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RESEARCH

A PILOT STUDY OF CLINICAL PHARMACIST-LED MEDICATION REVIEW IN OLDER ADULTS ON POLYPHARMACY AND RECEIVING HOME HEALTH CARE SERVICES

Abstract

Introduction: This study aimed to evaluate the frequency and types of medication-related problems in older adults receiving home health care services that were identified through clinical pharmacist-led medication review.

Materials and Methods: This pilot study was conducted in patients ≥65 years of age who were on polypharmacy and receiving home health care services from May 15th, 2019 through October 30th, 2019 in Turkey. A multidisciplinary home care team, including physicians, nurses and clinical pharmacist, performed the home visits. Scores on the drug burden index, medication regimen complexity index, and medication appropriateness index, present of potentially inappropriate medications, and the medication-related problems were assessed.

Results: Among 100 older adults (74 females) with a mean age of 78.5±7.9 years, the median number of medications used was 7 (interquartile range: 5-9); the median scores of the drug burden index, medication regimen complexity, and medication appropriateness index were 0.5 (interquartile range: 0-0.8), 21 (interquartile range: 17-31), and 13 (interquartile range: 6-16.9), respectively. The problems identified were those related to 'drug selection' (66%), 'education and information' (58%) and 'monitoring' (33%). The health care team accepted 84.2% of the recommendations made by the clinical pharmacists.

Conclusions: The results suggested that clinical pharmacist-led cognitive services in a home health care services team could reduce medication-related problems in older adults on polypharmacy.

Keywords: Pharmacists; Home Care Services; Polypharmacy

INTRODUCTION

Older adults receiving home healthcare services with polypharmacy are susceptible to medication-related problem (1). A 'Medication Management Model' is defined as structured interprofessional services that involves clinical pharmacists and home health nurses (2). As a part of this interprofessional model developed for home health providers, home visits were conducted by pharmacists for home care patients on polypharmacy (≥9 medications) and a total of 2,482 medication-related problems were determined (3). The advantages of these pharmacy services conducted in the home setting have been reported as providing a comfortable place for discussing many issues, enabling the development of an accurate medication list and allowing functional medication administration for participants (3).

The home medicines review (HMR) is a community-based service that involves general practitioners and pharmacists in order to prevent, determine, and resolve medication-related problems in Australia (4). The drug burden index (DBI) (5) and medication appropriateness index (MAI) (6) are evidence-based tools that are used to demonstrate potential contribution of pharmacist-led HMR (4). Home health care services have recently been integrated into the health system in Turkey; however, pharmacists are not involved in the home care services team that includes physicians and nurses. A novel project was initiated in 2019 by the Kocaeli Provincial Health Directorate in cooperation with the Clinical Pharmacy Department of Marmara University Faculty of Pharmacy. This project aimed to provide education and training for pharmacists on cognitive services in home health care services and to develop clinical pharmacy services that could be integrated into the health care services in the home setting. As a part of this project, the present pilot study aimed to evaluate the potential impact of providing medication review in older adults on polypharmacy and receiving home health care services. For this purpose, the frequency and types of medication-related prob-

lems were determined through the clinical pharmacist-led medication review in older adults who were on polypharmacy and receiving home health care services, and acceptance rate of the pharmacists' recommendations by the health care team (the physicians and nurses) were assessed.

MATERIALS AND METHODS

Ethics Approval

The present study was approved by the Clinical Trial Ethics Committee of University of Health Sciences Kocaeli Derince Training and Research Hospital of (approval number: 2019-40, date: May 9th, 2019). The informed consents of the patients and/or their caregivers was obtained before the study.

Setting and Study Design

This descriptive cross-sectional pilot study was conducted from May 15th, 2019 through October 30th, 2019. Patients aged ≥65 years who were on polypharmacy (defined as concurrently used 4 or more medications based on previous study) (7) and receiving health care services in the home setting in the Kocaeli province of Turkey were eligible for participation.

Clinical Pharmacist-Led Medication Review

A multidisciplinary home care team including physicians and nurses performed weekly or daily visits to evaluate the patients. A clinical pharmacist joined the health care team within the time frame of the present study. During the home visits, the pharmacists interviewed with the older adults and/or their caregivers about their medications.

Data Collection

The data of the older adults regarding age, sex, number of years of education, history of falls, co-morbidities, and hospital admissions during the previous six months were obtained from the med-

ical records. All medications, including medications with or without prescription and dietary supplements, were recorded for each patient and biochemical test results were also obtained from the medical records of each patient.

DBI scores were calculated for all patients. The DBI is an evidence-based tool that assesses the total exposure of older adults to anticholinergic and sedative medications (5). A previously published list was used as a reference to determine the minimum effective dose of medications (8).

The medication complexity of each patient was quantified using the Turkish version of the Medication Regimen Complexity Index (MRCI) (9). The MRCI is a 65-item valid tool that evaluates the medication complexity of patients according to the dosage forms, dosage frequency, and administration instructions of medications. Higher scores indicate more complex medication regimens (9).

Medication Related Problems

The appropriateness of all medications used by the patients was assessed with the MAI. This index contains 10 criteria, each of which is scored as appropriate, neutral, inappropriate, or unknown, and it yields a maximum potential score of 18. Lower scores indicate the appropriateness, whereas higher scores indicate inappropriateness of medication (6). The Potentially inappropriate medications (PIMs) used by the patients were determined with the 2019 American Geriatrics Society (AGS) Beers Criteria® (10) and TIME-to-STOP criteria (11).

The medication-related problems were determined by the clinical pharmacist-led medication review and listed by using the validated DOCUMENT classification system (12). The health care providers' (the physicians and the nurses) acceptance rate of clinical pharmacist's recommendations about the medication-related problems was recorded without evaluating the outcome of implementation these recommendations.

Statistical Analysis

The data analysis was performed using the Statistical Package for the Social Sciences for Windows (version 11; SPSS Inc., Chicago, IL, USA). The normality of data distribution was tested by using the Kolmogorov-Smirnov test. Data were expressed as median (interquartile range [IQR]) and mean and standard deviation (SD) for continuous variables and as frequency and percentage for categorical variables.

RESULTS

A total of 124 older adults who were receiving home health care services were visited during the study period, of which 19 had insufficient medication and clinical data, and five were not willing to participate in the study. Accordingly, the study was conducted in 100 older adults who were on polypharmacy and receiving home health care services. The mean age was 78.5±7.9 years; the majority of the patients were female (74%) and had less than eight years of education (97%). Nearly half of the patients (49%) had a hospital admission within the last six months, and 28 patients had a history of fall. The median total number of medications was 7 (IQR: 5-9). The median DBI score was calculated as 0.5 (IQR: 0-0.8). According to the DBI scores, a high exposure to anticholinergic and sedative medicines was determined in 22 older adults. The median total MRCI score was 21 (IQR: 17-31), and the median total MAI score was calculated as 13 (IQR: 6.0-16.9). The demographic and medical data of them included in the study are presented in Table 1.

Among the study patients, 40% were using PIMs according to the TIME-to-STOP criteria, and 7.0% of the all medications used (n=738) were PIMs. The MAI scores and the number of PIMs are presented in Table 2. At least one of the 2019 Beers Criteria® was determined in 53 of the patients receiving health care services in the home setting. The number of PIMs for the older adults receiving health care services in the home setting is summarized in Table 3.

Table 1. Demographic and medical data of older adults receiving home care services (number of patients=100)

	n
Age (years) Mean (SD)	78.5 (7.9)
Gender (%)	
Male	26
Female	74
Education (years) (%)	
<8	97
≥8	3
Hospital admission during last 6 months (%)	
Yes	49
No	51
History of Falls (%)	
Yes	28
No	72
Total number of medication Median (IQR)	7 (5-9)
DBI score Median (IQR)	0.5 (0-0.8)
DBI score	
0	35
<1	43
≥ 1	22
MRCI score Median (IQR)	21 (17-31)
MAI score Median (IQR)	13 (6.0-16.9)

SD: standard deviation; IQR: interquartile range DBI: drug burden index; MRCI: medication regimen complexity index; MAI: Medication Appropriateness Index

Table 2. Medication appropriateness index score and the number of PIMs (total number of medications= 738)

	A total number of medications (%)
MAI	
0	259 (35.1%)
1-2	298 (40.4%)
3-4	112 (15.1%)
≥5	59 (9.5%)
PIMs according to TIME-to STOP Criteria	
No	686 (93%)
Yes	52 (7%)
At least one PIM according to 2019 AGS Beers® Criteria	
Yes	90 (12.2%)
No	648 (87.8%)

MAI: Medication Appropriateness Index; PIM: potentially inappropriate medication; TIME to STOP: criteria for inappropriate medication use in Turkish older adults; AGS: American Geriatrics Society

For the older adults who were on polypharmacy, 329 medication-related problems were determined by the clinical pharmacist-led medication review, and 96% of the patients had at least one medication-related problem. Those problems were 'problems related to drug selection' (66%), 'problems related to education and information' (58%) and 'problems related to monitoring' (33%). Of the 329 recommendations of the pharmacists, 84.2% were accepted by the home health care team. The medication-related problems identified according to the DOCUMENT classification system for the patients

Table 3. PIMs in older adults receiving health care services at home setting (the number of patients=100)

PIMs according to TIME-to STOP Criteria	n
0	60
1	30
2	7
3	3
2019 AGS Beers Criteria® - PIM in Older Adults Due to Drug-Disease or Drug-Syndrome Interactions	
0	76
1	24
2019 AGS Beers Criteria® - PIM in Older Adult	
0	54
1	34
2	12
2019 AGS Beers Criteria® - Potentially Clinically Important Drug-Drug Interactions	
0	88
1	12
2019 AGS Beers Criteria® - Medications That Should Be Avoided or Have Their Dosage Reduced with Kidney Function of Older Patient	
0	98
1	2

PIM: potentially inappropriate medication; AGS: American Geriatrics Society; TIME to STOP: criteria for inappropriate medication use in Turkish older adults

are summarized in Table 4. The most commonly observed medication-related problems in older patients are summarized in Table 5.

DISCUSSION

The results of the present study, which investigated medication-related problems in older adults who were on polypharmacy and receiving home health care services, demonstrated that the majority of the patients (96%) had at least one medication-related problem determined by the clinical pharmacist. The problems identified were those related to 'drug selection' (66%), 'education and information' (58%) and 'monitoring' (33%). The health care team accepted 84.2% of the recommendations made by the clinical pharmacists.

The total number of medications was determined to be slightly lower than those reported in previous studies conducted in the home setting (13,14). Among our patients, the rate of those highly exposed to medications identified by the DBI was 22%. Similar to the results of the present study, the rate of exposure to medications identified by the DBI was shown to be nearly one fifth of them (15). In contrast, the rate of exposure to anticholinergic and/or sedative medications identified by the DBI in older patients has been reported to be higher in the community setting (7).

The median MRCI score was determined as 21 (IQR, 17-31) in the patients of this study; this finding was in parallel with the results reported in previous studies (16,17). However, the median total MAI score 13 [IQR, 6.0-16.9]) found in the present study was higher than that reported in previous studies (13,18).

In a retrospective study on community-dwelling older individuals (≥65 years; n=270) in Australia,

in which the effects of HMRs performed by pharmacists on prescribing appropriateness (13), were evaluated, the most common medication-related problems were reported as medications with no indication (22.0%), potential drug-drug interactions (14.3%) and problems related to dosage (13.0%). Additionally, the acceptance rate of the pharmacists' suggestions by the general practitioners was reported as 45.5% (13), a finding which was lower than the finding of the present study (84.2%). In contrast, similar to the rate found in the present study, the rate of receiving at least one PIM was reported to be 59% in patients with dementia living at home (19) and 40.4% in older home care patients in Japan (20). In a study conducted in Switzerland, 2.2% of all prescribed medications were identified as PIMs by

clinical pharmacists in the patients transferred from hospital to home care (21). In Qatar, the ratio of patients receiving at least one PIM was 38.2% among older home care patients (22). In a study from Europe, overall, 19.8% of patients were reported to receive at least one PIM (23); the rate of those receiving at least one PIM was reported as 41.1% in the Czech Republic (23), and this rate was similar to the finding of the present study.

In a study performed to investigate the recommendations made by geriatric clinical pharmacists through medication reviews for patients with dementia living at home, the health care providers accepted 44% of the recommendations made by the geriatric clinical pharmacists (19); these recommendations included those related to the cessa-

Table 4. Medication-related problems identified according to DOCUMENT in the study population (the number of patients=100)

The type of medication related problems	The number of patients	The number of recommendations n(%)
Drug selection	66	111 (33.7)
Education or information	58	77 (23.4)
Monitoring	33	40 (12.1)
Toxicity or adverse reaction	29	38 (11.5)
Over or underdose	24	29 (8.8)
Compliance	21	27 (8.2)
Undertreated	7	7 (2.1)

Table 5. The most commonly determined medication related problems in the older adults receiving health care services at home setting (the number of patients=100)

The most commonly determined medication related problems	n
Problems related medication administration such as lack of information about how and when to take medications	72
Anticholinergic and sedative utilization that are resulted in ataxia, impaired psychomotor function, additional falls	50
Utilization of PPI more than 8 weeks	35
Combination of three or more CNS active agents concomitantly	11
Dose adjustment is required	13

PPI: proton pump inhibitors, CNS: central nervous system

tion of a drug, dose adjustment, and switching to a potentially safer alternative (19). In another study conducted among older adults receiving home care services and using at least five medications in the Netherlands, a total of 1,565 medication-related problems were determined (14). In contrast to the results of the present study, the most common medication-related problems were reported to be associated with medication selection (28%), untreated indication (26%), and monitoring (21%) (14). In a study from Canada, medication-related problems were detected in patients receiving home care services through pharmacist-led medication review (24). Moreover, the acceptance rate of the pharmacists' recommendations by the physicians was reported to be 69.9%, which was a lower rate than that found in the present study (84.2%), and the most common medication-related problems were identified as medication adherence problems (37.6%), unnecessary medication use (16.6%), need for an additional treatment (12.9%), and problems related to dosage (12.9%) (24). A randomized control trial in Jordan evaluated the effects of the medication management review service via home visits in the intervention group as compared with a control group through pharmacist-led medication review (25). The most common medication-related problems according to clinical pharmacists were reported to be associated with education (27.2%), inappropriate adherence (16.5%), and issues with monitoring (15.8%). At the end of the study, 85.0% of the medication-related problems identified by the clinical pharmacist in the intervention group were corrected (25).

The medications used by participants were evaluated in detail using the MRCI, MAI, DBI, and the PIMs and medication-related problems were also assessed; these could be considered as strengths of the study. Nevertheless, the present study has some limitations. First, the small sample size from a specific region could be considered a limitation. However, the potential impact of the pharmacist-led medication review on clinical and patient-related outcomes was not evaluated; this could be considered another limitation, which is attributed to the cross-sectional design of the study. This study presented a low evidence with current study design for potential impact of the pharmacists in the home care team. This study was determined the medication related problems and their frequency, and the acceptance rate of the pharmacist's recommendations. The future studies would be conducted to evaluate impact of these recommendations' implementation on the older patients' outcomes at home care setting.

This pilot study elucidates the potential impact of integrating the pharmacist into a health care team to determine and solve medication-related problems. These findings may be helpful in training the pharmacist for cognitive services such as medication review for older patients receiving home health care services. The findings of the present study could also encourage the development of programs and/or care models involving pharmacists for home health care services in Turkey and other countries where the development and implementation of clinical pharmacy services are ongoing.

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