CHARLES UNIVERSITY IN PRAGUE

FACULTY OF PHARMACY IN HRADEC KRÁLOVÉ

DEPARTMENT OF SOCIAL AND CLINICAL PHARMACY

DIPLOMA THESIS

RISKS AND PROBLEMS ASSOCIATED WITH POLYPHARMACY IN OLDER PATIENTS – A SELF-SCREENING TOOL FOR IDENTIFYING RISKS OF PHARMACOTHERAPY BY PATIENTS THEMSELVES

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HRADEC KRÁLOVÉ, 2020

UNIVERZITA KARLOVA

FARMACEUTICKÁ FAKULTA V HRADCI KRÁLOVÉ

KATEDRA SOCIÁLNÍ A KLINICKÉ FARMACIE

DIPLOMOVÁ PRÁCE

RIZIKA A PROBLÉMY PROVÁZEJÍCÍ POLYFARMAKOTERAPII VE STÁŘÍ – NÁSTROJ PRO SCREENING RIZIK FARMAKOTERAPIE SAMOTNÝMI PACIENTY

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HRADEC KRÁLOVÉ, 2020

ACKNOWLEDGEMENT

Firstly, I would like to thank the supervisor of my thesis, Assoc. Prof. Daniela Fialová, PharmD, Ph.D. for her support and useful recommendations throughout all my thesis work. Secondly, I would also like to thank prof. Marja Airaksinen and Dr. Maarit Dimitrow from the University of Helsinki, for giving me the opportunity to work as a member of their research team.

I would also like to thank all respondents who participated in the study and everyone who helped me with distribution of questionnaires and data collection. Many thanks also go to RNDr. Jindra Reissigová, Ph.D., for her help with statistical analysis of the collected data.

Finally, I would like to express many thanks to all my friends and family members who were supporting me and never stopped believing in me during my studies and work on the thesis, both in the Czech Republic and abroad.

„I hereby declare that this thesis is my original work. All literature and other sources, which I used, are properly cited and mentioned in the list of references. This thesis contains no material that has been previously submitted for the award of any other academic degree or diploma."

„Prohlašuji, že tato práce je mým původním autorským dílem. Veškerá literatura a další zdroje, z nichž jsem při zpracování čerpala, jsou uvedeny v seznamu použité literatury a v práci jsou řádně citovány. Práce nebyla použita k získání jiného nebo stejného titulu."

Hradec Králové, 15. 5. 2020

Markéta Pitrová

CONTENT

1. ABSTRACT

Title: Risks and Problems Associated with Polypharmacy in Older Patients – A Self-Screening Tool for Identifying Risks of Pharmacotherapy by Patients Themselves

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BACKGROUND

With the increasing number of older adults in the population nowadays, the importance of rational pharmacotherapy – the indication of the most effective, most safe and most cost-effective drug treatments – in older people grows. In order to early assess and resolve the risks of pharmacotherapy in this population, different pharmacotherapy risk assessment and risk management tools have been developed for use by physicians, pharmacists and other health care professionals.

As the active involvement of older adults in the process of pharmacotherapy risk assessment and risk management increases, it is crucial to create also patient self-assessment tools in this area. Thus, the aim of the diploma thesis was to develop and test in a pilot study a new patient self-administered pharmacotherapy risk assessment screening tool for use by older adults.

METHODS

A literature search for already available patient self-administered risk assessment tools was performed as a following literature search to the systematic literature review of Puumalainen et al., 2019. It was conducted in databases: Evidence Based Medicine, Medline Ovid, Scopus, Web of Science, PubMed and Google Scholar for studies published between 8th of April 2016 to 10th of December 2018. Inclusion criteria for the

literature search were: tools focused on patients aged 65 years and older, outpatient care setting, patient-administered tools focusing on medication in general, English language and content of the tool included in the article. The results of this literature search were discussed during meetings of research team members. Items for newly developed patient self-assessment tool were selected and adjusted using qualitative interviews with pharmacists assessing the applicability of selected and newly adjusted items. The completed and finalized tool was validated by Delphi expert panel consensus in Finland in 2019. Final version of the full questionnaire was tested in a pilot study on a sample of 172 non-hospitalized older adults aged 65 and older living in the community in the Czech Republic.

RESULTS

Literature search results showed that there is a lack of similar patient-administered pharmacotherapy risk screening tools focusing specifically on geriatric patients (6 tools have been identified). Final version of our tool was developed as a 15-item questionnaire, in the Czech version complemented with questions related to sociodemographic characteristics of respondents and table of medicines used by the patient. The Finnish version was reduced to 8 questions during the validation process. Out of 172 participants in the pilot testing, 118 patients (68.6 %) were women, mean age was 74.2 years (SD ± 6.3). Lists of medicines were provided by 153 patients (89.0 %) and 69 of them (45.1 %) were using polypharmacy (5 and more medicines). Out of all respondents, uncontrolled use of OTC (over the counter) medicines and dietary supplements was reported by 64 patients (37.2 %). More than half of patients (N = 95; 55.6 %) had 3 and more physicians involved in the management of their therapy.

CONCLUSIONS

Active involvement of seniors in pharmacotherapy risk assessment and risk management is crucial for identifying medicines-related risks. Due to the lack of previously developed patient self-administered pharmacotherapy risk-screening tools for older adults, our newly developed questionnaire is one of the rare instruments in this area. It can serve as an instrument to simplify the identification of patients who are in need of a comprehensive medication review performed by an experienced clinical pharmacist or

in need of simpler support from community pharmacists to resolve problems with medication adherence, inappropriate application of different drug forms etc.

KEYWORDS

patient self-assessment tools, geriatrics, pharmacotherapy risk assessment, pharmacotherapy risk management, polypharmacy, risk-screening tools, patient active involvement

DEDICATION

The tool was developed during my Erasmus+ programme study stay at the University of Helsinki in Finland in a close cooperation with the team of Finnish researchers, prof. M. Airaksinen, Dr. M. Dimitrow and T. Toivo, MSc. (Pharm). These experts collaborated with my supervisor of diploma thesis, Assoc. Prof. Daniela Fialová, PharmD, Ph.D.

The work of the Czech research team has been financed by the European EUROAGEISM H2020 project that received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 764632 and from the European project INOMED reg. No. CZ. 02.1.01/0.0/0.0/18_069/0010046. The team was also supported by grant SVV 260417 and the scientific programme PROGRESS Q42 of the Scientific group KSKFII, Faculty of Pharmacy, Charles University in Hradec Králové, Czech Republic (Chair of the scientific group: Assoc. Prof. Daniela Fialová, PharmD, Ph.D.).

2. ABSTRAKT

Název: Rizika a problémy provázející polyfarmakoterapii ve stáří – nástroj pro screening rizik farmakoterapie samotnými pacienty

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CÍL PRÁCE

Se zvyšujícím se počtem seniorů v populaci v současné době význam racionální farmakoterapie, tedy indikace nejúčinnějších, nejbezpečnějších a nákladově nejefektivnějších léků, u starších pacientů narůstá. Byly vyvinuty různé nástroje pro hodnocení rizik a management rizik, s cílem časného hodnocení a řešení rizik farmakoterapie u této části populace, určené pro použití lékaři, farmaceuty a jinými zdravotnickými pracovníky.

S narůstajícím aktivním zapojením starších pacientů do procesu hodnocení a managementu rizik farmakoterapie je nezbytné vyvíjet také nástroje určené pro použití samotnými pacienty. Z tohoto důvodu bylo cílem této diplomové práce vytvořit a otestovat v pilotní studii nový nástroj určený pro použití samotnými pacienty v běžném životě.

METODY

Byla provedena literární rešerše za účelem identifikace již publikovaných nástrojů pro hodnocení rizik samotnými pacienty, která navázala na systematickou literární rešerši provedenou Puumalainen et al. v roce 2019. Hledání literatury probíhalo v databázích: Evidence Based Medicine, Medline Ovid, Scopus, Web of Science, PubMed a Google Scholar a zahrnovalo články publikované v období mezi 8. květnem 2016 a 10. prosincem

2018. Zařazovací kritéria byla: zaměření nástroje na nehospitalizované pacienty ve věku 65 let a více, nástroje určené pro použití samotnými pacienty bez orientace na konkrétní onemocnění nebo konkrétní skupinu léčiv, články publikované v anglickém jazyce obsahující vlastní nástroj. Výsledky literární rešerše byly diskutovány na jednáních výzkumného týmu. Položky pro nově vytvořený nástroj byly vybrány a přizpůsobeny na základě výsledků rozhovorů s farmaceuty, během kterých se hodnotila aplikovatelnost nově připravených položek dotazníku. Dokončený nástroj byl ve Finsku validován za využití Delfi metody v roce 2019. Finální verze dotazníku byla testována v pilotní studii na vzorku čítajícím 172 nehospitalizovaných pacientů ve věku 65 a více let, žijících v České republice.

VÝSLEDKY

Provedená literární rešerše poukázala na nedostatek podobných nástrojů pro screening rizik farmakoterapie samotnými geriatrickými pacienty. Finální verze nástroje má podobu dotazníku tvořeného 15 otázkami, v české verzi navíc doplněného o otázky týkající se sociodemografických charakteristik respondentů a o tabulku léčiv užívaných pacienty. Finská verze dotazníku byla v průběhu validace zkrácena na osm otázek. Ze 172 účastníků pilotního testování, 118 pacientů (68,6 %) byly ženy, průměrný věk byl 74,2 let (SD ±6,3). Seznam užívaných léků poskytlo 153 pacientů (89,0 %), z nichž 69 pacientů (43,1 %) užívalo 5 a více léků. Ze všech respondentů uvedlo 64 pacientů (37,2 %) užívání volně prodejných léčiv a doplňků stravy bez konzultace s odborníkem. Více než polovina pacientů (N = 95; 55,6 %) byla v pravidelné péči 3 a více lékařů.

ZÁVĚR

Aktivní zapojení seniorů do hodnocení a managementu rizik jejich farmakoterapie je zásadní pro identifikaci rizik spojených s užíváním léčiv. Vzhledem k nedostatku dříve vyvinutých nástrojů pro screening rizik samotnými staršími pacienty patří náš dotazník mezi ojedinělé nástroje v této oblasti. Může sloužit jako nástroj pro zjednodušení identifikace pacientů, u nichž je potřeba provést podrobnou revizi farmakoterapie klinickým farmaceutem, ale i pacientů, kteří potřebují pouze jednodušší pomoc lékárníka

s řešením problémů týkajících se adherence k farmakoterapii, nevhodného užívání různých lékových forem atd.

KLÍČOVÁ SLOVA

nástroje pro sebehodnocení pacientů, geriatrie, hodnocení rizik farmakoterapie, management rizik farmakoterapie, polyfarmakoterapie, nástroje pro screening rizik, aktivní zapojení pacientů

DEDIKACE

Nástroj byl vyvinut během mého studijního pobytu podpořeného programem Erasmus+ na Univerzitě v Helsinkách ve Finsku, ve spolupráci s týmem finských vědců, prof. M. Airaksinen, Dr. M. Dimitrow a Mgr. T. Toivo. Tito experti spolupracovali s mou vedoucí diplomové práce doc. PharmDr. Danielou Fialovou, Ph.D.

Práce českého týmu byla podpořena výzkumným projektem EUROAGEISM H2020, který je financován Programem pro výzkum a inovace Horizon 2020 Evropské unie na podkladě grantové dohody Marie Skłodowska-Curie číslo 764632 a evropským výzkumným projektem INOMED reg. No CZ.02.1.01/0.0/0.0/18_069/0010046. Tým byl dále podpořen grantem SVV 260417 a výzkumnou skupinou KSKF2 vědeckého programu PROGRESS Q42 na Farmaceutické fakultě v Hradci Králové, Univerzity Karlovy v České republice (vedoucí výzkumné skupiny: doc. PharmDr. Daniela Fialová, Ph.D.).

3. INTRODUCTION

Every person aged 65 years and older is conventionally considered as a senior or an older adult. According to Eurostat, in 2000, 13.8 % of the population in the Czech Republic were 65 and older, whereas in 2018, the population of people aged 65 years and older raised to 19.2 %. Statistics for Finland show the same phenomenon - in 2000, 14.8 % of the population were 65 years and older and in 2016 this percentage raised to 21.4 % [2]. It is undeniable that the population in Europe is ageing. In addition to this phenomenon there is an increasing need to focus on rationality of the treatment in this population and also to develop useful methods for pharmacotherapy risk assessment and risk management in older adults.

Older patients represent a specific group of patients which must be treated considering all of the specific features of safe and effective drug use in geriatrics. During the process of ageing, human organism undergoes various changes that affect drugs pharmacology and drugs efficacy, safety and therapeutic value. Ageing human body is also more vulnerable to the adverse effects of many drugs and to the adverse drug events. In addition, physiological ageing is often accompanied with additional problems which are very frequent in older age, such as disability, geriatric frailty, polymorbidity and polypharmacy.

Polymorbidity or multimorbidity is a term generally used to describe the co-occurrence of at least three but typically four and more chronic health conditions in one patient. Polymorbidity is closely associated with polypharmacy, which means the use of multiple medications, generally at least 5, at the same time [3]. Most of the senior patients tend to use 4 to 6 drugs on average, whereas hospitalized senior patients use between 5 to 8 drugs on average [4]. Results from the European project SHELTER (Services and Health for Elderly in Long Term Care, 7th Framework program of the European Commission, 2009-2014, with participation of 7 European countries and Israel) confirmed that the prevalence of excessive polypharmacy (10 and more drugs) in the Czech Republic was 25.2 % and in Finland 56.7 % [5].

Polypharmacy is also related to so-called prescribing cascades, defined as „situations in which the first drug administered to a patient causes adverse drug signs/symptoms or adverse drug events that are misinterpreted as a new condition, resulting in a new

medication being prescribed“ [6]. Finally, it has also been proved that polypharmacy is linked to increased risk of hospitalizations and mortality in older adults [7].

Because of the facts mentioned above, risk assessment and risk management play an essential role in older patients' pharmacotherapy. Although there are many tools and recommendations that could help the health care professionals and especially physicians to judge the appropriateness of geriatric pharmacotherapy, the whole evaluation of pharmacotherapy appropriateness and pharmacotherapy risks in geriatrics is very complex and requires detailed knowledge of pharmacotherapy and drug risks, as well as appropriate management of all risk factors (including also coordination of health care for the patient, family support etc.). Therefore, the occurrence of drug-related problems is, unfortunately, still very high in older population and leads to frequent complications of therapy and increased costs in the health care system.

Considering previously mentioned facts, there are numerous problems associated with pharmacotherapy in older adults and management of their health status is very complex. To reduce the number of pharmacotherapy risks, different tools and guidelines help to identify and resolve inappropriate prescribing in older patients have been developed. However, there still very few instruments enabling self-assessment of drug risks by older adults. Such instruments could fasten the identification of senior patients with serious drug risks soon before they visit health care professionals and have significant health problems manifested.

4. AIM OF THE THESIS

The aim of this diploma thesis was to contribute to development of a patient self-administered pharmacotherapy risk-assessment tool that would be easy and suitable for use by older patients themselves. This tool should identify main risks of pharmacotherapy and signals for a medication review in older adults, and at the same time it should help to identify patients with potentially inappropriate use or misuse of some high-risk medications that require attention of experts on pharmacotherapy. The tool developed in this diploma thesis is intended to be used in outpatient care in order to help with prioritizing of older patients in this setting for early clinical pharmacists´ interventions (individualization of drug schemes) or community pharmacists´ interventions (support

for better pharmacotherapy adherence, education of the patient, training of administration techniques etc.) Secondly, the intention of this thesis was also to test this newly developed patient self-administered tool in a pilot study on senior patients residing in the community.

In the Theoretical part of this diploma thesis, the age-related changes in pharmacokinetics and pharmacodynamics as well as basic information on measures of geriatric frailty and implicit and explicit methods of evaluation of appropriateness of geriatric drug therapy are described.

The Practical part of the diploma thesis is divided into three sections. In the first section, current evidence of already published patient self-administered pharmacotherapy risk assessment tools for older adults is summarized, as well as similarities and differences in items included in these previous risk assessment tools. This part gives an evidence-based background for the development of our new patient self-administered pharmacotherapy risk assessment screening tool. This new instrument developed during the works on this diploma thesis is described in Section II of the Practical part of this thesis. Section III then describes results obtained by pilot testing of this new tool on 172 geriatric patients aged 65 years and older residing in the community.

5. THEORETICAL PART

5.1 Specific features of rational geriatric pharmacotherapy

Older adults create a specific group of patients due to many aspects differentiating them from the younger population. There are many physiological changes accompanying ageing that make this cohort highly different from younger adults, as well as individual pathological changes due to various comorbidities that make the treatment of geriatric patients difficult and highly individual. Also, there is a very little evidence available (particularly from randomized control trials) that describes the real efficacy and safety of medications in different groups of geriatric patients. Thus, individualization of drug schemes in older adults requires in depth knowledge of geriatric clinical pharmacy and clinical pharmacology. Different therapeutic values of drugs (changed efficacy, safety and cost-effectiveness of medications) in higher age and insufficient individualization of drug schemes contribute to increased rate of adverse drug reactions and adverse drug events in older patients.

This chapter describes only some specific features of rational geriatric pharmacotherapy, namely physiological changes accompanying ageing that should be respected in all older adults because of subsequent specific changes in drugs pharmacology, as well as problematics of geriatric frailty and explicit and implicit evaluation of appropriateness of drug use in older patients (including also examples of some recommendations of explicit or implicit criteria of potentially inappropriate medications/potentially inappropriate prescribing in geriatric patients).

5.1.1 Specific age-related pharmacological changes in older adults

Ageing of the human body is a process that goes along with many physiological changes in the whole organism. Also, in many older patients, pathological changes may contribute to different pharmacokinetics and pharmacodynamics of drugs too. These changes lead to different therapeutic value of drugs in older individuals which has already been studied for many years also by the research group “Ageing and changes in the therapeutic value of drugs in the aged” (Chair Assoc. Prof. D. Fialová, PharmD, Ph.D.) at the Department of Social and Clinical Pharmacy, Faculty of Pharmacy, Charles University.

5.1.1.1 Age-related changes in pharmacokinetics

There are numerous changes in pharmacokinetics of many drugs in older people and they affect the pharmacokinetics at every level – at the level of drug absorption, drug distribution, drug metabolism and last, but not least, at the level of drug elimination. Some of the most important consequences might be for example delayed onset of drug effect or cumulation of lipophilic drugs in the adipose tissue and prolongation of many drugs half-life and effect in the organism [4][8].

5.1.1.1.1 Absorption

Drug absorption is closely linked to the gastrointestinal system and because of this, all drugs administered orally, which is the most common way of administration, can be affected. Typical changes occurring in an aged human body are reduced blood flow in the splanchnic area, reduced gastrointestinal motility and reduced absorption surface. The gastric pH is increased due to the reduction of secretion and at the same time, emptying of stomach is prolonged [4][8].

If we take into account the passive diffusion (as the most important way of absorption, for most of the drugs), it usually remains unchanged without any clinical outcome [8]. However, absorption by passive diffusion might be affected and prolonged in case of acidic drugs due to changes in proportion of ionized and non-ionized forms of drugs (e.g. NSAIDs - non-steroidal anti-inflammatory drugs, sulphonamides, sulfonylureas and furosemide). The onset of this type of active substances might be delayed [9].

On the other hand, the active transport of drugs is significantly decreased due to lower number of active transporters in the intestinal barrier. It is, for example, clinically significant pharmacological change in the case of vitamin D and calcium [9].

5.1.1.1.2 Distribution

Ageing of the organism is also linked to many differences in the proportion of body constitution, such as increase in body fat and decrease in blood plasma volume, total body water and extracellular fluids. This leads to reduction of the volume of distribution of polar drugs (e.g. digoxin, lithium, gentamicin, methotrexate) while their plasmatic levels

are usually increased. There is also a higher risk of toxicity of these drugs when older patients are dehydrated. On the other hand, the volume of distribution of lipophilic drugs is increased and there is a high risk of drug toxicity because of cumulation of these drugs in adipose tissues together with prolongation of their half-life. Typical examples are long-acting benzodiazepines, e.g. diazepam [4][8].

Older patients also have lower plasmatic levels of albumin because of multiple diseases and other ongoing pathophysiological processes. This may lead to higher levels of free plasmatic fractions of highly albumin-bound drugs, for example NSAIDs, warfarin, digoxin etc. and to higher clinical significance of drug-drug interactions of these medications on plasmatic proteins. [8].

5.1.1.1.3 Metabolism

The body's main organ responsible for drug metabolism and the transformation of drugs to more polar compounds and metabolites is the liver. Its size and blood flow through the portal vein decrease with higher age. Drugs with high first-pass effect (e.g. verapamil or some statins) and high clearance drugs (morphine) may have significantly reduced first stage of hepatic metabolism due to decreased perfusion of blood in vena portae because of changes in minute heart volume as a consequence of physiological ageing or pathological changes, e.g. heart failure disease. Drugs metabolized by oxidative metabolism by cytochrome P450 in the first phase of the liver metabolism (diazepam and some other substrates of CYP isoforms e.g. warfarin, theophylline, omeprazole) or metabolized by demethylation enzymes (amitriptyline, fluoxetine, imipramine etc.) or some medications metabolized by pathways of the second conjugation phase of the metabolism (e.g. oxazepam) may be also affected by age-related changes in biotransformation. However, it seems that the activity of the most important CYP pathways of the first phase of liver metabolism is mostly preserved (except metabolism by CYP450 3A4 isoform in postmenopausal women that is decreased) at least until the age of 80 years and no significant differences were found in the metabolism of the majority of metabolic pathways when comparing to the group of patients between 20-60 years old [8].

When it comes to drugs with the high first-pass effect, it should be kept in mind that their plasmatic concentrations might be higher in older patients with possibly impaired

metabolic activity of the liver and some risk management recommendations should be followed. A „Start Low, Go Slow“ rule is recommended when initiating new drugs in older patients and it means to start with lower doses than in younger adults, usually one third or one half of the normal dose for younger adults. If it is necessary to increase the dose, it should be done in geriatric patients in longer time intervals than in younger adults [9][10].

5.1.1.1.4 Elimination

The process of elimination of the drug and its metabolites from the body is also impaired among senior patients. The renal blood flow is decreased as well as the glomerular filtration rate, also because of the loss of numerous functioning glomeruli by renal atrophy. This leads to reduced renal clearance in older patients (in the age over 80 years nearly every second patient suffers from mild renal failure) and to possible drug risks or even toxicity of hydrophilic drugs and their metabolites that are significantly eliminated by kidneys, such as digoxin, metformin, allopurinol, lithium, some ACEis (angiotensin-converting enzyme inhibitors) etc. [4][9].

According to article published by Aymanns et al. in 2010, the loss of kidney function is affecting the pharmacokinetics more than dysfunction of any other organ in the body. Chronic renal disease stage 3 (eGFR, estimated glomerular filtration rate, from 30 to 59 ml/min/1.73 m2), which always requires dose adjustments, occurs in 15 to 30 % of older adults. This also emphasizes the importance of monitoring and calculating the individual GFR estimates when prescribing doses of medications for senior patients [11][12].

5.1.1.2 Age-related changes in pharmacodynamics

Pharmacodynamics represent the effects of a drug on body and its mechanisms of action in the organs, tissues, cells and receptors. It includes therapeutic effects but also toxic and adverse effects of drugs. While human body undergoes numerous changes during the ageing process, these changes obviously manifest also in the effect of drugs.

Whereas the alterations of pharmacokinetic processes are quite well described, the situation at the level of pharmacodynamics is more complicated, due to ethical and technical reasons complicating the research [9]. Nevertheless, changes in cardiovascular and central nervous system and general decrease in number and sensitivity of some receptor sites have already been described.

In the central nervous system, monoamine deficiency can occur because of higher activity of monoamine oxidase together with decreased sensitivity of adrenoreceptor sites. The monoamine oxidase is the enzyme responsible for degradation of monoamines, namely adrenaline, noradrenaline, serotonin and dopamine, and the lack of these neurotransmitters manifests in higher risk of depressions or drug-related depressions [13].

Dopamine deficiency and decrease in number of dopamine receptors also results in higher sensitivity to extrapyramidal side effects of drugs in older patients, e.g. metoclopramide, haloperidol and other antipsychotic treatments, particularly with longer administration or when typical antipsychotics are used [9].

On the other hand, the activity of choline acetyltransferase, lack of cholinergic receptors and loss of their sensitivity are responsible for higher sensitivity of older adults to adverse anticholinergic drug effects, to frequent cognitive disorders and other central and peripheral anticholinergic side effects, typical for e.g. TCA (tricyclic antidepressants) and some other antidepressants or parasympatholytic drugs used for the treatment of asthma and COPD (chronic obstructive pulmonary disease), gastrointestinal and urinary antispasmodics, etc. [9]. An example of very common anticholinergic adverse drug effect is the dry mouth that may cause loss of appetite and risk of malnutrition in older patients. Other frequent anticholinergic side effects are also constipation, urinary retention and incontinency, increased heart rate, depression and deliria [14].

5.1.2 Frailty

In addition to changes ongoing in ageing human body described above, it is also very important to mention the frailty syndrome. Frailty syndrome is a complex state of decline in late life, resulting from the impairment of multiple organs' function, lack of bone mass (osteopenia) and muscle mass (sarcopenia) and strength, decreased mobility, coordination of movements and decreased activity of immune system functioning [4].

Frail patients are not able to adapt to acute illnesses and traumas as easy as younger adults. Their treatment appears to be more complicated and requires longer hospitalizations with poor health outcomes and increased mortality, due to higher vulnerability of these patients [15][16].

Multiple tools for the classification of frailty exist. For example, CFS – The Clinical Frailty Scale serves for the evaluation of clinical frailty and can help with predicting the length of stay in acute medicine units. The categories of frailty included in CFS are displayed in Table 1.

Table 1: The Clinical Frailty Scale categories and their description

Category of frailty		Description
1	**Very fit**	Robust, active, energetic, well-motivated and fit people who exercise regularly and are the most fit group for their age
2	**Well**	Without active disease, but less fit than in category 1, exercise occasionally
3	**Managing well**	Disease symptoms and medical problems well controlled, but these people are not regularly active beyond routine walking
4	**Vulnerable**	Independent of daily help, patients typically complain about being “slowed up” and tired
5	**Mildly frail**	More evident slowing, need help in high order activities of daily living
6	**Moderately frail**	Need help with all outside activities and housekeeping. Problems with stairs, need help with bathing, might need assistance with dressing up
7	**Severely frail**	Completely depend on personal care due to physical or cognitive impairment
8	**Very severely frail**	Completely dependent, approaching the end of life. Not able to recover even from minor illnesses
9	**Terminally Ill**	Approaching the end of life, also includes people with life expectancy less than 6 months who are not evidently frail

Content of the table taken from article published by Juma et al. in 2016 [17]

5.1.3 Potentially inappropriate medications in older patients

While there is no official definition of potentially inappropriate medications (PIMs) in older patients, these drugs or drug procedures are generally described as „medications that should be avoided in older patients because of higher risk of adverse drug events that overweighs the benefits of their use when lower-risk and equally effective alternative therapies exist to treat the same health condition“ [18][19]. This means that PIMs can be mostly substituted by safer treatment alternatives in older adults. According to some definitions these should be also medications under specific monitoring because of substantially higher risk of drug complications in older age due to age-related changes. Thus, lists of PIMs represent mainly general preventive tools by which the specific principles of rational geriatric pharmacotherapy are recommended and promoted to clinicians of different specialities.

Older patients also often suffer from multiple problems and their treatment, including pharmacotherapy, might be very complicated and require special, multidisciplinary and individualized approach. To identify risks of pharmacotherapy in older adults, several guidelines and tools have been developed by multidisciplinary teams of health care professionals and researchers in order to help to evaluate the appropriateness of medications prescribed to older adults. These tools are called criteria and two different types of such criteria are distinguished nowadays: implicit and explicit criteria. Also, tools combining both implicit and explicit approaches exist.

5.1.4 Explicit criteria of PIMs

Many criteria of medications to avoid, so called PIM explicit criteria, have been published in several countries. However, since all these criteria differ from each other, it is difficult to estimate the real prevalence of use of PIMs when different explicit criteria are applied [20]. Some of the most important basic explicit criteria of PIMs are described below.

The use of explicit criteria is generally more common in the research area than use of implicit approach of evaluation of drug therapy. This approach requires detailed knowledge of geriatric clinical pharmacy and clinical pharmacology [21]. Development

of explicit tools of PIMs is based on literature research and consensus of opinions of groups of experts evaluated mostly by different modifications of Delphi method. Explicit criteria usually contain lists of medicines or their classes that should be avoided in older adults. Sometimes also the conditions of inappropriateness are specified by stating the inappropriate dosing, length of therapy, drug-disease interactions or basic drug-drug interactions for individual PIMs.

5.1.4.1 Beers criteria

Probably the best-known and most common explicit criteria of PIMs used by clinicians, researchers and educators are Beers criteria, first published in 1991 in the USA. Their updated versions were frequently modified in 1997 and 2003, later also by The American Geriatrics Society (AGS) as AGS criteria in years 2012, 2015 and 2019 [22]. Beers Criteria were first developed to assess the appropriateness of the use of medications in nursing home patients. For the validation of these criteria, group of geriatric experts in different disciplines participated in a Delphi survey to reach the consensus on the list of PIMs [23].

Nowadays, Beers Criteria can be used in senior patients in ambulatory, acute and institutional care, but they are not suitable for use in settings providing e.g. palliative care. Their purpose is to improve prescription of medications in general in senior population and to decrease the prevalence of adverse drug events as well as to educate both patients and clinicians in the basic aspects of appropriate geriatric drug prescribing [22].

The newest version of Beers/AGS criteria from 2019 is based on a systematic review of newly published geriatric studies since the previous update in 2015 and on discussion and a final anonymous Delphi survey of experts that reached the consensus on proposed changes [22]. After the last update, Beers/AGS criteria are now divided into five different categories and organized into five tables, as displayed in Table 2.

Table 2: Examples of criteria from each PIM category from the Beers/AGS list of PIMs

	Category	Example of the content in each category
1	**Medications potentially inappropriate in most of older adults**	Amiodarone, imipramine and other TCA, benzodiazepines etc. (30 PIMs in total)
2	**Medications potentially inappropriate in older adults with certain medical condition**	Drug-disease interactions of different classes of medications (25 PIMs in total)
3	**Medications to be used with caution**	Special warning for several medications, e.g. dabigatran, rivaroxaban because of higher risk of gastrointestinal bleeding in older adults etc. (15 PIMs in total)
4	**Potentially clinically important risks of some classes of medications**	E.g. use of multiple anticholinergic drugs because of increased risk of cognitive decline
5	**Medications that should be avoided or should have their dosage reduced in patients suffering from different stages of kidney failure**	Section describing in which dosing schemes some medications should be applied, checked and reduced because of lower renal functioning (23 PIMs in total)

Content of the table is based on the original list from Beers/AGS Criteria 2019 version [22]

The list is well-arranged and easy to understand, for each PIM a reason why it's use might be inappropriate/potentially inappropriate in older patient is stated, together with recommendations of a safer alternative. The strength of recommendation and the quality of evidence is also emphasized.

5.1.4.2 STOPP/START criteria

First version of criteria called STOPP (Screening Tool of Older People's Prescription) and START (Screening Tool to Alert the Right Treatment) was published in 2008 by Gallagher et al. This tool is unique as it encompasses both criteria for potentially inappropriate medications (STOPP) and medications having high benefit also in higher age that are potentially underused in older patients (START criteria), so it focuses also on the problematics of underprescribing in older patients [24].

As in the case of Beers Criteria, Delphi method with a panel of 18 experts from Ireland and the United Kingdom was used to define the validity of the tool. In 2015, an updated version, based on up-to-date literature review and afterwards validation using expert panel Delphi method with participation of 19 experts from all over Europe, was released. In comparison to the first version, there was an overall 31 % increase in the number of criteria included, with the final number of 114 [25].

The STOPP part of the criteria consists of 13 sections from A to N generally divided by indications of drugs for the treatment of disorders of different organ systems (see Table 3).

Table 3: Categories of STOPP criteria and examples of related PIMs

	Section	Example of one criterion from the whole list in each section
A	**Indication of medication**	Any duplicate drug class prescription
B	**Cardiovascular System**	Loop diuretic to treat hypertension with concurrent urinary incontinence
C	**Antiplatelet/Anticoagulant Drugs**	NSAID with concurrent antiplatelet agent(s) without PPI (proton pump inhibitors) prophylaxis
D	**Central Nervous System and Psychotropic Drugs**	Neuroleptics indicated as hypnotics, unless sleep disorder is due to psychosis or dementia
E	**Renal System***	NSAIDs if eGFR <50 ml/min/1.73m^2
F	**Gastrointestinal System**	Prochlorperazine or metoclopramide in patients with Parkinson disease
G	**Respiratory System**	Theophylline as monotherapy for COPD
H	**Musculoskeletal System**	NSAID with concurrent corticosteroids without PPI prophylaxis
I	**Urogenital System**	Alpha-1 selective blockers in those with orthostatic hypotension
J	**Endocrine System**	Pioglitazone in patients with heart failure
K	**Drugs that predictably increase the risk of falls in older people**	Benzodiazepines
L	**Analgesic Drugs**	Use of regular opioids without concomitant safer laxative agent (e.g. lactulose)
N	**Antimuscarinic/Anticholinergic Drug Burden**	Concomitant use of 2 or more drugs with antimuscarinic/anticholinergic properties

* The following drugs are potentially inappropriate in older people with acute or chronic kidney disease with renal function below particular levels of eGFR (refer to SPC datasheets and local formulary guidelines)

Content of the table is based on the list of STOPP/START criteria version 2017 [26]

Table 4 shows the 9 categories of the START part of these criteria and some examples of drugs that are suitable for use in seniors with some concrete medical conditions.

Table 4: Categories of START criteria and examples of drugs which should be considered as indicated under some medical conditions

	Section	Example of drug
A	**Cardiovascular System**	Antiplatelet therapy with a documented history of coronary, cerebral or peripheral vascular disease
B	**Respiratory System**	Home continuous oxygen with documented chronic hypoxaemia
C	**Central Nervous System & Vision**	Non-TCA antidepressant drug in the presence of persistent major depressive symptoms
D	**Gastrointestinal System**	PPI with severe gastro-oesophageal reflux disease or peptic stricture requiring dilatation
E	**Musculoskeletal System**	Vitamin D supplement in older people who are housebound or experiencing falls or with osteopenia
F	**Endocrine System**	ACEis or sartans in diabetes with evidence of mild renal disease with or without serum biochemical renal impairment
G	**Urogenital System**	5-alpha reductase inhibitor with symptomatic prostatism, where prostatectomy is not considered necessary
H	**Analgesics**	Laxatives in patients receiving opioids regularly
I	**Vaccines**	Seasonal trivalent influenza vaccine annually

Content of the table is based on the list of STOPP/START criteria version 2017 [26]

5.1.4.3 The EU(7)-PIM list

EU(7)-PIM list represents a screening-tool and explicit criteria developed in 2015 with participation of 30 experts on geriatric pharmacotherapy from Estonia, Finland, France, the Netherlands, Spain and Sweden. The EU(7)-PIMs list focuses on the weak points of other tools - the fact that usually the explicit criteria are country-specific and it is difficult to apply them in the international environment [27].

This list contains 282 substances and drug classes from 34 therapeutic groups that are potentially inappropriate for use in older adults. Preliminary list of PIMs was based on other lists of PIMs, including German PRISCUS list of PIMs, and also a Delphi survey was used for reaching the consensus of panel of experts on individual items [27].

For each PIM in the list a reason why it is included among PIMs is also given and suggested dose adjustment or special consideration for use of alternative drug or therapy is stated. An example of PIM on the EU(7)-PIM list is e.g. metoclopramide – its use is inappropriate in older adults because of anticholinergic and antidopaminergic effects. Only a short-term use and dose reduction could be recommended in patient cases where (exceptionally) short indication of this drug is necessary. Domperidone is recommended as an alternative therapy [27].

5.1.5 Implicit criteria

Implicit criteria represent an individual approach of risk management based on clinical judgement of a health care professional and this judgement is assessor- and patient-specific. It means that when those criteria are applied, patient's health information, results of clinical assessments and laboratory tests, as well as existing literature sources are taken into account by a health care professional with some level of expertise evaluating the medications. The use of this type of criteria relies on the experience, knowledge and attitude of health care professionals performing the assessment of prescription appropriateness [28].

Because the appropriateness of patient's pharmacotherapy is, in the case of use of implicit criteria, reviewed and judged individually for each patient and by different experts, the reliability of application of these criteria is lower than in the case of use of explicit criteria. Another disadvantage of this patient-specific approach is that the

application of this type of criteria is money- and time-consuming and appropriate judgment requires clinical expertise and background in geriatric clinical pharmacy and geriatric clinical pharmacology [29]. These are probably some of the reasons why implicit criteria in geriatrics are not as commonly applied in studies as the explicit criteria. But they are, of course, widely used by clinicians in clinical practice and sometimes also in combination with explicit tools.

5.1.5.1 Medication appropriateness index

Medication Appropriateness Index (MAI), introduced in the USA in 1992 by Hanlon et al., is one of the most common implicit criteria in use and is suitable for all patients regardless of their age [30]. MAI as a tool is a set of 10 questions to individually assess the appropriateness of each drug the patient is taking by a 3-point Likert scale ranging from appropriate to marginally appropriate and inappropriate.

Table 5: Questions from the Medication Appropriateness Index and their scoring

Question	Weighted score
1. Is there an indication for the drug?	3
2. Is the medication effective for the condition?	3
3. Is the dosage correct?	2
4. Are the directions correct?	2
5. Are the directions practical?	1
6. Are there clinically significant drug-drug interactions?	2
7. Are there clinically significant drug-disease/condition interactions?	2
8. Is there unnecessary duplication with other drug(s)?	1
9. Is the duration of therapy acceptable	1
10. Is this drug the least expensive alternative compared to other drugs of equal quality?	1
Maximal score (totally inappropriate)	18

Content of the table taken from the original paper presenting MAI published by Hanlon et al. in 1992 [30]

When using MAI for the assessment, potentially inappropriate prescribing is detected more often than in case of use of the explicit criteria. According to previous studies, this tool can be also used to predict adverse health outcomes and to show the positive effect of the interventions preventing inappropriate prescribing [31].

5.1.6 Other problems associated with rational/irrational pharmacotherapy in older patients

It might seem that the use of medicines generally causes a lot of harm to older patients and that use of unnecessary medicines should be restricted as much as possible. However, underprescribing, representing an insufficient treatment when medicines that are demonstrably highly beneficial for the patient are not prescribed, is also a significant problem [4].

With increasing number of medicines in patient's regimen, the costs of the therapy are raising as well. Although the majority of medicines costs in the Czech Republic are covered by health insurance and patients usually co-pay only smaller amount of the total price when picking up their prescriptions in a pharmacy, there are seniors and their families who cannot afford to pay for drug treatment or safer drug alternatives. The overuse of ineffective medicines or overuse of unnecessary polypharmacy also represents a significant financial burden for the health care system, including frequent additional costs for hospitalizations and other negative consequences of adverse drug events.

Some seniors are, due to their health condition, mental or psychological status etc., not able to follow the therapeutic regimen given by their doctors. The instructions might be too difficult for them to understand, they keep on forgetting to take their medicines, they can have problems with some more complicated dosage forms etc. This often results in medication nonadherence. When there is a proper family background and support, it is easier for older patients to manage complications related to inappropriate medicine use. However, many seniors do not have this support and need substantial help with appropriate drug administration from pharmacists or other healthcare professionals, e.g. nurses.

6. PRACTICAL PART

Practical part of this thesis is divided into three sections. The aim of Section I was to conduct a literature review of studies describing previously developed patient self-administered medication risk assessment tools. Section II then focuses on application of results of this literature review in the development of a new patient self-administered risk assessment screening tool for seniors. Section III of the Practical part focuses on pilot testing of newly developed questionnaire in the Czech Republic on 172 patients aged 65 years and older residing in the community, in order to test the feasibility of this instrument and its applicability in everyday practice.

For all three parts of this thesis, sections Methods and Results are stated separately because methodology and results of Section II are in tight connection to results of literature review (Section I) and all three sections follow in logical order. The Discussion part and Results part are written for all three sections together.

Both the literature review (Section I) and further development of the tool (Section II) were initiated during my Erasmus+ programme stay at the University of Helsinki, Finland. During my studies at this institution I had the opportunity to join the Finnish research team and cooperate with researchers from the Faculty of Pharmacy, University of Helsinki, namely with: Prof. Marja Airaksinen, Professor of Social Pharmacy and Head of the Clinical Pharmacy Group at the faculty, Dr. Maarit Dimitrow, the author of another risk screening tool, and three postgraduate students –Terhi Toivo, MSc (Pharm), Emmi Puumalainen, MSc (Pharm) and Ghada Hassan, MSc (Pharm), as well as with one bachelor pharmacy student – Roosa Saarenmaa.

The instrument itself was translated into Czech language after my return to our country and used after agreement with Finnish team in original Czech version (including after advice of my Czech supervisor a comprehensive medication part of all medicines used by a patient and more items than in reduced Finnish version). The Czech version of the instrument was applied in a pilot study on 172 older patients in the period between May 2019 and March 2020. Results of this diploma thesis were therefore obtained in my joint collaboration with the Finnish team, my supervisor Assoc. Prof. D. Fialová, PharmD, Ph.D. and my Finnish supervisors prof. M. Airaksinen and Dr. M. Dimitrow who are stated as consultants of this diploma thesis. The cooperation on publication outputs of this whole research team will further continue after diploma thesis defense.

6.1 Section I: Literature review of previously developed patient self-administered pharmacotherapy risk assessment tools

To find an evidence-based support for the development of the new patient-administered pharmacotherapy risk assessment tool, a review of previously published literature was performed. All similar previously published tools were compared in terms of included items and questions and served as a background for the further development of our tool.

6.1.1 Section I: Methods – Literature review of previously developed patient self-administered pharmacotherapy risk assessment tools

The literature search followed a systematic literature review, conducted by one of the research team members from the University of Helsinki, Emmi Puumalainen, which covered the period from the 1st of January 1985 to the 7th of April 2016 [1]. The aim of our following literature search was to find out if any new, patient-administered pharmacotherapy risk assessment tools focusing on patients aged 65 years and older, have been published after the 7th of April 2016. Until this date, 4 patient-administered tools were found in Puumalainen‘s systematic review [1]. The fact that only 4 tools were published between 1985 and 2016 raised an opinion that the chances of finding new tools published after this date are not very high.

The literature search for this diploma thesis covered the period from the 8th of April 2016 to the 10th of December 2018. Searched databases were used also in the previous systematic review, namely Evidence Based Medicine, Medline Ovid, Scopus, Web of Science and in the additional part of literature search also Google Scholar and PubMed databases were included. In order to follow the same search strategy, the search terms used were the same as in the systematic review of Puumalainen et al. [1]. These search terms were:

((elderly OR aged OR ageing) AND ("medication-related problem*" OR "drug-related problem*" OR "drug therapy problem*" OR "medicine-related problem*" OR "medication management problem*" OR "therapy-related problem*" OR "DRP*") AND (risk OR risk assessment) AND (screen OR "screening tool" OR form OR assessment* OR evaluation* OR indicator* OR criteria OR survey* OR questionnaire* OR factor* OR "risk factor*"))

The inclusion and exclusion criteria applied in the following literature search were slightly modified. Unlike in the previous systematic literature review, only tools focused on patients aged 65 and more were included, and it was not assessed if the tool was published in a peer-reviewed journal or not. The inclusion and exclusion criteria were:

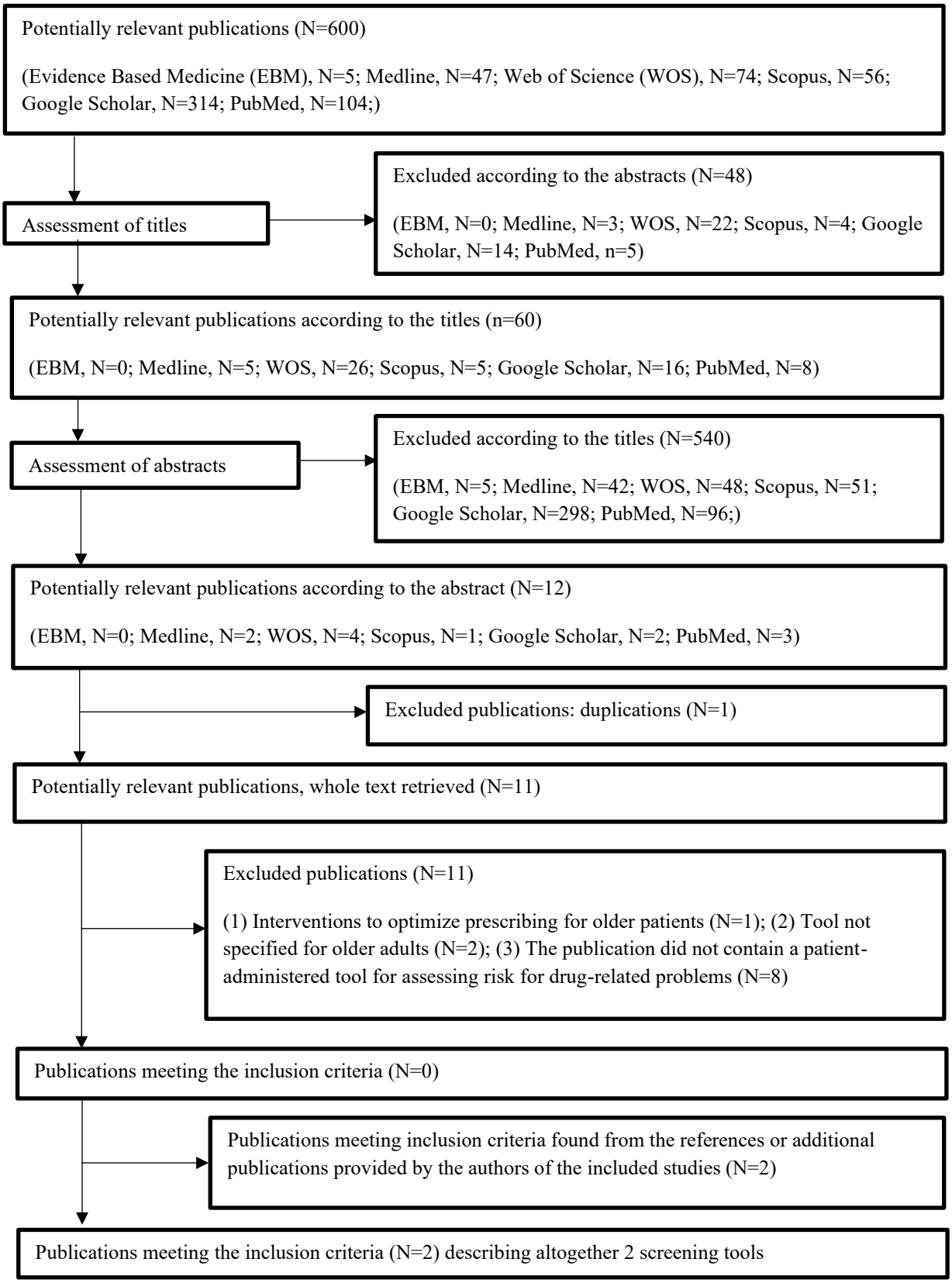
Table 6: Inclusion and exclusion criteria applied during the additional part of literature review

Inclusion criteria	Exclusion criteria
Patients ≥65 years old	Patients <65 years old
Published between April 8, 2016 and December 10, 2018	Published before April 8, 2016
Outpatient care setting	Other settings
Patient-administered tool	Other than patient-administered tool
General medication	Specific condition treatment (e.g. cancer)
Content of the tool included in the article	Content of the tool not included in the article
English language	Other languages

The inclusion and exclusion criteria were taken from previous systematic literature review published by Puumalainen et al. in 2019 and modified for the needs of literature search [1]

The flowchart of the literature search is showed in Table 7. It had the same structure as the flowchart from Puumalainen's work, because the literature search process also followed the steps of her systematic literature review to get comparable results [1].

Table 7: Flowchart of the additional literature search



Content of the flowchart respects and follows the structure of flowchart from previous literature review published by Puumalainen et al. in 2019 [1]

These two newly found tools were then compared with previously obtained patient-administered tools from the systematic literature review of Puumalainen et al. 2019 [1]. Firstly, the general characteristics of all tools were compared. Data extracted and analysed from the articles were – names of the authors, year of publishing and the country of origin, the purpose of the tool, setting in which the tool is meant to be used, nature of the criteria used (explicit or implicit), process of development and finally, assessment of validity and reliability of the tools. Those characteristics of all tools were compared and are displayed in Section I: Results, in Table 8.

The results of this first part of the literature search gave the background evidence for some questions added to the questionnaire. All the items from previously developed patient-administered tools were compared, including how many times they occurred in other tools, and also the clinical importance of those items. If the evidence was strong and the item was found important for clinical practice, the research team decided to add the item to the list of questions after series of discussions. Tables comparing previously developed tools with our new tool and DRP-RAT tool (Drug-Related Problem Risk Assessment Tool), which served as starting point for the development, can be found in Section I: Results [32].

6.1.2 Section I: Results – Literature review of previously developed patient self-administered pharmacotherapy risk assessment tools

As it can be seen in the flowchart of the literature search, after the application of inclusion and exclusion criteria, no new tools were found among newly published articles in the period between the 8th of April 2016 to the 10th of December 2018. Because of this, two articles (searched also in additional databases, e.g. Google Scholar) that met the inclusion criteria the most were added into the search results of the literature review after a discussion and agreement of the research team members.

First tool added was a questionnaire from article published by Willeboordse et al. in 2016 [33]. This article was included, even though it was published in January 2016, because it was found in Google Scholar database, which had not been searched in the previous systematic literature review. The second article was published by Berman et al. in 2018 and it was found in Medline database [34]. The research team decided to add this

article despite the fact that the described tool is meant to be used for patients aged 55 years and older.

Table 8 compares the characteristics of these two newly found tools with previously developed patient-administered tools. The structure of the table and characteristics of the first 4 tools (published by Barenholtz Levy in 2003, George et al. in 2007, Pit et al. in 2007 and 2008 and Doucette et al. in 2013) are taken from Table 2 in Puumalainen's systematic review [1][35][36][37][38][39]. The characteristics of the 2 newly found tools (published by Willeboordse et al. in 2016, Berman et al. in 2018) were added at the end of this table [33][34].

Table 8: Comparison of previously developed patient self-administered tools found in the systematic literature review and the follow-up literature search

Tool	Authors and country	Purpose	Setting	Development process	Implicit/Explicit	Validity	Reliability
10-item Self–Administered Medication-Risk Questionnaire	Barenholtz Levy 2003 USA	To detect those older patients (≥ 60 years) that have the highest risk for medication-related problems	Ambulatory care	Ten items selected for inclusion from existing literature and unpublished screening tools from colleagues. Clarity of the questionnaire pilot tested.	Use of the tool explicit, interpretation of the results/answers of the questions based on clinical judgment.	Content validation: Number of yes answers on the questionnaire correlation with higher Drug Regimen Review severity scores ($r = 0.556$; $p = 0.01$) Drug regimen review scores were based on an earlier drug related problem categorization	Inter-rater reliability ($r = 0.847$; $p < 0.001$), Test-retest reliability ($r= 0.889$; $p < 0.001$), Internal consistency ($\alpha = 0.69$)
Risk Factors for Medication Misadventure (MRQ)	George et al. 2008 UK	To detect those older patients (≥ 60 years) that have the most risk for medication-related problems	Intermediate care / Sheltered housing	Tool is an extended version of the 10-item Self-Administered Medication-Risk Questionnaire. The additional contents including Townsend scale for disability and patient self-reported adherence tool, Morisky scale	Use of the tool explicit, interpretation of the results based on clinical judgment.	The individual scales used were validated in previous studies. [28,31,32] Content validation: Analysis of whether or not the individual questions in the tool predict hospitalization and further analysis by logistic regression model (forward selection method validated by backward selection method).	Internal consistency of the disability score (Crohnbach´s $\alpha = 0.91$)
Medication Risk Assessment Form	Pit et al. 2007 and 2008 Australia	To identify patient risk factors for medication misadventures	Primary care /General practitioner's surgery	Existing studies including a list of triggers published by the Australian National Prescribing service and expert opinion through comments and a workshop. Pre-tested for comprehensibility and pilot-tested	Use of the tool explicit, interpretation of the results of the questions based on clinical judgment.	The acceptability, feasibility and quality of the form were determined through direct observation, cognitive lab. techniques or unstructured interviews. No data presented. Content validation: Comparing the results of the risk assessment to the GP's choices on who to make the Medication Review	As part of direct observation, a member of the research group was located in the waiting room to observe whether the patients were able to complete the form. No data presented.

Tool	Authors and country	Purpose	Setting	Development process	Implicit/Explicit	Validity	Reliability
Medication user self-evaluation (MUSE) tool	Doucette et al. 2013 USA	To identify Medicare Part D beneficiaries who would benefit from a comprehensive medication review (a part of MTM services)	Primary care / Medicare beneficiaries	The draft tool based on literature, previous tools and expert opinion. The final tool was formed using ordinal logistic model with clinical pharmacist opinion as the golden standard. Akaike information criterion (AIC) model selection measure was used in finalizing the tool.	Use of the tool explicit, interpretation of the results of the questions based on clinical judgment.	Content validation: Validation of the model with more cases with clinical pharmacist opinion as the golden standard. (prediction accuracy 68%)	No measure for reliability reported
Questionnaire from article: Information on actual medication use and drug-related problems in older patients: questionnaire or interview	Willeboordse et al. 2016 The Netherlands	To obtain information for medication review from the patients and compare it with information obtained during an interview.	Primary care / General practice	Questionnaire was developed from an existing interview protocol to identify DRPs and the PCNE's DRP classification system. Then the tool was reviewed by experts and improved based on their suggestions. Two-phased pilot test on 7 and 4 patients followed.	Use of the tool explicit, interpretation of the results of the questions based on clinical judgment.	The agreement on actual drug use and the agreement on drug-related problems between the questionnaire and the interview were assessed.	Independent T tests and Chi-square tests to analyse differences in agreement in actual medication and DRPs for gender, age, living situation, education level, self-perceived health, health literacy, number of medications and number of chronic diseases.
MedUseQ	Berman et al., 2018 USA	To identify medication use problems experienced by older adults	Clinical and community setting	In phase 1, the concept mapping methodology was used. Phase 2 included developing the tool from the items generated from the concept mapping statements. Phase 3 created the final format of the questionnaire.	Use of the tool explicit, interpretation of the results of the questions based on clinical judgment.	For validation they used the Rasch analysis in the Phase 2 to examine dimensionality, fit of items to the model, rating scale functionality, internal consistency and appropriateness of the model for the target group of patients.	Internal consistency of reliability: 0.74 person reliability (acceptable) 0.96 item reliability (high) Cronbach's $\alpha = 0.87$

Content of the table: data concerning the first four tools in the table are taken from systematic review published by Puumalainen et al. in 2019 [1], data about the 2 newly added tools published by Willerboordse et al. in 2016 [33] and Berman et al. in 2018 [34] were inserted into the table additionally

The comparison of items included in all tools found as results of the systematic literature review is displayed in Tables 9-12. Development of the new tool followed up a previous project and tool presented in dissertation work of one member of the research team, Dr. Maarit Dimitrow [32]. For this reason, this tool is also included in the table and compared with other tools, even though it is not a patient-administered tool and it was not a result of the literature search. This tool was added to simplify the process of comparing the „DRP-RAT - Traffic lights of risks “, which were used for the development of the new tool, with others (see below).

After conducting the second part of the literature search, items from newly added articles were also compared (Table 9, 10, 11 and 12). Because some items included in these two new tools were different from those in the previous tools, the comparison of these new tools is displayed separately in Table 13.

Table 9 displays the comparison of items related to medicine use.

Table 9: Medicine use related items in previously developed patient self-administered tools in comparison with our tool

Item	Barenholtz Levy, 2003	George et al., 2007	Pit et al., 2008	Doucette et al., 2013	Dimitrow et al., 2016	Our tool
Number of currently used medicines	≥5	≥5	≥5	fill in the number	≥5	table to fill in the medicines in Czech version
12 and more medication doses each day	x	x	-	-	x	-
Use of drugs with narrow therapeutic window	Carbamazepine, lithium, phenytoin, quinidine, warfarin, digoxin, phenobarbital, procainamide, theophylline	Carbamazepine, lithium, phenytoin, warfarin, digoxin, phenobarbital, procainamide, theophylline	-	-	Amiodarone, carbamazepine, digoxin, fluoxetine, lithium, methotrexate, theophylline, warfarin	-
Use of specific medicines	-	Antihypertensives digoxin, diuretics, hypnotics, NSAID, Parkinson drugs, warfarin	For nerves, sleep, stress, anxiety or depress-ion	-	NSAID, diuretics, statins	For long term pain (excluding paracetamol), diuretics, statins, anticoagulants (warfarin)
Use of over-the-counter medicines and supplements in the past 2 weeks	-	-	-	-	x	x
Use of drugs without physician's knowledge	-	-	x	-	x	x
New medicine prescribed in the past 4 weeks	-	-	x	-	x	x
Number of pharmacies dispensing prescriptions	x	x	-	x	-	-
Change in the medications or instructions few times in the past year	x	x	x	-	-	x
Someone else bringing the medications to the patient	x	x	-	-	-	-
Use of any drugs longer than 6 months	-	-	x	-	-	-

Content of the table: data taken from articles presenting the tools [35][36][37][39][32]
x – the item is included in the tool

Table 10 shows the comparison of items related to possible adverse drug reactions.

Table 10: Adverse drug reactions related items in previously developed patient self-administered tools in comparison with our tool

Item	Barenholtz Levy, 2003	George et al., 2007	Pit et al., 2008	Doucette et al., 2013	Dimitrow et al., 2016	Our tool
Symptoms suggestive of adverse-drug reactions	-	-	Troubles in sleeping, drowsiness, dizziness, nausea, stomach problems, skin rash or itch, leaked urine, constipation	-	Drowsiness, fatigue, skin rash or itch, dizziness, urination problems, muscle pains, nausea, diarrhea, constipation, dizziness when getting up, recurrent falls, swellings, memory problems, confusion, visual problems, stiffness, troubles in walking, low blood pressure, systolic pressure under 100 mmHg (in the last 4 weeks)	Drowsiness, fatigue, skin rash or itch, dizziness, urination problems, muscle pains, nausea, diarrhea, constipation, dizziness when getting up, recurrent falls, swellings, memory problems, confusion, visual problems, stiffness, troubles in walking, low blood pressure, troubles in sleeping, stomach problems, bruises, sudden bleeding (in the last 4 weeks)

Content of the table: data taken from articles presenting the tools [35][36][37][39][32]

Table 11 displays comparison of items related to health and health care.

Table 11: Health and health care related items in previously developed patient self-administered tools in comparison with our tool

Item	Barenholtz Levy, 2003	George et al., 2007	Pit et al., 2008	Doucette et al., 2013	Dimitrow et al., 2016	Our tool
Admission to hospital in previous 6 months	-	-	-	x	-	-
Short term care stay during the past 4 weeks	-	-	-	-	x	-
Fall in the past 12 months	-	-	x	-	x	x
Communication with a pharmacist about medicines	-	x	-	-	-	-
Number of prescribing physicians	x	x	x	x	x	x
Change of GP in previous 3 months	-	-	x	-	-	-
Number of medical conditions treated	x	x	x	x	x	3 or more
Changes in condition noticed by relatives/visitors	-	-	-	-	x	-

Content of the table: data taken from articles presenting the tools [35][36][37][39][32]
x – the item is included in the tool

Table 12 shows the comparison of adherence related items.

Table 12: Adherence related items in previously developed patient self-administered tools in comparison with our tool

Item	Barenholtz Levy, 2003	George et al., 2007	Pit et al., 2008	Doucette et al., 2013	Dimitrow et al., 2016	Our tool
Difficulties in following drug regimen	x	x	x	-	x	x
Knowing the reason for taking all medicines	x	x	x	-	x	x
Other compliance issues	-	Are you always careful about taking the medicine? Do you stop taking the medicine after feeling better? After feeling worse, when you take the medicine, do you stop taking it? Do you use something to help you remember to use or take your medicines? Do you think you need more help to use your medicines?	Side effects Using many medicines at once Reading the label Understanding the label Opening bottles and packets Sharing the medicines with others	-	Troubles with opening the bottles or packages or with medicines related therapeutic devices Sometimes consciously taking the medicine differently than prescribed Is the client aware of the medicines he/she uses? Is the client aware of his/her diseases and their treatments?	Troubles with opening the bottles, packages or with medicines related therapeutic devices Troubles with tablet splitting Troubles with swallowing the tablets Troubles with monitoring the effect of drug Sometimes taking more in order to get more relief Knowing for how long take the medicines Worries about side/adverse effects Worries about interactions Uncomfortable use of medicines
Forgetting to take the medication	-	x	x	x	x	x
Someone helps the patient to take the medicines	-	x	-	-	-	-
Problems with affording the medicine	-	-	x	x	x	x

Content of the table: data taken from articles presenting the tools [35][36][37][39][32]
x – the item is included in the tool

Table 13 compares items included in two newly found tools with our tool.

Table 13: Comparison of items in two newly found tools in the following literature search compared with our final tool

Items related to:		Willeboordse et al. 2016	Berman et al. 2018	Our tool
Medicine use	Medication list	x (Rx, OTC)	-	x
	Number of medications used	x	-	-
	Use of OTC medication	x	x	x
	Doubts about the medication (e.g. effectiveness, amount)	x	x	x
Adverse drug reactions	Experience of side effects	x	-	-
	Worry about side effects	x	x	x
	Worry about interactions	-	x	x
	Effects of medication on daily activities	-	x	-
Adherence issues	Forgetting to take the medication	x	x	x
	Time of taking the medication	x	-	-
	Prevention of forgetting	x	-	-
	Skipping/taking less	x	x	x
	Taking more	x	x	x
	Stop of use	x	-	x
	Knowing the reason for taking the medication	x	-	x
	Difficulties in taking the medication	x	x	x
	Practical issues in using the medication	x	x	x
	Way of administration issues	-	x	x
	Difficulties in getting the medication from pharmacy	-	x	-
	Money issues	-	x	x
	Use of alternative product	-	x	-
	Alcohol use	-	x	-
	Drug misuse	-	x	x

Content of the table taken from articles presenting the tools [33][34] x – the item is included in the tool

As it can be seen in Table 13, items in newly published tools were focused more on adherence-related issues than on medicine use in general when compared to the tools developed until April 2016. Items present in both tools and finally included also in our tool are highlighted in yellow.

6.2 Section II: Development of new patient self-administered pharmacotherapy risk assessment tool

The aim of the Section II of practical part of this diploma thesis was to further develop a patient self-administered questionnaire for use by senior patients in outpatient care, based on the results of literature review. The goal was to make the questions understandable and easy to answer for patients and at the same time, to choose questions that could provide useful data to community and clinical pharmacists and other health care professionals.

This tool could generate signals of risks in patient's pharmacotherapy and help to identify those patients, who would benefit from a complete medication review performed by a clinical pharmacist. Patients with less serious problems in their pharmacotherapy could be directed to a community pharmacist to discuss the problematic issues in the patients' pharmacotherapy, for example problems with use of inhalers, problems with adherence to pharmacotherapy, etc.

6.2.1 Section II: Methods – Development of a new patient self-administered pharmacotherapy risk assessment tool

The starting point for the development of this patient-administered questionnaire was a risk-identifying tool called Drug-Related Problem Risk Assessment Tool (DRP-RAT) developed and published by one of the research team members, Dr. Maarit Dimitrow, in 2016 [32]. This tool was developed with help of other researchers who also participated in the development of the patient self-administered pharmacotherapy risk assessment tool described in this thesis.

DRP-RAT was invented for use by practical nurses visiting home care patients in Finland. Development of DRP-RAT consisted of two systematic literature reviews, research group discussions and consultations with an external geriatrician. Later, the tool was validated using a 3-round Delphi survey with participation of 18 panellists specialized in geriatric field.

From this previous tool, authors chose the 8 most important risk indicating questions identified as crucial by a geriatrician and these questions formed so called „Traffic Lights "of risks:

1. Has the client had any of the following symptoms in the last 4 weeks?
   drowsiness, fatigue, skin rash or itch, dizziness, urination problems, muscle pains, nausea, diarrhea, constipation, dizziness when getting up, recurrent falls, swellings, memory problems, confusion, visual problems, stiffness, troubles in walking, low blood pressure; systolic pressure under 110 mmHg

2. Does the client have more than one physician involved in his/her care? (e.g., general practitioners, specialists, private practitioners)

3. Has the client had more than one fall in the past 12 months?

4. Does the client use any of the following medicines (please check the ones used)?
   amiodarone, carbamazepine, digoxin, fluoxetine, lithium, methotrexate, theophylline, warfarin

5. Has the client had troubles in:
   a) remembering to take the medicines?
   b) following the medicines regimen?
   c) knowing what his or her medicines are used for?
   d) affording the medicines (e.g. economic problems)?
   e) opening the drug bottles or packages or managing with medicines related therapeutic devices?

6. Does the client use medicines that:
   a) relieve pain by reducing inflammation (does not apply to paracetamol)?
   b) elevate the rate of urination (diuretics)?
   c) are intended to lower the cholesterol level (statins)?
   d) the physician does not know about?

7. Have the client's relatives/proxies expressed their concern about the client's medicine use?

8. Has the client started a new medicine in the last 4 weeks? (excluding different brands of the same active ingredient)

These 8 questions were reformulated and afterwards used as the first preliminary proposal for the patient-administered tool/questionnaire. Then 3 other questions were added, based on results of previous research works and the opinions of the research group members. These questions were:

- Do you have an up-to-date medication card/list?
- Is there anyone who has reviewed your whole medication within a year?
- Have you had sleeping medicines in regular long-time use? (i.e. over 3 months)

All together this formed 11 questions that were later discussed in the research team meetings. After the discussions, one question was eliminated from the list (question number 7 in the previous list). Seven new questions were added (highlighted in bold), based on the most frequent items in previously developed tools from the literature search and also based on opinions of the research team members. The list of symptoms was extended, based on multiple suggestions of the research team members. The questionnaire at this phase consisted of the following items:

1. Do you have an up-to-date medication card/list?

2. Is there anyone who has reviewed your whole medication within a year?

3. Have you started a new medicine in the last 4 weeks? (excluding different brands of the same active ingredient)

4. **Have your medications or the instructions on how to use them been changed few times in the past year?**

5. Do you use medicine(s), without follow up, that:
   a) relieve strong pain (does not apply to paracetamol)?
   b) elevate the rate of urination (diuretics)?
   c) are intended to lower the cholesterol level (statins)?
   d) the physician does not know about?

6. Have you been using prescription sleeping medicines for longer than 3 months?

7. **Do you use over-the-counter medicines or vitamin, mineral or herbal products without discussing with the pharmacist or physician if it fits with your prescription medication(s)?**

8. **Do you use medicine(s), for which there should be a follow-up, but for some reason there is no follow-up?**

9. Do you use any of the following medicines (please check the ones used)?
   amiodarone, carbamazepine, digoxin, fluoxetine, lithium, methotrexate, theophylline, warfarin, phenytoin, phenobarbital, procainamide, quinidine

10. Have you had any of the following symptoms in the past 4 weeks?
    (Please tick below 'yes' if it has been ongoing and add another tick in the right column, if the symptom is a new one = a symptom that had first occurred within the last 4 weeks): drowsiness, *(feeling abnormally sleepy),* fatigue, *(overall lack of energy, no motivation)*skin rash or itch, dizziness, *(feeling unbalanced, lightheaded),* urination problems, muscle pains, nausea, diarrhea, constipation, dizziness when getting up, *(orthostatic/postural hypotension = feeling dizzy after standing up),* recurrent falls, swellings, *(enlarging of a tissue, skin, organ as a result of inflammation or fluid build-up),* memory problems, confusion, *(disorientation, difficulties in time focusing and decision making).* visual problems, stiffness, *(in muscles, joints),* troubles in walking, low blood pressure, systolic pressure under 110 mmHg, troubles in sleeping, stomach problems

11. Have you had more than one fall in the past 12 months? (due to confusion, difficulty in balance, feeling dizzy when getting up)

12. Do you have 3 or more physicians involved in your care? (e.g., general practitioners, specialists, private practitioners)
    If yes: How often do you visit your main prescribing physician?

13. Have you had troubles in:
    a) remembering to take the medicines?
    b) following the instructions on how to use your medications?
    c) knowing what are your medicines used for?
    d) knowing for how long to take the medications?
    e) monitoring how the medicines work (e.g. blood sugar level and blood pressure level measurement)
    f) opening the drug bottles or packages or managing with medicines related therapeutic devices?
    g) splitting the tablets
    h) swallowing the tablets

14. **Are you currently taking medicines for three or more diseases or symptoms without any follow-up in a year? (including acute diseases)**

15. **Do you sometimes take less of a medication or do you stop using it because:**
    a) you are worried about the side/adverse effects?
    b) you are worried about the interactions with other medications?
    c) you are trying to save money?
    d) it is uncomfortable for you to use it? (e.g. injections, inhalers)

16. **Do you sometimes take more medication than prescribed in order to get more relief from your symptoms? (for example: pain) If yes, how often?**

17. **Do you think your medication is helping to improve your condition?**

Items included in the questionnaire could be also categorised in the same way as the items from previously published tools (as seen in Table 9, 10, 11 and 12):

- Questions related to medicine use: 1, 3, 4, 5, 6, 7, 8, 9
- Questions about adverse drug reactions: 10, 11 and partly 15
- Questions about health and health care: 12 and 14
- Questions related to adherence issues: 13, 15, 16 and 17

After completing the 17-item questionnaire, seven Finnish pharmacists were asked to tell their opinion on the relevance and importance of each question from the list. Some items were discussed more deeply with the pharmacists, to get the most information

concerning this topic from them. This helped to assess the importance of the items in everyday practice. At the end of the interview, the pharmacists were asked to pick the 10 most important questions out of 17 according to their opinion.

Interview as a method of qualitative research was chosen, because it is a good way how to get more in-depth information from the interviewed person and also it is more personal way of getting information than a simple written questionnaire. In this case, interviews were beneficial to further investigate participants' responses [40]. Also, the opportunity to ask the interviewees some follow-up questions was used and proved to be very beneficial. To make sure no information will be missed, the interviews were audio recorded with the permission of all participants. The opinions and recommendations given by the pharmacists are presented together with the final version of the patient self-administered tool in the Results part of the Section II.

To assess the validity of the tool, Finnish research team decided to use the Delphi method. This method was also previously used for the development and validation of DRP-RAT [32], there was a good experience with using this method and it was found suitable also for this following project. Delphi method relies on opinions of a panel of invited experts who are willing to participate. Those experts anonymously answer questionnaires (queries) and manager of the query analyses and creates a summary of experts' answers and reasons given by the experts for their decisions. This summary is provided to all participants who are able to afterwards think about their opinions again and change it in the way the other experts replied. There is also a space for discussion of the experts. After achievement of a consensus, the results are analysed by the manager [41]. The Delphi method provides various benefits. Firstly, the panel is formed by a group of experts on a specific field. Another benefit of the Delphi method is that the experts are giving their judgements anonymously. This means that the experts are not influenced by other experts' opinions. They also feel free to give their honest statements and ideas. The outcome of Delphi survey in Finland is described in the Results part of the Section II.

6.2.2 Section II: Results – Development of a new patient self-administered pharmacotherapy risk assessment tool

The answers and opinions given by the pharmacists were analysed and compared. Out of the 17 items in the presented questionnaire, 8 were marked as important by at least 5 pharmacists. Those were items number 5, 6, 7, 10, 11, 13, 15 and 16. All pharmacists evaluated item number 15 as important (Item 15: „Do you sometimes take less of a medication or do you stop using it, because..“). For some items, the interviewees gave recommendations to combine items with other items in the tool or to delete them completely. The recommendations were discussed in the research team to decide, which items should be included, deleted or rephrased.

After the discussion, the research team agreed on the final list of 15 questions included in the tool. The final version of the questionnaire consisted of the following questions:

1. Do you have an up-to-date medication card/list?

2. Is there anyone who has reviewed your whole medication within a year?

3. Have you started a new medicine in the last 4 weeks?

4. Have your medications or the instructions on how to use them been changed few times in the past year?

5. Do you use medicines, without follow up, that:
   a) relieve long-term pain (does not apply to paracetamol)?
   b) elevate the rate of urination (diuretics)?
   c) are intended to lower the cholesterol level (statins)?
   d) the physician does not know about?
   e) are intended to decrease blood coagulation (warfarin)?

6. Have you been using prescription sleeping medicines for longer than 3 months?

7. Do you use over-the-counter medicines or vitamin, mineral or herbal products without discussing with the pharmacist or physician if it fits with your prescription medication(s) and your physical condition?

8. Have you had any of the following symptoms in the past 4 weeks?
   (Please tick below 'yes' if it has been ongoing and add another tick in the right column, if the symptom is a new one = a symptom that had first occurred within the last 4 weeks):
   drowsiness, *(feeling abnormally sleepy)*
   fatigue, *(overall lack of energy, no motivation)*
   skin rash or itch,
   dizziness, *(feeling unbalanced, lightheaded)*
   urination problems,
   muscle pains,
   nausea,
   diarrhea,
   constipation,
   dizziness when getting up, *(orthostatic/postural hypotension = feeling dizzy after standing up)*
   recurrent falls,
   swellings, *(enlarging of a tissue, skin, organ as a result of inflammation or fluid build-up)*
   memory problems,
   confusion, *(disorientation, difficulties in time focusing and decision making)*
   visual problems,
   stiffness, *(in muscles, joints)*
   troubles in walking,
   low blood pressure;
   systolic pressure under 110 mmHg
   troubles in sleeping,
   stomach problems
   bruises,
   sudden bleeding

9. Have you had more than one fall in the past 12 months? (due to confusion, difficulty in balance, feeling dizzy when getting up)

10. Do you have 3 or more physicians involved in your care? (e.g., general practitioners, specialists, private practitioners)

11. Have you had troubles in:
    a) remembering to take the medicines?
    b) following the instructions on how to use your medications?
    c) knowing what are your medicines used for?
    d) knowing for how long to take the medications?
    e) monitoring how the medicines work (e.g. blood sugar level and blood pressure level measurement)
    f) opening the drug bottles or packages or managing with medicines related therapeutic devices?
    g) splitting the tablets
    h) swallowing the tablets

12. Are you currently taking medicines for three or more diseases or symptoms without any follow-up in a year? (including acute diseases)

13. Do you sometimes take less of a medication or do you stop using it because:
    a) you are worried about the side/adverse effects?
    b) you are worried about the interactions with other medications?
    c) you are trying to save money?
    d) it is uncomfortable or difficult for you to use it? (e.g. injections, inhalers)

14. Do you sometimes take more medication than prescribed in order to get more relief from your symptoms?

15. Do you think your medication is helping to improve your condition?

The following work with this final version of the questionnaire took two different directions. Whereas the researchers in Finland decided to validate the tool by using the Delphi method and make the questionnaire shorter, we decided to perform pilot-testing of a full version of this questionnaire, including information on the whole medication list of the patients, to test the feasibility and user acceptability of the full version of the questionnaire. The pilot testing of the complete tool on older Czech patients is described in Section III of the Practical part of this thesis.

After the validation of the tool based on the results from the Delphi survey in Finland, the Finnish version finally consisted of only 8 questions:

1. Do you miss an up-to-date medication list (written on paper or an electronic version) containing all medicines that you use at the moment? The list should contain all prescription medicines, over-the-counter (OTC) medicines, vitamins, mineral and herbal products.

2. Do you have more than one physician involved in your care (e.g. general practitioners, specialists, private practitioners)?

3. Do you miss regular follow-up of your medication therapy (e.g. control visits in health care or home measurements)?

4. Have you had any of the following symptoms troubling your normal live in the last four weeks? a) feeling unusual tiredness or drowsiness at the daytime,
   b) dizziness,
   c) falls,
   d) urinary problems (urinary incontinence or difficulty with urination),
   e) nausea,
   f) constipation or other stomach problems,
   g) memory problems,
   h) confusion,
   i) getting easily bruises or nosebleed,
   j) your mouth is unusual dry

5. Is it unclear to you how long time you have to use your medicines? I.e. are your medicines intended for regular use, for periodic course, or are they as needed medicines?

6. Do you have following troubles when using your medicines?

   a) You don't exactly know what your medicines are used for?

   b) You have difficulties to take your medicines e.g.,

      You don't understand the dosing instructions?

      You don't remember to take the medicines as instructed?

      Taking the medicines overlap with your daily life?

   c) You have difficulties in administering the medicines e.g.,

      You don't know how to drop the eye-drops or it is difficult to drop it?

      You don't know how to dose asthma medicines or it is difficult to dose the asthma medicines?

      You can't prick medicines yourself or it is difficult to prick medicines?

      You have difficulties in opening the drug bottles or packages?

      You have difficulties to divide tablets into halves?

7. Do you feel that your prescription medicine is not suitable for you?
8. Are you sometimes forced to go short of your necessary medicines because of economic problems?

Questions should be answered “yes”, “no” or “I don’t know” with each answer “yes” and “I don’t know” indicating the risks. Content of the tool and the instructions were translated from Finnish, the original version can be found on the official website of the Finnish Medicines Agency [42]. The tool was launched in the middle of March 2020 for general use in everyday practice among older patients in the community in Finland [42].

The full version of the questionnaire which we decided to use for pilot-testing in community residing older patients in the Czech Republic, includes also a table where patients can record the list of their medicines is also added (see Attachment 1).

6.3 Section III: Pilot testing of newly developed patient self-administered pharmacotherapy risk assessment tool

In order to test the feasibility of the tool and its user acceptability, we decided to distribute the questionnaire to non-hospitalized patients and to collect and analyse these pilot data. The questionnaire was approved for testing on patients by the Ethics Committee of the Faculty of Pharmacy in Hradec Králové, Charles University, in April 2019.

6.3.1 Section III: Methods – Pilot testing of newly developed patient self-administered pharmacotherapy risk assessment tool

The tool was translated into Czech language and the items were reorganized in order to gather questions concerning similar problems in pharmacotherapy. For the purpose of our data collection and analysis, a section about sociodemographic data of respondents was added as Part 1 of the questionnaire. The patients were asked to provide information including gender, age, highest level of education obtained and also, if they visit their general practitioner for regular check-ups or not.

The tool itself was included as Part 2 of the questionnaire and patients were supposed to choose their "yes" or "no" answer for majority of the questions. In case of questions number 6, 9, 12 and 13, the patients were asked to choose all of the possible answers which they found corresponding with their pharmacotherapy and health condition. Based on suggestion of the thesis supervisor, Assoc. Prof. Daniela Fialová, PharmD, Ph.D., a table for patients to fill in all medicines they were using was added as part of the question number 1 in the questionnaire. This was done in order to collect complete information about medicines the patients were taking and to have possibility to screen with this instrument both patients that need either intervention of a clinical pharmacist, or intervention of a community pharmacist, based on patients' subjective answers and objective problems recognized by this screening tool.

The questionnaires were distributed to the patients and collected in the dates between May 2019 and March 2020. All patients provided their answers and sociodemographic information anonymously. All rules of GDPR were followed according to Ethics

Committee consent and patients were asked to undersign informed consent about their willingness to participate in the pilot study prior to completing the questionnaire. The questionnaire and informed consent distributed to the patients can be found attached as Attachment 1 and Attachment 2 at the end of this thesis.

Completed questionnaires were rewritten from the original paper versions into a computer database. Patients were identified only by code numbers so their identity could not be revealed. Only scientific computers of research team and coded data were used for the statistical analysis. The statistical descriptive analysis focused on comparison of patients' answers in the questionnaire with sociodemographic data and medication data of respondents. Qualitative values were described by absolute and relative frequencies and differences between prevalence were calculated using Fisher's exact test. The differences were considered statistically significant when the level of significance was lower than $p < 0,05$. Data processing was performed by study statistician using R software for statistics, version 3.4.2.

Because only pilot testing was performed, the patients were not specifically selected for the purpose of this study. The main inclusion criterion for the patients to be involved was the age of 65 years and more. Also, only non-hospitalized older patients living in community were asked to participate. Patients were asked in person to fill in the questionnaire by the author of this thesis or by their relatives and family members, who mediated the contacts with other patients. About 15 % of the patients did not return the questionnaire back. Altogether, 172 questionnaires were collected from the patients who participated in the study.

In terms of missing information in collected questionnaires, the question number one including the table of medicines was found to be problematic for some patients to complete. There were 2 patients (1.2 %) who did not answer if they had the list of medicines or not and 12 patients (7.0 %) who reported having the list but did not fill in the table with all medicines used. Out of 153 patients who provided the list, 62 (40.5 %) did not include the dosage regimen. Also question number 15 was left without any answer by 9 respondents (5.2 %) and question number 14 by 5 respondents (2.9 %). There were 2 missing answers also to question number 7 (1.2 %) and 1 missing answer to questions number 2, 4, 5, and 11 (0.6 %).

6.3.2 Section III: Results – Pilot testing of newly developed patient self-administered pharmacotherapy risk assessment tool

This chapter presents the results obtained by collecting data from 172 respondents aged 65 years and older, living in the community, who were willing to participate in the pilot testing of our newly developed patient self-assessment tool.

6.3.2.1 General characteristics of respondents

Out of all 172 respondents, 68.6 % (N = 118) were women. Mean age of participants was 74.2 years (standard deviation – SD ± 6.3, median: 73 years). Respondents were stratified into three age groups: young-old (65-74 years), which was the biggest age group in the total sample (N = 95; 55.8 %), middle-old (75-84 years) including 65 patients (37.8 %) and the smallest age group were old-old patients (85 years and older), who were 11 (6.4 %). The oldest participant was 100 years old.

The highest level of education obtained by 105 patients (61.4 %) was secondary/high school education. The second most common education was tertiary/university education in 42 patients (24.6 %), basic level of education was documented in 24 patients (14.0 %).

Out of all 172 patients, 147 (85.5 %) stated that they regularly visited their general practitioner (GP) for check-ups (period was not clarified in the questionnaire). Men visited their GPs more regularly (N = 48; 88.9 %) than women (N = 99; 83.9 %). All main sociodemographic characteristics of respondents are displayed in Table 14.

Medicines taken were not filled in the questionnaire table by 12 patients (7.0 %). From the rest of patients, the mean number of medicines used by respondents was 4.3 (SD ± 2.9; median: 4). The majority of patients were taking 1 to 4 medicines (N = 84; 52.5 %) and the second highest prevalence in the sample was documented for use of 5 to 9 medicines (N = 62; 38.7 %). This category already represents patients who used polypharmacy drug regimens. Finally, there were 7 patients (4.4 %) taking more than 10 medicines, which is considered as excessive polypharmacy. Altogether, there were 69 patients (43.1 %) with polypharmacy (5 and more medicines). The maximum of medicines used by one patient was 16. The number of medicines used according to age categories and gender is also described in Table 14.

Table 14 displays sociodemographic characteristics of respondents together with number of medicines used and information about regular visits to their GP.

Table 14: Sociodemographic characteristics of respondents, number of medicines used and regular visits to GP

		Total sample		Women		Men		65-74 years		75-84 years		85 years and older	
		N = 172		N = 118		N = 54		N = 96		N = 65		N = 11	
		N	%	N	%	N	%	N	%	N	%	N	%
Age	65-74 years	96	55.8 %	60	50.8 %	36	66.7 %	-	-	-	-	-	-
	75-84 years	65	37.8 %	48	40.7 %	17	31.5 %	-	-	-	-	-	-
	85 and older	11	6.4 %	10	8.5 %	1	1.8 %	-	-	-	-	-	-
Education*	Elementary	24	14.0 %	13	11.1 %	11	20.4 %	11	11.6 %	9	13.8 %	4	36.4 %
	Secondary	105	61.4 %	83	70.9 %	22	40.7 %	60	63.2 %	41	63.1 %	4	36.4 %
	Tertiary	42	24.6 %	21	18.0 %	21	38.9 %	24	25.2 %	15	23.1 %	3	27.2 %
Number of medicines used**	0	7	4.4 %	4	3.6 %	3	6.1 %	3	3.4 %	2	3.2 %	2	22.2 %
	1-4	84	52.5 %	58	52.3 %	26	53.1 %	52	59.1 %	30	47.6 %	2	22.2 %
	5-9	62	38.7 %	45	40.5 %	17	34.7 %	30	34.1 %	28	44.4 %	4	44.5 %
	5 and more	69	43.1 %	49	44.1 %	20	40.8 %	33	37.5 %	31	49.2 %	5	55.6 %
	10 and more	7	4.4 %	4	3.6 %	3	6.1 %	3	3.4 %	3	4.8 %	1	11.1 %
Visiting GP regularly	Yes	147	85.5 %	99	83.9 %	48	88.9 %	81	84.4 %	59	90.8 %	7	63.6 %
	No	25	14.5 %	19	16.1 %	6	11.1 %	15	15.6 %	6	9.2 %	4	36.4 %

**one patient did not answer – denominator: total sample (N = 171), women (N = 117), 65-74 years (N = 95)*
***12 patients did not provide their medicine list – denominator: total sample (N = 160), women (N = 111), men (N = 49), 65-74 years (N = 88), 75-84 years (N = 63), 85 years and older (N = 9)*

☐ *p <0.001*

6.3.2.2 General questions related to medicine use and utilization of health care

Table 15 describes answers to questions related to medicines use (questions No 1-4 in the questionnaire). It shows that the majority of patients (N = 121; 71.2 %) reported having a medication list. The tendency to have medication list increased with number of medicines used. Most of patients (N = 104; 60.8 %) reported that they had their whole medication reviewed in the past year. The majority of patients in the total sample did not start using any new medicines in the past 4 weeks (N = 155; 91.7 %) and did not have their medications or instructions how to take medications changed during the past year (N = 129; 75.4 %).

Table 15: Answers to general questions related to medicine use I. (questions No 1-4 in the questionnaire)

		Total sample		Women		Men		65-74 years		75-84 years		85 years and older		1-4 medicines		5-9 medicines		5+ medicines		10+ medicines	
		N = 172		N = 118		N = 54		N = 96		N = 65		N = 11		N = 84		N = 62		N = 69		N = 7	
		N	%	N	%	N	%	N	%	N	N	N	%	N	%	N	%	N	%	N	%
Medication list*	Yes	121	71.2 %	85	73.3 %	36	66.7 %	69	73.4 %	49	75.4 %	3	27.3 %	58	70.7 %	55	88.7 %	62	89.9 %	7	100 %
	No	49	28.8 %	31	26.7 %	18	33.3 %	25	26.6 %	16	24.6 %	8	72.7 %	24	29.3 %	7	11.3 %	7	10.1 %	0	0.0 %
Medication reviewed within a year **	Yes	104	60.8 %	69	59.0 %	35	64.8 %	52	54.2 %	49	75.4 %	3	27.3 %	52	61.9 %	41	66.1 %	46	66.7 %	5	71.4 %
	No	67	39.2 %	48	41.0 %	19	35.2 %	43	44.8 %	16	24.6 %	8	72.7 %	32	38.1 %	21	33.9 %	23	33.3 %	2	28.6 %
New medicines in the past 4 weeks ***	Yes	14	8.3 %	9	7.7 %	5	9.6 %	8	8.6 %	5	7.7 %	1	9.1 %	5	6.0 %	4	6.6 %	7	10.3 %	3	42.9 %
	No	155	91.7 %	108	92.3 %	47	90.4 %	85	91.4 %	60	92.3 %	10	90.9 %	78	94.0 %	57	93.4 %	61	89.7 %	4	57.1 %
Medicines or instructions changed in the past year **	Yes	42	24.6 %	32	27.4 %	10	18.5 %	22	23.2 %	19	29.2 %	1	9.1 %	10	11.9 %	25	40.3 %	28	40.6 %	3	42.9 %
	No	129	75.4 %	85	72.6 %	44	81.5 %	73	76.8 %	46	70.8 %	10	90.9 %	74	88.1 %	37	59.7 %	41	59.4 %	4	57.1 %

**2 patients did not answer – denominator: total sample (N = 170), women (N = 116), 65-74 years (N = 94),1-4 medicines (N = 82)*
***1 patient did not answer – denominator: total sample (N = 171), women (N = 117), 65-74 years (N = 95)*
****3 patients did not answer - denominator: total sample (N = 169), women (N = 117), men (N = 52), 65-74 years (N = 93), 1-4 medicines (N = 83), 5-9 medicines (N = 61), 5 and more medicines (N=68)*

p <0.001 *p = 0.007* *p = 0.002* *p = 0.04*

Table 16 describes patients' answers to questions number 5, 7, 8 and 11 in the questionnaire. The majority of patients who were taking medicines for 3 and more medical conditions were under control of prescribing physician (N = 146; 85.4 %). Out of 172 patients, 64 (37.2 %) reported use of OTC medicines, dietary supplements, vitamins, minerals or herbal products without consulting with a doctor or pharmacist its appropriateness. The use of OTC medicines and other products was more frequent among women (N = 48; 40.7 %), patients aged 65-74 years (N = 42; 43.8 %) and patients without polypharmacy (N = 38; 45.2 %). Use of prescription sleeping medicines longer than 3 months was not very common in the sample, only 18 patients (10.6 %) answered positively to this question.

There were 95 patients (55.6 %) having 3 and more doctors involved in their treatment. This phenomenon occurred more frequently in young-old patient group (N = 40; 61.5 %). The tendency to visit 3 and more physicians increased with number of medicines used (see Table 16).

Table 16: Answers to general questions related to medicine use (II.) and number of physicians providing care (questions No 5, 7, 8 and 11 in the questionnaire)

		Total sample		Women		Men		65-74 years		75-84 years		85 years and older		1-4 medicines		5-9 medicines		5+ medicines		10+ medicines	
		N = 172		N = 118		N = 54		N = 96		N = 65		N = 11		N = 84		N = 62		N = 69		N = 7	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Use of medicines for more than 3 conditions without control*	Yes	25	14.6 %	17	14.4 %	8	15.1 %	15	15.8 %	7	10.8 %	3	27.3 %	9	10.7 %	12	19.4 %	13	18.8 %	1	14.3 %
	No	146	85.4 %	101	85.6 %	45	84.9 %	80	84.2 %	58	89.2 %	8	72.7 %	75	89.3 %	50	80.6 %	56	81.2 %	6	85.7 %
Use of sleeping medicines longer than 3 months**	Yes	18	10.6 %	14	12.0 %	4	7.5 %	9	9.6 %	9	13.8 %	0	0.0 %	8	9.6 %	9	14.5 %	10	14.5 %	1	14.3 %
	No	152	89.4 %	103	88.0 %	49	92.5 %	85	90.4 %	56	86.2 %	11	100 %	75	90.4 %	53	85.5 %	59	85.5 %	6	85.7 %
Use of OTC drugs or supplements without consulting	Yes	64	37.2 %	48	40.7 %	16	29.6 %	42	43.7 %	19	29.2 %	3	27.3 %	38	45.2 %	17	27.4 %	19	27.5 %	2	28.6 %
	No	108	62.8 %	70	59.3 %	38	70.4 %	54	56.3 %	46	70.8 %	8	72.7 %	46	54.8 %	45	72.6 %	50	72.5 %	5	71.4 %
3 and more doctors involved in treatment*	Yes	95	55.6 %	67	56.8 %	28	52.8 %	54	56.8 %	40	61.5 %	1	9.1 %	41	48.8 %	45	72.6 %	51	73.9 %	6	85.7 %
	No	76	44.4 %	51	43.2 %	25	47.2 %	41	43.2 %	25	38.5 %	10	90.9 %	43	51.2 %	17	27.4 %	18	26.1 %	1	14.3 %

**1 patient did not answer – denominator: total sample (N = 171), men (N = 53), 65-74 years (N = 95)*

***2 patients did not answer – denominator: total sample (N = 170), women (N = 117), men (N = 53), 65-74 years (N = 94), 1-4 medicines (N = 83)*

p <0.001 *p = 0.004*

Table 17 shows answers of respondents related to the use of specific groups of medicines without regular controls by physicians, including chronic use of analgesics (excluding paracetamol), diuretics, medicines intended to lower the level of cholesterol, to decrease blood coagulation (warfarin) and use of other medicines that the physician does not know about. Most commonly used medicines without any control were medicines to lower cholesterol level, reported by 24 respondents (14.0 %), followed by long-term use of analgesics (excluding paracetamol) in 17 patients (9.9 %). Taking some other drugs without informing physician was the third most common answer (N = 9; 5.2 %). Other possible answers were reported by less than 5.0 % of patients (see Table 17). The use of medicines to lower cholesterol level without any controls was more common in the group of young-old patients (N = 14; 14.6 %) and among patients taking less than 10 medicines (see Table 17).

Table 17: Patients who reported use of specific groups of medicines without regular controls (question No 6 in the questionnaire)

	Total sample		Women		Men		65-74 years		75-84 years		85 years and older		1-4 medicines		5-9 medicines		5+ medicines		10+ medicines	
	N = 172		N = 118		N = 54		N = 96		N = 65		N = 11		N = 84		N = 62		N = 69		N = 7	
	N	%	N	%	N	%	N	%	N	N	N	%	N	%	N	%	N	%	N	%
Patients answering positively to at least 1 question	45	26.2 %	32	27.1 %	13	24.1 %	27	28.1 %	17	26.2 %	1	9.1 %	21	25.0 %	18	29.0 %	19	27.5 %	1	14.3 %
Long-term use of medicines to relieve pain	17	9.9 %	12	10.2 %	5	9.3 %	9	9.4 %	8	12.3 %	0	0.0 %	7	8.3 %	8	12.9 %	9	13.0 %	1	14.3 %
Diuretics	3	1.7 %	2	1.7 %	1	1.9 %	1	1.0 %	2	3.1 %	0	0.0 %	0	0.0 %	2	3.2 %	3	4.3 %	1	14.3 %
Medicines to lower cholesterol level	24	14.0 %	17	14.4 %	7	13.0 %	14	14.6 %	9	13.8 %	1	9.1 %	8	9.5 %	11	17.7 %	12	17.4 %	1	14.3 %
Medicines to decrease blood coagulation	7	4.1 %	5	4.2 %	2	3.7 %	2	2.1 %	5	7.7 %	0	0.0 %	2	2.4 %	4	6.5 %	5	7.2 %	1	14.3 %
Patients taking some other drugs without physician's knowledge*	9	5.2 %	5	4.2 %	4	7.4 %	8	8.3 %	1	1.5 %	0	0.0 %	8	9.5 %	0	0.0 %	0	0.0 %	0	0.0 %

**9 patients reported taking some other drugs without controls, but only in 8 of them the number of medicines used was known*

☐ *p <0.001*

6.3.2.3 Symptoms and falls experienced by patients

Questions number 9 and 10 in the questionnaire focused on symptoms and falls. Patients were classified into 6 categories based on number of symptoms reported (see Table 18) and there were 50 patients (29.1 %) who did not suffer from any of the listed symptoms and 51 patients (29.7 %) and 39 patients (22.7 %) who reported 1-2 symptoms and 3-4 symptoms on the list, respectively.

Table 18: Categorization of patients based on number of symptoms (question No 9 in the questionnaire)

N (symptoms)	Total sample	
	N = 172 patients	
	N (patients)	%
0 symptoms	50	29.1 %
1-2 symptoms	51	29.7 %
3-4 symptoms	39	22.7 %
5-6 symptoms	17	9.9 %
7-8 symptoms	10	5.8 %
9-11 symptoms	5	2.9 %

Table 19 expresses the mean and median number of symptoms reported by patients according to gender, age group and number of medicines used. Mean number of reported symptoms increased with higher age and higher number of medicines used. Whereas young-old patients tended to report mean number of symptoms 2.3 (SD ± 2.3), patients from the old-old category (85 years and older) stated 4.1 (SD ± 4.1) symptoms on average. In case of number of medicines used, patients taking 1-4 medicines experienced 1.9 (SD ± 1.9) symptoms on average but patients with excessive polypharmacy (10 and more medicines) reported 6.3 (SD ± 3.2) symptoms on average. There was a statistically significant difference in the number of reported symptoms according to number of medicines used ($p = 0.002$).

Table 19: Mean and median number of symptoms reported by patients according to gender, age group and number of medicines used (question No 9 in the questionnaire)

		Number of patients (N)	Mean number of symptoms	SD	Median number of symptoms	Min.	Max.	p-value
Total sample		172	2.4	± 2.5	2	0	11	
Gender	Women	118	2.4	± 2.5	2	0	11	0.6697
	Men	54	2.6	± 2.6	2	0	11	
Age	65-74 years	96	2.3	± 2.3	2	0	11	0.4634
	75-84 years	65	2.4	± 2.4	2	0	9	
	85 years and older	11	4.1	± 4.1	4	0	11	
Number of medicines used	0 medicines	7	0.9	± 1.1	0	0	2	0.002
	1-4 medicines	84	1.9	± 1.9	1	0	7	
	5-9 medicines	62	2.7	± 2.8	2	0	11	
	10+ medicines	7	6.3	± 3.2	7	1	11	

Prevalence of particular symptoms in absolute and relative numbers (categorized by different organ systems), is displayed in Table 20. The most often reported symptoms were sleeping problems (N = 45; 26.2 %), fatigue, overall lack of energy or no motivation (N = 44; 25.6 %) and muscle and joint stiffness (N = 40; 23.3 %). Answers of patients reporting more than 1 fall in the past 12 months were also added to Table 20 (question No 10 in the questionnaire). Only 18 patients out of 169 (10.7 %) experienced more than one fall in the past 12 months due to confusion, difficulties in balancing or due to feeling dizzy when getting up. Other symptoms reported by more than 10.0 % of patients in the total sample were: memory problems (19.2 %), muscle aches (16.9 %), dizziness when getting up (15.7 %), troubles in walking (14.5 %), constipation (12.8 %), urinary problems (12.2 %), visual problems (11.0 %) and drowsiness or feeling abnormally sleepy (10.5 %).

Table 20 shows the prevalence of particular symptoms and falls among the respondents.

Table 20: Particular symptoms and falls reported by patients divided according to different organ systems (questions No 9 and 10 in the questionnaire)

		Total sample	
		N = 172	
		N	%
Symptoms related to cardiovascular system	Dizziness when getting up	27	15.7 %
	Low blood pressure	13	7.6 %
	Bruises	9	5.2 %
	Sudden bleeding	1	0.6 %
Symptoms related to nervous system	Drowsiness, feeling abnormally sleepy	18	10.5 %
	Fatigue, lack of energy and motivation	44	25.6 %
	Dizziness	13	7.6 %
	Recurrent falls	6	3.5 %
	Memory problems	33	19.2 %
	Confusion	9	5.2 %
	Visual problems	19	11.0 %
	Troubles in sleeping	45	26.2 %
Symptoms related to musculoskeletal system	Swellings	12	7.0 %
	Muscle aches	29	16.9 %
	Recurrent falls	6	3.5 %
	Muscle or joint stiffness	40	23.3 %
	Troubles in walking	25	14.5 %
Symptoms related to gastrointestinal system	Nausea, stomach problems	11	6.4 %
	Diarrhea	11	6.4 %
	Constipation	22	12.8 %
Falls*	More than 1 fall in the past 12 months	18	10.7 %
Other symptoms	Skin rash or itch	12	7.0 %
	Urinary problems	21	12.2 %

**3 patients did not answer to this question – denominator: total sample (N = 169)*

6.3.2.4 Adherence-related problems

Last part of the questionnaire (questions number 12-14) assessed problems of patients with adherence to pharmacotherapy (see Table 21). There were 39 patients (22.7 %) who reported at least one adherence-related issue from the list and no significant difference was found between women and men.

Among the most common adherence-related issues were reported problems with remembering to take the medicines, stated by 18 patients (10.5 %), equally by women and men. There were 11 patients (6.4 %) who sometimes did not know the reason why they were taking the medicine. Problems with tablet splitting were the third most commonly reported adherence-related problem in 9 patients (5.2 %).

Table 21: Medication adherence-related issues reported by patients I. (question No 12 in the questionnaire)

Adherence-related issues/problems with:	Total sample		Women		Men		65-74 years		75-84 years		85 years and older		1-4 medicines		5-9 medicines		5+ medicines		10+ medicines	
	N = 172		N = 118		N = 54		N = 96		N = 65		N = 11		N = 84		N = 62		N = 69		N = 7	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Patients who reported at least 1 problem	39	22.7 %	25	21.2 %	14	25.9 %	19	19.8 %	18	27.7 %	2	18.2 %	20	23.8 %	11	17.7 %	15	21.7 %	4	57.1 %
Remembering to take the drugs	18	10.5 %	9	7.6 %	9	16.7 %	12	12.5 %	5	7.7 %	1	9.1 %	11	13.1 %	5	8.1 %	6	8.7 %	1	14.3 %
Knowing the indication of medications	11	6.4 %	8	6.8 %	3	5.6 %	6	6.3 %	4	6.2 %	1	9.1 %	3	3.6 %	6	9.7 %	7	10.1 %	1	14.3 %
Splitting the tablets	9	5.2 %	7	5.9 %	2	3.7 %	2	2.1 %	6	9.2 %	1	9.1 %	3	3.6 %	4	6.5 %	6	8.7 %	2	28.6 %
Monitoring the effect of drugs	8	4.7 %	5	4.2 %	3	5.6 %	5	5.2 %	3	4.6 %	0	0.0 %	3	3.6 %	2	3.2 %	5	7.2 %	3	42.9 %
Knowing the length of therapy	7	4.1 %	5	4.2 %	2	3.7 %	4	4.2 %	2	3.1 %	1	9.1 %	4	4.8 %	2	3.2 %	3	4.3 %	1	14.3 %
Following the medication instructions	6	3.5 %	4	3.4 %	2	3.7 %	3	3.1 %	2	3.1 %	1	9.1 %	3	3.6 %	2	3.2 %	3	4.3 %	1	14.3 %
Manipulation with drugs	5	2.9 %	4	3.4 %	1	1.9 %	2	2.1 %	1	1.5 %	2	18.2 %	0	0.0 %	3	4.8 %	4	5.8 %	1	14.3 %
Swallowing the tablets	5	2.9 %	4	3.4 %	1	1.9 %	1	1.0 %	3	4.6 %	1	9.1 %	0	0.0 %	2	3.2 %	4	5.8 %	2	28.6 %

p <0.001 *p = 0.009* *p = 0.047*

Table 22 shows answers of patients to questions number 13 and 14 in the questionnaire investigating if patients are sometimes taking less or more of a medicine or medicines used. There were only 7 patients (4.2 %) who reported that they were sometimes taking more of a medicine/medicines in order to obtain higher relief from some symptoms. Among respondents to question number 13, there were 15 patients (8.7 %) who admitted they were sometimes taking less of a medicine or they stopped using it at all due to at least one of the reasons listed in Table 22. Most of these patients (N = 13; 7.6 %) were worried about medication side or adverse effects. The rest of reasons stated in Table 22 was reported only by less than 2.0 % of patients.

Table 22: Medication adherence-related issues II. – taking more or less of a medicine/medicines than prescribed (questions No 13 and 14 in the questionnaire)

		Total sample		**Women**		**Men**		**65-74 years**		**75-84 years**		**85 years and older**		**1-4 medicines**		**5-9 medicines**		**5+ medicines**		**10+ medicines**	
		N = 172		N = 118		N = 54		N = 96		N = 65		N = 11		N = 84		N = 62		N = 69		N = 7	
		N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Sometimes taking more than prescribed*	Yes	7	4.2 %	5	4.4 %	2	3.8 %	3	3.2 %	3	4.7 %	1	10.0 %	1	1.2 %	4	6.7 %	6	9.0 %	2	28.6 %
	No	160	95.8 %	109	95.6	51	96.2 %	90	96.8 %	61	95.3 %	9	90.0 %	81	98.8 %	56	93.3 %	61	91.0 %	5	71.6 %
Sometimes taking less than prescribed because of different worries about:	Side/adverse effects	13	7.6 %	9	7.6 %	4	7.4 %	7	7.3 %	6	9.2 %	0	0.0 %	7	8.3 %	4	6.5 %	5	7.2 %	1	14.3 %
	Drug interactions**	2	1.2 %	0	0.0 %	2	3.7 %	2	2.1 %	0	0.0 %	0	0.0 %	1	1.2 %	0	0.0 %	0	0.0 %	0	0.0 %
	Money issues	3	1.7 %	1	0.8 %	2	3.7 %	3	3.1 %	0	0.0 %	0	0.0 %	3	3.6 %	0	0.0 %	0	0.0 %	0	0.0 %
	Uncomfortable use of medicines	1	0.6 %	0	0.0 %	1	1.9 %	1	1.0 %	0	0.0 %	0	0.0 %	1	1.2 %	0	0.0 %	0	0.0 %	0	0.0 %
	Patients who chose at least 1 option	15	8.7 %	10	8.5 %	5	9.3 %	9	9.4 %	6	9.2 %	0	0.0 %	8	9.5 %	4	6.5 %	5	7.2 %	1	14.3 %

**5 patients did not answer – denominator:*
total sample (N = 167), women (N = 114), men (N = 53), 65-74 years (N = 93), 75-84 years (N = 64), 85+ years (N = 10), 1-4 medicines (N = 82), 5-9 medicines (N = 60), 5+ medicines (N = 67)
***2 patients reported this reason for sometimes taking less of a medicine, but only in 1 of them the number of medicines was known*

☐ *p <0.001* ☐ *p = 0.023*

The very last question of the questionnaire, number 15, was: “Do you think your medication is helping to improve your condition?”. The majority of patients answered “yes” to this question (N = 145; 89.0 %). There were 9 respondents who did not answer this question and surprisingly, 2 patients (1.2 %) marked both “yes” and “no” answer. Patients aged 85 years and older and patients taking 10 and more medicines tended to answer “no” to this question.

6.3.2.5 Analysis of medication lists

At the beginning of the questionnaire, patients were also asked to fill in the table with names of medicines they were using, including also strength, dose and timing. These data about patients’ medications were also analysed by descriptive statistics.

Altogether, 723 records of medicines were collected from 153 patients who provided information about their medication lists. In these 723 records, medications from 11 different ATC drug groups were identified (see Table 23). Some patients also reported use of some other products, such as dietary supplements, vitamins, etc. Table 23 shows how many records were identified and how many patients were taking at least one medicine from the particular ATC group. One patient reported use of compounded medicines for convulsions and use of intra-articular injections. These medicines were certainly prescribed by a physician, but could not be identified with an ATC code, therefore were recorded as NA (not applicable) in our database and in the table. As shown in Table 23, the 5 most frequent ATC groups of medicines used among the patients were: A - alimentary tract and metabolism with 114 records (15.8 %), B - blood and blood forming organs (N = 53; 7.3 %), C - cardiovascular system (N = 295; 40.8 %), H - systemic hormonal preparations excluding sex hormones and insulins (N = 59; 8.2 %) and N - nervous system (N = 64; 8.9 %). These ATC groups represented most of the medicine records and at the same time, they had the highest frequencies in terms of patients who were taking at least 1 medicine from individual ATC group.

Table 23 displays the prevalence of use of different medicine groups including also dietary supplements.

Table 23: Use of medicines (according to main anatomical ATC group), dietary supplements and other products among respondents

		All records of medicines		Users of at least 1 drug from the particular group*	
		N = 723		N = 153	
		N	%	N	%
Main ATC group of medicines used	A	114	15.8 %	67	43.8 %
	B	53	7.3 %	48	31.4 %
	C	295	40.8 %	136	88.9 %
	D	1	0.1 %	1	0.7 %
	G	16	2.2 %	15	19.8 %
	H	59	8.2 %	52	34.0 %
	L	3	0.4 %	3	2.0 %
	M	49	6.8 %	39	25.5 %
	N	64	8.9 %	44	28.8 %
	R	32	4.4 %	22	14.4 %
	S	7	1.0 %	5	3.3 %
Dietary supplements and other products	Dietary supplements and other products	30	4.1 %	19	12.4 %
	NA	2	0.3 %	1	0.7 %

**12 patients did not provide their medication list and 7 patients were not taking any medicines: denominator (N = 153).*

Explanation of ATC classes stated in Table 23: (A) alimentary tract and metabolism, (B) blood and blood forming organs, (C) cardiovascular system, (D) dermatologicals, (G) genitourinary system medications and sex hormones, (H) systemic hormonal preparations excluding sex hormones and insulins, (L) antineoplastic and immunomodulating agents, (M) medications of musculoskeletal system, (N) nervous system, (R) respiratory system and (S) medications used to treat problems of sensory organs

Although there were 153 patients who provided their lists of medicines, not all of the lists were complete and very often the information about dosage regimen was missing. There were 62 patients (40.5 %) who did not provide the information about their dosage regimen. Most of the patients whose dosage regimen was known (N = 91; 59.5 %), were taking medicines once daily (N = 32; 20.9 %), there were 28 patients taking their medicines three times a day (18.3 %), 27 patients were taking their medicines twice daily (17.7 %) and 4 patients four times a day (2.6 %). In terms of number of administered doses of drug forms in a day, the majority of patients were taking 1-4 administered doses of medicines in a day (N = 50; 32.7 %). The mean number of administered doses taken was 4.69 (SD ± 3.5) with median number 4. The maximum number of administered doses of medications in one day by one patient was 22.

Table 24: Information about dosage regimens of patients

		Patients who provided their medication list	
		N = 153	
		N	%
Number of administered doses of medicines in one day by the patients	1-4	50	32.7 %
	5-9	33	21.6 %
	10 and more	8	5.2%
	No information about dosage regimen	62	40.5 %
Number of administrations of medicines in one day	Patients taking medicines once daily	32	20.9 %
	Patients taking medicines twice daily	27	17.7 %
	Patients taking medicines three times a day	28	18.3 %
	Patients taking medicines four times a day	4	2.6 %
	No information about dosage regimen	62	40.5 %

7. DISCUSSION

The pharmacotherapy risk assessment tool presented in this diploma thesis was created as a patient self-administered questionnaire intended for screening and identification of risks of pharmacotherapy in senior patients living in the community.

Unlike the majority of previously published pharmacotherapy risk-screening tools, this tool is one of the rare instruments which are patient self-administered and are intended for screening of pharmacotherapy risks in non-institutionalized older patients. It provides the possibility of involving patients in self-assessment of the risks of pharmacotherapy (for example by filling this questionnaire in a web-based platform of healthcare institutions). Patients at risk thus can be early identified, prioritized and reached by clinical pharmacists, community pharmacists or nurses who may help them with different problems related to the management of the potential risks resulting from their pharmacotherapy.

At the same time, such self-assessment tool raises patients' awareness about medicines risks and motivates patients to be more actively involved in appropriate use of medicines (better adherence, more regular controls of pharmacotherapy etc.). According to results of a study published by Kari et al. in 2018, the patient active involvement in pharmacotherapy risk management is crucial to identify clinically significant risks of pharmacotherapy, as 84.0 % of these drug-related risks could not be identified without involving the patients [43].

The presented tool should also help to identify and prioritize patients in need for a complete medication review performed by a trained and experienced clinical pharmacist. At the same time, it also helps to distinguish cases that do not need a comprehensive medication review, but in which a simpler advice on e.g. medication adherence issues given by community pharmacists, nurses or patients' relatives would be sufficient.

The literature search in Practical Part of this diploma thesis (Section I) described that until now, only 6 patient self-administered pharmacotherapy risk assessment screening tools were developed for use by non-hospitalized seniors. The majority of previously published tools focused only on hospitalized patients, patients with specific medical conditions, or they were not intended for use by older adults only. Based on findings of our literature search, there is a lack of studies that present similar patient self-administered risk assessment tools developed for seniors in the community and we can conclude that

such approach of involving older patients in screening of their pharmacotherapy risks is still not common in primary care practice and there is a strong need to have such tools available.

In terms of development of our tool, which was the aim of Section II of the Practical part of this diploma thesis, our evidence-based strategy of tool development was similar to development of already existing tools and corresponded with usual methodology used in this process. Selection of items in most of the previously published patient self-administered pharmacotherapy risk assessment screening tools was based on published literature evidence and experts' opinions [33-40]. Our newly developed tool consists of 15 questions, the number of items is lower than average in already published tools (20 items, ranging from 7 to 40) [33-40]. The Finnish final version of this questionnaire was even reduced to 8 questions after validation by Delphi expert panel [42]. The Czech version is more comprehensive and more clinically oriented. It includes all original items related to clinically significant risks of pharmacotherapy and it provides also information on patient's concrete medicines and dosage regimen. Our tool can help to investigate both clinical and general risks of pharmacotherapy and might be of interest to different healthcare professionals, including clinical pharmacists, community pharmacists, general practitioners and nurses. Although the Czech version of the tool is more detailed and includes more questions (15 questions plus table of medicines and 4 items related to sociodemographic characteristics of respondents, in comparison to 8 questions included in the Finnish version), none of the patients in our pilot study complained about the length of the questionnaire and manner of the items and overall user acceptance of our tool by the respondents was very good. Usually, the respondents did not need more than 15 minutes to complete the questionnaire.

In the Section III of the Practical part, results of pilot testing of the developed patient self-administered pharmacotherapy risk assessment screening tool on a sample of 172 older adults aged 65 years and older residing in the community are described. Estimated response rate in our sample was 75.0 % and these results were found similar to findings obtained in other pilot studies of previously developed patient self-assessment tools which ranged from 61.0 % to 78.0 % [33-40]. Most problematic part of the questionnaire for the patients was probably completing the table of medicines. There were 12 patients (7.0 %) who did not fill in the names of their medicines and 62 patients (40.5 %) who did not state dosage regimen of medicines. The reason for this might be that these patients

did not have their lists of medicines with them and were not able to remember all medicines used or did not understand why this information might be important (for example as a signal for medication review). This problem was also reported in publications presenting results of other pilot studies of previously developed tools. For example, during testing of the Medication-Risk Questionnaire, participants were able to report names of all medications and dosages only in 45.0 % of cases [35]. More accurate and complete responses might be obtained if patients had access to their list of medicines and understand the importance of this information for pharmacotherapy risk assessment screening. Considering other missing data in answers of patients to the questionnaire, questions concerning the medication adherence were left without any answer more often than the rest of questions (5 and 9 patients did not answer to adherence-related questions number 14 and 15, respectively, in comparison to the rest of questions that were usually left unanswered by 1 or 2 patients). The reason might be that patients did not want to admit having problems with adherence-related issues and did not want to provide this sensitive type of information. Interviewing the patients in person or using objective methods of medication adherence assessment might be more successful way to investigate patients' real adherence to pharmacotherapy. However, even the preliminary information obtained by this questionnaire is important for screening of patients requiring interventions to support their medication adherence

Concerning the data obtained by pilot testing of the questionnaire, our sample of respondents was found to be comparable with the samples of patients responding in pilot studies testing previously developed tools in terms of sociodemographic characteristics. Even though our sample size was smaller (N = 172, only two previously developed tools were tested on smaller samples of 97 and 40 patients, respectively [34][36]), gender distribution and mean age of participants corresponded with all research works published in this area [33-40], as well as mean or median number of medicines used by patients [35][40].

Data from the patients' lists of medicines also provided information on prevalence of polypharmacy and excessive polypharmacy among respondents. There were 69 patients (43.1 %) using polypharmacy, which means use of 5 and more medicines. This prevalence of polypharmacy corresponded with other studies focusing on polypharmacy in senior patients. The results published by Midão et al. in 2018, evaluating the prevalence of polypharmacy in senior patients in 17 European countries, showed that

overall prevalence of polypharmacy in the Czech Republic was 39.9 %. It was the highest prevalence of polypharmacy from all countries involved in this study (mean prevalence of polypharmacy in all countries was 32.1 %, ranging from 26.3 % in Switzerland to 39.9 % in our country) [44]. In articles presenting the results of pilot testing of previously developed patient self-administered risk assessment screening tools, the prevalence of polypharmacy among respondents varied from 43.3 % [34] to 54.0 % [38]. Regarding this information, it might seem that polypharmacy is a frequent problem also in our country and its prevalence should be reduced. However, it has to be emphasized that polypharmacy can be both appropriate and inappropriate [3]. Evaluating the appropriateness of polypharmacy should be done by trained and experienced clinical pharmacists who have access to patients' medical records and all clinical results. On the other hand, abilities of experienced community pharmacists should not be underestimated. It was proved e.g. in a study published by Laaksonen et al. in 2010, that also trained community pharmacists may demonstrate ability to beneficially identify 75.0 % of drug-related problems (DRPs) identified by clinical pharmacists [45]. This gives us the evidence that newly developed tool, combining actively involved patients as well as different health care professionals in pharmacotherapy risk-assessment, might substantially help in the future with early identification of patients at risks and early resolution of problems that might result in the occurrence of negative outcomes (hospitalizations, injuries, etc.).

Out of pharmacotherapy-related risk factors with the highest prevalence, uncontrolled use of OTC medicines, dietary supplements, vitamins, minerals and herbal products was reported by 64 patients (37.2 %). It was slightly higher than in results of Japanese study published by Masumoto et al. in 2018, in which use of OTC medicines or dietary supplements was reported by 32.5 % of patients. Comparably to results of our study, the tendency to use OTC medicines decreased with higher number of medicines used and higher age [46]. Another pharmacotherapy-related risk factor occurring in more than half of our respondents was having 3 and more physicians involved in the treatment (N = 95; 55.6 %). The interrelation between higher number of drugs prescribed, higher number of potentially inappropriate combinations and increasing number of prescribing physicians has been reported in several published studies [47][48]. The coordination and continuity of care among multiple prescribers is always more difficult and plays essential role in rationality of pharmacotherapy, especially in geriatric patients who tend to suffer

from higher number of diseases of various organ systems and tend to be prescribed more medicines than younger individuals.

Further studies testing the applicability of this questionnaire should focus on identification of clusters of questions/answers that might prioritize patients directly for interventions of an experienced clinical pharmacist or for a community pharmacist's interventions. Some complicated pharmacotherapy problems always require comprehensive medication review performed by a trained clinical pharmacist who has access to patient's complete medical data and is able to identify problems in patient's pharmacotherapy in terms of all health conditions and to highly individualize patient's drug therapy. On the other hand, some pharmacotherapy risks require rather interventions of a skilled community pharmacist and do not need to be solved by clinical pharmacists, e.g. some problems with pharmacotherapy adherence, problems with not having the medication list, etc. Collaboration between community pharmacists and clinical pharmacists is of course crucial in resolution of patient's drug safety problems, as well as collaboration of pharmacists with nurses and physicians.

7.1 Limitations

The Practical Part of this thesis has several limitations. Main limitation of Section I – Literature review is that even though the literature search was done in the same way as the previous systematic literature review, we cannot consider this follow-up search as fully systematic, because there was no second assessor to confirm the objectivity of results found.

Numerous limitations and possibilities for improvements of the tool came to the surface also during the process of pilot testing of our questionnaire. Concerning Part 1 of the questionnaire, in the question asking respondents if they visit their general practitioner for regular check-ups, the frequency of these visits was not specified (e.g. once a year, once every 3 months, once every 6 months) and such clarification could be added. Considering the table of medications in the questionnaire, it should be underlined that patients were asked to fill in all prescription drugs and over the counter medicines together with dietary supplements, vitamins, minerals and herbal products they use. For patients it is usually difficult to distinguish these categories. Therefore, it would be

probably more helpful to add one more column into this table for patients to specify, if the individual medicine was prescribed by a doctor or not and in case of OTC medicines and dietary supplements, it should be also stated if the patient bought the product based on a doctor's suggestion or not (some medicines are bought by patients based on recommendation of a doctor). One more column might be added to specify the regularity of use of individual medicines (in case the patient does not take this individual medicine regularly).

Question number 5 might be difficult for the patients to answer. For example, in case of drugs for cardiovascular system disorders, one drug can serve to treat multiple medical conditions and on the other hand, combinations of drugs can be indicated to treat one disease. The answer to this question strongly relies on the education of patients by doctors and on the involvement of patients in their treatment. Thus, in our opinion, results obtained by this question probably cannot provide relevant information.

In question number 6, which is focused on use of specific groups of medicines without any controls by a physician, multiple changes would be suitable. Option d) should be modified and not only warfarin but at least "for example, warfarin" should be stated in the brackets. Also, in option e) "use of any other medicines without the physician's knowledge" – here patients should be asked to specify which medicines they use without regular controls and their physician's knowledge.

Based on the results of our pilot testing, also question number 7 probably does not provide requested information. It could be modified in a way that not only prescription sleeping medicines but also OTC sleeping medicines, dietary supplements and herbal products should be stated. Non-prescription sleeping medicines and products provide usually safer option for occasional relief from sleeping problems. But as well as their prescription alternatives, OTC sleeping medicines can cause sedation which can lead to tiredness, confusion and possibly also to falls.

In question number 9, which asks patients to state various symptoms they experienced, the respondents should also be given a space to report any other symptoms they experienced and that are not included in the list. Also, the following question 10, asking patients to report if they had more than one fall during the past 12 months and what was the cause, is most probably redundant. It is usually very hard for the patient to subjectively identify the cause of the fall which is very often a multifactorial event. In

questions number 13 and 14 it would be good to also ask patients to further specify of which medicine they take less or more, so the pharmacotherapy risks could be easily evaluated.

Moreover, pilot results could give more findings for improvement if the patient sample had been larger. However, development of a questionnaire always requires some modifications after pilot testing and adjusted version of the tool with implemented changes can be tested again on a larger sample of older patients residing in the community.

8. CONCLUSION

As the number of seniors in the population increases in the past decades, it is more important than ever to focus our attention on geriatric pharmacotherapy and its risk management. As described in the Theoretical part of this diploma thesis, the ageing process is accompanied with many changes in human body which obviously affect the pharmacokinetics, pharmacodynamics and therefore also clinical effects of many drugs. All these changes make pharmacotherapy of older adults very complex and complicated. Therefore, all health care professionals should be aware of basic principles of geriatric pharmacotherapy and should be able to identify basic risks of pharmacotherapy in older patients.

Early identification of problems and early solution of these problems before patient experiences serious negative consequences appear as a priority in the pharmacotherapy risk management. To simplify the process of screening of pharmacotherapy, many tools have already been developed to assess the risks of pharmacotherapy by health care professionals. However, there is lack of publications presenting pharmacotherapy risk-screening tools intended for self-assessment by senior patients, even though the active involvement of patients in pharmacotherapy risk management is nowadays very important. This makes our developed tool unique in comparison with other tools and instruments, as well as the fact that this tool is intended for use by non-hospitalized seniors residing in the community. Presented tool could potentially serve as a risk-screening instrument used among older patients in the community in the Czech Republic and improve communication between patients and clinical and community pharmacists

Pilot testing of the tool confirmed high prevalence of polypharmacy among Czech seniors residing in the community and it gave us information that many patients have three or more physicians involved in their care. Because both polypharmacy and higher number of prescribing physicians are considered to be important risk factors in the pharmacotherapy risk management, many patients might potentially benefit from using this tool. It would be good to develop a scoring system to evaluate the severity of particular risks and problems identified in patient's pharmacotherapy. There is also space for analysing the real appropriateness of medicines used by the patients when detailed clinical data are also available along with answers to the questionnaire to clinical pharmacists. Being aware of limitations of the presented tool, there are numerous

possibilities to enhance its usefulness and applicability in clinical practice and these are also further goals of our Czech and Finnish collaborating research teams.

The work of the Czech research team has been financed by the European EUROAGEISM H2020 project that received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 764632 and from the European project INOMED reg. No. CZ. 02.1.01/0.0/0.0/18.069/0010046. The team was also supported by grant SVV 260417 and the scientific programme PROGRESS Q42 of the Scientific group KSKFII, Faculty of Pharmacy, Charles University in Hradec Králové, Czech Republic (Chair of the scientific group: Assoc. Prof. Daniela Fialová, PharmD, Ph.D.).

9. LIST OF ABBREVIATIONS

Abbreviation	*Meaning*
et. al.	*Et alii = and others*
OTC	*Over-the-counter medicines*
SHELTER	*Services and Health in the Elderly in Long Term Care*
etc.	*Et cetera = and other similar things*
e.g.	*Exempli gratia = for example*
NSAIDs	*Non-steroidal anti-inflammatory drugs*
CYP450	*Cytochrome P450*
ACEi	*Angiotensin-converting enzyme inhibitors*
eGFR, GFR	*(Estimated) glomerular filtration*
TCA	*Tricyclic antidepressants*
COPD	*Chronic obstructive pulmonary disease*
CFS	*Clinical Frailty Scale*
PIMs	*Potentially inappropriate medications*
USA	*United States of America*
AGS	*American Geriatrics Society*
STOPP/START	*Screening Tool of Older People's Prescriptions/Screening Tool to Alert to Right Treatment*
PPI	*Proton pump inhibitors*
SPC	*Summary of product characteristics*

Abbreviation	*Meaning*
MAI	*Medication Appropriateness Index*
DRP-RAT	*Drug-Related Problem Risk Assessment Tool*
EBM	*Evidence Based Medicine (database)*
WOS	*Web of Science (database)*
UK	*United Kingdom*
DRP	*Drug-related problem*
PCNE	*Pharmaceutical Care Network Europe*
mmHg	*Millimeter of mercury*
Rx.	*Prescription medicines*
i.e.	*Id est = that is*
GDPR	*General Data Protection Regulation*
SD	*Standard deviation*
GP	*General practitioner*
No	*Numero = number*
Min.	*Minimum*
Max.	*Maximum*
ATC	*Anatomical-therapeutic-chemical (group of medicines)*
NA	*Not applicable*

10. LIST OF TABLES

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12. ATTACHMENTS

Attachment 1: Czech version of the questionnaire distributed to patients

Attachment 2: Informed consent for participants of the pilot testing

ČÁST PRVNÍ – Demografické údaje:

Pohlaví: MUŽ ŽENA

Věk:

Dosažená úroveň vzdělání: ZÁKLADNÍ STŘEDNÍ VYSOKOŠKOLSKÉ

Chodíte na pravidelné kontroly ke svému hlavnímu ošetřujícímu/praktickému lékaři?

ANO NE

ČÁST DRUHÁ – Vlastní dotazník:

1. Máte sepsaný seznam léků, které aktuálně užíváte?

   ANO NE

   Pokud ano, uveďte prosím seznam užívaných léků do tabulky včetně síly balení a dávkování:

Název léčivého přípravku (např. Ibalgin)	Síla léčivého přípravku (uvedená na balení, např. 400 mg)	Předepsané dávkování (např. 1-0-1)

2. Kontroloval nějaký odborník v průběhu minulého roku Vaši celkovou předepsanou léčbu?

   ANO NE

3. Začal/a jste v průběhu posledních 4 týdnů užívat nějaké nové léky?

   ANO NE

4. Byly Vám v průběhu uplynulých 12 měsíců změněny léky nebo instrukce, podle kterých máte své léky užívat?

   ANO NE

5. Užíváte v současné době léky na 3 a více různých onemocnění nebo zdravotních potíží bez jakékoliv kontroly lékaře v průběhu posledního roku? (včetně akutních onemocnění)

   ANO NE

6. Užíváte, bez pravidelných kontrol, léky na:

   a) úlevu od dlouhodobé bolesti (mimo léčivé přípravky obsahující paracetamol)

   b) odvodnění organismu, zvýšení vylučování vody z organismu

   c) snížení hladiny cholesterolu

   d) snížení srážlivosti krve (warfarin)

   e) jakékoliv další zdravotní potíže bez vědomí Vašeho lékaře

7. Užíváte déle než 3 měsíce léky na spaní, které Vám předepisuje Váš lékař?

   ANO NE

8. Užíváte nějaké volně prodejné léčivé přípravky nebo doplňky stravy jako jsou vitamíny, minerály či rostlinné přípravky, aniž byste diskutovali se svým lékařem či lékárníkem, zdali jsou pro Vás tyto léky vhodné vzhledem k Vašemu zdravotnímu stavu a dalším lékům, které užíváte?

   ANO NE

9. Pociťoval/a jste v průběhu posledních 4 týdnů některý z následujících stavů? Pokud ano, prosím zakroužkujte. Pokud se stav objevil poprvé, podtrhněte ho v seznamu, prosím:

   nadměrná spavost, ospalost
   únava, vyčerpání, nedostatek energie
   vyrážka, svědění kůže
   závratě
   problémy spojené s močením
   otoky
   bolest svalů
   opakované pády
   ztuhlost svalů či kloubů
   potíže s chůzí
   nevolnost, žaludeční obtíže
   průjem
   zácpa
   pocit poklesu tlaku, motání hlavy či závratě při náhlé změně polohy – při vstávání ze sedu apod.
   nízký tlak
   problémy s pamětí
   zmatenost (dezorientace, obtížné rozhodování se, obtížné orientování se v čase)
   potíže s viděním
   problémy se spaním (potíže s usínáním, časté probouzení během noci)
   častý náhlý vznik modřin
   náhlé samovolné krvácení

10. Stalo se Vám, že jste v průběhu posledních 12 měsíců více než jedenkrát spadli? (Následkem zmatenosti, pocitu nerovnováhy, točení hlavy při zvedání se ze sedu,…)

    ANO NE

11. Jste v pravidelné péči 3 a více doktorů? (Např. praktický lékař, specialista –kardiolog, diabetolog, apod…)?

    ANO NE

12. Míváte někdy potíže v některých z následujících oblastí? Pokud ano, možnost zakroužkujte, prosím:

    a) zapomínání na braní léčiv
    b) užívání léčiv podle zadaných instrukcí
    c) znát důvod užívání léčiv
    d) vědět, jak dlouho léky užívat
    e) sledování/měření efektu léčiv – např. pravidelné měření krevního tlaku, hladiny cukru v krvi, atd.
    f) otevírání balení léčiv, manipulace s léčivy a zařízeními jako jsou inhalátory, injekce, náplasti s léčivy atd.
    g) dělení tablet
    h) polykání tablet

13. Stane se Vám někdy, že užijete menší množství léků, než máte předepsáno, nebo lék neužijete vůbec, protože:

    a) máte obavy z vedlejších či nežádoucích účinků léčiv
    b) máte obavy z interakcí léčiv s dalšími přípravky
    c) chcete ušetřit peníze
    d) je vám užívání těchto léčiv nepříjemné (např. aplikace injekcí, používání inhalátorů)

14. Užijete občas větší množství nějakého léku, než máte předepsáno, abyste získal/a větší úlevu od svých zdravotních potíží? (např. léky na bolest a jiné)

    ANO NE

15. Máte pocit, že Vám léky, které užíváte, zabírají a pomáhají na Vaše zdravotní potíže?

    ANO NE

INFORMOVANÝ SOUHLAS

Vážená paní, Vážený pane,

jsem studentkou 5. ročníku Farmaceutické fakulty v Hradci Králové, Univerzity Karlovy v Praze, a chtěla bych Vás poprosit o spolupráci na projektu, který provádím za účelem vypracování své diplomové práce.

Součástí tohoto projektu je tvorba dotazníku zaměřeného na pacienty ve věku 65 let a více, kteří pravidelně chodí vyzvedávat své léky do lékárny a užívají větší množství léků. Tento dotazník by měl usnadnit hledání případných rizik v rámci terapie pacienta, ať už ze strany předepisování či užívání rizikových léčiv, anebo užívání těch správných léčiv nevhodným způsobem.

Vyplněním předloženého dotazníku výrazně přispějete k dosažení cílů projektu a k jeho případnému budoucímu celoplošnému využití i mezi ostatními pacienty. Pro svůj projekt Vás žádám o vyplnění několika demografických údajů a vlastního dotazníku. Vámi uvedené demografické údaje a vyplněný dotazník budou shromažďovány a hodnoceny zcela anonymně bez uvedení jména, příjemní, data narození a dalších osobních údajů.

Poskytnuté informace budou sloužit pouze pro vědecké účely.

V případě dotazů či nejasností se mě, prosím, neváhejte zeptat. Můžete také kontaktovat vedoucí mé diplomové práce, doc. PharmDr. Danielu Fialovou, Ph.D.: fialovad@faf.cuni.cz

Markéta Pitrová

Prosím Vás o udělení informovaného souhlasu s účastí v projektu:

Souhlasím s účastí v projektu a s využitím poskytnutých údajů za účelem vypracování diplomové práce Markéty Pitrové, studentky 5. ročníku Farmaceutické fakulty v Hradci Králové, Univerzity Karlovy v Praze.

JMÉNO A PŘÍJMENÍ: _____

DATUM A MÍSTO: _____

PODPIS: _____