

Frequency of multimorbidity and polypharmacy among geriatric patients

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Abstract

Hungary is characterized by an ageing society. The majority of healthcare is used by the elderly. Hospitalization is frequently required due to iatrogenesis, caused by drug toxicity and adverse interactions. Polypharmacy can augment these problems.

The purpose of my research is to assess the frequency and harmful effects of polypharmacy in an elderly inpatient care unit. In addition to the survey results, during the research, which was conducted in an inpatient department, I collected data on regularly taken medications, the established diagnoses as well as the results of kidney function test. Informed consent was obtained from each patient.

According to the research, it was proven that among geriatric patients, polypharmacy is an important contributor to their potential risk. The more diseases a person suffers from, the more medications he or she must take, so more drug interactions must be expected. Therefore, it is extremely important to regularly reconsider databases concerning drug interactions. To improve patient safety, the "unit-dose system" provides great help concerning inpatients, which also includes the automatic monitoring of interactions. With the help of all this, the development of complications, hospitalization and mortality can be reduced. Decreasing iatrogenicity not only improves the patient's quality of life but also lowers the burden on the healthcare system.

Multimorbiditás és polipragmázia vizsgálata idős betegek körében

Kulcsszavak: Az iogenetikus betegségek és a gyógyszereszedés: Geriátria, multimorbiditás, polipragmia, farmakokinetika, korszerű ápoló, geriátriai ellátás

Absztrakt

Magyarországra jellemző az elöregedő társadalom. Az egészségügyi ellátás nagy részét az idősek veszik igénybe. Kórházi kezelésre gyakran van szükség iatrogenézis miatt, amelyet gyógyszer-toxicitás és nemkívánatos kölcsönhatások okoznak. A polifarmácia fokozhatja ezeket a problémákat.

Kutatásom célja, hogy felmérjem a polifarmácia gyakoriságát és káros hatásait egy idősek fekvőbeteg-ellátó osztályán. A felmérés eredményei mellett. A fekvőbeteg osztályon végzett kutatás során az érintett betegek beleegyezésével összegyűjtöttem a szedett gyógyszereket, a felállított diagnózisokat és a vesefunkciót.

A kutatás szerint bebizonyosodott, hogy az időskorú betegek körében fontos a potenciális kockázataik. Minél több betegségben szenved egy személy, annál több gyógyszert kell szednie, így több gyógyszerkölcsönhatásra kell számítani. Ezért rendkívül fontos az adatbázisok rendszeres átvizsgálása a gyógyszerkölcsönhatások tekintetében. A betegbiztonság javítása érdekében a fekvőbetegek tekintetében nagy segítséget nyújt az "unit-dose rendszer", amely a kölcsönhatások automatikus monitorozását is magában foglalja. Mindezek segítségével csökkenthető a szövődmények kialakulása, a kórházi kezelés és a halálozás. Az iatrogenitás csökkentése nemcsak a betegek életminőségét javítja, hanem az egészségügyi rendszer terheit is csökkenti.

Introduction

In old age, the pharmacokinetics and pharmacodynamics of drugs change. As a result, the fate of the drug in the body will be different and its effectiveness may also change. Many side effects may occur more frequently and drug-drug interactions may be more likely.

To avoid iatrogenic harm, careful drug therapy is needed, and attention should also be paid to modifying therapy to account for frequent renal dysfunction. I think it is important to pay due attention to drug interactions, and side effects of drugs. This will reduce hospitalisation, the burden on the health system and mortality and possibly morbidity. In addition to doctors, Advanced practice nurses could also play a role in monitoring and rethinking therapies, thus preventing health problems caused by medicines. With the right therapy, some hospital admissions could be avoided.

As an Advanced Practice Nurse, you may be responsible for using interaction databases to monitor patients' drug therapy. If a risk of drug-drug interaction is identified, this can be brought to the attention of the treating physician, who can modify the drug therapy.

Our study aimed to assess whether patients in a geriatric ward, taking into account multimorbidity, suffer from this polypragmasia. Drug interactions during polypragmasia were investigated using the interaction database available on the university website. We evaluated the severity of the interactions that occurred. In addition, we assessed the renal function of the study group, as in case of impaired renal function even more cautious medication is needed.

Materials and method

The research was conducted at the Geriatric Clinic and Nursing Centre, Active Internal Medicine Unit. Altogether 100 patients were included in the study.

The criteria for inclusion were that the patient must be at least 65 years of age or admitted to the Active Internal Medicine Unit.

We obtained permission for the survey from the Ethics Committee of Semmelweis University (SE RKEB number 231/2022) and the patients gave written consent to use their data and results anonymously. Data were obtained from fever charts, medical records and previous final reports.

We used the Drug Interactions page of the UpToDate database to monitor drug interactions. In healthcare, it is important to use reliable databases like this. These criteria had to be taken into account for the database used for the drug interaction study, as quick access is important in addition to reliability in providing quality patient care. In the analysis of drug interactions, we considered the drugs recorded in the fever chart. During the research, the ward physician assisted in studying the previous final reports. Age was taken as the first step for inclusion. When analysing drug interactions, we recorded the interactions that occurred, their severity and the side effects.

UpToDate Drug Interactions database

The database allows us to record the different active ingredients. Several active substances can be recorded at the same time, not just the interaction of two active substances being analysed at the same time. Once the active substances have been recorded, it shows us the severity of the interaction between the active substances. This will help us to decide on an individualised therapy and will also help us to know what side effects to look out for if the use of a particular drug combination is important for the patient's health.

The database is not specifically designed for the treatment of elderly people, so the longer drug interaction description gives us a broader perspective when considering a patient's drug therapy.

Grouping of drug interaction severity:

- unknown interaction

- no need for drug change
- monitoring of therapy is important
- change in therapy should be considered
- drug combination not recommended

A Microsoft Office Excel program was used to record the data. To process the statistical data, we used SPSS version 27. Descriptive statistics and Spearman rank correlation were used.

Results

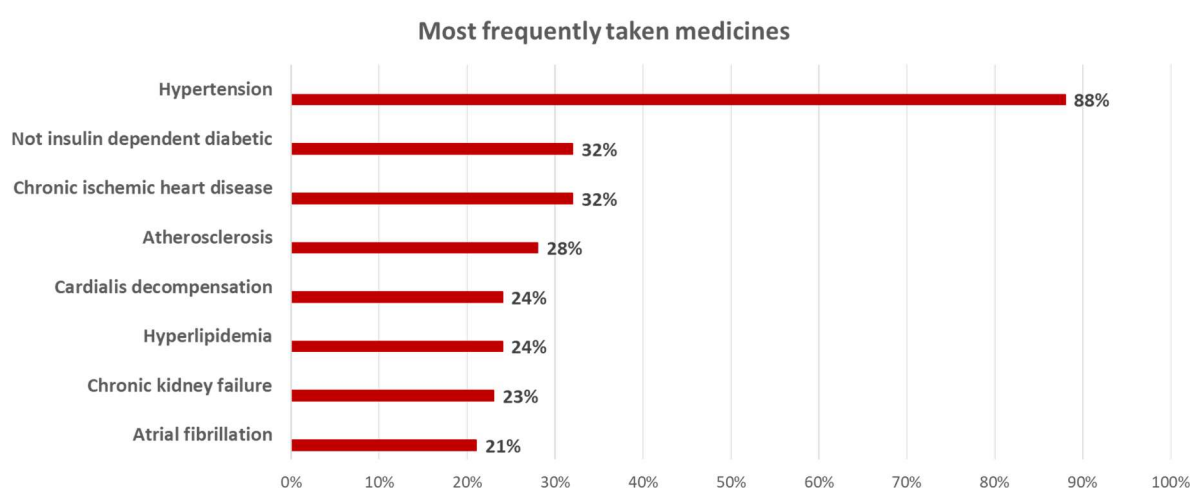
Most common diseases

During the study I investigated the most common diseases.

The most common diseases were diabetes and renal failure, in addition to cardiovascular disease. 88% of patients had hypertension, while 32% had non-insulin-dependent diabetes or chronic ischaemic heart disease. General atherosclerosis affected 28% of the study group, while heart failure or hyperlipidemia occurred in 24%. The seventh most common disease was chronic renal failure, followed by atrial fibrillation.

Prevalence of multimorbidity

The elderly population is characterised by multimorbidity. Our study confirms that multimorbidity was present in the geriatric population (see *Figure 1*).



1. Figure Most frequently taken medicines

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Only 5% of the study group was not affected by multimorbidity, 5 individuals had less than 2 chronic diseases. 31% of the patient group had 2-5 chronic conditions. More than half of the patients (54%) had between 6 and 10 chronic conditions at any one time, while 10% had more

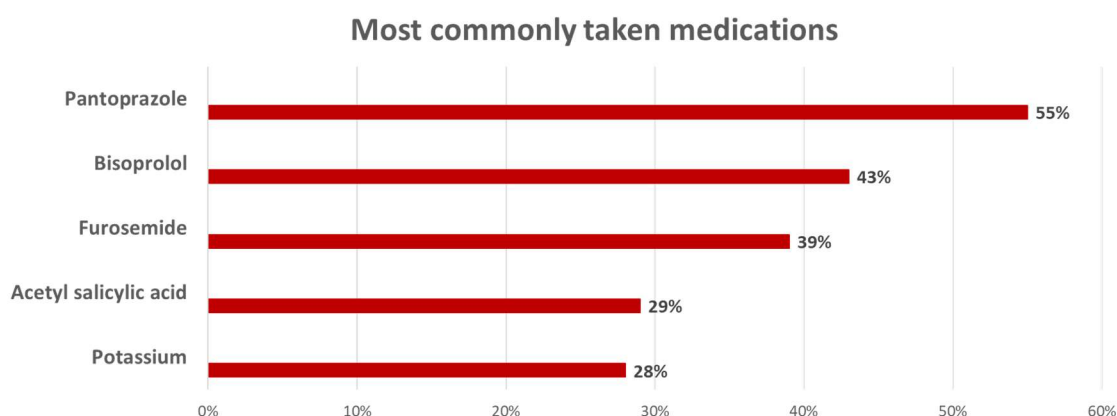
than 10 of them. These findings demonstrate that the presence of chronic diseases increases with ageing. Medicine is making us live longer and longer with more and more diseases.

Most commonly taken medications

More than half of the study group received treatment with the proton pump inhibitor pantoprazole. When patients were interviewed, they insisted on the therapy for fear of ulcers or to prevent gastritis that had previously caused problems. However, it has been observed that proton pump inhibitor drugs are often prescribed without a justified diagnosis. Over-prolonged use can cause many problems (e.g. increased incidence of *Clostridium diff.* infection).

The second most commonly used therapy is bisoprolol, which belongs to the group of beta blockers. It is a widely used drug for high blood pressure, heart failure and coronary artery disease. It states that the second most commonly taken drug is already in line with the most common diseases.

Heart failure was one of the most common conditions for which the third most commonly used therapy, furosemide, is one of the drugs of choice. It is also used for its antihypertensive effects.



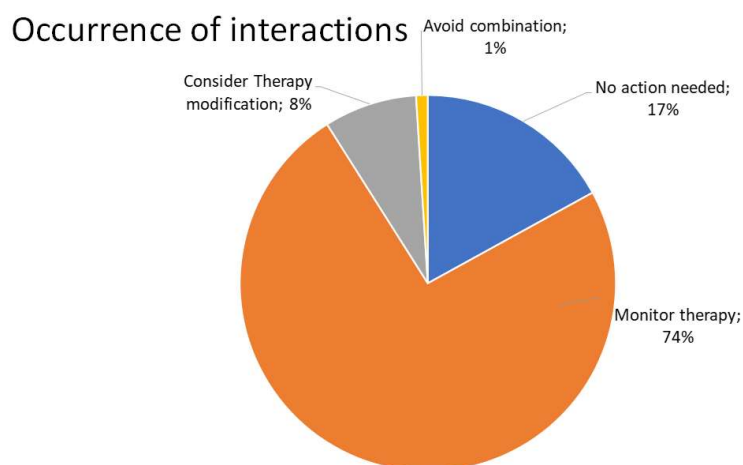
2. Figure Most commonly taken medications

source: own editing

Several beneficial effects of acetylsalicylic acid are exploited in the clinical practice. In addition to its analgesic and antipyretic effects, it is also used in low doses as a therapy for the prevention of myocardial infarction and stroke. However, it should not be used as a therapy for renal failure in the elderly because of its side effects. Potassium may have occurred with such frequency because of the increased renal loss of potassium in the elderly, either spontaneously or as a result of therapy given by us. Potassium deficiency and potassium supplementation can be important in the clinical practice because other symptoms and diseases may develop in the presence of potassium deficiency.

Incidence of drug interactions, correlations

To investigate drug interactions, We used the Drug Interaction function of the UpToDate database. The advantage was that we could record the entire drug therapy of a patient in an interaction study process, thus avoiding that any interaction escaped my attention. I could record the active ingredients of the drugs in the program.



3. Figure Occurrence of interactions

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In 17% of the studies, no follow-up of drug therapy was necessary because there was no interaction with the drug therapy used.

In 74% of cases, we were advised to monitor the therapy continuously and reconsider it periodically. At this point, no changes were needed, but close monitoring became necessary.

However, in 8% of the therapies used, the database recommended we rethink the therapy, to find other solutions to drug therapy. In these cases, drug interactions occurred where there was a high likelihood of side effects that could cause more harm than good to the individual.

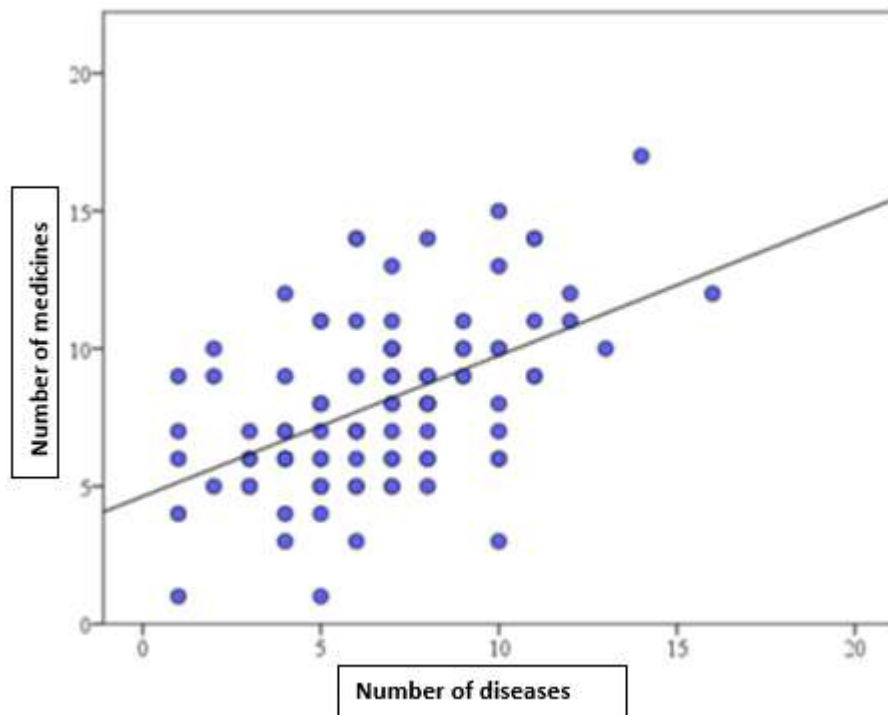
Avoidable combinations occurred in 1% of the study therapies.

The combinations to avoid in the study were the combination of doxazosin and tamsulosin. The antihypertensive effect may be enhanced when the two drugs are used together. This combination of drugs is commonly used in elderly men with prostatic hypertension who have received doxazosin therapy for blood pressure reduction.

However, some drug combinations cannot be abandoned because of the patient's condition, so ongoing consideration and close monitoring of the patient in the clinic is a challenge for clinicians. polypragmasia are known, the prevention of adverse drug interactions is not effective enough.

Thus, in our research, we assessed the relationship between the diseases, the drugs taken and the interactions that occur in the study group. This is to emphasise that over-medication and

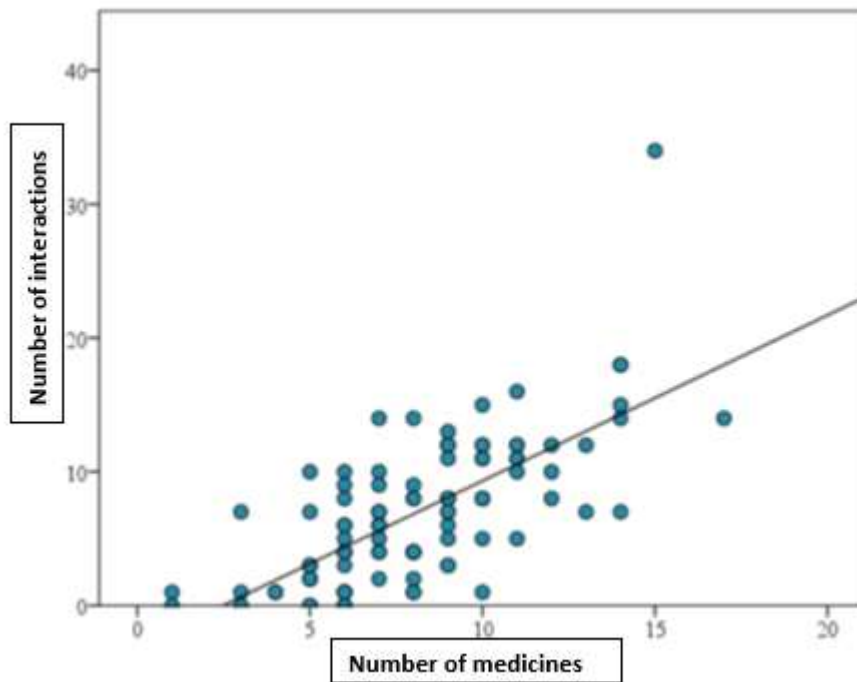
uncontrolled therapy are dangerous for the elderly, who may present with new complaints and symptoms in the health care system.



4. Figure title

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The number of medicines has a statistically significant positive medium relationship with the number of diseases. The relationship was $\rho(98) = 0.483$ and $p < 0.001$. The relationship was considered significant if $p < 0.001$. Thus, the more diseases someone had in the study group, the more likely they were to take more medication.

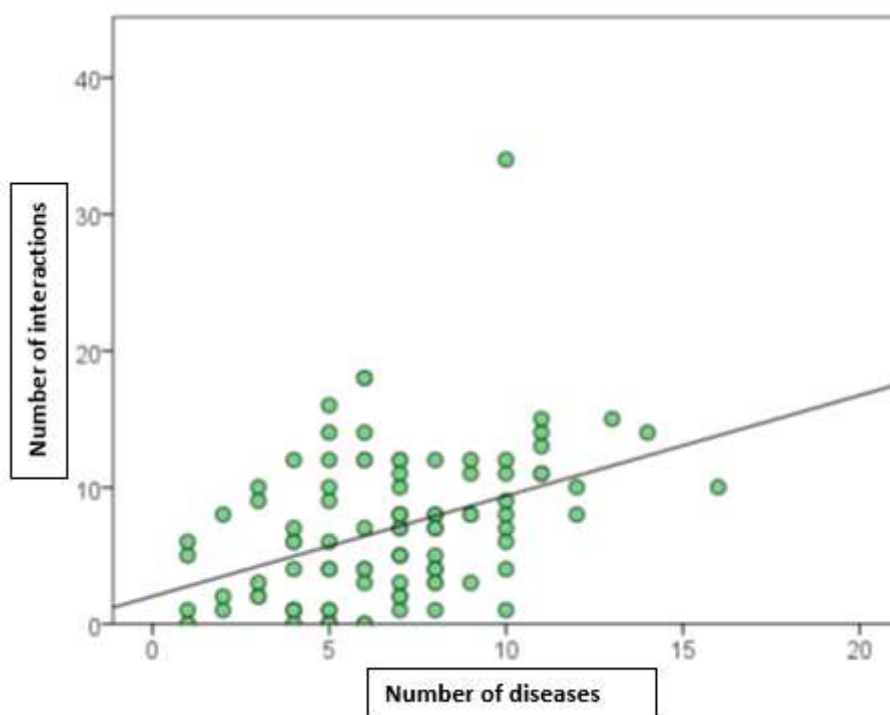


5. Figure title

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The number of drugs has a statistically significant, positive strong relationship with the number of interactions. In this study, $\rho(98) = 0.702$, $p < 0.001$. The relationship was considered significant if $p < 0.001$.

Our study confirms that the more drugs were taken, the more drug interaction occurred. In many cases, it is not one but several drugs for a given disease. However, the study confirms that multiple drug therapies for fewer diseases may result in a higher chance of drug interactions.



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There is a statistically significant positive medium relationship between the number of diseases and the number of interactions. The statistical result was $\rho(98) = 0.415$, $p < 0.001$. Statistically significant was considered when $p < 0.001$.

Our results confirmed that the more disease someone has, the more likely would have a drug interaction. In the clinical setting, there are already combinations of drugs that may affect more than one disease, but the science is not yet there to treat multiple chronic conditions with a few pills. In fact, in most cases, taking more than one medicine for a single disease is justified. So for a given disease, an individual is taking more than one medicine, which makes interactions more common.

Conclusion

In our study, we concluded that in the elderly population multimorbidity and polypharmacy are a serious problem. In addition, the geriatric population has other factors that play a role in the risk of drug-induced side effects caused by medication. Among elderly multimorbid patients, the absorption and excretion of the drug changes. A renal impaired and this may result in toxic harm and iatrogenicity. Cognitive decline may also be a characteristic of the elderly, which makes the appropriate use of medication uncertain. These changes in old age increase the risk of drug interaction, side effects, morbidity and mortality due to drug interactions, because drug

side effects may lead to geriatric syndromes or increase the severity of existing syndromes. The most common side effect of medicines caused by antihypertensives is orthostatic hypotension, which increases the risk of falls. Falls caused by complications such as immobility, thrombosis, pneumonia, self-harm, decubitus ulceration and depression, increase the mortality rate. Another common side effect is constipation caused by opioids which are used for pain relief. Incontinence may be caused or aggravated by, for example, the use of doxazosin. Antiparkinsonian drugs for Parkinson's disease in the elderly can increase the risk of delirium. These side effects influence the patients' mood, which makes them more susceptible to other diseases and infections. This increases the time and cost of their healthcare. Despite being a common issue, a solution is still to be found. The literature confirms that 10-15% of hospital admissions in the elderly are due to incorrect drug therapy. Life expectancy at birth in Hungary is about 76 years, of this, health and social care are most used in the last 8-10 years of life. This in turn highlights the importance of special care for geriatric patients.

Our research concludes that the more diseases an elderly patient has, the more medications they take. Among the patients we studied, the most common diseases are hypertension, non-insulin-dependent diabetes, diabetes mellitus, and chronic ischaemic heart disease. These conditions were followed in frequency by atherosclerosis, heart failure, hyperlipidemia, chronic renal failure and atrial fibrillation. These diseases require different drug therapies. This means there is a risk of more drug interactions. To reduce this risk, there are various tools available to which it would be important to put into practice. For example, regular monitoring of interactions with morbidity rates can be reduced. Only the most necessary prescription must be taken for the most essential medicines.

Drug therapy should be reconsidered each time the patient presents to any of the specialists. In addition, when new symptoms appear, you should check whether it is not an adverse drug reaction. In everyday life, this is little checked in everyday practice, but rather symptomatic treatments, new drugs are prescribed. It is important to take into account the highest possible patient safety when administering medication. Our aim is not to harm our patients but to use each medication to improve their condition. We can improve patient safety by providing inpatient wards with clinical pharmacists to monitor drug therapy. In hospital settings, the so-called "unit dose system" can be used to make patient care safer. The unit-dose system is an automated drug delivery system with a built-in interaction analyser. This can reduce medication errors and is more economical.

We think that in social care, where there is not a doctor all the time, and in nursing wards, it would be a great help if advanced practice nurses, or even graduated nurses, knew that it is important to monitor the side effects of drugs in patients in the particular case. We are confident that advanced practice nurses will also be able to play a role in inpatient care by reviewing drug therapy on admission. Drug interaction analysis programmes can help them to do this.

In 8% of our study, a revision of the drug therapy was recommended. The ratio between the expected benefit of the therapy and the harm it causes should then be assessed. We believe that advanced practice nurses, with their knowledge of pharmacology, could make suggestions to the doctor in these cases. They could draw the doctor's attention to the fact that a change in this

therapy may be necessary. Although small, the incidence of combinations to avoid was 1% in our study. It is important to note, however, that the research was conducted in a setting where, fortunately, attention is being paid to rethinking drug therapy. Thus, in 1% of the interactions in the study group, the advanced practice nurse could alert the physician to reconsider and change the drug combination. We consider it very important to study drug-drug interactions. If the database tells us that there is no need to change drug combinations, then after taking into account the pharmacokinetic and pharmacodynamic changes, drug therapy can be prescribed and continued with due care. In this way, advanced practice nurse competence can, in our opinion, assist the work of the doctors.

Even taking into account the natural decline in function in old age, moderate to moderately impaired renal function or renal failure was observed in one-third of the study group. In their case, particular attention should be paid to drug therapy. Our research concluded that an increase in the number of cases is needed to provide more accurate data to demonstrate what is a trivial problem for workers. We would like to assess in the future whether the use of a drug delivery system reduces the number of interactions. We want to investigate whether monitoring drug interactions helps rational prescribing. In addition, we consider it important to include non-pharmaceutical medicinal products in the study. These products can cause many complications if they are not taken properly.

With our research, we wanted to draw attention to this part of the already-known health care, which has not been addressed to date. However, we have tools to help us to treat patients more safely. This could reduce the burden on healthcare and the financial costs. It could reduce, and last but not least both mortality and morbidity.

Proposal from

By presenting the research results, we can confirm that prescribing drug therapy for the geriatric population is a specific and important task. Appropriate drug therapy requires continuous monitoring. In this context, we would suggest the use of our drug interaction monitoring database, "UpToDate Drug Interaction", to monitor drug interactions. Other programs can also assess drug interactions, but this has the advantage of being able to record all the prescribed drugs at once, thus providing more accurate and faster results. We believe that drug interaction monitoring programmes should be used in primary care, specialist care, outpatient and inpatient care.

We would recommend that the analysis of the active substance should also take into account non-medicinal or medicinal products, as well as blood supplements and herbal remedies. It would be worthwhile to include these in the drug interaction assessment programmes.

In any case, it is important to develop a monitoring programme or improve an existing one for drug therapy for elderly patients. Pharmacokinetic and pharmacodynamic changes should also be taken into account. Particular attention should be paid to renal function. It would be a very useful feature in drug interaction databases if renal function could be recorded and taken into account in the analysis.

In the continuation of our research, we would like to increase the number of cases.

We also believe that a survey should be conducted to assess drug-related mortality to raise awareness of the dangers of medication in geriatric patients. We would like to promote the importance of drug interaction analysis among health professionals in the future. We believe that advanced practice nurses could also play an important role in monitoring drug interactions. These educated nurses, whether in community, emergency or geriatric settings, could take the lead in introducing this and demonstrating its importance.

Furthermore, We think it is important that articles are published on the most common drug interactions in geriatric patients and that the age limits in research areas are extended so that drugs can be made safer by testing drugs in elderly patients during the research phase.

There are tools in our everyday lives that can be used to make patient care.

However, the beauty of caring for geriatric patients is that even with so many devices, individual discretion plays a very important role.

Summary, summary findings

This study was able to assess multimorbidity and polypragmatism among geriatric patients. We wanted to draw attention to the severity of this issue. Previous literature also discusses the difficulties specific to the geriatric population, but we forget to take them into account in our daily lives. Our research has highlighted the high incidence and severity of drug interactions in elderly patients. This increases the number of hospitalisations, mortality and morbidity. The over-65 population is an increasing percentage of the population, making it increasingly important to organise care for the elderly. One of the pillars of this can be to avoid care due to drug-drug interactions by prescribing the safest possible drug therapy for the elderly, with continuous monitoring. The results of this study have confirmed the importance of specialised care for geriatric patients.

We hope that as part of the development of health care, we will succeed in developing the existing support for safe drug therapy (databases, programmes, unit-dose system). Because in ageing societies, like our country, I believe that an important element of healthcare development is the improvement of care for elderly patients. The involvement of advanced practice nurses is a key factor in the development of safe elderly care.

This would help to reduce the number of hospital admissions, mortality and morbidity due to drug interactions in comorbid patients with polypragmasia.

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