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# An Overview of Polypharmacy in Geriatric Patients

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Bilge Sözen Şahne

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## Abstract

Ageing causes a decrease in cognitive and physical abilities, thus making the elderly more sensitive and vulnerable. Besides, the elderly' living conditions are greatly affected by various diseases and other health-related problems. As is known, a large number of medicines are used to treat the health-related problems in elderly. Multiple drug use can be named as polypharmacy, though many definitions for "polypharmacy" are available in the literature. Many studies are available to explain the situation of the polypharmacy. Furthermore, there are many studies that confirm the prevalence of polypharmacy in several countries such as Brazil, the Netherlands, Sweden and Singapore. Health professionals involve in different stages of the health care services from the prescription until the usage of the drugs. Especially, pharmacists have significant role in informing the patients about rational use of drugs. It is known that the metabolism in geriatric patients changes with ageing. Therefore, medications, particularly polypharmacy, can cause serious side effect in geriatric patients. However, effective communication between the pharmacists and the patient and reasonable intervention by the pharmacist could prevent the negative effects caused by medications. In addition, an ethical perspective is crucial for considering geriatric patients' benefit.

**Keywords:** polypharmacy, geriatrics, pharmaceutical services, health care services

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## 1. Introduction

Due to technological developments, in the last century, the life expectancy has increased, so the number of old people has been increasing in the world population. Baby boomers, people who were born between 1946 and 1964, are ageing [1].

However, the birthrate has decreased and the demographic structure of the population has changed [2]. Furthermore, the populations in the most developed countries already have aged [3]. For all these reasons, senility has become an important issue [4].

Senility is a special part of the life course, which differs from person to person because of several reasons like genetic factors and lifestyle. In this period, decreased cognitive and physical abilities make this people more sensitive and vulnerable. Besides, various diseases and other health-related problems affect elderly's living conditions and life quality [5–8]. Some of the reasons of these are as follows [9–12]:

- Some changes take place in the gastrointestinal tract.
- The liver function differentiates.
- The amount of body secretions varies.
- The amount of body water decreases.
- Because of all this, changes in absorption and effect of drugs occur.
- Reduction in sensory perception is seen frequently.
- Emotional changes can be intensely seen.

The World Health Organization defines the memory loss, urinary incontinence, depression and falls or immobility as “four giants of geriatrics” [3, 9]. To solving all of these problems, medication treatment comes into prominence. However, the drug response of geriatric patients is changed because of some reasons like [13]:

- Accumulation of drugs which are eliminated by the kidneys
- Increase in drug binding
- Increase in dispersion of fat-soluble drugs
- Decrease in dispersion of water-soluble drugs
- Accumulation of drugs which are metabolized by liver
- Tendency to heart failure
- Variable dosage regimes

The term of “*polypharmacy*” originated from a Greek word “*poly*” which means “more than one” generally [14, 15]. Multiple drug use can be named as polypharmacy, but there are many different definitions for this term in the literature [14, 16–23]. Some of these definitions are listed below:

- “*Medication did not match diagnosis*”
- “*The use of several drugs concurrently for the treatment of one or more coexisting diseases*”
- “*Concurrent use of 5–9 drugs*”

- *“The use of potentially inappropriate medications, which can increase the risk for adverse drug events”*

Besides, according to some definitions, topical and herbal drugs, vitamin and minerals are not included to the polypharmacy. On the other hand, the duration of therapy is important on polypharmacy for some definitions [16].

In this context, one of the most common definitions of polypharmacy is the concurrent use of six or more medications by a patient. The number of medications varies from 4 to 10 in different studies [20, 21, 24–26]. In some researches, 0–4 drug use is named as non-polypharmacy, concurrent use of 5–9 drugs defined as polypharmacy, on the other hand 10 and more drugs as excessive polypharmacy [21].

As is known, a large number of medicines are used to solve the health-related problems encountered in elderly [11, 19, 27, 28]. Also, the elderly can use many non-prescription drugs with prescription drugs [16, 22, 29, 30]. In order to overcome the side effects caused by drugs used in the treatment of certain diseases, additional drugs are used, but it may cause polypharmacy [16].

There are several problems that may be caused of polypharmacy. In general, the reduction of water consumption and the increase in the body's water supply with ageing, and even in some cases starting to use taking medicaments with food instead of water, is one of these problems. Besides, some other problems that may arise can be listed as below [16, 18, 31, 32]:

- Drug-drug interactions,
- Drug-food interactions,
- Adverse drug reactions,
- Compliance problems,
- Increasing emotional problems,
- Various financial problems.

For all this reason, polypharmacy is a particular concern for all community, especially elderly.

## 2. Polypharmacy practices in the world

It is known that major medication safety concern in elderly patients is polypharmacy and potentially inappropriate medication use [24]. Polypharmacy draws the attention as an increasingly critical problem in the health care systems, especially on the geriatric patients around the world.

Many studies are available to explain the situation of the polypharmacy in the literature. Most of the studies are made in nursing homes where elderly people live in close quarters [20, 21, 28, 33].

According to the results of a longitudinal study made by Veehof et al., polypharmacy is increasing [33]. Furthermore, there are many studies, which confirm the prevalence of

polypharmacy from several countries like Brazil, the Netherlands, Sweden and Singapore [16, 18, 20, 24, 28, 31, 34, 35].

There are also some researches about the commonly used drugs for geriatric patients. Some of the most widely used drugs in geriatrics are as follows [13, 24, 34, 35]:

- Proton pump inhibitors
- H<sub>2</sub> receptor blockers
- Beta-blockers
- Diuretics
- Statins
- ACE inhibitors
- Non-steroidal anti-inflammatory drugs

Drug-drug interaction is an important problem for polypharmacy in geriatric patients. Some studies are focused to this problem [36, 37].

Some drugs combination like carbamazepine-nifedipine, warfarin-acetic acid derivate, haloperidol-escitalopram, *Ginkgo biloba*-warfarin are defined as “drugs that should not be combined” because of their dangerous interactions [37]. These interactions can be resulted with possible increased bleeding risk or drug concentration problems [37].

In addition to these, the drug interaction risk must be considered during the use of some drugs like cimetidine, sucralfate, ketoconazole, omeprazole, phenobarbital and clomipramine [36].

One of the important studies about polypharmacy in geriatric patient is SHELTER Study from the Europe. This study includes 4156 nursing home residents from seven European Union countries. According to the results of this research, 49.7% of the residents use 5–9 drugs and 24.3% of the residents use 10 or more drugs [21, 38].

In another study, Junius-Walker et al. found that most of the prescription and non-prescription drug consumers are elderly in Germany [32]. The study sample contained 466 geriatric patients and 26.7% of them were on prescribed polypharmacy. When the OTC user was included to them, this ratio increased to 53.6% [32].

Cankara et al. have investigated the polypharmacy presence in a university hospital in Turkey [35]. According to this study, most of the polypharmacy patients were middle aged and elderly. A hospitalized geriatric patient used 340 different active substances during 30 days [35].

In Spain, San-Jose et al. showed that polypharmacy became prevalent in patients and older than the younger elderly [34]. Besides, they stated that potentially inappropriate medicine is associated with polypharmacy during the use of 10 or more drugs [34].

An important result of polypharmacy is drug-related problems. Finkers et al. found that 96% of the geriatric polypharmacy patients in the Netherlands’ nursing homes had one or more drug-related problem like decreased renal function and elevated liver enzymes [20]. Poly-

pharmacy is a common practice to treat geriatric patients; also, it was found in 58.59% of the nursing home residents [28].

Like many other countries in the world, polypharmacy is also widespread among geriatric patients in Sweden. Moreover, Haider et al. revealed that there are significant differences in drug use in different educational groups of geriatric patients [24].

### **3. The role of pharmacists and other health care professionals in polypharmacy**

Health professionals involve in different stages of the health care services from the prescription until the usage of the drugs [14, 19]. Geriatric patients are an important part of the patient group on briefing because of their cognitive abilities. Especially, pharmacists as the most easily accessible health professionals have significant role on informing of the patients about rational drug use [4, 27].

Pharmacists show ultimate attention to provide information to the patients [39]. Particularly with the spread of self-treatment efforts, the role of the pharmacists has become more important [40].

Especially geriatric patients use non-prescribed drugs as well as the prescribed drugs [29], and this situation may cause major problems. Old patients, due to their chronic diseases, since they use more drugs than other age groups and they are more likely to be under risk, they are frequently in communication with their pharmacists [41].

In addition to these, there are many reasons of geriatric patients' pharmacy visits [4]:

- Buying prescription and non-prescription drugs,
- Consulting about their health status,
- Getting vaccine injections,
- Learning to use some medical devices,
- Measuring blood pressure,
- Chatting.

In pharmacy selections of the elderly patients, the quality of the services provided by the pharmacy and the pharmacist's characteristics play an important role. It is indicated that geriatric patients prefer responsible, friendly and cooperative pharmacists [41].

In addition, geriatric patients are expecting the pharmacists to give them information like side effects of the medications and drug-drug interactions [19, 27, 31, 41]. During these briefings, asking open-ended questions makes it easier to understand probable problems [8]. Moreover, counselling services that can be provided along with are thus aligned as follows [4]:

- To control the drug interaction
- To listen to the patient with patience
- To counsel according to patient status
- To continue the counselling process until the patient understands

It should be noted the importance that it will provide important benefits to In order for pharmacists to make appropriate interventions about the use of drugs, it is necessary that the pharmacy service is patient oriented and the relationship between the patient and the pharmacist is important [4, 31, 39, 41].

Furthermore, the pharmacist-physician communication is also important to improve patient care [27, 42]. With an appropriate communication between them can prevent possible medication errors. Also, with this collaboration, geriatric patients' drug compliance gets easier.

Pharmacists have to be more careful when taking the geriatric patient's medication history and medication use-misuse choices should be considered. Especially, it is important to be careful about non-prescribed drugs [29].

Among health service providers, pharmacists take an important place and to provide better service, they have to have sufficient information to make appropriate interventions [42]. During their undergraduate educations, the pharmacists must have detailed information about the geriatric patients, and if it is provided, the service they provide will be more qualified [43].

The physicians' poor prescribing practices are also a common reason of the negative effects of polypharmacy [44]. Therefore, physicians' care and attentions have a core importance.

In addition, in the health services provided to the elder people, at common approaches that lead to various problems particularly like polypharmacy, to prevent patient injury, all health personnel should be working as a team.

In necessary cases, while prescribing appropriate drugs, physicians should cooperate with the pharmacists and the nurses while tracking and applying the drugs for the patients who are hospitalized and who are staying in nursing homes should come together with the pharmacists in necessary cases, and this will minimize the problems faced by the use of drug of older patients.

Moreover, at various problems that the patients in question are facing, orienting the patients to the specialists like physiotherapists and dieticians who are experts in their fields will contribute positively to the quality of life of the patients.

#### **4. Salient points on polypharmacy**

It is known that many changes take place on geriatric patient's metabolism. Therefore, side effects of medications have negative impact on geriatric patients, particularly polypharmacy.



Pharmacokinetic changes are one of the most common reasons of polypharmacy's harmful effects on geriatric patients. Some of these changes are listed below [45–48]:

- Absorption problems can be occurring because of the high gastric pH, insufficient absorption space and gastrointestinal motility. Because of these, solubility and chemical stability of drugs can be changed and active transport can be decreased. In addition to these, the risk of esophageal lesions can be increased.
- The composition of body and the permeability of blood-brain barrier can be changed. Moreover, protein-binding sites can be reduced. These changes affect the distribution of drugs, for example, changes on the volume of distribution for lipo-soluble drugs and water-soluble drugs.
- Decrease on the activity of cytochrome P450 and hepatic blood flow affect the metabolism.
- Excretion also changes because of the decreased rate of glomerular filtration and tubular secretion. These cause problems on the elimination of water-soluble drugs.

However, an effective communication between the pharmacists and the patient and reasonable intervention by the pharmacist could prevent these negative effects [19, 25, 27].

Some of the important points that the other health personnel with the pharmacists should pay attention in the application of polypharmacy for the geriatric patients are listed as below:

- While informing the patients with vision loss occurring by senility, caution should be exercised. In cases where written information should be given, attention should be paid to the preparation of the articles can be read easily.
- Especially in some regions, it should not be forgotten that some geriatric patients' reading level is low. In those types of cases, especially while preparing reminders regarding when and how to use the drugs, it would be useful to use pictograms.
- Hearing loss is common in geriatric patients is a condition that should not be forgotten during providing health services. Especially while informing those patients, it is necessary to set the voice tone appropriately.
- It would be helpful to use special drug cases for easy tracking especially for the patients who have memorial problems like dementia. If necessary, the related health personnel should come into play while placing the pills to the boxes that will be used daily, weekly and monthly.
- It should be considered that the geriatric patients' physical strength may be decreased and especially the drug packages, which are developed to protect the children, should be packed by using different packages for the elderly.

Also, an ethical perspective is crucial for considering geriatric patients' benefit. Like in the other patient groups, for the provision of the pharmacy services by especially paying attention to the secrecy of the geriatric patients, there must be a separate place in pharmacies to protect privacy [40].



Besides, in some cases, dementia has caused some problems with regard to informed consent and autonomy, which are important ethical component. Therefore, attention should be paid to taking geriatric patients' history and informing them. Health care professionals must be more careful especially during the polypharmacy.

Also, the principle of justice should not be forgotten during the allocation of limited health resources [49]. It is known that there is no clear solution for these kinds of ethical dilemmas [50]. However, the vulnerability of the geriatric patients should be always considered and health care professionals should give particular importance their beneficence and autonomy [51]. With all that, the principle of non-maleficence must be considered using the evidence-based treatments for geriatric patients [52].

In conclusion, to decrease negativity that may be originated from polypharmacy, the cooperation of the health personnel and the patient relatives is of great importance. Together with adopting and generalizing rationalist drug use, reaching the requested treatment results, increasing the life quality of patients and decreasing the costs would be possible.

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