Medication use errors and affecting factors in older people: a nursing home example

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ABSTRACT

Purpose: This study was carried out to determine medication use errors, which pose important problems for older people's health, and the affecting factors.

Materials and methods: The population of this cross-sectional study consisted of older people living in a nursing home in Izmir province (N=666). No sample selection was made in the study, and the study was conducted with 401 older people who voluntarily wanted to participate in the study between May and July 2018. Research data were collected using a questionnaire that was created by reviewing the literature. Number, percentage, mean, and logistic regression analysis were used in the analysis of the data. Statistical significance was accepted as $p<0.05$ at a 95% confidence interval.

Results: The mean age of the older people included in the study was 74.68±7.00. Of the older people, 52.1% used 1-3 medications; 39.4% used 4-5 medications; 8.5% used 6 or more medications. The mean number of medications used was 3.62±1.66. When medication use errors were examined, it was determined that 76.6% of the older people forgot to take their medications, that only 49.1% knew why they used their medications, that 40.8% did not know the name of the medication they used, that 30.3% did not pay attention to take the medication on an empty/full stomach and that 14.9% used overdoses of medications.

Conclusions: As a result of the study, medication use errors of older people were determined as forgetting to take the medication, not knowing why they used the medication, taking overdoses of medications, not taking the medication when feeling good, and not paying attention to the expiry date of the medication used.

Keywords: Medication, medication use, nursing home, older people

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INTRODUCTION

"Old age" is a developmental period of the life process in which individuals lose their physical, psychological, and social independence and become dependent [1]. The decrease in fertility rate and the control of infectious diseases has increased life expectancy; therefore, the world population has been rapidly aging for the last 50 years [2]. According to the United Nations data (2017), the ratio of the population aged 60 and over to the total world population was 8% in 1950, and this ratio increased to 13% in 2017 [3]. Similarly, the elderly population is increasing rapidly in our country. According to the Turkish Statistical Institute data, the ratio of the elderly population to the total population was 8% in 2014 and increased to 8.8% in 2018. Thus, the ratio has increased by 16% in 5 years. According to the population projection, the ratio of the elderly population is estimated to be 10.2% in 2023 [4].

With aging, pharmacokinetic and pharmacodynamic changes occur in the body because of weakening in hemostatic control and decreasing organ functions. As a result, the number of chronic diseases also increases [5]. According to a study conducted by the Ministry of Health, of the older people over 65 years in our country, 90% have at least one, 35% have at least two, 23% have at least three, and 14% have at least four or more chronic diseases [6]. The coexistence of most chronic diseases in old age leads to the use of multiple medications (polypharmacy). Polypharmacy is defined as the simultaneous use of one or more medications and increases with aging. It has become a common public health problem, especially in individuals aged 65 and over [7,8]. It is reported that 45% of prescriptions are given to adults aged over 65 in England [9]. Dedeli and Karadakovan (2011) conducted a study in our country and found that 51.5% of older people used three or more medications for their diseases [10].

Older people apply to different physicians for different diseases, use unprescribed medications from pharmacies for each symptom, and receive medication recommendations, especially from friends and relatives. These prepare the ground for polypharmacy (multiple medication use) [11]. Moreover, polypharmacy reduces compliance with essential medications that an elderly should use, affecting disease management negatively. Visual disorders, dementia, and dysmnesia in older people also lead to medication use errors [12,13]. A study conducted in Europe reported that the rate of medication misuse was 27.7% in the age group of 80 and over [12]. Older people in our country have also been determined to misuse medications like those in European countries [8,14-16].

The most common medication use error in the elderly are as follows: using medications in line with complaints and symptoms of the disease instead of prescribed medications for the diagnosis, leaving the previous medication and using a different one, asking for re-prescription for the medication used, taking medications without a prescription and supplying medications from family members or other relatives, not taking the medication on time or forgetting, overusing the medication, not knowing the name of medications and accordingly mixing the medications, not paying attention to the expiry date, and discontinuing medications without informing the physician [17-20].

Medication use errors affect the health of the elderly negatively and reduce their quality of life. Therefore, medication management is an inseparable part of disease management. For successful disease management, good communication should be established between the individual, the family, society, and the nurse. The physician prescribes the medication; the nurse administers the medication to the patient and teaches how to use it. Nurses know the patient best and observe whether the medication provides the necessary effect [18,21]. Therefore, nurses are one of the most active trainers in training programs for patients and have important responsibilities in preventing medication misuse. It is essential for older people and their families to evaluate their knowledge about the medication effects, usage patterns, side effects, medication interactions, time, and dosage for medication management. Furthermore, nurses will ensure the effectiveness of their care by evaluating the older people psychologically, physiologically, and socioeconomically with a holistic perspective. Thus, training content will be formed in line with the needs of the individual. The training provided will minimize medication use errors and, in turn, ensure effective medication management and increase treatment compliance [18,22,23]. In line with this perspective, the study was planned to determine medication use error, which poses important problems for elderly health, and the affecting factors.

Research questions

1) What is the medication use error of older people?
2) What are the factors affecting medication use in older people?

MATERIALS AND METHODS

Study design and population

The research had a cross-sectional design. The study population consisted of older people living in a nursing home in İzmir province (N=666). No sample selection was made in the study. The study was carried out with 401 older people who voluntarily wanted to participate in the study between May and July 2018. Those who had no visual, hearing, or mental problems, who were

literate and spoke Turkish, and who were diagnosed with at least one chronic disease were included in the research. Patients with psychiatric disorders were excluded from the research.

Data Collection Tools and Data Collection

The research data were collected using a questionnaire form which was created by reviewing the literature and which consists of 34 questions regarding descriptive characteristics (11 questions) and medication use error (23 questions) [18,19,23]. The face-to-face interview method was used for data collection.

Ethical Aspects of Research

The ethics committee approval (protocol number:158-2017) was received, and institutional permission was taken from the nursing home where the study was conducted. In addition, the older people participating in the study were informed about the purpose of the study and written, and verbal consent was taken.

Data Evaluation

The data were evaluated in the Statistical Package for the Social Sciences (SPSS) 21.0 program. Number, percentage, mean, and logistic regression analysis were used in the analysis of the data. Statistical significance was accepted as $p<0.05$ at a 95% confidence interval.

RESULTS

The mean age of the older people included in the study was 74.68±7.00. The number of medications used by the older people was at least one and at most 8. The mean number of medications used was 3.62±1.66. Other characteristics are presented in Table 1.

Table 1. Descriptive characteristics of older people

Descriptive Characteristics	N	%
Age		
65-74	229	57.1
75-84	94	23.4
85 and over	78	19.5
Gender		
Female	166	41.4
Male	235	58.6
Educational Status		
Literate	40	10.0
Primary school	134	33.4
Secondary school	54	13.5
High school	110	27.4
University	63	15.7
Presence of chronic diseases		
Yes	357	89.0
No	44	11.0
Receiving training about the disease		
Yes	175	43.6
No	226	56.4
Control examination		
I do not go	82	20.5
I go when I have complaints	181	45.1
I go as my physician suggests	108	26.9
I was not told about going to control examination	30	7.5
Number of Medications		
1-3	209	52.1
4-5	158	39.4
6 and over	34	8.5

Of the older people, 40.6% did not know the name of the medication used. 49.1% did not know why they used the medication, and 30.2% did not pay attention to taking the medication on an empty/full stomach. Only 15.0% used overdoses of medications. 20.9% changed the dose of the medication used, and 76.8% had no information on medications' interactions with food and beverages. 76.6% of respondents forgot to take the medication; 73.8% did not pay attention to the expiry date; 44.1% recommended the medication they used to someone else; 54.4% took the medication recommended by someone else. 63.3% did not take their medications when they felt well (Table 2).

Table 2. Inappropriate medication use of older people

Inappropriate medication use	**N**	**%**
Knowing the name of the medication		
Yes	238	59.4
No	163	40.6
Knowing the reason to use the medication		
Yes	204	50.9
No	197	49.1
Paying attention to taking the medication on an empty/full stomach	280	69.8
Yes	121	30.2
No		
Taking overdoses		
Yes	60	15.0
No	341	85.0
Changing the dose		
Yes	84	20.9
No	317	79.1
Information on medication interactions with food/beverage		
Yes	93	23.2
No	308	76.8
Forgetting to take the medication		
Yes	307	76.6
No	94	23.4
Paying attention to the expiry date		
Yes	105	26.2
No	296	73.8
Recommending to someone else		
Yes	177	44.1
No	224	55.9
Taking the medication recommended by someone else		
Yes	218	54.4
No	183	45.6
Not taking the medication when felt well		
Yes	254	63.3
No	147	36.7

Table 3 shows the findings obtained from the logistic regression analysis, which was performed to determine the effects of age, gender, educational level, the presence of chronic disease, and the number of medications used on medication use error. Age (CI=4.604-11.994) and educational level (CI=1.617-2.545) were determined as risk factors for knowing the name of the medication. The status of knowing the name of the medication decreased by 7.4-fold as age (75 years and over) increased and 1.6-fold as the educational level decreased (Table 3). Age (CI=1.482-2.844), gender (CI=.172-.415), the presence of chronic disease (CI=.199-.844), and the number of medications used (CI=.369-.805) were determined as risk factors for the status of knowing the reason to use the medication. Only age (CI=1.581-4.014) and gender (CI=1.379-4.592) were determined as risk factors for the status of taking overdoses of medications. Women and those aged 65-74 years were found to take overdoses 2.5-fold more compared to men and those aged 75 and over, respectively. Gender (CI=1.581-4.014), educational level (CI=1.581-4.014), the presence of chronic disease (CI=1.581-4.014), and the number of medications used (CI=1.581-4.014) were determined as risk factors for the status of forgetting to take the medication. Age (CI=10.829-79.648), gender (CI=.064-.350), the presence of chronic disease (CI=9.774-251.013), and the number of medications used (CI=8.065-42.072) were determined as risk factors for the status of paying attention to the expiry date of the medication used. It was found that individuals aged 75 and over did not pay attention to the expiry date of the medication used by 29.3-fold compared to those aged 65-74; those with a chronic disease did not pay attention by 49.5-fold compared to those without a chronic disease; those using 4 medications and over did not pay attention by 18.4-fold compared to those using 3 medications and less.

Age (CI=1.502-2.953), gender (CI=2064-5.728), educa-tional level (CI=.521-.733), and the presence of chronic disease (CI=.003-.072) were determined as risk factors for the status of not taking the medication when felt well.

Table 3. Results obtained from the logistic regression analysis of variables associated with inappropriate medication use

Variables	Knowing the Name of the Medication			
	P value	ODDS RATIO	95% confidence interval for beta	
			Lower Limit	Upper Limit
Age (75 years and over)	0.000	7.431	4.604	11.994
Gender (Female)	0.057	0.575	0.325	1.018
Educational Level (Literate)	0.000	2.029	1.617	2.545
Presence of Chronic Disease (Yes)	0.997	0.000	0.000	-
Number of Medications	0.102	1.425	0.933	2.178
Variables	**Knowing the Reason to Use the Medication**			
	P value	ODDS RATIO	95% confidence interval for beta	
			Lower Limit	Upper Limit
Age (85 years and over)	0.000	2.053	1.482	2.844
Gender (Female)	0.000	0.267	0.172	0.415
Educational Level (Literate)	0.779	1.022	0.876	1.192
Presence of Chronic Disease (Yes)	0.016	0.410	0.199	0.844
Number of Medications (6 medications and over)	0.002	0.545	0.369	0.805
Variables	**Taking Overdoses**			
	P value	ODDS RATIO	95% confidence interval for beta	
			Lower Limit	Upper Limit
Age (aged 65-74 years)	0.000	2.519	1.581	4.014
Gender (Female)	0.003	2.516	1.379	4.592
Educational Level	0.303	1.110	0.910	1.354
Presence of Chronic Disease	0.997	33.08	0.000	-
Number of Medications	0.141	0.712	0.453	1.119
Variables	**Forgetting to Take the Medication**			
	P value	ODDS RATIO	95% confidence interval for beta	
			Lower Limit	Upper Limit
Age	0.832	1.049	0.676	1.627
Gender (Female)	0.000	6.299	3.203	12.386
Educational Level (Literate)	0.000	0.505	0.385	0.663
Presence of Chronic Disease (Yes)	0.000	0.034	0.007	0.155
Number of Medications (4 medications and over)	0.000	0.137	0.074	0.253
Variables	**Paying Attention to Expiry Date of the Medication**			
	P value	ODDS RATIO	95% confidence interval for beta	
			Lower Limit	Upper Limit
Age (75 years and over)	0.000	29.369	10.829	79.648
Gender (Female)	0.000	0.149	0.064	0.350

Educational Level (Below high school)	0.515	0.911	0.687	1.207
Presence of Chronic Disease (Yes)	0.000	49.532	9.774	251.013
Number of Medications (4 medications and over)	0.000	18.421	8.065	42.072
Variables	**Not Taking the Medication When Felt Well**			
	P value	**ODDS RATIO**	**95% confidence interval for beta**	
			Lower Limit	**Upper Limit**
Age (75 years and over)	0.000	2.106	1.502	2.953
Gender (Female)	0.000	3.438	2.064	5.728
Educational Level (Literate)	0.000	0.618	0.521	0.733
Presence of Chronic Disease (Yes)	0.000	0.015	0.003	0.072
Number of Medications	0.370	0.847	0.589	1.218

DISCUSSION

In the study, the mean age of the older people was 74.68±7.00, and 41.4% were female, and 58.6% were male (Table 1). In the study conducted by Bozkurt et al. [24], the mean age was 75.53±7.22; 49.1% of the elderly were female; 50.9% were male (n=106). Baser et al. [25] determined the mean age of the elderly as 73.05±6.20, and in their study, 56.3% of the elderly were female, and 43.7% were male. As in other studies, the study sample was consistent with Turkey's average.

The study determined that 52.1% of the older people used 1-3 medications; 39.4% used 4-5 medications; 8.5% used six medications and over. The mean number of medications used was 3.62±1.66 (Table 1). Ozturk et al. (2017) found that of 218 older people aged 65 and over, 10.5% used one medication; 13.7% used two medications; 11.3% used three medications; 8.7% used four medications; 38.0% used five medications and over. It was determined [15]. In another study conducted in our country, 38.2% of 1433 patients aged over 65 were found to use four medications or over [26]. Baser et al. (2019) reported that 58.3% of the patients used four medications and over and that the mean number of medications used was 4.24±2.38 [25]. Our study findings are consistent with other research results. The number of chronic diseases increases as age increases, leading to medication use error [27]. In this context, it can be suggested that information to be provided by nurses to older people about medication management within the scope of their educative roles may contribute to the increase of individuals' treatment compliance.

In the study, it was found that 40.6% of the older people did not know the name of the medication they used (Table 2). Gunes and Kıyak (2017) found that 79.8% of the elderly did not know the name of the medication they used [20]. Ozbek et al. (2006) reported this rate as 89.0% [28]. As a result of the logistic regression performed within the scope of the study, it was found that the status of knowing the name of the medication decreased 7.4-fold and 1.6-fold as age (75 years and over) increased, and educational level decreased, respectively (Table 3).

It was found in the study that 49.1% of the older people did not know the reason to use the medication (Table 2). Gunes and Kıyak [20] determined that 49.8% of the elderly did not know why to use the medication. Demirbag and Timur reported this rate as 38.7% [29]. Logistic regression analysis was performed since knowing the reason to use the medication and affecting variables are important for medication management [30]. According to the analysis results, age, gender, the presence of chronic disease, and the number of medications used were found as risk factors for knowing the reason to use the medication (Table 3).

In the study, 15.0% of the older people stated that they took the medications at a dose higher than recommended (Table 2). Oztas and Aslan [16] determined that 3.6% of older people took medications at the wrong doses [16]. Kasar and Karadakovan [14] reported this rate as 6.7%. As a result of the logistic regression performed within the scope of the study, it was determined that age and gender pose a risk and that the group aged 65-74 years and women were found to take overdoses 2.5-fold more compared to those aged 65-74 years and men, respectively (Table 3).

It was determined that 76.6% of the older people forgot to take the medication (Table 2). The rate of older people who forgot to take the medication was 46.4% in the study conducted by Oztas and Aslan [16], 24% in the study conducted by Demirbag and Timur [20], and 82% in the study conducted by Gunes and Kıyak [29]. As a result o f

the analysis performed within the scope of the research, gender, educational level, the presence of chronic disease, and the number of medications used were determined as risk factors for forgetting to take medications. The identified risk factors are consistent with those reported in the literature and are important variables that affect the medication management of individuals [17-20].

In the study, it was found that 73.8% of the older people did not pay attention to the expiry date of the medication (Table 2). Demirbag and Timur [2] stated that 70.9% of the elderly did not pay attention to the expiry dates [29]. Gunes and Kiyak [20] determined that 32.7% of the elderly did not pay attention to the expiry dates of medications and that individuals in the 65-74 age group paid attention to the expiry dates significantly more than other age groups ($p<0.05$). In the present study, similar to the literature, it was found that individuals aged 75 and over did not pay attention to the expiry date of the medication used by 29.3-fold compared to those in the 65-74 age group; those with a chronic disease did not pay attention by 49.5-fold compared to those without a chronic disease; those using four medications and over did not pay attention by 18.4-fold compared to those using three medications and less (Table 3). Paying no attention to the expiry dates of medications will have negative consequences on the health of older people; therefore, it can be suggested that the identification of affecting variables makes a significant contribution to the literature.

In the study, 63.3% of the older people stated that they did not take the medication they used when they felt well (Table 2). This rate was reported as 46.3% by Gunes and Kıyak [16], 37.3% by Kasar and Kizilci [20], and 20% by Oztas and Aslan [31].

It was determined that he stopped taking. As a result of the analysis performed within the scope of the study, age, gender, educational level, and the presence of chronic disease were found to be risk factors for the status of not taking the medication when felt well. Individuals aged 75 and over did not take the medication they used when they felt well 2.1-fold more than individuals aged 65-74 and women did not take the medication when they felt well 3.4-fold more than men (Table 3).

Kasar and Karadakovan [14] reported that women misused medications 6.5-fold more compared to men. Bierman et al. [32] reported a higher misuse rate in women than in men without specifying the rate [32]. Not taking the medication when feeling well may have significant side effects for the elderly. This result shows that older people do not take their medications regularly. Furthermore, nurses can determine the content of the training they will give on medication management by assessing each elderly individual in line with these risk factors. This may increase the treatment compliance of older people.

That the results of the research are generalizable to its own target population is an important limitation because it was conducted with older people who applied to only one nursing home at a particular time and accepted to join the study.

CONCLUSIONS

Medication use errors are among the problems important for older people's health. In the present study conducted to determine medication use error and affecting factors, the mean age was 74.68±7.00 and the mean number of medications used was 3.62±1.66. It was found that most of the older people forgot to take their medications; about half of them did not know the reason to use the medication, did not pay attention to the expiry dates of medications they used, and stopped taking the medication when they felt well. Furthermore, additional analyses found that age, gender, educational level, the prevalence of chronic diseases, and the number of medications used were all factors that influenced medication use. To cope with all these negative outcomes, informing older people about medication management appears to be the most practical, simple, applicable, and cost-effective method. For this reason, nurses should pursue their educational roles actively. Training to be given by nurses to the older people should be in line with basic information such as the name of the medication used, the reason for using, the expiry date, not taking an overdose, not stopping to take the medication when feeling good, and not recommending medications to others or not using the medication recommended by others. Medication management of older people who receive training will be improved and their treatment compliance will be ensured.

Limitations of Research

The research results cannot be generalized to the entire society since the study was carried out only in one institution within the scope of medication use.

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Conflict of Interests

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