patient told them about being dizzy or experiencing falls (Paper I). This is in line with the study by Nixon and Kousgaard (Nixon & Kousgaard, 2016), who observed how cues trigger the GP to discontinue prescribing of medicines. A cue is understood as something that attracts the GP's attention, either from the patient or some kind of record based reminder (Nixon & Kousgaard, 2016). This is in line with our findings where the GPs were reminded of FRIDs as potential risk factors when their patients told them that they had felt dizziness or fallen. Other cues to review the prescribing of FRIDs came through discharge letters from the hospital, where suggestions were made for changes of medication considering fall risk, such as lowering of dose of a drug or the shift from diazepam to oxazepam.

It is difficult to report relevant adverse effects to your prescriber if you do not know what you should pay attention to (Modig, Kristensson, Ekwall, Hallberg, & Midlov, 2009). The patient needs to have a certain level of knowledge to be able to differentiate between symptoms of the disease and those of medication side effects (Modig et al., 2012). Having little knowledge about effects and side effects affects the patient's ability to actively participate in decisions about their treatment (Kristensson, Modig, Midlov, Hallberg, & Jakobsson, 2010), and to take part in patient-centred care (Bain et al., 2008). Elderly patients in the study (Paper II) had very little knowledge about FRIDs as a relevant risk factor for falls. Even if the numbers cannot be used as a generalisation, it is noteworthy that only one out of 14 elderly could recall that the GP had informed them about dizziness as a side effect of FRIDs or to regularly ask if they had experienced any dizziness since the last consultation. This is in line with other studies, reporting that only 6-12 per cent of elderly living at home have knowledge of their medicine's potential risks and side effects (Barat, Andreasen, & Damsgaard, 2001; Chan, Wong, So, Kung, & Wong, 2013).

The ability to distinguish between 'normal ageing' and 'disease' is hindered when knowledge about the medicines' potential side effects is lacking (Morgan, Pendleton, Clague, & Horan, 1997). A knowledgeable patient, who is aware of the FRIDs' potential as a risk factor for falls, has the potential to convey important clinical information about how the medication therapy is working to their GP. In addition, this knowledge is essential for being able to interpret and recognize the symptoms as possible side effects of FRIDs. For patients who receive home care services, nurses may assist the patient in conveying clinical information related to the use of FRIDs to the GPs. This is due to the nurses learning how to interpret and link patient symptoms to the effect or side effect of medications in use when participating in IMRs (Paper III).

7.2.2 Communication challenges between GPs and patients

Lack of communication between GP and patient about the patients' perception of the on-going medication treatment (Paper I and Paper II) contributes to the medication therapy not being assessed or reviewed. There might be several reasons why elderly

patients under-communicate health information. Some patients would rather adjust their everyday life activities instead of bothering their physician about occasionally feeling dizzy (Paper II). The reluctance to tell the GP about dizziness can also be explained by the importance for elderly patients to perceive the body as still going strong (Santimaki et al 2008), in order to maintain their independence. In our study, elderly patients perceived the physicians as being too busy and they felt restricted by the fact that they could only discuss only one health related problem during consultations (Paper II). The GPs (Paper I) confirmed this finding, by saying they had a high workload during consultations and that elderly patients who presented many health problems during one consultation resulted in too little time for each problem. Others have found that time restraints during consultations prevent elderly patients from asking questions (Modig et al., 2012; Moen et al., 2009). In addition, older dizzy patients may downplay dizziness and only present dizziness as a secondary complaint when visiting their GP (Stam et al., 2016).

The patient's lack of clinical vocabulary or interpretation of symptoms (Paper II) may result in poor communication and even misunderstanding between patient and prescriber. This may also explain why the GP perceive the patient as not presenting clinical information about the on-going medication treatment (Paper I). Some patients felt that it was difficult to get their point across to the physician when presenting diffuse bodily discomfort which affected their quality of life, or when they had a direct question whether their medicine could cause their perceived dizziness or unsteadiness (Paper II). There might therefore be situations where the GPs did receive input from the patient, but where they did not recognize the problem described as a medication-related problem. One reason might be that GPs find it difficult to evaluate side effects, and downplay the issue and how it affects the patient's quality of life (Nixon & Vendelo, 2016).

The GPs said they considered stopping or changing certain medications when a patient had fallen or if they presented with symptoms of dizziness (Paper I). Our results in Paper II however, show that patients do not necessarily present their dizziness, and that they also might struggle to get their point across when presenting symptoms to their GP.

A passive and incommunicative patient must be a challenge for any GP. There were also patients (Paper II) who said they had a high level of confidence or trust in their physician and therefore did not necessarily wish for more information about their medicines, in spite of not always being given information about possible adverse effects (Modig et al., 2012). This finding reflects that elderly patients often prefer their physicians to be responsible for medical decisions, and indicates that they prefer a paternalistic physician-patient relationship (Levinson, Kao, Kuby, & Thisted, 2005). In addition, some GPs have acknowledged that they adopt an authoritarian style when encountering elderly patients (Clyne, Cooper, Hughes, Fahey, & Smith, 2016). The GPs, however, cannot solely rely on the elderly patients to be responsible for reminding them to pay attention to FRIDs as a possible risk factor for falls, and to remind them to perform regular medication reviews. The GP should therefore systematically schedule check-ups of elderly patients in order to explicitly and regularly elicit the patient's experience of taking the medicines (Nixon & Kousgaard, 2016).

7.2.3 Tools developed to assist the GP in appropriate prescribing

The GPs stated that there was a lack of de-prescribing tools for polypharmacy patients and an uncertainty about the patient's health outcome after changing dosages or stopping FRIDs and other drugs (Paper I). This is in line with challenges found to prevent discontinuation of medications (Bain et al., 2008). The uncertainty about consequences for the patients after changing dosages or stopping drugs such as fear of withdrawal syndrome, symptom relapse or increased risk of the condition has been found to affect prescribing behaviour (Anderson et al., 2014).

Tools have been developed to assist GPs in appropriate prescribing for elderly patients, and to raise the GPs' awareness of FRIDs as a risk factor for falls, e.g. STOPP/START criteria (O'Mahony et al., 2015). The STOPP/START criteria contain specific sections, e.g. Section K, which focus on drugs that can increase the risk of falls in older people. In Norway, the GP legislation (Regulations on Regular General Practitioner scheme in the municipalities, 2015) encourages GPs to perform a medication review for patients with more than four medications when perceived as medically necessarily. The GP is

reimbursed for performing these medication reviews. The legislation does not specify that the medication review should be according to any specific guideline. Guidelines and tools developed to assist physicians in appropriate prescribing are no better than their implementation. Several barriers to implementation of clinical guidelines have been identified, such as lack of agreement with the recommendations, organizational constraints, lack of knowledge regarding the recommendations, and unclear or ambiguous recommendations (Cabana, 1999; Lugtenberg, 2009). Several facilitators for implementation have also been demonstrated. The likelihood for a recommendation to be followed has been found to increase when, to a lesser extent, they required new skills, less often as part of a complex decision tree, were more compatible with the existing norm and values in practice, and more supported with evidence (Burgers et al, 2003).

The STOPP/START criteria have been perceived by physicians as more of a reminder than an actual tool (Dalleur et al., 2014), and are therefore not used on a regular basis. In 2013, the Norwegian Medical Association commented on the GP legislation and state "The requirements for medication review are extensive" (The Norwegian Medical Association, 2013). We can only speculate whether this indicates a lack of agreement with the recommendations, or organizational constraints. The implementation of medication reviews as a GP task might, however, be influenced by the GPs' lack of awareness and knowledge of FRIDs as a potential risk factor for falls (Paper I). It is also unfortunate that the interpretation of the legislation makes the recommendations unclear and ambiguous.

Inter-professional cooperation could also be viewed as a tool to prevent inappropriate prescribing. A thorough medical history, regular blood pressure control, and regular medication reviews have been suggested as obligatory tasks to prevent falls in all parts of the health care system (Smebye, Granum, Wyller, & Mellingsaeter, 2014). The authors also conclude that an inter-professional and targeted investigation is suitable for detecting fall risk. FRIDs do not necessarily represent the most prominent fall risk for a specific patient at a given time, but normal routine for GPs should therefore be to talk to the patient about fall risk, and to regularly perform check-ups when renewing

prescriptions. In this way, the GP can assess whether the choice of medication and the dosage in use remains appropriate for that specific patient. With time there may be changes in other fall risk factors such as frailty (Clegg et al., 2013), or just because of aging itself (WHO, 2017). The renewal of prescriptions without an assessment of the treatment might therefore represent a potential problem for these patients (Cabana et al., 1999; Lugtenberg et al., 2009). Although physicians did not take part in the focus groups about IMR (Paper III), both the nurses and the pharmacist claim that IMRs raised the physician's awareness of appropriate prescribing. The discussions about medication therapy during the IMRs were said to encourage the physicians to reflect upon their previous medication prescribing, in line with other studies (Halvorsen, Stensland, & Granas, 2011).

7.2.4 GPs' participation in IMRs in primary health care

Inter-professional medication review is one of many initiatives to enhance patient safety and appropriate medicine use in nursing homes and home care service (The Norwegian Ministry of Health and Care Services, 2011). In primary care, inter-professional medication reviews can be performed by teams consisting of a physician, a nurse and a clinical pharmacist, according to the LIMM-model (Modig et al., 2016). The participants in Study III, however, reported that they had taken part in IMRs performed without the physician present (Paper III). According to evaluation reports from two of the counties who participated in the Norwegian Patient Safety Programme, the participating teams reported challenges on ways to engage the physicians more in order to take part in IMRs in the municipalities (Andreassen, 2014; Nygård, n.d.) We can only speculate whether this has to do with organizational constraints such as being perceived as too time consuming, unclear roles, or a reluctance to take the responsibility expected of them in such teams (Hansson, Friberg, Segesten, Gedda, & Mattsson, 2008; Kokko, 2009).

It has been found that multi-disciplinary meetings contribute to increased knowledge and critical reflections on medication treatment (Halvorsen, Ruths, Granas, & Viktil, 2010). The GPs expressed an uncertainty when they had to vouch for the decisions on

their own (Paper I). In addition, the pharmacists (Paper III) said that after the establishment of IMR teams, the number of telephone and e-mail inquiries from physicians regarding medication therapy questions had increased. IMRs where GPs and pharmacists physically meet and discuss pharmacotherapeutical issues might support GP decisions in difficult situations, such as experiencing perceived patient pressure, or when GPs experience uncertainty of outcome resulting from change of FRIDs (Paper I). This is supported in the literature where GPs use pharmacists as decision support in medication reviews (Schuling, Gebben, Veehof, & Haaijer-Ruskamp, 2012), and the finding that pharmacists elevate the performance of other health personnel (Makowsky et al., 2009).

In their occupation, physicians have professional autonomy, since they have control over their remuneration, and are thus in a position to influence policy decisions and to make their own clinical judgments (Edmunds & Calnan, 2001). They might therefore not consider that an initiative organized from above such as the Patient Safety Programme, where participation also was voluntarily for the physicians, as particularly important. This can only be speculation, but Edmunds and Calnan (Edmunds & Calnan, 2001) who interviewed GPs about re-professionalization of community pharmacists, found that GPs clearly saw pharmacists as co-workers to whom they could delegate tasks. They also found that GPs regarded the participation of pharmacists in clinical activities as undermining the doctor/patient relationship, indicating a perception of the pharmacist as someone who threatened their autonomy and control. Comparing this with the challenge of getting GPs on board in the Patient Safety Programme, one might wonder whether GPs have sufficient awareness of what IMRs are, and what a clinical pharmacist represents.

Involvement of GPs is a necessity in order to achieve well-functioning IMRs, as perceived by the nurses and the pharmacists (Paper III), as well as functioning inter-professional teams in general in primary health care (Vedel et al., 2009). To get GPs involved in inter-professional collaboration in primary care, however, has been a recurring challenge (Hansson et al., 2008; Kokko, 2009). Based upon the above, there are reasons to question whether the autonomy of GPs, and the lack of government

regulation to ensure GP participation in IMRs, hinders precautions to be taken regarding appropriate drug use e.g FRIDs.

7.3 The role of the nurse in medication therapy management

For those patients living in nursing homes or who receive home based health care, nurses can provide the GP with additional and complementary information about the patient's on-going medication therapy (Bain et al., 2008). Our findings (Paper III) showed that there is a potential for nurses to give GPs complementary and important clinical information about the patient's medicine use (cues), since the nurses stated they had learned how to better interpret patients' symptoms and link them to the medications in use. It is the nurse's task to document the patient's medicines in use and to observe the patient (Edwards & Axe, 2015), but as found (Paper III) it may not be a priority in comparison to other nursing tasks. It was one of the aims of the Patient Safety Programme that the patient's response to medications should be continuously recorded and documented (The Norwegian Ministry of Health and Care Services, 2011). One might wonder, however, whether roles are clear enough between GPs and nurses as to who should keep a clinical eye on community based elderly patients, especially those living at home with home based health care.

If the nurses should take a more prominent role in conveying clinical information about the patient's FRIDs and fall risk to the GP, this presupposes that the nurses have the relevant knowledge, competence and skills in how to interpret patient symptoms related to medications in use. Others have found that nurses lack knowledge and understanding of pharmacology, and also perceive organizational barriers such as time and work pressure impacting on safe medication management (Dilles, Elseviers, Van Rompaey, Van Bortel, & Stichele, 2011). In addition, nurses are likely to be set tasks unrelated to medicine handling such as catering, tidying and cleaning (Storli, Nakrem, & Elstad, 2017), which may take the focus away from medication therapy management. In a study with the aim to measure the competence of nursing staff in community based elderly care in Norway, a lower score than the maximum was found on patient observations and nursing documentation (Bing-Jonsson, Hofoss, Kirkevold, Bjork, & Foss, 2016),

indicating the need for both skilled nurses and better organization before nurses can fulfil the role described above.

The potential to perform adequate patient observations was also linked to the actual time each nurse spent with the patient in question. The nurses (Paper III) mentioned challenges in performing the preparatory work of interviewing elderly patients, especially in home based health care where they spend only a short time with domiciliary patients. In addition, part-time positions and shift work complicate both the feasibility of making good patient observations, and of conveying relevant information to the nurse taking part in an IMR. Since approximately 30 per cent of staff in Norwegian community elderly care roles are assistants without any formal health care training (Bing-Jonsson et al., 2016), and are the ones usually spending more time with elderly patients than the nurses, there is a need to improve how such additional clinical information about the patient is passed on to the GP.

7.4 The role of the clinical pharmacist in medication therapy management

Clinical pharmacists have unique knowledge of pharmaceuticals. They increasingly expand the settings of where they work and use their knowledge in pharmacokinetics and pharmacodynamics. For elderly patients, this knowledge is relevant in a range of medication-related problems, for instance on how to taper or discontinue drugs, or in drug-drug interactions (Bain et al., 2008) In Norway, the number of clinical pharmacists is relatively low. Apart from a few hospitals wards in the larger cities, clinical pharmacists are new to most health care professionals. So, with being the first clinical pharmacist that either GPs or nurses work with, comes many professional challenges.

Three of the clinical pharmacists in our study (Paper III) had previous experience from performing IMRs in a hospital setting in addition to primary health care. Spinewine et al (Spinewine, Fialova, & Byrne, 2012) examined the role of the pharmacist in optimizing pharmacotherapy in older people in the community. They argue that for pharmacists to be able to add significant value the following crucial elements are significant: close

collaboration with other health care personnel such as physicians and nurses; access to patient records and active communication with patients; and other health care personnel as part of an inter-professional team. This echoes our findings (Paper III) where discussions between the three professions during IMRs were perceived to contribute to more individualized care. The pharmacists felt, however, that they could not fulfil their roles during IMRs when the GP was absent, or when the nurses did not present updated drug monitoring data and complementary patient documentation.

Spinewine et al argue that pharmacists must have active communication with patients to add significant value (Spinewine et al., 2012). Our clinical pharmacists (Paper III) did not systematically meet with the patients, and therefore depended on the nurses passing on patient information as discussed above. Another challenge for pharmacists in general - and community pharmacists who wish to perform medication reviews in particular - is that they have no default access to patient records (Hazen et al., 2015). The clinical pharmacists (Study III) did mention that they, in some cases, had changed the preparing routines prior to the IMR and spent the whole day at the nursing home or home care service site gathering and collecting information from the patient's journal, and talking to nurses when nurses struggled to find time to do their preparatory work.

Pharmacists lacking clinical pharmacology knowledge and clinical reasoning skills may also hamper implementation of medication reviews in primary care (Hazen et al., 2015). The clinical pharmacists in the study (Paper III) did have formal clinical pharmacy training, and three of the four had Master's degrees in Clinical Pharmacy. It is unfortunate, however, that neither the Norwegian National Guideline of Medication reviews (The Norwegian Directorate of Health, 2015) nor the approach as to how to perform IMRs in the Patient Safety Programme (Norwegian Ministry of Health and Care Services, 2011) specify that the pharmacist needs to possess clinical pharmacology and reasoning skills in order to perform medication reviews in primary health care in Norway. The lack of clinical knowledge and skills is unfortunate since it might affect the pharmacists' ability to substantiate their arguments during the IMR discussions.

Community pharmacists also lack financial incentive to spend additional time on medication reviews, as they are not reimbursed for this (Hazen et al., 2015). In Norway, no examples of payment of IMRs for outpatients can be shown (Bernsten, Andersson, Gariepy, & Simoens, 2010). Three out of the four clinical pharmacists in Study III were on contracts with the municipality through the hospital pharmacy where they were employed. The fourth did the IMRs as a volunteer in her spare time. Hazen et al also pointed out cultural differences between community pharmacists and GPs, such as having different responsibilities, which may hinder collaboration. The pharmacists (Paper III) did not mention this in particular. Three out of four, however, had significant experience in performing IMRs in a hospital setting, and spoke of a growing understanding with time of why their theoretically grounded suggestions were not always accepted by the primary health care physicians. This may indicate perceived cultural differences when performing IMRs in secondary versus primary health care. This is supported by pharmacists integrated in general practice clinics, who also perceived lack of implementation and feedback from general practitioners about their recommendations (Tan, Stewart, Elliott, George, 2014a).

Pharmacists worldwide seek to enhance their professional status (Edmunds & Calnan, 2001). The stereotypical business-orientated image of community pharmacy as "making money" has for decades hindered the adoption of new roles (Hughes & McCann, 2003). If clinical pharmacists were to expand their roles and thrive within the primary health care sector, remuneration, funding, and the availability of physical space to work, which have been identified as barriers to the integration of pharmacists into a general practice environment (Freeman, Cottrell, Kyle, Williams, & Nissen, 2012) must be adressed. These are also relevant questions to raise in the continuation of IMRs in the Norwegian primary health care. Arguably a better solution than keeping an eye on professional boundaries and roles would be more emphasis on solving the problems with polypharmacy and inappropriate medication in elderly patients.

7.5 Inter-professional medication reviews as a tool to prevent fall risk

This thesis has explored medication therapy management in community-based elderly patients, with focus on FRIDs from the perspectives of GPs, patients, nurses, and clinical pharmacists. The three studies are not designed to conclude if inter-professional medication reviews can prevent fall risk in elderly patients. The results rather elaborate on challenges with FRIDs and with IMRs. Inter-professional medication reviews have, however, been shown to reduce medication-related problems of FRIDs such as psychotropic drugs, in addition to improving the quality of prescribing in primary health care (Modig et al., 2016; Nishtala, McLachlan, Bell, & Chen, 2011; Jokanovic et al., 2016). The literature, however, reports both successes and failures of implementing IMR in a primary care setting (Tan, 2014a; Tan, Stewart, Elliott, & George, 2014 b).

The nurses and the clinical pharmacists themselves (Paper III) felt that they made the physician reflect upon their previous prescribing. The nurses acknowledged that the clinical pharmacists, through posing other types of questions, comments and solutions during the IMRs, added significant value in optimizing pharmacotherapy. Since GPs did not take part in the focus groups, their view is not studied. As mentioned, close collaboration with other health care personnel such as physicians and nurses is a crucial element when pharmacists optimize pharmacotherapy in older people in the community (Spinewine et al,, 2012). In a systematic review by Gillespie et al (Gillespie et al., 2012) on interventions to prevent falls in older people living in the community, they concluded that there is limited evidence of the effectiveness of interventions targeting medications such as the withdrawal of psychotropic drugs, or of educational programmes for family physicians. When looking more closely at the three medication-withdrawal interventions included in this review, none of the three interventions (Campbell, Robertson, Gardner, Norton, & Buchner, 1999; Pit et al., 2007; Weber, White, & McIlvried, 2008) included discussions of medication review findings between involved professions when all three professions were present (Paper III). The participants did emphasize that it was the discussions during IMRs where all three professions were present that were perceived as benefical, indicating that performing

IMRs together contributed to both learning and the perception of a mutual inter-dependence. It could be worthwhile to pursue this further.

8 CONCLUSION

The overall aim of this thesis was to investigate how involved health personnel and community-based elderly drug users perceive their medication therapy management, with a specific focus on Fall Risk Increasing Drugs. Awareness and knowledge of FRIDs as a risk factor for falls were low among the GPs and elderly users of FRIDs. The low awareness and knowledge among the GPs contributed to a renewal of prescriptions without assessing whether the medication in use was still appropriate. Precautions were therefore not necessarily taken when treating elderly patients with FRIDs, and GPs tended to rely on receiving cues from their patients before assessing the medication treatment. Lack of knowledge among elderly FRID users prevented them from being able to differentiate between symptoms of illness or aging, and the adverse effects of medicines, and this affected their communication with their GPs.

The nurses and pharmacists said that although experiencing challenges when conducting IMRs, the learning experiences improved their own practice. They perceived IMRs as improving the quality of medication therapy management, resulting in better and more individualized care for patients. Nurses reported that they learned how to better interpret patients' symptoms as possible effects or side effects of medications, and this made it easier to convey clinical information regarding the elderly FRID user to the physicians. This was particularly useful for the GPs, who had limited contact with their patients. The pharmacists felt that they could not fulfil their roles during IMRs where the GP was absent, or when the nurses did not present updated drug monitoring data and complementary patient documentation. The nurses reported that if the clinical pharmacist was present during the IMRs, it encouraged the physicians to reflect upon their previous therapeutic choices. This thesis, however, highlights challenges on how accommodate participation from all three professions in IMRs, and how to obtain thorough information about the patient.

The awareness of FRIDs as a risk factor for falls was not particularly present among either GPs or home-dwelling elderly users of FRIDs. This had consequences for the follow up of the medication therapy by the GP and the elderly medicine user's

understanding and perception of their medication treatment. Study III elaborates how IMRs can contribute to an improved medication therapy management for community based elderly patients by facilitating a regular assessment of the medication therapy. An assessment, that do not necessarily take place during the consultation between the GP and elderly FRID user. Study III also pin-points the many challenges IMRs as a collaboration system have in the way primary health care in Norway is structured today. Overall, all three professions express concerns about the medication therapy management for community-based elderly patients, and that it seems reactive and fragmented rather than proactive and structured.

9 IMPLICATIONS FOR PRACTICE

Based upon the findings in this thesis where the medication therapy management for community-based elderly patients seems both reactive and fragmented, there is a need for a more co-ordinated and organized primary health care. Updated and knowledge-oriented health services with sound and competent health professionals contribute to ensure a high level of patient safety, and especially to maintain the patient's dignity. In addition, health care personnel who dare to navigate the ethical landscape through use of reflection are of utmost importance. As stated by John Dewey (GoodreadS, n.d.) "We do not learn from experience…we learn from reflection on experience.". All health professionals should stop and reflect on 'do we over-treat' our patients. The intentions may be good, but we must be willing to consider that the results may harm the patient. There is a need for physicians who are willing to de-prescribe. There is a need for nurses, who often are the ones closest to the patient, to step up and to a greater extent, use their pharmacological competence by conveying important clinical information to the physician. There is also a need for pharmacists to acknowledge that clinical knowledge and skills is a necessity when performing IMRs. There is a need for politicians to change regulations and funding schemes and with that, to facilitate inter-professional collaboration in medication therapy management, for the sake of the patient. The time is ripe for all health professionals, and physicians in particular, to realize that inter-professional collaboration is key to ensuring high quality medication therapy management for community-based elderly patients.

The Norwegian government recognized the challenges of a fragmented primary health care when presenting the white paper "The primary health and care services of tomorrow –and integrated" in 2015 (Ministry of Health and Care Services, 2015). There, they presented the "Primary health care team" functioning as an expanded general practice. The primary health team will consist of a GP, nurse and a health secretary. The need for changes in regulations and funding schemes is recognized. The white paper, however, does not explicitly mention clinical pharmacists as a member of this team. In light of the findings in this thesis, involving pharmacists could improve the reflection of the medication therapy management that takes place.

In Canada, a non-dispensing pharmacist has been contracted to a general practice where they provided both individual patient medication assessments and patient education, in addition to dissemination of new therapeutics evidence to the GPs (Dolovich et al., 2008). Such a clinical pharmacist can educate both GPs and the elderly FRID user on FRIDs. The pharmacist could complement the GP, ensuring the GP has updated knowledge of FRIDs, and acting as a knowledgeable partner in discussing medication therapy. Patients could also be taught by the pharmacist to recognize side effects of their medical treatment. It may also make it easier for patients to present more issues of importance if given the opportunity to talk to both a GP and a pharmacist, and thus be offered more time. This could enable additional clinical information of importance to be forthcoming.

The presence of a clinical pharmacist employed at the GP office would present an opening for IMRs to be performed with the patient present. To have the patient present may be the best solution in more complex cases, as the patient is an irreplaceable source of information regarding both medical history, and when to establish care goals for the treatment.

10 IMPLICATIONS FOR RESEARCH

There are several steps, which can be taken to build further on the research in this thesis.

- Quantitative studies to investigate to which extent GPs and elderly FRID users relate the use of FRIDs to fall risk compared to other known fall risk factors. There is also a need for quantitative studies on the amount and degree of de-prescribing, and review of the on-going treatment of FRIDs. Relevant research methods could be through the use of questionnaires.

- There is a need for research on GPs' views of IMRs. The research could focus on the GPs' knowledge of IMRs and subsequently on how they perceive participation in IMRs, aiming to describe perception of learning and perceived barriers for its implementation. Initially, one could perform focus group interviews and thereafter questionnaire-based surveys resulting from the findings from the focus group interviews.

- It could also be interesting to study whether IMRs have an impact on fall risk and fall rate for the involved patients. This could be achieved by performing a RCT with patients in an intervention group receiving IMRs and patients in a control group receiving normal care.

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12 APPENDIX

Appendix 1: Interview guide study I – GPs

Main questions:

1. In which situations do you associate drug use with falls among the elderly above 65 years and what factors influence your prescribing and cessation of FRIDs?

2. What are your overall thoughts on the use of FRIDs amongst elderly patients?

3. What are your experiences of consultations with elderly patients and their next-of-kin regarding FRIDs?

Appendix 2: Interview guide study II - Elderly users of FRIDs

Main questions:

1. Can you tell me about the drugs you use and how you use them?

2. Have you experienced dizziness or falls and can you explain to me what happened?

3. Do you link the use of your drugs up to dizziness and falls?

4. What information have you got about your drugs, effects and side effects, from your prescriber?

5. Do you communicate with other health personnel and family/friends about the drugs you use?

Appendix 3: Interview guide study III- Interprofessional medication reviews

Main questions:

1. From your experience of performing Interprofessional Medication Reviews (IMRs) in nursing homes and home-based care, can you describe factors that promoted or hindered the process of working together?

2. Can you describe the knowledge and the learning you gained by performing IMR in primary care?

    a. What were your expectations towards the other professions, i.e. physicians, pharmacists and nurses, and their contributions into the process of IMRs?

    b. How did you experience the communication, information flow and the collaboration between the different professions?

    c. What was in your view the unique contribution from the different professions during the IMR?

    d. Did you beforehand have any expectations of what the results from an IMR would be to patients and professionals?

Appendix 4: Consent for participation - all studies

”Medisiner og Fall: Tanker, forståelser og bevissthet til medisinbruk”
Kontaktperson Hege Therese Bell, Doktorgradsstudent og farmasøyt,
Høgskolen i Nord-Trøndelag/NTNU
MTSF, NTNU, 7489 Trondheim
Tel. 92080915, e-post: hege.t.bell@hint.no

Samtykke til deltakelse i forskningsprosjektet:
”Medisiner og fall:
Tanker, forståelser og bevissthet til medisinbruk”

Bakgrunn og hensikt
Leger har ulike forskrivningsmønstre, og de kan ikke alltid forklares ut fra ulike pasientdiagnoser, men beror ofte på ulike terapitradisjoner. Hensikten med denne studien er å undersøke hvilken bevissthet fastleger har til forskrivning og bruk av psykofarmaka (antipsykotika, hypnotika/sedativa, anxiolytika og antidepressiva) og hjerte-karmedisiner til pasienter over 65 år. Det er også ønskelig å kartlegge i hvilken grad fastleger knytter bruken av disse legemidlene opp mot fall hos denne pasientgruppen.

Hva innebærer studien?
Alle som deltar blir bedt om å være med på **ett** intervju. Intervjuet vil foregå som en samtale mellom deg og en forsker. I intervjuet vil du bli spurt om din bevissthet knyttet til forskrivning og bruk av psykofarmaka til pasienter over 65 år, og om du knytter bruk av disse legemidlene til fall hos eldre. Du vil også bli spurt om hvilke forskrivningprosedyrer du har og hvilken kjennskap og oppfatning du har av eksisterende forskrivningsstøtte og ulike kliniske retningslinjer slik som for eksempel NorGeP, STOPP og START. I tillegg vil du bli spurt om dine opplevelser knyttet til forskrivningssituasjonen. Samtalen vil fokusere på dine tanker og din bevissthet knyttet til temaet.

Intervjuene vil vare rundt en time og vil foregå enten på ditt kontor eller på et annet egnet sted om du ønsker det. Det er også en mulighet for at intervjuet kan foregå i forbindelse med etterutdanningsgruppene som du deltar i. Intervjuene vil bli tatt opp på digitalt lydbånd.

Hva skjer med informasjonen om deg?
Informasjonen som registreres om deg skal kun brukes i denne studien. Alle opplysningene vil bli behandlet uten navn eller andre direkte gjenkjennende opplysninger. Det er kun personell knyttet til prosjektet som har adgang til navnelisten og som kan finne tilbake til deg. Lydbåndene vil bli slettet når prosjektet er ferdig, og utskriftene fra lydbåndene vil bli anonymisert. Det vil ikke være mulig for utenforstående å identifisere deg i resultatene av studien når disse publiseres.

Frivillig deltakelse
Det er frivillig å delta i studien. Du kan når som helst, og uten å oppgi noen grunn, trekke ditt samtykke til å delta i studien. Dette vil ikke få konsekvenser av noe slag. Om du senere ønsker å trekke deg eller har spørsmål til studien, kan du kontakte Hege Therese Bell på telefon 920 80 915.

Jeg bekrefter å ha lest informasjonen og er villig til å delta i studien.

Dato og signatur: _____

”Medisiner og Fall: Tanker, forståelser og holdninger til medisinbruk”
Kontaktperson Hege Therese Bell, Doktorgradsstudent og farmasøyt,
Høgskolen i Nord-Trøndelag/NTNU
MTSF, NTNU, 7489 Trondheim
Tel. 92080915, e-post: hege.t.bell@hint.no

Samtykke til deltakelse i forskningsprosjektet:
”Medisiner og fall:
Tanker, forståelser og holdninger til medisinbruk”

Bakgrunn og hensikt
Hvilken forståelse man har av medisinene sine er den viktigste faktoren som påvirker om man bruker de slik legen har anvist. Alle mennesker har sine egne tanker om, forståelser av og holdninger til medisinbruk som det er viktig for helsepersonell å kjenne til. Det er mye vi ikke vet om disse tankene, forståelsene og holdningene knyttet til bruken av medisiner som påvirker søvn, humør, angst samt hjerte og kar. Vi vet også lite om hvordan de som bruker disse medisinene ser på fall, og om de knytter det til medisinbruk. Hensikten med denne studien er derfor å undersøke nettopp dette hos deg som bruker slike medisiner, samt kartlegge hvordan du opplever møtet hos legen når du trenger en ny resept.

Hva innebærer studien?
Alle som deltar blir bedt om å være med på ett intervju. Intervjuet vil foregå som en samtale mellom deg og meg. I dette intervjuet vil du bli spurt om hvorfor du bruker medisinene dine slik du gjør og om du knytter medisinbruken opp mot ustøhet, svimmelhet og fall. Du vil også bli spurt om hvordan du opplever kommunikasjonen rundt medisinbruken din nå du er sammen med helsepersonell som lege, sykepleier og farmasøyt samt dine nærmeste. Intervjuene vil vare rundt en time og vil foregå enten hjemme hos deg, på min arbeidsplass eller på et annet egnet sted om du ønsker det. Intervjuene vil bli tatt opp på digitalt lydbånd.

Hva skjer med informasjonen om deg?
Informasjonen som registreres om deg skal kun brukes i denne studien. Alle opplysningene vil bli behandlet uten navn eller andre direkte gjenkjennende opplysninger. Det er kun personell knyttet til prosjektet som har adgang til navnelisten og som dermed kan finne tilbake til deg mens behandlingen av opplysningene foregår. Lydbåndene vil bli slettet når prosjektet er ferdig, og utskriftene fra lydbåndene vil bli anonymisert. Det betyr at ingen kan finne tilbake til deg fra utskriftene. Det vil ikke være mulig for utenforstående å identifisere deg i resultatene av studien når disse publiseres.

Frivillig deltakelse
Det er frivillig å delta i studien. Du kan når som helst, og uten å oppgi noen grunn, trekke ditt samtykke til å delta i studien. Dette vil ikke få konsekvenser for ditt forhold til fastlege, hjemmesykepleien eller andre. Dersom du senere ønsker å trekke deg eller har spørsmål til studien, kan du kontakte Hege Therese Bell på telefon **920 80 915**.

Jeg bekrefter å ha lest informasjonen og er villig til å delta i studien.

Dato og signatur: _____

Invitasjon til deltagelse i forskningsprosjekt
Identifisering av suksessfaktorer for god samhandling i forbindelse med læringsnettverk i NT

Bakgrunn for prosjektet
Samhandling er et sentralt begrep i politiske føringer i helse- og omsorgssektoren med direkte betydning for praksis. Samhandling innebærer noe mer enn å fordele arbeidsoppgaver, og fordrer at koordinering og gjennomføring av aktiviteter forhandles frem av de ulike aktørene. Det er flere sentrale elementer som trekkes fram som premisser for god samhandling mellom tjenesteytere, slik som varighet av samarbeid, kunnskap om taushetsplikt, avklarte rutiner, felles målsetning, arenaer for samhandling og avklarte roller.

Hovedmål for prosjektet
Kartlegge og undersøke i hvilken grad innføring av læringsnettverk i sykehjem og hjemmetjeneste vil føre til bedre samhandling og kunnskapsspredning, når det gjelder legemiddelbehandling i kommunehelsetjenesten, slik at man oppnår riktigere legemiddelbruk hos eldre.

Metoden som brukes
Kvalitativ forskning kan hente data fra gruppesamtaler. En bestemt måte å gjøre dette på kalles fokusgrupper. Dette er en tilnærming som er spesielt egnet når man ønsker å lære om erfaringer, holdninger eller synspunkter i et miljø der mange mennesker samhandler.

Ei fokusgruppe består vanligvis av fem-åtte informanter som snakker sammen en time eller to under ledelse av en moderator. Moderatoren har en intervjuguide hvor temaene som ønskes belyst er samlet. Det ønskelig å foreta et intervju hvor deltakerne i fokusgruppa stort sett snakker fritt innenfor temaene i intervjuguiden. Moderator skal i utgangspunktet ikke gjøre annet enn å holde deltakerne innenfor ønsket tema.

Det er ønskelig med et eget rom og at det settes av 75 minutter til å gjennomføre fokusgruppeintervjuet. Intervjuet vil bli tatt opp digitalt og senere skrevet ut. Alle deltakere sikres anonymitet og det vil ikke bli mulig å spore uttalelser tilbake til enkeltindivider. Opptakene vil slettes når analysen av intervjuet er gjennomført.

Det vil være en sekretær tilstede i tillegg til moderator for å kunne notere hovedmomenter og forhold som ikke kommer frem på lydfilen.

Ragnhild Omli
Førsteamanuensis
Avdeling for helsefag
HiNT
Ragnhild.omli@hint.no
Tlf: 74212309

Hege Therese Bell
Stipendiat
Avdeling for helsefag
HiNT
hegetheresebell@gmail.com
Tlf: 92080915

Samtykkeerklæring for deltagelse i delprosjekt 2 "Identifisering av suksessfaktorer for god samhandling i forbindelse med læringsnettverk i Nord-Trøndelag"

Undertegnede har lest informasjonsskrivet og har hatt anledning til å stille spørsmål om nevnte forskningsprosjekt. Det er frivillig å delta i studien og jeg vet at jeg når som helst og uten å oppgi grunn kan trekke mitt samtykke til å delta i studien.

Jeg samtykker til å delta.

……	…….	……
Sted	Dato	Underskrift

Appendix 5: Presentation of findings – national and international

Paper	When	Where	Conference/Occasion	Type of presentation
I	June 2014	Tromsø Norway	Norwegian PhD School of Pharmacy (NFIF)	Oral
I	August 2014	Boston USA	International Social Pharmacy Workshop (ISPW)	Oral
I	September 2015	Sundvollen Norway	Norwegian Research School in General Practice (NAFALM)	Oral and Poster
I	March 2016	Oslo Norway	Nasjonal konferanse i alders- og sykehjemsmedisin (Aging and nursing home medicine conference)	Oral
II	June 2017	Reykjavik Iceland	Nordic Federation of General Practice	Oral
III	October 2016	Oslo Norway	European Society of Clinical Pharmacy	Oral and Poster
I-III	May 2016	Paris France	Université Paris Descartes (5th year pharmacy students)	Oral
I-III	February 2017	Copenhagen Denmark	Norwegian PhD School of Pharmacy (NFIF)	Oral
I-III	September 2017	Levanger Norway	Verdighetskonferansen Senter for Omsorgsforskning	Oral

Appendix 6: List of Papers I - III

Paper I

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ORIGINAL ARTICLE

Factors influencing prescribing of fall-risk-increasing drugs to the elderly: A qualitative study

HEGE THERESE BELL[1,2], ASLAK STEINSBEKK[2] & ANNE GERD GRANAS[3]

[1]*Department of Pharmacy, Faculty of Health Sciences, Nord-Trondelag University College, Namsos, Norway,* [2]*Department of Public Health and General Practice, Norwegian University of Science and Technology, Trondheim, Norway,* [3]*Department of Life Sciences and Health, Faculty of Health Sciences, Oslo and Akershus University College, Oslo, Norway*

Abstract

Objective. Explore the situations in which GPs associate drug use with falls among their elderly patients, and the factors influencing the prescribing and cessation of fall-risk-increasing drugs (FRIDs). *Design*. A qualitative study with 13 GPs who participated in two semi-structured focus groups in Central Norway. Participants were encouraged to share overall thoughts on the use of FRIDs among elderly patients and stories related to prescribing and cessation of FRIDs in their own practice. *Results*. The main finding was that GPs did not immediately perceive the use of FRIDs to be a prominent factor regarding falls in elderly patients, exceptions being when the patient presented with dizziness, reported a fall, or when prescribing FRIDs for the first time. It was reported as common to renew prescriptions without performing a drug review. Factors influencing the prescribing and cessation of FRIDs were categorized into GPs' clinical work conditions, uncertainty about outcome of changing prescriptions, patients' prescribing demands, and lack of patient information. *Conclusions*. The results from this study indicate that GPs need to be reminded that there is a connection between FRID use and falls among elderly patients of enough clinical relevance to remember to assess the patient's drug list and perform regular drug reviews.

Key Words: *Drug review, elderly, falls, general practitioner, inappropriate prescribing, primary care, qualitative, Norway*

Introduction

Injuries caused by falls are one of the leading causes of death in elderly, and often lead to longstanding pain and disability [1,2]. The underlying causes of falls are multifaceted, including a combination of biological and environmental factors [3]. A number of drugs called fall-risk-increasing drugs (FRIDs), mainly those affecting the cardiovascular and the central nervous system, have been found to increase the risk of falls [3–6].

Inappropriate prescribing occurs commonly among elderly patients [7–9]. The sum of multiple disease, changed metabolism of drugs, and insufficient knowledge concerning how to use the drugs puts the elderly at higher risk for adverse drug events such as falls. The consequences of such adverse drug events are also decreased quality of life and high cost of health care [10].

General practitioners (GPs) usually manage the whole treatment, including medication management, for the elderly living at home, and they are therefore the main prescribers of FRIDs. Prescribing patterns in general practice vary and cannot be accounted for on purely pharmacological grounds [11]. Inappropriate prescribing of benzodiazepines and z-hypnotics for the elderly is common despite guidelines advising the contrary [12] and many physicians have poor knowledge of guidelines or are unaware of them [13]. General practitioners report that they experience conflicts between adhering to national guidelines and follow the patient's preferences [14].

However, there is still a lack of studies exploring the GPs' motives for providing medical prescriptions [15]. Knowledge regarding whether the GPs associate drug use with falls and how this might affect clinical practice is thus important. The aim of this

Correspondence: Hege Therese Bell, Høgskolen iNord-Trøndelag, Finn Christensens veg 1, NO-7800 Namsos, Norway. Tel: +47 920 80 915. E-mail: hege.t.bell@hint.no

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- Injuries caused by falls often lead to longstanding pain and disability and are one of the leading causes of death in the elderly. Psychotropic, antihypertensive, and cardiovascular drugs (termed FRIDs) contribute to the risk of falls.
- It was found that the GPs did not perceive drugs as a prominent factor in causing falls among the elderly. It was reported as common practice to renew FRIDs without further considerations.
- Access to and quality of the prescribing and de-prescribing support tools, handling outcome uncertainty, and patient demands were said to influence practice.
- GPs need to recognize the connection between FRID use and falls as of enough importance to change practice and perform regular drug reviews.

study was therefore to explore whether GPs associate drug use with falls among their elderly patients, and the factors influencing prescribing and cessation of FRIDs.

Material and methods

This was a qualitative study with focus-group interviews of GPs held in Central Norway during May and June 2013. The Regional Ethics Committee for Research in Medicine of Central Norway approved the study, and the participating GPs signed written consent.

Setting

In Norway, all citizens are entitled to have a GP who is responsible for providing general healthcare, and 99.6% of the population were registered with a personal GP by the end of 2012. In 2009 the elderly above 60 years had on average more than three consultations per year and those above 80 years up to five [16]. GPs have access to support tools for prescribing and cessation of possible inappropriate drugs for elderly, such as the NORGEP criteria (Norwegian General Practice Criteria) [17], the START/STOP criteria (Screening Tool to Alert doctors to the Right Treatment/Screening Tool of Older People's potentially inappropriate Prescriptions) [18], checklist on how to perform drug reviews [19] and the National Guidelines on the Use of Habit Forming Drugs [20]. The latter includes the driving licence regulation, which explains explicitly how much of a specific prescription drug a driver is allowed to use whilst driving.

New GP legislation from 2013 states that for patients who use four or more drugs the GP is supposed to perform drug reviews when considered necessary from a medical point of view [21]. However, this regulation does not state the frequency of drug reviews or whether they should be multidisciplinary.

Informants

The aim was to recruit GPs with experience in prescribing for the elderly. To ensure variation, we recruited GPs of both genders, with different length of experience and from different GP offices. Participants were recruited through two peer-continued medical education groups (CME). To keep their specialization, GPs in Norway are obligated to attend such groups at least three times, for a minimum of six hours, during each 12-month period [22].

Data collection

The semi-structured focus-group [23,24] interviews were conducted as part of an already scheduled CME meeting. The interviews lasted approximately one hour and were led by the first author (HTB). The term FRIDs was accounted for by referring to the drug groups psychotropic drugs, antihypertensive drugs, and cardiovascular drugs [25,26]. The open-ended questions in the interview guide used for this study were:

- In which situations do you associate drug use with falls among the elderly above 65 years and what factors influence your prescribing and cessation of FRIDs?
- What are your overall thoughts on the use of FRIDs amongst elderly patients?
- What are your experiences of consultations with elderly patients and their next-of-kin regarding FRIDs?

Data analysis

The focus-group interviews were digitally recorded and transcribed verbatim. They were analysed using the method of systematic text condensation [27], which consists of an iterative four-step process. In the first step, all authors read the transcripts, and preliminary themes were then identified and discussed. In the second step, the transcripts were coded according to these themes by identifying meaning units and the main themes were adjusted. In the third step, the meaning units were arranged into subthemes and a condensate was made of each theme and sub-

theme. In the last step, an analytic text was produced based on each theme and subtheme. The themes and the analysis were discussed in an extended research group to ensure validity. During the whole process, the authors went back to the transcripts to ensure that the analysis was based on them.

Results

Participant characteristics are listed in Table I. When starting the interviews the GPs' immediate response was that they did not perceive the use of drugs among their elderly patients to be a prominent factor in causing falls. Upon reflection two exceptions were expressed: when they received an external probe to do a drug review and when they prescribed FRIDs for the first time. The factors influencing the prescribing or cessation of FRIDs were categorized into the following subthemes; consultation time, guidelines and prescribing support, uncertainty about outcome of change in FRIDs, patient's demand for prescriptions, and not getting all information about the patient.

Drugs not perceived as a prominent risk factor for falls

The sum of multiple factors such as alcohol use, slippery floors, domestic obstacles, multiple diseases, and poor quality of life were spontaneously mentioned by the GPs to be equal or more important contributors to falls than drugs. After further elaboration antihypertensive drugs were also mentioned as a potential challenge due to orthostatic hypotensive side effects. Orthostatic hypotension was perceived to be a greater contributor to falls than the use of psychotropic drugs.

> To be honest I believe it is the sum of many factors like alcohol, domestic traps, multiple diagnosis, and bad quality of life, due to poor sleep, that makes them fall. (Male GP, 10 years of practice)

Table I. Participant characteristics.

	Focus group 1 n = 5	Focus group 2 n = 8	Total n = 13
Female (n)	1	2	3
Years as GP (n)	7–11	11–36	7–36
Specialist in general practice	4	8	12
Specialist in another medical discipline	1	1	2
Number of different GP offices	5	7	11*

Note: *One GP from FG1 and one from FG2 came from the same GP office and two GPs in FG2 worked at the same GP office.

When asked how consultations regarding FRIDs took place and how they communicate with the patient the GPs said that the majority of their elderly patients had used the same FRID for many years. It was therefore common practice to renew any prescription without performing a drug review, the reason being no perceived medical indication for a change and also reluctance to change a treatment that seemed to work even though they knew patients received potentially inappropriate prescriptions. The GPs would continue to prescribe FRIDs if they perceived that termination of that medication would negatively affect the patient's quality of life. Drug addiction was generally not seen as a problem in this patient group compared with younger patients.

> Long-term treatment passes by without my questioning. We know that inappropriate combinations occur sometimes, but we daren't make changes since things seem to work, at least to a certain extent. (Female GP, 7 years in practice)

One situation leading to a consideration of the drug prescribed was if a patient had fallen or had presented with symptoms such as dizziness. This information could come from the patient, the next-of-kin or in a hospital discharge letter. Some GPs said they especially appreciated discharge letters in which someone had done a medical review and made suggestions for alterations on their prescribing. These external probes triggered considerations and decisions about whether to terminate the drug or change its dose. This made them aware of those previously effective drugs that might now be ineffective due to physiological age-related changes. It was said that discharge letters could serve as a general reminder of regular drug reviews for the elderly.

> If a patient has fallen I feel guilty, and the patient's medication list comes to mind as a possible explanation. (Male GP, 26 years in practice)

The initiation of a new FRID was also a situation where drug use was linked to falls. In this case, an accurate diagnosis was said to be important to ensure correct prescribing; to do a thorough examination of the patient in order to ensure that there was an indication for the drug; and to exclude other possible explanations for the symptoms. Before prescribing hypnotic drugs, some GPs said they would initially make an effort to explain changes in sleep patterns due to age, to make it clear to the elderly patient that they could not necessarily expect to sleep as much as when they were younger. If the consultation resulted in a prescription, they would thoroughly explain both effects and side effects. First-time

prescribing of FRIDs was perceived to occur more rarely than renewal of existing prescriptions.

> It is very important that the diagnosis is 110% and that they use the drug only for a short period of time. Start low and go slow. (Male GP, 23 years in practice)

Consultation time, guidelines, and prescribing support

The GPs said that the time set aside for consultations affected prescribing since elderly patients usually do not visit very often but when they do, they present with many issues. The perceived high workload, resulting in little time for each issue, was therefore given as a reason for renewed prescription of FRIDs.

> If he struggles with his sleep that is only one of many problems. I do not arrange a new appointment to just talk about his drugs. That will be a complication for both him and me. (Male GP, 9 years in practice)

Existing national prescribing guidelines were not perceived to be suitable when prescribing drugs for the elderly. The reasons given were that such guidelines cover only one disease and therefore do not reflect the complexity in primary care. In addition elderly people with polypharmacy and multiple diseases were perceived as very different from the population the guidelines were based on. Lack of suitable guidelines therefore contributed to the habit of renewing FRID prescriptions without a drug review. The GPs felt that if they were to follow all existing guidelines for a patient with multiple diseases the patient would be prescribed many more drugs than were appropriate. Some GPs also reflected upon the age at which they should stop attempting to prevent future diseases in a patient, since there is a trend for existing guidelines to no longer define an age limit.

A pull factor that could initiate change in prescribing of FRIDs and other drugs was the electronic prescription system and the multi-dose drug-dispensing system. One GP said that these two systems improved the possibility of gaining an overview of the patient's drug use and also of preventing over-prescribing and misuse. Some of the informants also found it helpful to receive notifications from the electronic prescription system when patients had picked up prescriptions in the pharmacy, allowing them to monitor adherence. However, on the push side another GP strongly expressed frustration related to too many alerts by the software indicating drug interactions; this was perceived as annoying and counterproductive.

> These new systems have forced me to go through the medication lists frequently. When I use the electronic prescription system, the whole medication list is presented each time I prescribe. I can no longer say, "I forgot you were using that drug" when talking to a patient. It also forces me to reflect on whether the patient really needs all these drugs or if I should remove some of them. (Male GP, 36 years in practice)

Uncertainty about outcome of change in FRIDs

Handling outcome uncertainty was perceived as a factor affecting both the prescribing and the cessation of FRIDs. To know that a drug might both be beneficial and harmful was described as a dilemma. When it was considered appropriate to end a FRID, decisions were made depending on the class of drug and the specific disease. The GPs described incidents in which terminating a drug had worsened the patient's condition, but also the opposite when reducing the number of drugs to a bare minimum made the patients blossom. The paradox of not being able to predict the outcome of changes in drug treatment was perceived as challenging and uncomfortable. They found it easier to remove drugs the patient did not like, such as antihypertensive drugs, compared with psychotropic drugs. They assumed that from the patient's point of view this had to do with the type of withdrawal symptoms or absence of such, and also with the patient's experience of the condition being treated. The GPs said that the patients might be reluctant to terminate psychotropic drugs due to the drug being perceived as an assurance in life, and that termination of the drug would create great discomfort and a nocebo effect. From the GPs' point of view, they found it easier to explain and understand the pharmacological causality of adverse drug reactions such as dizziness from antihypertensive drugs compared with reactions from psychotropic drugs. The knowledge that physiological changes often lead to orthostatic hypotension due to ageing itself was mentioned as a reason, but it was also perceived as easier to examine the possible correlation between dizziness and orthostatic hypotension.

> I find it is easier to remove antihypertensive drugs compared with psychotropic drugs, since I better understand the pharmacological correlation between the effect of the drug and the symptom of dizziness. (Male GP. 9 years in practice)

Patients' demands for prescription

Prescribing demands by the patient were not mentioned spontaneously by the GPs. When asked, the GPs described the elderly as modest and

undemanding compared with younger patients. However, they could put some pressure on the GPs, e.g. by asking for their annual prescription of sleeping pills just before leaving the consultation room leaving little chance for discussion. In addition the GPs described situations where the elderly person or next-of-kin expressed a deep need for sleeping pills and the GP found it unpleasant to say no. One GP expressed that he found it easier to say yes and that it was a limitation to how many times he had the energy to say no during one day. It was described as unpleasant to say no, in spite of the drugs' potential side effects, when the GP perceived the drug to be a possible solution to the patient's problems.

> Many patients are very fond of their drugs and are very reluctant to end the treatment. Then my threshold to let them continue is often low. (Female GP, 11 years of practice)

It was described as difficult to terminate a drug due to a feeling of letting the patient down, especially in those patients who had used the drug for a very long time. Deeper conversations and pharmacological explanations were mentioned as the best approach to getting the patient to support the decisions for termination or dose-reduction of a drug. When the patient offered resistance to terminating a psychotropic drug the GPs said they appreciated if they could get others to support their decisions, like receiving a specialist's second opinion or that of the next-of-kin. They perceived it to be easier for the patient to accept a drug termination when more than one professional supported the decision.

> It might be our bad consciences that make it easier to write a prescription. Most patients are initially more satisfied if they get one. But if you take time to talk, the majority of patients will understand that a prescription is not always the only possible solution. (Male GP 36 years of practice)

The GPs generally agreed that their patients sometimes take FRIDs such as psychotropic drugs for too long and at too-high dosages. However, this was said to be difficult to alter because the GPs perceived that the patients were not motivated for change. The driving licence regulation was highlighted as a gateway to change, as the GPs could use the dose range given in the regulation to both explain side effects related to the drug's use and to justify a drug's termination. By using this regulation, they felt they could shift the responsibility for such a difficult decision onto the authorities.

> If I use the driving licence regulation to justify termination of a drug, it feels as though it is not solely my decision and I am no longer the "executioner". Then they have the choice of either keeping their driving licence or the psychotropic drug. (Male GP, 8 years in practice)

Not getting all information about the patient

The GPs told of situations where they felt that they did not have all the relevant information about the patient and this was said to affect both prescribing and termination of FRIDs and whether they performed drug reviews. Patients sometimes withheld important information concerning side effects from the GP, in fear of either being taken off the drug or being forced to move home to a nursing home.

The next-of-kin attending the consultation with the patient was in this regard viewed as helpful to ensure that vital information was available and exchanged. The next-of-kin could also help to gain better insight before making a decision, especially so for patients living in nursing homes.

> We need to rely upon our observations and the information given by the patient at consultations. Sometimes we need to act without having access to the whole picture. (Male GP, 36 years of practice)

Discussion

Drug use was not immediately perceived by the GPs as a prominent factor in falls among the elderly. It was reported as common practice to renew FRIDs without further consideration of the drugs in use. Factors such as the GPs' clinical work conditions, uncertainty about outcome of changing prescriptions, patients' prescribing demands, and lack of patient information were also found to affect prescribing and cessation of FRIDs and whether a drug review was performed.

Strengths and limitations

The strength of this study was the wide variation in the sample regarding working experience, gender, and GP offices. Since we used existing CME groups, the interviewees knew each other in advance and this might have contributed to a more relaxed and free-speaking environment. However, any former disagreements might have limited the discussions.

Two of the authors being pharmacists (first and last author) with an interest in and experience of issues related to appropriate drug prescribing and patient empowerment would naturally affect what is emphasized in the results. It cannot be ruled out that the GPs avoided some points due to social desirability, but our

judgement is that we obtained a fair representation of their actual opinions, as some of the things that were said could be perceived as reflecting negatively upon the GPs.

A limitation was that the interviewees came from CME groups in only one city in Norway. Although this might hamper the transferability, the findings are similar to other studies in other contexts indicating that some general themes identified have external validity [28]. The numbers of focus groups were low and saturation might not be met. However, there are similar studies with the same number of focus groups and participants [28].

Contribution of FRIDs in falls

The GPs in this study correctly identified some of the other central risk factors for falls that have been documented in the literature in addition to drug use, such as advanced age, previous falls, increased disability, musculoskeletal problems, and neurological diseases [3,29]. Diseases such as depression, heart failure, or hypertension may increase fall risk, but so also may the drugs used to treat these conditions, and the fall risk increases with an increasing number of simultaneously occurring chronic diseases and risk factors present [25,26,30].

However, the GPs in our study did not consider drug use to be an important enough risk factor for falls in general to let it affect their habit of renewing prescriptions of FRIDs without performing regular drug reviews. This is in contrast to research findings, in which the use of FRIDs is found to be associated with an increased risk of falls even after adjustment for comorbid conditions and disability [3]. Several others have confirmed the relationship between number of prescription drugs and falls, although the definition of polypharmacy has varied [25,29,31–33]. Higher doses of antihypertensive drugs have been shown to be independently associated with falls in older people, with a 48% greater risk in those with a daily defined dose of more than three, particularly in those with a history of stroke [34]. In particular the use and dose of psychotropic drugs such as hypnotics/anxiolytics and antidepressants has been linked to falls even when adjusted for chronic disease status [30,35,36].

In light of both polypharmacy and multimorbidity being factors that increase the risk of falls, it is understandable that this complexity might give rise to insecurity when assessing the prescribing and cessation of FRIDs for elderly patients. The GPs in our study had experienced both favourable and unfavourable results of changing prescription, creating an uncertainty about which outcome to expect and an attitude that it might be better not to change prescriptions and therefore to renew prescriptions of FRIDs. Whether this is anchored in a fear of making mistakes was not further looked into in this study, but other studies has showed that there exist "non-pharmacological" prescribing reasons [11,37].

Different tools have been developed to assist GPs in these complex situations such as the Beer criteria [38], the START/STOP criteria [18], and the NORGEP criteria [17]. There is less research performed on assisting best-practice de-prescribing [39] and the lack of such research might have an impact on GPs' habit of keeping the status quo and not terminating possibly inappropriate drugs. The GPs in this study reported being more influenced on cessation of FRIDs from national prescribing support initiatives than guidelines since the latter were perceived as not suitable. This is consistent with other research showing that external validity of research evidence-based guidelines is perceived as problematic in general practice [40]. Both the e-prescription system and the driving licence regulation were perceived by the GPs as of great value. By using the driving licence regulation they felt they could shift the responsibility of the difficult decision on to the government. This was in contrast to when they used guidelines and criteria and might felt that they had to vouch for the decision by themselves. This might indicate a greater wish for shared decision-making than revised guidelines.

Regular drug reviews

Our results indicate that GPs do not necessarily follow the precautionary principle when prescribing FRIDs to the elderly. Research has shown that drug-related events such as falls are often associated with unnecessary prescriptions [41], too long a duration of drug treatment [42], and the lack of drug reviews on repeated prescriptions [43]. It has been stated that it is important to review the indications and evidence for continuing long-standing drugs on a regular basis for elderly patients [44–47] and re-evaluation of drug therapy has been mentioned by several authors as one of the major prevention strategies against falls [48,49]. A thorough anamnesis, regular blood pressure control, and regular drug reviews have been suggested to be obligatory tasks to prevent falls in all parts of the health care system [50].

Since the GPs in this study did not spontaneously comment on the drug-review paragraph in the new GP legislation, and the reimbursement connected to it [21], there is still an open question as to whether this will lead to regular drug reviews. The GPs stated that they appreciated hospital discharge letters where someone at the hospital had performed a

drug review and made suggestions for alteration. This might indicate that the GPs could be open to accept input on their drug care from others.

Drug reviews can be performed by GPs alone or supported by other health personnel, such as nurses and pharmacists [51]. Drug-review interventions where clinical pharmacists have formulated prioritized written recommendations to the GP have been associated with reductions in inappropriate prescribing in older outpatients showing a reduction of 24% compared with 6% in the control group [52]. In another study community pharmacists met with GPs to discuss possible drug changes based on clinical drug reviews. This showed a significantly improved Medication Appropriateness Index in the intervention group [53]. In light of the results of this study, where the GPs appreciated the ability of support in difficult situations, receiving input from other health personnel on possible changes in prescribing and cessation of FRIDs might be a reasonable way to reduce inappropriate prescribing of these drugs.

The results from this study indicate that GPs need to be reminded that there is a connection between FRID use and falls among elderly patients of enough clinical relevance to remember to assess the patient's drug list and perform drug reviews on a regular basis.

One way to change GPs' behaviour could be to offer the GPs help with reviewing their patients' prescriptions and suggest alterations.

Ethical approval

The Regional Ethics Committee for Research in Medicine of Central Norway approved the study, and the participating GPs signed written consent.

Declaration of interest

The authors report no conflict of interest. The authors alone are responsible for the content and writing of the paper.

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Paper II

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Hege Therese Bell, Aslak Steinsbekk & Anne Gerd Granas

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Elderly users of fall-risk-increasing drug perceptions of fall risk and the relation to their drug use – a qualitative study

Hege Therese Bell[a,b], Aslak Steinsbekk[b] and Anne Gerd Granas[c]

[a]Department of Pharmacy, Faculty of Health Sciences, Nord University, Namsos, Norway; [b]Department of Public Health and General Practice, Norwegian University of Science and Technology, Trondheim, Norway; [c]School of Pharmacy, University of Oslo, Oslo, Norway

ABSTRACT

Objective: The aim of the study was to explore how home-dwelling elderly who use fall-risk-increasing drugs (FRIDs) perceive their fall risk and how they relate this to their drug use.

Design, setting and subjects: A qualitative study with 14 home-dwelling elderly FRID users between 65 and 97 years in Central Norway participating in semi-structured individual interviews. The data were analyzed thematically by using systematic text condensation.

Results: The main finding was that the informants did not necessarily perceive the use of FRIDs to be a prominent risk factor for falls. Some informants said they did not reflect upon drug use whatsoever and said they fully trusted their physician's choices. When either experiencing dizziness, fall episodes or by reading the patient information leaflet the informants said to either adjust their drug use or to contact their physician. Some felt rejected due to not getting their point across or their wish to alter the drug was not granted by the physician.

Conclusions: Elderly FRID users did not necessarily relate their drug use to fall risk or struggled to present their perceived drug-related problems. Physicians need to regularly inform, monitor and assess the drug treatment when treating elderly with FRIDs.

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Fall risk; elderly patients; fall-risk-increasing drugs; physicians

Introduction

Elderly persons are more prone to falls [1] and falls are a prominent cause of unintentional injury [2]. More than every third person above 65 years fall each year and the frequency increases with age and frailty level and falls account for 40% of all injury deaths [2]. The underlying causes of falls are multifaceted, including a combination of biological and environmental factors [3], e.g. aging [4], different diseases [5] and the use of drugs [6].

The aging process involves changes that lead to reduced homeostatic reserves and make the person vulnerable to dizziness and other fall risk factors [4]. However, when asked, persons between 60 and 96 years old associated older age with physical and mental decline, but did not necessarily consider themselves as old except in periods when experiencing physical decline [7].

Dizziness increases the risk of falls [5] and in elderly over 75 years dizziness is a frequent reason for visiting the family physician, accounting for one of 10 visits during one year [8]. Prevalence of dizziness has been reported by 17.5% for the age group 60–80 years and 31.0% for those above 80, with a higher prevalence in women [9]. Studies of elderly's experiences of living with dizziness found that they fought to live a normal life [10], to understand the causes [8] and also to get accurate information in order to handle or control the dizziness [11].

Studies on fall-related knowledge among community-dwelling elderly show that the elderly recognize fall-risk factors, especially exterior factors like rugs, furniture and pavements, but do not consider themselves susceptible to falling [12]. When asked to recognize factors that affect the recognition and reflection of fall risk, the elderly mentioned alarming experiences, gradually growing insight, sharing mutual experience and public information [13]. Older people often support fall-prevention advice for others, but not for themselves [14].

Dizziness and the risk of falling significantly increase with the number of drugs [3] especially when using fall-risk-increasing drugs (FRIDs) like psychotropic drugs and some drugs affecting the cardiovascular system [6,15]. FRIDs are associated with impaired postural

CONTACT Hege Therese Bell hege.t.bell@nord.no Skjermvegen 60a, 7023 Trondheim, Norway

control and adverse effects like orthostatic hypotension [15]. We have not been able to find studies investigating whether elderly persons link FRID or drug use in general with risk of falling due to, e.g. dizziness and how they handle their drug use if they perceive there to be a connection. The aim of the study was therefore to explore how home-dwelling elderly FRID users perceive their fall risk and how they relate this to their drug use.

Materials and methods

This was a qualitative study with individual semi-structured interviews. The data collection took place in an urban municipality in Central Norway from May 2013 to October 2014. The Regional Committees for Medical and Health Research Ethics of Central Norway approved the study (2012/2163).

Setting

All residents in Norway are entitled to a regular general practitioner (GP) for providing general healthcare [16] and 99.6% of the population are registered with a GP [17]. Home-dwelling elderly receive their medical service from their GP [17], but might be prescribed FRIDs from other physicians like hospital physicians and other specialist physicians [17]. Norway had by April 2016 14.1% aged 67 years or older [18]. Fall injuries are ranked as the sixth most important contributor to burden of disease in Norway ranked over cardiovascular disease [19]. According to the Norwegian Prescription Database [20], 573,000 persons above 65 years use a vasodilator drug (ATC-C01, C02CA, C08, C09A-D). The corresponding number for neuroleptic drugs (ATC-N05) is 258,000, respectively.

Informants

The aim was to include elderly persons living at home, above the age of 65 that used FRIDs. To ensure variation, we included informants with a registered fall but also elderly that both did and did not self-report a fall or experienced dizziness. In addition, we strived to get a variation in gender, age and FRID.

To recruit informants, several approaches were used. The first author presented the study and distributed the information letter to the unit for Health and Social Care at the municipality and to different senior associations. To increase the chances of getting informants who had registered a fall, an employed pharmacist at the orthopedic department at the University Hospital informed eligible patients about the study and handed out information letters. In addition, the word was spread throughout the authors' local networks of elderly.

Data collection

Data were collected using individual face-to-face semi-structured interviews [21] at the homes of the elderly except one interview conducted at a recovery nursing home. Before the interviews started, more detailed information was given and the written consent was signed. The interviews lasted from 21 to 87 minutes.

The first author performed the interviews according to a preset topic guide to ensure that all aspects of interest were covered in all the interviews. The participants were also encouraged to talk freely about related topics. The main questions in the interview guide were as follows:

- 'Have you experienced dizziness or falls? Can you explain to me what happened?'
- 'Can you tell me which medicines you are taking and what information you have received from your physician?'
- 'Do you associate the use of your medicines with dizziness and falls? Please explain'.

Data analysis

The interviews were digitally recorded, transcribed verbatim and analyzed using the method of systematic text condensation (STC) [22]. STC is suitable for descriptive transversal analysis of phenomena [21]. The method consists of an iterative four-step process starting with making four to eight preliminary topics based on a total impression of the data. To do so, the first author read all the transcripts and chose the three richest transcripts, according to the aim of the study, that were read by all authors. In the second step, the first author went through all the data and identified and sorted meaning units that elucidated the study question into the preliminary topics. Then these topics with subtopics were adjusted, refined and renamed as a result of discussions between the three authors. This was done in several stages. In the third step, the first author wrote a condensate for every subtopic. The condensate is an artificial quotation maintaining the original terminology used by the participants. In the last step, the first author produced an analytic text for each subtopic based on the condensates to ensure closeness to the original wording used by the informants. In this step, the text is reconceptualized and the synthesized results reflect the validity and wholeness

Table 1. Demographic characteristic of the participants.

	Number
Gender	
Female	7
Male	7
Age	
Age range women in years (mean)	79–97 (87)
Age range men in years (mean)	66–85 (76.7)
Handling drugs themselves	12
Dizziness and fall injuries	
Reported dizziness	4
Reported fall injuries	4
None of the above	6
Drugs	
Range number all drug women (mean)	3–14 (7.4)
Range number all drug men (mean)	2–9 (4.7)
FRIDs	
Range all FRID women (mean)	1–4 (2.4)
Range all FRID men (mean)	1–4 (2.3)
	(Number of appearance among informants)
Drug classes FRIDs	β-blockers (5), A II-blockers (5), Ca blockers (5), Diuretics (5), Z-hypnotics (4), antidepressant (3), ACE inhibitors (2) and α-β-blockers (1)

of their original context [22]. There were regular inputs from the co-authors during all steps of the analyses. During the whole process, the authors went back to the transcripts to ensure that the analysis was based on them. The themes and the analysis were also discussed in an extended research group to ensure validity.

Results

A total of 14 home-dwelling elderly FRID users were interviewed. There was an equal distribution of gender with a mean age of 81 years. Their mean total number of drugs and FRIDs was 6.1 and 2.1, respectively. Further characteristics of the participants are listed in Table 1. The findings were categorized into three main themes that sum up the participants' perception of fall risk and the relations to drug use (Table 2). The themes are as follows:

'It is not related to drug use'

The main impression from the interviews was that the informants did not perceive to have a particular risk of falling. If they did, they did in general not relate this to their drug use. None of the informants used the word risk of falling, but rather spoke of dizziness, unsteadiness and similar terms.

Other risk factors perceived as more prominent

Some informants did not see themselves as having any personal risk for falling whatsoever.

> I do not feel dizzy. I have a very good balance. I actually do. (Woman 84 not dizzy/no falls)

When asked elaborating questions, some of these informants said that in certain situations, they could feel dizzy or unsteady. However, these informants said that they did not necessarily perceive their fall risk as a particularly prominent challenge. On the contrary, it was emphasized how much they still were capable to manage in their daily life. When asked to give more details of what they saw as possible risks for falling, they listed factors like worsening eyesight, different diseases, slippery surface due to wearing socks indoors or icy ground outdoors, weaker muscles and the perception of a rigid body which hindered steadiness, stumbling due to, e.g. furniture standing in their way or being in a hurry.

> I fell once out on the balcony. I was wearing my slippers. It was a thin layer of ice. There was nothing related to drug use. (Woman 85 not dizzy/no fall injury)

Adapting everyday life instead of bothering the physician

The informants talked about how they adapted their everyday life to handle their fall risk. This was done through showing a little more caution when getting out of bed in the morning or rising from a chair, to use stair railings or to stop performing certain activities like cross-country skiing or other sports. The reason for doing so was the effort of getting up from the floor or the ground if they had fallen.

> When I get up in the morning I have to wait for the head to get on place before I stand up. I walk like a one year old – I guess that is how it is when you are getting old. (Male 84, not dizzy/no fall injury)

Table 2. Overview of findings.

Main theme	Subthemes
'It is not related to drug use'	Other risk factors perceived as more prominent
	Adapting everyday life instead of bothering the physician
Suspecting the drug	Information about drug as a fall risk factor
	Adjusting drug use by themselves
Communication with the physician about drug use	'I trust my physician when it comes to drugs'.
	Feeling rejected by the physician when presenting a problem
	The trade-off between the effect and side effect

These informants said to hold back contacting a physician when experiencing dizziness or other symptoms related to fall risk. When asked to give grounds for why they refrained to address their problems, the informants perceived the physicians as too busy or they got the impression that they were only allowed to express one problem at a time during their consultation. One informant said that she did not think the physicians always had the answer to all types of questions.

> I do not know if that is something to trouble the doctor about. (Woman 79, fall injury)

Suspecting the drug

There were informants who said they were afraid of falling and they connected this mainly to dizziness. These informants did not settle down with the explanation of their dizziness and/or fall episode(s) to be an accident or caused by aging. None of the informants were familiar with the term FRID and therefore spoke about their drugs in general. They talked about how they after experiencing repeated dizziness or fall episodes had eliminated other plausible causes and then the idea of the drug causing the problems had emerged. Examples of this were, e.g. having a hangover feeling of being heavy headed the morning after using a sleeping pill. One informant described two scary fall episodes two nights in a row when heading for the toilet which made him anxious and unwilling to continue taking sleeping pills. Another informant using an antihypertensive gave a rich description on how he almost fainted when bending down to tie his shoes. Informants experiencing similar episodes expressed a wish to understand the causes of their perceived dizziness or unsteadiness since this gave rise to fear of new fall episodes or stress due to not being able to predict the next episode.

> It is the dizziness that bothers me the most (…) I believe for sure that it has to do with the drugs. (Man 78, dizzy)

Information about drug as a fall risk factor

One of the informants said that he could recall his GP informing him about dizziness as a side effect of the FRID and to regularly ask him whether he felt dizzy. However, to be informed by physicians of other side effects like addiction from, i.e. sleeping pills was more common.

Regardless of information from their physician, most patients always read the patient information leaflets (PILS). This information was at times frightening and gave rise to new questions, especially for those who expressed concerns about side effects. One informant explained how he always read through the information leaflets when he was prescribed a new drug in search of description of dizziness. For informants talking about an association between dizziness and drug use, the role of the PILS was central, but they did not necessarily have a clear opinion of what came first. They could either read the leaflet and then becoming aware of their dizziness, or they felt dizzy and then connected this to information in the PILS.

> It is not the smartest thing to read the information leaflets, because they can scare you to not dare to take any medicine. What I have found out about side effects I have read myself…. (Man 70, dizzy/fall injury)

Some informants mentioned their local pharmacist or someone from their social network using the same drug as the ones making them aware of drugs as a risk factor for falls. When suspecting the drug to be the cause and presenting this as a problem at the pharmacy, the pharmacist was said to come forward as an information source confirming their suspicion and to elaborate the information from the drug leaflet. One informant underlined that you cannot necessarily trust information about side effects in your social network since all experience drugs differently.

Adjusting drug use by themselves

There were informants who said they modified their drug use without contacting their physician when suspecting their drug. One informant said she had started taking her antihypertensive at bedtime instead of in the morning to avoid feeling tired during the day when reading in the PILS that the drug could cause drowsiness. Another informant described how he felt unwell and confused after using a psychotropic drug for his sleeping problems and therefore had to stop

taking the drug. The same informant was later prescribed another type of sleeping pill where he after a while adjusted the dose without informing his physician mainly due to the wish of sleeping naturally, but also because of feeling heavy headed in the morning.

> The morning after taking a sleeping pill (…) it can be like when you drink alcohol and gets too much of it and then when you get up the next morning. (Man 79, dizzy)

Communication with the physician about drug use

There were informants who said they did not talk specifically about the drugs with the physicians because they trusted their physician, while others wished for their prescriber to always go into details about the drug's potential side effects. It was variation in how much they said they knew about the purpose of their drugs, ranging from the ones who took what was prescribed without knowing specifically or had misconceptions to why the drug was prescribed to those that had detailed knowledge. The informants did not always know the name of their FRID, neither brand name nor generic name, but did recognize the drug's therapeutic category like, e.g. 'high blood pressure' or 'sleeping pill'.

> I am not sure if it is for my heart – is it? (Woman 97, fall injury)

I trust my physician when it comes to drugs

The reason given for trusting their physician was that physicians are well educated and this makes their choices trustworthy. Furthermore, to prescribe and treat was said to be the physician's responsibility and not theirs. They therefore accepted a drug even though they not always understood why treatment was initiated. They did not necessarily have that many expectations of any additional information about their drug during the consultation beyond the written instruction on the label that was perceived as enough information.

> I guess I get the information I need, but maybe I should have asked more questions…. I have just accepted it, because I fully trust my GP. I do not have an opinion (…) because that is up to the GP to decide. It is his responsibility. (Woman 79, fall injury)

As the citation shows, there were also informants who said that it might not solely be the physician's job to inform during the consultation but just as well their responsibility to ask more questions.

Feeling rejected by the physician when presenting a problem

The informants said it sometimes was difficult to get your point across when presenting a diffuse bodily discomfort perceived to affect their quality of life to the physician or when asking more specifically whether their drug could cause their fall risk. Sometimes the physician refrained to make any changes, arguing there were no alternatives. Informants perceived this as being rebuffed and were not satisfied with the answer or the argumentation given. In particular, this concerned informants using statins that caused muscle pain and restless legs perceived to affect their balance. One of them felt rejected by his GP when he asked whether his statin could cause his muscle aches. He thereby asked his local pharmacist who encouraged him to present the symptoms to the GP once again. The other patient, taking a maximum dosage of a statin, said she had failed to make her GP understand why she had a tingling and stinging pain in her feet and therefor said she had given up to resolve her symptoms. This informant said she did not feel dizzy and emphasized that it was her body and not her head that had caused her two fall injuries.

> I asked my GP once 'Can you please explain to me why I get this stinging feeling in my legs? It feels like there is something walking around in my veins'. He could not give me an answer and then he did not talk more about it. It might just be aging, but I find it strange that it moves around and stop when I touch my leg. (Woman 79, fall injury)

The trade-off between the effect and side effect

When the physicians did acknowledge the informants' complaints as drug related, the physician either reduced the dose straight away or left it to the patient to reduce the dose or to stop the drug altogether. The physician could ask the patients whether they still were in need of their drug when experiencing severe side effects. When asked the same question during the interview, there were informants that pointed at the contrast of a perceived need of the drug to be able to live their lives but at the same time the unpleasant experience of the drug to affect their risk of falling.

> I believe that if I had not taken sleeping pills I would have felt worse in the morning. (Woman 89, fall injury)

In some cases, the informants said they were asked by their physician to themselves regulate the dose to balance effect and side effect. One informant described the relief he felt when his drug calmed his galloping heart allowing him to sleep at night, but at

the same time how he struggled with dizziness during daytime. This patient did not appreciate to be given such a responsibility and therefore perceived the trade-off between the wanted effects against the unpleasant side effect as a dilemma.

> When the hospital physician called me back I told him that the metoprolol is affecting my quality of life and make me anxious about when the dizziness will emerge. (…) He understood me and said 'that is why we need to do something about it'. He told med I could reduce the dose to 25 mg, but it was up to me. (…) I want to discuss it with my GP first so that I don't have to make the decision entirely on my own. (Man 66, dizzy)

Discussion

The overall impression was that the informants saw aging and external factors as more plausible risk factors for falls than drugs. Those who suspected their drug to affect their fall risk said the suspicion had grown upon them after either experiencing severe dizziness or fall episodes or after reading the PILS. It was rarely connected to being informed by health personnel or someone in their social network. It was common to trust the physician and to not reflect much upon drugs and drug use. However, when presenting either with a wish to find a cause, alter or discontinue the drug a feeling of rejection could occur when they felt, they did not get their point across. It was also perceived as a dilemma to be given the responsibility to be the one to balance effect and side effect by choosing themselves how much medicine they should take.

Strength and limitations

We found both new perspectives and confirmations in the literature of our findings that ensured the validity of our results. Furthermore, the narrow aim and the diversity of eligible informants regarding gender, age and number of drugs in addition to comprise informants who both had and had not experienced dizziness and falls gave this study sample a high information power [23]. However, only four of the informants had experienced fall injury and an additional four reported dizziness that can be perceived as a limitation of the sample. Additionally, the interviewees had an interest in the subject that might affect the transferability of the findings due to the limitation in the diversity of the perspectives. However, all interviews, except one, were conducted at the elderlies' homes in addition to the interviewer being a pharmacist with long experience talking to elderly patients that contributed to a relaxed atmosphere assuring good quality dialogues. The analysis was performed by three researches with different backgrounds that contributed to different perspectives. In addition, the results were discussed in an extended research group that also strengthened the validity.

In need of information – perception of fall risk and knowledge of drugs

The main finding was that the informants in our study did not consider drug use to be a prominent factor for fall risk, but recognized other causes to be more plausible. The underlying causes of falls are multifaceted [2] and the informants identified known risk factors like aging [4], muscle and neurological diseases [3], and environmental factors like furniture, carpets and slippery surface [2] as risk factors for falls. To not consider themselves susceptible to falls and to mainly recognize exterior factors to cause falls [12] and to fight for a normal life style when occasionally feeling dizzy have also been found by others [10]. This is in line with the finding that some of our informants downplayed their fall risk [13] or dizziness [8] since they were eager to emphasize what they still managed in everyday life. Another reason might be that some of them did not remember having fallen [24]. Even if several informants did not see themselves at risk of falling when first asked, they did take precautions through making physical adaptions in everyday life or gave up certain activities. Thus, at least when asked elderly persons have an awareness of fall risk, but based on this study do not consider drugs to be a prominent factor.

Between 60 and 70% of elderly outpatients above 65 years have been found to be aware of their drug's name and purpose [25–27]. However, the knowledge of the side effects is found to be poorer with 4–12% [26–28] correctly identifying them. This is one possible reason for why the informants in our study did not think of drug use as a risk for falling. The expressed need for information of side effects was not particularly present in our study and is in contrast to others' findings, where all patients mentioned a wish for a full disclosure of information of side effects [29]. Some of the informants who showed little interest in why they took their drugs said to fully rely on their physician's treatment decisions, indicating a wish for a physician-directed style of care [30]. This could constitute a problem as patients who are not familiar with side effects of their drugs have a higher risk of serious complications [27]. This is in addition to some of our informants who said that the PILS that follows the medicine package could evoke fear [31] and

anxiety [32]. Since such fear can lead to the elderly consulting their GP for assistance and a wish for individual judgment [31], it is important that patients regularly get individualized information of their drugs' common side effects so that they know when to seek help, e.g. experiencing dizziness when using FRIDs.

How to unveil whether the FRID causes problems

Even if our informants did not identify drugs in general or FRIDs in particular as increasing fall risk, there is good documentation of such a connection. Psychotropic drugs like benzodiazepines [33], neuroleptic drugs [6,34] and hypnotic z-drugs [35,36] have been linked to falls even when adjusted for chronic disease status [37,38]. In addition, vasodilator drugs increase the risk of falls [39,40]. However, statins that were said by some of our informants to be the cause of their unsteadiness are in some literature not linked to fall risk [41]. However, there is suggestive evidence that these drugs may affect muscle strength in older patients [41]. According to the Norwegian guidelines for treatment and rehabilitation, the effectiveness of statin treatment for elderly above 80 years is weak and individual assessment is recommended [42]. Regardless the drug being known as causing fall risk, physicians need to be alert when patients reports complaints perceived to affect their fall risk.

Some of our informants said they struggled to get their point across when presenting their bodily discomfort to their physician [43]. Elderly also often present complex problems [44,45] and in one-third of the consultations of older patients, the physician did not recognize the patient's complaints or gave other health problems a higher priority than the patient [45]. If patients then both do not relate drug use to fall risk and in addition struggle to describe and present what could be a side effect of FRIDs during consultations, there is a need for physicians to be aware of these challenges.

We have in a previous qualitative study found that general practitioners rarely consider fall risk when issuing repeat prescriptions of FRIDs unless patients report symptoms like dizziness or falls [44]. When this is considered in light of the present study where our informants did not connect drugs and fall risk and also struggled to present what could be a side effect, it raises the question about how the connection between drugs and fall risk then can be noticed. One answer is for physicians to systematically use evidence-based guidelines and tools like START/STOPP criteria where there is a specific section (section K) that lists drugs that predictably increase risk of falls [46]. Not all general practitioners are familiar with the START/STOPP criteria [44,46] and barriers to use the tool have been identified by GPs [47].

Another solution to the challenge of systematically identifying drugs that increases risk of falling could be to encourage the physicians to perform regular and thorough drug assessment like systematic drug reviews as described in the integrated medicine management (IMM) model [48]. A thorough anamnesis, regular blood pressure control and regular drug reviews have been suggested to be obligatory tasks to prevent falls in all parts of the healthcare system [49]. Especially, interprofessional drug reviews with mulitidisciplinary case conferences where the different professions meet and discuss the physician can get decision support through increased knowledge and critical reflections on the ongoing drug treatment [50].

Elderly FRID users do not necessarily relate their drug use to fall risk. Some struggle to verbalize their perceived drug-related problems to their physician. Physicians should regularly inform, monitor and assess the drug treatment when treating elderly with FRIDs to make sure they recognize side effects like dizziness and falls.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Ethical approval

The Regional Committees for Medical and health Research Ethics of Central Norway approved the study, and the participating elderly persons signed written consent.

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Notes on contributors

Hege Therese Bell, MPharm and PhD-student of Nord University, Namsos, and NTNU (Norwegian University of Science and Technology), Trondheim, Norway

Aslak Steinsbekk, Professor of behavioural sciences in medicine and health research, NTNU (Norwegian university of Science and Technology), Trondheim, Norway

Anne Gerd Granas, Professor in social and clinical pharmacy, UiO (University of Oslo), Oslo, Norway

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Paper III

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RESEARCH ARTICLE Open Access

Nurses' and pharmacists' learning experiences from participating in interprofessional medication reviews for elderly in primary health care - a qualitative study

H. T. Bell[1,2*], A. G. Granas[3], I. Enmarker[4,5], R. Omli[1,4] and A. Steinsbekk[2]

Abstract

Background: Traditionally, drug prescription and follow up have been the sole responsibility of physicians. However, interprofessional medication reviews (IMRs) have been developed to prevent drug discrepancies and patient harm especially for elderly patients with polypharmacy and multimorbidity. What participating nurses and pharmacists learn from each other during IMR is poorly studied. The aim of this study was to investigate nurses' and pharmacists' perceived learning experience after participating in IMRs in primary health care for up to two years.

Methods: A qualitative study with semi-structured focus group interviews and telephone interviews with nurses and pharmacists with experience from IMRs in nursing homes and home based services. The data was analysed thematically by using systematic text condensation.

Results: Thirteen nurses and four pharmacists were interviewed. They described some challenges concerning how to ensure participation of all three professions and how to get thorough information about the patient. As expected, both professions talked of an increased awareness with time of the benefit of working as a team and the perception of contributing to better and more individual care. The nurses' perception of the pharmacist changed from being a controller of drug management routines towards being a source of pharmacotherapy knowledge and a discussant partner of appropriate drug therapy in the elderly. The pharmacists became more aware of the nurses' crucial role of providing clinical information about the patient to enable individual advice. Increasingly the nurses learned to link the patient's symptoms of effect and side effect to the drugs prescribed.

Conclusions: Although experiencing challenges in conducting IMRs, the nurses and pharmacists had learning experiences they said improved both their own practice and the quality of drug management. There are some challenges concerning how to ensure participation of all three professions and how to get thorough information about the patient.

Keywords: Medication review, Nurse, Pharmacist, Learning, Inappropriate drug use, Primary care

* Correspondence: hege.t.bell@nord.no
[1]Department of Pharmacy, Faculty of Health Sciences, Nord University, Namsos, Norway
[2]Department of Public Health and General Practice, Norwegian University of Science and Technology, Trondheim, Norway
Full list of author information is available at the end of the article

Background

Elderly living at home and in nursing homes use many drugs [1] and are therefore at risk of experiencing adverse drug reactions and increased risk of falls [2]. Physicians have traditionally been responsible for drug prescription and follow up, but it has e.g. been shown that they renew prescriptions without assessing if the medication is still indicated [3]. In addition frequent changes in caregivers both between secondary and primary care but also within primary care, make elderly patients and patients with complex care needs more vulnerable to drug discrepancies that can lead to drug errors [4]. As a result systems for medication reconciliation and interprofessional medication reviews (IMRs) have been developed [5]. IMRs by physicians, nurses and pharmacists have been showed to reduce drug-related problems and improve quality of prescribing in hospitals and nursing homes patients [6, 7].

Primary health care workers often face additional challenges compared to those working in a hospital setting due to lack of geographical proximity of the team members [8]. Facilitators and barriers to interprofessional collaboration in primary health care has been identified as being both structural and cultural like the need of shared facilities, written procedures, shared communication tools, accessibility, trust, value and leadership [9, 10]. Collaboration between nurses and community pharmacists in primary care concerns mainly product advice and dispensing issues [11], but when nurses and pharmacists collaborate in an inpatient medical setting they can learn to appreciate each other's roles [12].

The existing research on IMR has mainly focused on the outcome of the intervention of the drug-related problems [13] or the different participants' perception of the collaboration process [14]. However, we have found no research focusing on what nurses and pharmacists perceive to learn when participating in IMRs. The aim of this study is therefore to describe what nurses and pharmacists perceive to learn from participating in interprofessional drug review teams in a primary health care setting for up to two years.

Methods

This qualitative study is part of a larger study with focus group and individual interviews performed between October 2014 and February 2016 in Norway. The Regional Committees for Medical and Health Research Ethics in Central Norway approved the study (2014/1140).

Setting, training and practice

In Norway the municipalities are responsible for social welfare and health care for all its inhabitants, including home based health and social care and nursing homes [15]. Part-time contracted general practitioners (GPs) most commonly provide the medical services in nursing homes [16] and the home dwelling elderly with home based health and social care receive their medical service from their GP with assistance from home care nurses [17]. The nurses in home care services often work alone as nurses, supported by staff with less or no formal nursing education [18]. The majority of Norwegian pharmacists work in privately owned community pharmacies or hospital pharmacies. The municipalities have contracts with a hospital or community pharmacy to provide services to inspect drug management or to perform medication reviews [19].

Interprofessional medication reviews is not established in primary health care in Norway, but since 2013 the GP legislation states that patients prescribed four or more drugs, the GP should perform medication reviews if this is necessary from a medical point of view [20]. There is yet no such legislation for patients in nursing homes. In 2011–13 the Norwegian Patient Safety Programme "In safe hands" was implemented throughout Norway. Two of the 12 focus areas were to establish interprofessional teams on medication reviews in nursing homes and home based health and social care services [21]. The centres for Development of Institutional and Home Care Services [22] in each of Norway's 19 counties were responsible for spreading the program to municipalities in their own county, following a national guideline based on the Intergrated Medicines Management (IMM-model) [23].

The IMM-model consists of four main steps [23] and is based upon the original version from Northern Ireland [24]. In the first step, the nurses interview and go through a checklist with the patient, order blood samples and construct a drug list based on the available information. In the second step, the nurses pass this information to the pharmacist who identifies potential drug-related problems and checks if the prescribing is according to national guidelines. In the third step, the drug review is performed at a case conference where the responsible physician, nurse and the pharmacist meet and perform medication reconciliations and reviews where they discuss the best drug regime for that specific patient. The physician is responsible for the overall treatment. Finally, the nurse updates information of the drug regime agreed upon in the patient's journal. They also observe how the patient responds to any changes and give feed back to the GP when necessary [21]. The drug reviews require consent from the patient that allows health information to be shared in between the three professions involved.

The municipalities were encouraged to form interprofessional teams, consisting of at least one representative from the three professions; physician, nurse and pharmacist. In a course consisting of three structured learning meetings throughout one year the interprofessional teams of health professionals, were introduced to the methodology in the IMM-model, introduction to why IMRs are

useful for the elderly patient, encouraged to initiate interprofessional cooperation and to establish interprofessional medication reviews (IMRs) [25]. The interprofessional teams were encouraged to start practicing medication reconciliations and IMRs after the first meeting in the course [21]. The nurses within each team were charged with developing local routines for the selection of eligible patients, routines for how to organize IMR-tasks on top of everyday tasks, and how to book case conferences. They were also responsible for spreading of knowledge on IMR to their colleagues. Only two physicians from the 11 participating municipalities attended the implementation course and only at the first meeting. It was therefore up to the team leaders, who were nurses, to recruit an appropriate physician from their municipality to their team. In some of the municipalities no physician was recruited and the IMRs were performed with only nurse and pharmacist present. In these teams the pharmacist first presented her findings to the nurse who then gave her input before she later was responsible of presenting the revised results from the discussion to the physician.

Informants and data collection

We aimed to recruit physicians, nurses and pharmacists who had participated in the patient safety program and who had experience of performing IMR. To ensure a representative sample, we wanted to have teams representing different municipality size, different length of experience with IMR and from both nursing homes and home based health and social care. The reports given by the different teams after the course were used to select teams based on these criteria.

To recruit informants, the appointed team leaders in 11 municipalities in Central Norway were contacted by e-mail and then by phone. They were told that they could volunteer teams even though not all team members in each team wanted to participate. This approach only lead to the recruitment of two pharmacists participating in several teams each and therefore additional two pharmacists were recruited through the hospital pharmacies in the county.

The semi-structured focus group interviews were conducted with representatives from all included teams 1–2 years after initiation of the course in their county. Focus group is particularly useful for exploring people's common experiences, attitudes and views in environments where people interact. The use of group interaction is an explicit part of the method [26]. The focus group interviews were either conducted at a nursing home or at the city hall in the municipality. An interview guide with open-ended questions focused on the following themes was used; perceived learning and gained knowledge in addition to perceived facilitators and barriers to be able to perform interprofessional medication reviews in primary health care [27] (Additional file 1). The focus group interviews lasted approximately one and a half hour, were digitally recorded and led by the first author (HTB). The telephone interviews lasted approximately 20 min performed by the first author using the same interview guide. Participants were provided with written and oral information about the study and informed that they could withdraw at any time. Written informed consent was obtained from the participants before the interviews were conducted.

Data analysis

The interviews were digitally recorded and transcribed verbatim. They were analysed using the method of systematic text condensation [28], according to an iterative four-step process. In the first step, all authors read a selection of the transcripts to identify preliminary themes, which were discussed. In the second step, the transcripts were searched in detail by the first author to identify meaning units, which were sorted under the preliminary themes and these were presented to the other authors. In the third step, the meaning units were arranged into subthemes. In all these steps the preliminary themes were adjusted. Then a narrative condensate was made of the meaning units sorted under each theme and subtheme. In the last step, an analytic text was produced based upon each theme and subtheme. The themes and the analysis were discussed among the authors several times and also in an extended research group to ensure validity. During the whole process, the authors went back to the original transcripts to ensure that the analysis was based upon them.

Results

A total of thirteen nurses from five different nursing homes and three home-based care units and four pharmacists were interviewed. There were three focus group interviews consisting of nurses only but from both nursing homes and home based care, and two with nurses from different workplaces and a pharmacist. The remaining two pharmacists were interviewed by telephone. Further participant characteristics are presented in Table 1.

The perceived learning from participating in structural interprofessional medication reviews in primary health care are arranged in the following five themes; Learning about each other's role, A more comprehensive documentation of drug management, Challenge the physician's role, Importance of detailed information about each patient and Linking patient's symptoms and medication use.

Learning about each other's role

It was new for the nurses in the nursing home and home based health and social care to learn during the interprofessional medication reviews (IMRs) that pharmacists could provide advice and guidance on appropriate drug

Table 1 Participant characteristics

	Nurses ($n = 13$)	Pharmacists ($n = 4$)
Working in nursing homes	8	-
Rural	5	3
Urban	3	4
Working in home-based care	5	-
Rural	2	-
Urban	3	-
≤1 year experience of performing IMR in primary health care	5	1
>1 year experience of performing IMR in primary health care	8	3
Experience from performing IMR in hospital	-	3
Experience of performing IMR with a physician present	10	4
Experience of performing IMR without a physician present	3	3

use for the elderly patients. This was contrary to their previous experience of pharmacists as someone who came on irregular visits and primarily focused on controlling their drug management routines. After taking part in IMRs, however, they now perceived the pharmacist as a supportive partner who could give them useful advice on pharmacology and pharmacotherapy. They especially appreciated the pharmacists' knowledge concerning drug monitoring data for laboratory values like haematology, proteins, hormones, vitamins and drugs such as digoxin with a small therapeutic window. The pharmacists said that after the establishment of the IMR-teams, the number of telephone and e-mail inquires from both nurses and physicians regarding drug therapy questions had increased.

> *The pharmacists gave us a very good impression by showing how much they could contribute regarding knowledge on drugs and drug therapy. They knew much more than we thought they did. Our previous impression was that they sold plasters and handled the drugs at the pharmacies. (Nurse, less than one year of experience with IMR)*

The pharmacists did not meet with the patients themselves and therefore talked about a dependency on the patient information given by the nurses. Preparing for the IMRs could be challenging for the pharmacists when not having access to updated drug monitoring data and complementary patient documentation. They perceived the majority of the nurses to provide good information and documentation, but there were also examples of the contrary like e.g. nurses who did not know the patient well.

> *"A case has many sides and I only know the patient through his drug list. So it is very important for me to get the additional information from the nurses. Like when a patient has pain. When does he have pain and what type of pain?" (Pharmacist, more than 2 years experience of IMR)*

A more comprehensive documentation of drug management

Taking part in the IMR, the nurses talked about how they learned to become more critical towards their own drug management routines and talked about a raised awareness on better documentation of these routines in everyday work. In addition, especially the nurses working in home based health and social care, learned the importance of medication reconciliation that ensured an updated list of drugs in use due to the high number of carer that could be involved. An updated drug list which they trusted to be correct also helped them to get a more complete and documented overview of the patient's medical situation and to later link this to the drugs in use.

When the other professions regarding drug management raised challenging questions the nurses said they learned the need for accurate, updated and detailed information in the patient journals about drugs in use and the need for a broader focus on drug management as a whole. This included having all the patient's diagnosis listed in the journal and to ensure written indications for the different drugs to be available for all health personnel involved with the patients. Participating in IMRs were therefore said to promote an understanding of comprehensive documentation of the drug management as a nurse task just as important as the other nursing tasks. It was highlighted that staff without any formal nursing education, who often are the ones to hand out the drugs and spend most time with the patients, especially appreciated this quality improvement.

> *"In the beginning when the indications were vague and not always written on the patient's medicine card it was difficult to evaluate the usefulness of the drugs. Especially since it was not written why they were put on those drugs." (Nurse, less than one year of experience of IMR)*

Challenge the physician's role

The nurses with experience of performing IMRs together with both a physician and a pharmacist said that the pharmacist challenged the physician's role as the only drug expert. In particular this involved posing other types of questions, comments and solutions than the nurses did. This was said to stimulate the physicians to reflect upon their previous drug prescribing and in some instances forced the physicians to argue their case when

there where disagreements. Both professions perceived disagreements as strength for the quality of drug therapy for the patients, because it triggered the physician to review the drug therapy choices initiated by themselves or other prescribers. Some nurses felt that the pharmacists' questions echoed comments and questions previously raised by themselves to the physicians, but where they hitherto had failed to argue their case or gave in without getting a clear answer. However, when the pharmacists asked questions during the team discussions the physicians responded better and more clearly.

"The pharmacist sees it from another angel and uses her own specialist knowledge to come up with new alternatives that the physician has not thought of – as far as I can see that must increase the quality." (Nurse, with more than one year experience of IMR)

The nurses that had performed IMRs without having a physician present did not compliment the pharmacist in the same way and said that the physician was the one who knew what was best for the patient regardless the pharmacist's suggestions. These nurses sometimes perceived the physicians as headstrong but it was also emphasized that the physicians often had long experience in the municipality and therefore had a better insight into the totality of the patient's situation. In some of the cases the experience was also that when the nurses presented the suggestions to the physicians after the IMR with the pharmacist the physician rarely if at all took the suggestions into account.

"We presented it to the physician. And since they were only suggestions he did not go for them." (Nurse, with less than one year of experience of IMR and IMR without physician)

The pharmacists that had experienced IMR without a physician appreciated the nurse's contribution during the drug review, but found it unsatisfactory not being able to discuss and argue their case directly with the physician. Not knowing whether their suggestions were followed were also highlighted as a disadvantage since they perceived to learn less when missing out the discussions with the physician in particular. When the physician was present the pharmacists perceived that the physicians in the majority of the cases appreciated their contributions, but there were also experience of the contrary. With time the pharmacists said to understand better why their theoretical grounded suggestions not always were accepted by the physicians, mainly due the physicians' knowledge of a larger totality of the patients' situation than themselves. This was said to contribute to a wider understanding of some of the choices taken by the primary care physician and to enable the pharmacists to view a case from another perspective than they usually did.

"We get the physicians view of the patient. A GP know the patient and his history better than I do and I might suggest a change that might have been tried out before (…) which the physician find difficult to implement (…) because the patient might refuse." (Pharmacist, more than 2 years experience of IMR)

Importance of detailed information about each patient

In some municipalities the pharmacists experienced that the nurses struggled to find time to do their part of the preparatory work, such as interviewing the patient, order drug monitoring blood samples and filling in the patient checklist. This resulted in delayed or deficient documentation to the pharmacist. These drug reviews were perceived as unsatisfactory since the pharmacist then only could give generic advice and not tailor the suggestions for the patient in question.

"The advices we give might be good, but it might not be the best for that specific patient. For example I set up an optimal list of drugs based upon the guidelines, but then maybe the patient is not able to swallow tablets or remember to take the tablets twice a day. There is a lot of extra information I need to be able to set up an appropriate list of drugs." (Pharmacist, more than 2 years experience of IMR)

As a consequence, one pharmacist had changed the preparing routines prior the IMR and now spent the whole day at the nursing home or home based health care. Information about the patient were gathered and collected by the pharmacist using information from the patient's journals and talking to the nurses. The preparations took place in the morning and then the IMR was performed in the afternoon. This was said to give a better access to the existing documentation and also gave the pharmacists the opportunity to ask the nurses and other staff of supplementary information when needed.

None of the drug reviews were performed with the patient present. Perceiving themselves as the patient's voice at the drug review made the nurses discover that detailed knowledge of each patient was a necessity to be able to answer questions raised by the other two professions at the IMR. Contrary, the nurses felt awkward when presenting patients they did not know well or relied on second hand information. Good cooperation with nursing assistants or other care workers was perceived as important when collecting necessary information on function level and behaviour. Likewise, it was said to be important to discuss the observations of each patient in the nurse

collegium since different persons perceived the patients differently. This was especially important in home based health care service as opposed to nursing homes, because the nurses spend only a short time with domiciliary patients.

It was also expressed as difficult to convey patient information, when the nurse interviewing and collecting the information about the patient might not be the same presenting at the drug review. The teams that perceived good backing for the IMR tasks in the municipality and who had managed to develop good routines throughout the collegium were also those who found collecting these data least difficult.

"I felt sometimes – oh I should have known more about this patient. I do not believe that I will be the one that continues performing drug reviews." (Nurse, less than one year experience of IMR)

Linking patient's symptoms and medication use

The pharmacists experienced that the nurses gradually showed a deeper engagement for the medication reviews, such as being more updated on the patients' conditions, symptoms and the prescribed drugs. The nurses said that during the medication reviews they had learned new things about pharmacotherapy, especially how drugs work and drug-drug interactions. Examples were knowledge about drugs with anticholinergic effect and drugs that can increase the risk of falls in their patients.

"We have learned more about combination of different drugs and anticholinergic effects. (…) Being more aware on pain relief – the need to assess the treatment more often and at an earlier stage. Previously they had Paracetamol 1 g x 3 without us assessing, but now we ask them whether they still need them. The questions pop up more frequently." (Nurse, more than one year experience of IMR)

A stronger knowledge on pharmacotherapy made the nurses more observant and capable of interpreting patients' behaviour possibly linked to the drug use – both effects and side effects. They said that they became more curious and critical, therefore asking more questions to the physicians and pharmacists. They also became more aware of the need for a more comprehensive documentation of the drug management. New awareness was said to be transferrable to other patients not yet part of IMRs such as assessing drug therapy at an earlier stage, for example in long-term pain treatment. Participation in IMR with both pharmacist and physician heighten their awareness on drug treatment as a whole and were said to contribute to the perception of more individual care.

"We have gained a greater awareness on drugs (…) You become a little more aware when you see a drug sheet. "Can this be correct?" (…) You become more critical." (Nurse, with more than one year experience of IMR)

When asked if the learning emerged from participating in the course or from performing IMR, both the professions linked the learning to active participation in IMRs. They said that at a course you were only a passive recipient, whereas during IMR you had to use your adopted knowledge actively which again led to learning. Arguing their case was particularly highlighted to contribute to learning. The nurses who had performed IMRs without a physician present spoke less of what they had learned during this period.

"I believe that IMR give something extra since you have to use what you know actively. You get forced to think through what you are doing. Why do we do this IMR, and you look at the check list and think of the patient's drugs and how the whole situation is for the patient." (Nurse, more than one year experience of IMR)

Discussion

In this study it was found that both professions reported to learn more about each other's role when performing interprofessional medication reviews (IMRs). The nurses' perception of the pharmacist changed from being a controller of drug management routines towards being a source of pharmacotherapy knowledge and a discussant partner for appropriate drug therapy in the elderly. The pharmacists became more aware of the nurses' crucial role of providing clinical information about the patient to enable individual advice. Increasingly the nurses learned to link the patient's symptoms to the prescribed drugs due to having learned more about pharmacology and pharmacotherapy and also the importance of comprehensive drug management and detailed information about each patient. With time both professions jointly spoke of an increased awareness of the benefit of working as a team and the perception of contributing to better and more individual care. Through this they learned to challenge the physicians' knowledge and prescribing decisions. IMRs were found to be unsatisfactory without the physician's input and without thorough information about the patient's condition.

Learning from each other and the experience of mutual interdependence

Others have found that pharmacists can have other roles than controlling and checking up on the other professions' drug handling [29] and that other professions' awareness of the pharmacists' clinical skills increases with time

[12, 30]. This is in line with our findings. The most prominent learning reported by the informants in this study was how they came to appreciate each other's role during the medication reviews and how this created a sense of mutual interdependence. Participating in IMR were said to lift the focus on medication management as an important nurse task and that the pharmacists' contributions during the IMRs elevated the nurses' own performance. Nurses and physicians have both stated a perceived elevation of performance and educational benefit from working together with pharmacists [12].

It has been found that effective teamwork demands role clarity and an understanding of roles and responsibilities [8, 31], where working together can create a sense of mutual interdependence when different professions learn to know each other's roles [32]. Pharmacists cooperating with other professions have been shown to facilitate a team approach that improved the patient's drug related outcomes [12, 30]. This is in line with our study. The discussions during the IMRs where all professions were present were especially perceived as beneficial and therefor indicate that doing IMRs together can contribute to both learning and the perception of mutual interdependence.

Challenges when applying IMRs in primary health care

Lack of mandate for the pharmacist's role [10], the time the pharmacist was on site and funding of the pharmacists [14] has been found as barriers for pharmacists participating in interprofessional teams in primary health care. The model of IMM provides guidelines for the role of the pharmacists in IMRs [23], but the funding is dependent on the municipalities' willingness to pay for the pharmacist and can be a limitation for the continuation of IMRs in primary care. Our findings also concur with findings in studies from Supper et al. and Bell et al. which found that limited access to the complete medical history and relevant monitoring data can be perceived as a barrier for the pharmacist [10, 33]. In our study it was particularly evident that the main barrier was if there were delayed or deficient documentation about the patient's condition given to the pharmacist prior to the IMRs.

The physician has a pivotal role in decisions making about the prescribed medicines [34]. No surprise, when the physician is not present at the IMR, the interviewees said that they learned less. Accessibility has been shown to be a premise for interprofessional collaboration particularly between physicians and allied health professionals [9]. Not having all professions present is also a deviation from the IMM-model [24]. When team members have separate bases or buildings they are less integrated with the team [8]. However, it was perceived as challenging to gather all professions for joint meetings in primary care. The same was found in studies of interprofessional cooperation in family health teams and family medicine clinics that describe challenges according to management, leadership, time, space and governance [32, 35]. Thus, there seems to be a need for innovative solutions to overcome obstacles such as finding common time and booking meeting facilities for the case conferences, in home based care and in rural municipalities.

Another challenge experienced by our informants was how to ensure good and correct information about each patient. Shift work and part-time positions in addition to nurses spending little time with home dwelling patients, made it difficult to collect the relevant patient information. Thus it can be a challenge to gather and collect comprehensive and objective information about the patient from all personnel involved prior to the medication reviews. This raises the question whether the patients themselves, unlike today [34], should be present during IMR to make sure that the patients' perspectives are taken into account. From an ethically perspective patients should be included in decisions about their own care [36]. We have, however, not found any studies investigating such a solution in IMRs.

Medication management in primary care – more than right medicine to right patient

Since service users in primary care receive lower level of medical service intensity compared to hospital patients, the need to observe, document and report effects of the medical treatment has been reported to be an even more crucial task for the nurses [37, 38]. This includes monitoring medication administration, adherence and the effect medicines have on patients' symptoms [39]. The findings in this study indicates that this could be problematic due to the infrequent contact with the patient in home based care and not being challenged to report specifically on these issues. It is therefore reassuring that the IMR was experienced as an arena where the nurses became more aware of the importance of thorough medication handling routines and a need for written high quality instructions on all the steps in the medication management process.

Strengths and limitations

The strength of this study was that the informants had real life experience with doing interprofessional medication reviews over time and the variation in the clinical situations the IMRs were conducted. In addition, there were variation in geography and population. It was a limitation that the interviewees came from one county in Norway and none of the municipalities were a large city. However, as others have similar findings [12, 30] this does not seem to limit the transferability. The lack

of the physicians as informants is another limitation. The physicians were invited on equal terms as the other two professions, but none of the physicians involved responded to the invitation. There is therefore a need for studies in the physicians' perspectives but also on the patients' perspective.

The focus groups purposefully consisted of teams that had participated in the course and performed medication reviews together. This contributed to a relaxed and freely speaking environment. Former disagreements could have limited discussions of topics they knew could cause disagreement and even hamper future collaboration. Furthermore, the fact that HTB is a pharmacist could have limited criticism of the pharmacists' role. However, the review of the transcripts indicates that the interviewees spoke also about disagreements during the interviews.

From the interviews, it seemed like the nurses learned more from the pharmacists than the other way around. This is likely to be due to the predominance of nurses among the informants, but it might also be due to the nurses getting access to a new profession's knowledge and skills, which was unlike the pharmacists whom the majority had former experience from IMR in hospitals.

Conclusion

From the nurses' and pharmacists' perspective in this study, IMRs in primary health care can be a learning arena for the participating professions. It was experienced to contribute to improving their own practice and the quality of drug management, resulting in better and more individualised care. There are some challenges especially concerning how to ensure participation of all three professions and how to get thorough information about the patient.

Additional file

Additional file 1: 20170203Interviewguidemanuscript IMREndelig.docx, Interview guide. (DOCX 15 kb)

Abbreviations

GP: General practitioner; IMM: Integrated medicines management; IMR: Interprofessional medication review

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Availability of data and materials

The data for this study consist of written transcripts in Norwegian. The transcripts constituting the data in the current study are available from the corresponding author on reasonable request.

Authors' contributions

HTB and RO conducted the interviews in the study. HTB, RO, AS and AGG analyzed the data and HTB, AS and AGG wrote the manuscript by providing critical appraisals. HTB, RO and IE particpated in the design of the study and all authors contributed to the content in the manuscript and read the final manuscript. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests neither financial nor non-finacial.

Consent for publication

Not Applicable.

Ethics approval and consent to participate

The Regional Committees for Medical and Health Research Ethics in Central Norway approved the study (2014/1140). Participants were provided with written and oral information about the study and informed that they could withdraw at any time. Written informed consent was obtained from the participants before the interviews were conducted. Our manuscript does not involve the use of any animal or human data or tissue.

Author details

[1]Department of Pharmacy, Faculty of Health Sciences, Nord University, Namsos, Norway. [2]Department of Public Health and General Practice, Norwegian University of Science and Technology, Trondheim, Norway. [3]School of Pharmacy, University of Oslo, Oslo, Norway. [4]Centre for Care research Mid- Norway, Steinkjer, Norway. [5]Department of Nursing, Mid University, Østersund, Sweden.

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