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ORIGINAL ARTICLE

Medication Reconciliation Service in Hospitalized Patients with Infectious Diseases During Coronavirus Disease-2019 Pandemic: An Observational Study

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ABSTRACT

Objectives: To determine the prevalence and type of medication discrepancies and factors associated with unintentional discrepancies and identify the rate of hospital readmission and emergency service visit within 30 days after discharge among hospitalized patients with infectious diseases and receiving clinical pharmacist-led medication reconciliation during the coronavirus disease-2019 (COVID-19) pandemic.

Materials and Methods: This observational study was conducted in the internal medicine and infectious diseases wards of a tertiary university hospital between July 2020 and February 2021 among hospitalized adult patients with infectious diseases. Medication reconciliation service (including patient counseling) was provided in person or by telephone. The number and type of medication discrepancies detected during the medication reconciliation services, the acceptance rate of pharmacists' recommendation, and factors associated with having at least one unintentional medication discrepancy at admission were evaluated. At follow-up, hospital readmission and emergency service visit within 30 days after discharge were assessed by telephone.

Results: Among 146 patients, 84 (57.5%) had at least one unintentional discrepancy at admission. Only three unintentional discrepancies were determined in three patients at hospital discharge. All the pharmacists' recommendations for medication discrepancies were accepted by the physicians. Having COVID-19 [odds ratio (OR): 2.25, 95% confidence interval (CI): 1.15-4.40; $p<0.05$], being at a high risk for medication error (OR: 2.01, 95% CI: 1.03-3.92; $p<0.05$), and higher number of medications used at home (OR: 1.41, 95% CI: 1.23-1.61; $p<0.001$) were associated with having at least one unintentional discrepancy at admission. The rates of 30 day hospital readmission and admission to the emergency medical service were 12.3% and 15.8%, respectively.

Conclusion: Medication reconciliation service provided by in-person or by telephone was useful for detecting and solving unintentional medication discrepancies during the COVID-19 pandemic.

Key words: Medication reconciliation, clinical pharmacist, infectious disease medicine, COVID-19, unintentional discrepancy

INTRODUCTION

Medication reconciliation is "a formal process for creating the most complete and accurate list possible of a patient's current medications and comparing the list to those in the patient record or medication orders" to avoid medication errors such as duplications and omissions.[1] The medication reconciliation could reduce medication errors and related harms. Providing, recording, and passing along the current and correct medication list of the patient is essential for patient safety, especially

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during the transition of care (including hospital admission and/or discharge).[2]

The medication reconciliation can be provided by various healthcare professionals. However, studies have shown that services such as medication reconciliation and discharge patient consultation led by pharmacists increase patients' knowledge of medication and reduce adverse drug events and medication errors in the transition of care.[3,4] Pharmacists who have diverse knowledge and skills can establish and maintain an effective medication reconciliation process in hospitals and healthcare systems.[5] The medication reconciliation led by an inpatient pharmacist is an effective method for maintaining the patient's post-discharge care.[6] A review published in the Cochrane Library concluded that the impact of pharmacist-involved medication reconciliation services was unclear on medication discrepancies, adverse drug effects, and health values.[7] Medication discrepancy is defined as the differences between medication regimens given in different care settings and often results from lack of documentation and time to create a complete and accurate list of the patients' medication history. Therefore, medication reconciliation is an essential component in ensuring safe patient care by preventing medication discrepancy in any setting.[1,7]

Clinical pharmacists provide medication reconciliation services in patients with various infectious diseases.[8,9] In the infectious disease ward, medication reconciliation reduces the number of undocumented unintentional discrepancies[10] and hospital readmission within a month after discharge.[11]

During the coronavirus disease-2019 (COVID-19) pandemic, clinical pharmacists continued to provide services (including medication reconciliation) with different working models.[12,13] Medication reconciliation service is not provided routinely at hospitals in Türkiye. There are few studies in Türkiye about medication reconciliation services provided in hospitalized older patients at admission[14] and in patients admitted to oncology and internal medicine services.[15]

The aim of the study was to determine the prevalence and type of medication discrepancies and factors associated with unintentional discrepancies and identify the rate of hospital readmission and emergency service visit within 30 days after discharge among hospitalized patients with infectious diseases and receiving clinical pharmacist-led medication reconciliation during the COVID-19 pandemic. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement was followed to report this observational study.[16]

MATERIALS AND METHODS

Study design and setting

This observational study was conducted in the internal medicine and infectious diseases wards of a tertiary university hospital between July 2020 and February 2021 among hospitalized adult patients with any infectious diseases (including COVID-19).

Study population and recruitment

All hospitalized adult patients with infectious diseases who chronically used at least one medication before hospital admission were eligible for this study. All eligible patients were included in the current study without using any specific sampling method. Medication reconciliation services (including gathering the best possible medication history) were provided by clinical pharmacy resident within 48 h after hospital admission in person or by telephone. The patients were excluded from the study, if they were transferred to an intensive care unit or another hospital, stayed in the hospital for less than 24 hours, died, refused the therapy, were unwilling to continue after participating or did not receive medication reconciliation service provided by the clinical pharmacy resident within 48 h after hospital admission.

Medication reconciliation

Neither hospital pharmacists nor clinical pharmacy residents have been involved in medication history taking and medication reconciliation services at this hospital. There was no discharge patient counseling service provided routinely by pharmacists. During this study, medication reconciliation service [both at admission and discharge (including patient counseling service)] was provided in person or by telephone. These services were provided by the clinical pharmacy resident who had theoretical and clinical courses during his education and training for clinical pharmacy services.

Medication reconciliation service flow charts were adapted from previous projects.[17,18] The best possible medication history [including prescribed medications, over-the-counter (OTC) drugs, herbals, and dietary supplements] was taken within 48 h after hospital admission in person and by telephone. At least two resources (such as self-reports of patients and/or caregivers, medication records, and home medicine list) were used for obtaining the best possible medication history.[18]

During medication reconciliation service at hospital admission, a current and accurate medication list was provided by comparing the physicians' orders at admission with their best possible medication history for home medicines. At hospital discharge, medications used in the last 24 h before hospital discharge, the discharge prescription, and the best possible medication history for home medicines were assessed by a clinical pharmacy resident. The medication discrepancies were discussed with the physicians at hospital admission and discharge to provide a current and accurate medication list. At hospital discharge, according to the current and accurate medication list, pill cards (including pictograms),[19] and brochures (including low-molecular-weight heparin prescribed for patients with COVID-19) were provided to the patients by the clinical pharmacy resident. Patient counseling was provided by using the teach-back method.[20]

Data collection and variables

Data including age, sex, education level, having COVID-19, duration of hospital stay, the number of medications used at home, and Charlson comorbidity index[21] were collected at baseline. For evaluating the risk of medication error, statistical consolidation of redundant expression measures (SCOREM) index was calculated[22]. If the total score of SCOREM index was three or greater, the patients were considered as high

risk of medication error. All patients' medications (including prescribed and OTC medications) were recorded. The risk of mortality and unplanned hospital readmission at hospital discharge was calculated using length of stay, acuity of the admission, comorbidity of the patient (LACE) index.[23] If the score of LACE index was 10 points or higher (out of 19), the patients were considered as having a high risk for mortality and unplanned hospital readmission.

Primary outcomes were prevalence, type of medication discrepancies, and factors associated with unintentional medication discrepancies. The number of discrepancies detected during the medication reconciliation service was evaluated and classified according to medication discrepancy taxonomy (MedTax).[24] Resources for obtaining the best possible medication history were recorded. At follow-up, the history of readmission to the hospital or emergency service within 30 days after discharge was assessed by telephone calls.

Ethics approval

The study protocol was approved by Marmara University Clinical Trials Ethical Committee (date: June 12, 2020, and number: 09.2020.508). The required permission to conduct this study was obtained from Ministry of Health, The Republic of Türkiye. Informed consent was obtained from patients and/or caregivers.

Sample size calculation

As in the study by Cornish et al.[25], all eligible patients were consecutively included in this study. In a previous study, the rate of patients with at least one unintended medication discrepancy was 47% in internal medicine wards.[26] It was assumed that the rate would be 60% in the study population during the COVID-19 pandemic. The sample size was calculated as 96 with alpha at 0.05 and power of 0.80 to detect the prevalence of unintentional discrepancies.[27]

Statistical analysis

Descriptive statistics were presented as number (n) with percentage and median (interquartile range). $P<0.05$ was considered statistically significant. According to the findings of the Kolmogorov-Smirnov test, non-parametric statistics were conducted in this study. Fischer's Exact test was used to compare two groups (w/wo COVID-19 and with high or low risks according to LACE index). Univariate logistic regression analysis was performed to determine factors associated with unintentional discrepancies. The odds ratio (OR) [confidence interval (CI) 95%] was presented. Statistical analysis was done using IBM SPSS (Statistical Package for Social Sciences) 11.0 statistics.

RESULTS

A total of 146 patients, who received medication reconciliation service during hospital admission, were included in the study. Among them, 90 patients (61.6%) received clinical pharmacy resident-led medication reconciliation both at admission and discharge. The flow diagram of the study is displayed in Figure 1. The characteristics of the patients are presented in Table 1.

The most common sources for providing the best possible drug history on admission were the patient's medical record (93.8%), the patient's medication boxes (76.0%), and the patient's self-report (66.4%).

At hospital admission, the median of total discrepancies was 7.0 (5.0-10.0), the median of intentional discrepancies was 6.0 (4.0-9.0), and the median of unintentional discrepancies was 1.0 (0.0-2.0). Among them, 99.3% (n: 145) had at least one intentional

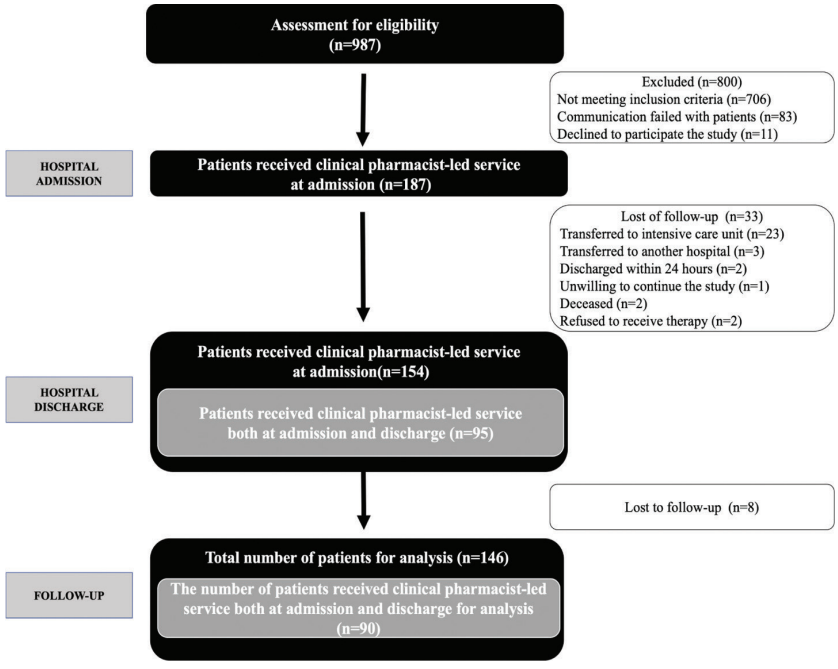

Figure 1. STROBE flow diagram of the study

STROBE: Strengthening the Reporting of Observational Studies in Epidemiology

discrepancy and 57.5% (n: 84) had at least one unintentional discrepancy at the hospital admission. At hospital discharge (n: 90), the median of total discrepancies was 3.0 (2.0-5.0) and the median of intentional discrepancies was 3.0 (2.0-4.25). Among them (n: 90), 94.4% (n: 85) had at least one intentional discrepancy and only three unintentional discrepancies were determined in three patients at hospital discharge. The most common unintentional discrepancy was drug omission (n: 142; 74.7%) at admission. All the pharmacists' recommendations for medication discrepancies were accepted by the physicians. The frequency and type of medication discrepancies according to MedTax are presented in Table 2.

Having COVID-19 (OR: 2.25, 95% CI: 1.15-4.40; $p<0.05$), being at a high risk for medication error according to SCOREM index (OR: 2.01, 95% CI: 1.03-3.92; $p<0.05$), and a higher number of medications used at home (OR: 1.41, 95% CI: 1.23-1.61; $p<0.001$) were associated with having at least one unintentional discrepancy. Factors associated with having at least one unintentional discrepancy are presented in Table 3.

Out of 146 patients who received medication reconciliation at admission, 78.8% had a high risk of mortality and unplanned hospital readmission (Table 1). Among these patients (n: 146), the rates of 30 day hospital readmission and emergency medical service visits were 12.3% and 15.8%, respectively. In 90 patients who received medication reconciliation both at hospital admission and discharge, 80.0% had a high risk of mortality and unplanned hospital readmission (Table 1). Among these patients (n: 90), the rates were 10.0% for 30 day hospital readmission and 14.4% for emergency medical service visit. According to LACE index, patients with high risk had a significantly higher rate of emergency medical service visits within 30 days, when compared with patients with low risk ($p<0.05$). Patients with infectious diseases other than COVID-19 had a significantly higher rate of hospital readmission within 30 days than patients with COVID-19 ($p<0.05$). Secondary outcomes during follow-up in patients who received medication reconciliation service are presented in Table 4.

DISCUSSION

To the best of our knowledge, this is the first study to determine the prevalence and type of medication discrepancies and factors associated with unintentional discrepancies and identify the rate of hospital readmission and emergency service visit within 30 days after discharge among hospitalized patients

Table 1. Characteristics of patients

	Total (n: 146)	CP-led services received both at admission and discharge (n: 90)
	n (%)	n (%)
Age median [IQR]	62.0 [54.0-72.0]	62.0 [54.0-72.0]
Sex		
Male	66 (45.2)	38 (42.2)
Female	80 (54.8)	52 (57.8)
Education level*		
<8 y	111 (76.0)	65 (72.2)
≥8 y	35 (24.0)	25 (27.8)
Had COVID-19		
Yes	76 (52.0)	53 (58.9)
No	70 (48.0)	37 (41.1)
The length of stay (day) median [IQR]	10.0 [6.0-15.0]	10.5 [6.75-15.0]
Charlson comorbidity index median [IQR]	3.0 [2.0-4.25]	3.0 [2.0-4.0]
The number of medications used at home median [IQR]	5.0 [3.0-8.0]	5.0 [2.0-7.0]
Patient group according to SCOREM index n (%)		
High risk	71 (48.6)	42 (46.7)
Low risk	75 (51.4)	48 (53.3)
Patient group according to LACE index at discharge n (%)		
Low risk	31 (21.2)	18 (20.0)
High risk	115 (78.8)	72 (80.0)

*The group was determined according to compulsory education year before 2012 in Türkiye, IQR: Interquartile range, CP: Clinical pharmacy resident, COVID-19: Coronavirus disease-2019, LACE: Length of stay, acuity of the admission, comorbidity of the patient

Table 2. The frequency and type of medication discrepancies according to medication discrepancy taxonomy

	Medication reconciliation at admission (n: 146)		Medication reconciliation at discharge (n: 90)	
	Intentional discrepancies	Unintentional discrepancies	Intentional discrepancies	Unintentional discrepancies
	n (%)	n (%)	n (%)	n (%)
Medication mismatched	**866 (90.4)**	**150 (78.9)**	**269 (87.1)**	**2 (66.7)**
Drug commission or addition	616 (64.3)	6 (3.2)	101 (32.7)	-
Drug omission	218 (22.8)	142 (74.7)	140 (45.3)	1 (33.3)
Therapeutic class substitution	32 (3.3)	2 (1.1)	28 (9.1)	1 (33.3)
Medication partly matched	**92 (9.6)**	**40 (21.1)**	**40 (12.9)**	**1 (33.3)**
Discrepancy in the name of medication				
Unclear or wrong name	-	3 (1.5)	-	1 (33.3)
Different brand name but the same generic name	14 (1.5)	1 (0.5)	6 (2.0)	-
Discrepancy in the strength and/or frequency and/or number of units of dosage form and/or total daily dose				
Unclear or wrong strength	-	2 (1.1)	-	-
Omission of strength	-	14 (7.4)	-	-
Different strengths and different total daily doses	44 (4.6)	7 (3.7)	24 (7.8)	-
Different strength but the same total daily dose	1 (0.1)	-	1 (0.3)	-
Same strength and the same number of units but different frequency and different total daily dose	4 (0.4)	7 (3.7)	2 (0.6)	-
Same strength but different frequency and different number of units and different total daily dose	4 (0.4)	3 (1.5)	2 (0.6)	-
Same strength but different frequency and different number of units but the same total daily dose	1 (0.1)	-	-	-
Discrepancy in the dosage form/route of administration				
Different dosage form but the same route of administration	3 (0.3)	-	1 (0.3)	-
Different dosage forms and different routes of administration	21 (2.2)	1 (0.5)	4 (1.3)	-
Discrepancy in the time of drug administration				
Different time of administration throughout the day	-	2 (1.1)	-	-
Total	**958**	**190**	**309**	**3**

Table 3. Factors associated with having at least one unintentional discrepancy at admission

	Having at least one unintentional discrepancy at admission (n: 84)		
	OR	CI 95%	*p* value
Had COVID-19			
Yes	2.25	(1.15-4.40)	0.018
No	Reference		
Patient group according to SCOREM index n (%)			
High risk	2.01	(1.031-3.92)	0.040
Low risk	Reference		
The number of medications used at home	1.41	(1.23-1.61)	<0.001

OR: Odds ratio, CI: Confidence interval, COVID-19: Coronavirus disease-2019

Table 4. Secondary outcomes during follow-up in patients who received CP-led medication reconciliation service

	Total (n: 146)	*p* value	CP-led services both at admission and discharge (n: 90)	*p* value
30 day hospital readmission n (%)	**n: 18 (12.3)**		**n: 9 (10.0)**	
Patient group according to LACE index n (%)				
Low risk	1 (5.6)	NS	1 (11.1)	NS
High risk	17 (94.4)		8 (88.9)	
Had COVID-19				
Yes	5 (27.8)	0.038*	2 (22.2)	0.029*
No	13 (72.2)		7 (77.8)	
30 day emergency medical service visit n (%)	n: 23 (15.8)		n: 13 (14.4)	
Patient group according to LACE index n (%)				
Low risk	1 (4.3)	0.029*	0	-
High risk	22 (95.7)		13 (100)	
Had COVID-19				
Yes	12 (52.2)	NS	7 (59.7)	NS
No	11 (47.8)		6 (40.3)	

*$p<0.05$, COVID-19: Coronavirus disease-2019, NS: Not significant; CP: Clinical pharmacy resident, LACE: Length of stay, acuity of the admission, comorbidity of the patient

with infectious diseases and receiving clinical pharmacist-led medication reconciliation during the COVID-19 pandemic in Türkiye. This service was found useful to detect unintentional discrepancies and all recommendations of the clinical pharmacy resident were accepted by the physicians. More than half of hospitalized patients with infectious diseases had at least one unintentional medication discrepancy at admission. However, the number of patients with at least one unintentional medication discrepancy at discharge was only 3 in patients receiving medication reconciliation both at admission and discharge. Patients with COVID-19 with a high risk for medication errors and higher medications were more likely to have at least one unintentional medication discrepancy at admission during the COVID-19 pandemic.

In Croatia, it was found that 35% of the patients admitted to internal medicine service had at least one unintentional discrepancy.[28] In Italy, one-fourth of patients had at least one unintentional discrepancy at hospital admission and discharge.[29] Cornish et al.[25] determined that half of the patients used four or more medications and had at least one unintentional discrepancy during admission to the internal medicine ward. In China, more than one-fifth of patients had at least one unintentional discrepancy.[30] In the present study, an increased rate of having at least one unintentional discrepancy is likely due to the study population including patients with COVID-19. In line with the finding of the present study, previous studies[28,30,31] exhibited a high number of medications as a factor related to unintentional discrepancy at admission. Like the present study, the most common reason for the unintentional discrepancy was the omission of medication in these studies.[25,28-31]

In this study, the number of unintentional discrepancies was more than half at the hospital admission. On the other hand, only three unintentional discrepancies were detected by the clinical pharmacy resident. Cadman et al.[32] demonstrated a reduction in the number of unintentional discrepancies at discharge after providing medication reconciliation at admission.

Study limitations

This study had some limitations, which was conducted in a single center, which limited the generalizability of the findings. Actual or potential harms, including medication errors related to these discrepancies, could not be evaluated with this study protocol. The average time spent providing medication reconciliation was not recorded and assessed because of non-feasibility during the COVID-19 pandemic. Although it was suggested to provide medication reconciliation service within 24 h,[17] medication reconciliation was provided within 48 h during the COVID-19 pandemic. This could impact the effectiveness of this service.

Further studies will evaluate the impact of medication reconciliation services in hospitalized patients with infectious diseases. Implementing this service (in person or by telephone) could decrease the number of unintentional discrepancies in hospitalized patients with COVID-19 and/or high risk of medication errors. This study was conducted during the COVID-19 pandemic by one clinical pharmacy resident. This impact on the rate of patients receiving clinical pharmacy resident-led medication reconciliation both at admission and discharge medication reconciliation at discharge.

CONCLUSION

Medication reconciliation service provided in person or by telephone was useful for detecting and solving unintentional medication discrepancies during the COVID-19 pandemic.

Ethics

Ethics Committee Approval: The study protocol was approved by the Marmara University Clinical Trials Ethical Committee (date: June 12, 2020, and number: 09.2020.508). The required permission to conduct this study was obtained from Ministry of Health, The Republic of Türkiye.

Informed Consent: Informed consent was obtained from patients and/or caregivers.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Concept: B.O., C.E., B.E.Ş., M.S., V.K., Design: B.O., C.E., B.E.Ş., M.S., V.K., Data Collection or Processing: B.O., C.E., B.E.Ş., Analysis or Interpretation: B.O., C.E., B.E.Ş., M.S., V.K., Literature Search: B.O., C.E., B.E.Ş., Writing: B.O., C.E., B.E.Ş., M.S., V.K.

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REFERENCES

1. Barnsteiner JH. Medication Reconciliation. In: Hughes RG, eds. Patient safety and quality: an evidence-based handbook for nurses. Rockville (MD): Agency for Healthcare Research and Quality (US); chapter 38; 2008. Available from: https://www.ncbi.nlm.nih.gov/books/NBK2648/
2. Splawski J, Minger H. Value of the pharmacist in the medication reconciliation process. P T. 2016;41:176-178.
3. Mekonnen AB, McLachlan AJ, Brien JA. Effectiveness of pharmacist-led medication reconciliation programmes on clinical outcomes at hospital transitions: a systematic review and meta-analysis. BMJ Open. 2016;6:e010003.
4. Phatak A, Prusi R, Ward B, Hansen LO, Williams MV, Vetter E, Chapman N, Postelnick M. Impact of pharmacist involvement in the transitional care of high-risk patients through medication reconciliation, medication education, and postdischarge call-backs (IPITCH Study). J Hosp Med. 2016;11:39-44.
5. Developed through the ASHP Council on Pharmacy Practice and approved by the ASHP Board of Directors on April 13, 2012, and by the ASHP House of Delegates on June 10, 2012. ASHP statement on the pharmacist's role in medication reconciliation. Am J Health Syst Pharm. 2013;70:453-456.
6. Kerstenetzky L, Heimerl KM, Hartkopf KJ, Hager DR. Inpatient pharmacists' patient referrals to a transitions-of-care pharmacist: evaluation of an automated referral process. J Am Pharm Assoc (2003). 2018;58:540-546.
7. Redmond P, Grimes TC, McDonnell R, Boland F, Hughes C, Fahey T. Impact of medication reconciliation for improving transitions of care. Cochrane Database Syst Rev. 2018;8:CD010791.
8. Coghlan M, O'Leary A, Melanophy G, Bergin C, Norris S. Pharmacist-led pre-treatment assessment, management and outcomes in a hepatitis C treatment patient cohort. Int J Clin Pharm. 2019;41:1227-1238.
9. Barnes E, Zhao J, Giumenta A, Johnson M. The effect of an integrated health system specialty pharmacy on HIV antiretroviral therapy adherence, viral suppression, and CD4 count in an outpatient infectious disease clinic. J Manag Care Spec Pharm. 2020;26:95-102.
10. Bravo P, Martinez L, Metzger S, Da Costa Noble E, Meckenstock R, Greder-Belan A, Parnet L, Samdjee F, Azan S. Conciliation médicamenteuse d'entrée en service de médecine interne: retour d'expérience après un an de pratique [Medication reconciliation in a department of internal medicine and infectious and tropical diseases: feedback after one year practice]. Rev Med Interne. 2019;40:291-296. French.
11. Bouchand F, Leplay C, Guimaraes R, Fontenay S, Fellous L, Dinh A, Deconinck L, Sénard O, Matt M, Michelon H, Perronne C, Salomon J, Villart M, Izedaren F, Pottier S, Barbot F, Orlikowski D, Vaugier I, Davido B. Impact of a medication reconciliation care bundle at hospital discharge on continuity of care: a randomised controlled trial. Int J Clin Pract. 2021;75:e14282.
12. Paudyal V, Cadogan C, Fialová D, Henman MC, Hazen A, Okuyan B, Lutters M, Stewart D. Provision of clinical pharmacy services during the COVID-19 pandemic: experiences of pharmacists from 16 European countries. Res Social Adm Pharm. 2021;17:1507-1517.
13. Li H, Zheng S, Liu F, Liu W, Zhao R. Fighting against COVID-19: innovative strategies for clinical pharmacists. Res Social Adm Pharm. 2021;17:1813-1818.
14. Selcuk A, Sancar M, Okuyan B, Demirtunc R, Izzettin FV. The potential role of clinical pharmacists in elderly patients during hospital admission. Pharmazie. 2015;70:559-562.
15. Sancar M, Demir Özker P, Er E, Turan B, Okuyan B. The implementation of a pharmacist driven medication reconciliation program at the admission to hospital. Clin Exp Health Sci. 2014;4:226-231.
16. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP; STROBE Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. J Clin Epidemiol. 2008;61:344-349.
17. WHO The High 5s Project - Medication Reconciliation Implementation Guide. Accessed Date 27 April 2022. Available from: https://www.who.int/initiatives/high-5s-standard-operating-procedures_
18. Canadian Patient Safety Institute, ISMP Canada Medication Reconciliation in Acute Care 2017. Accessed Date: 27 April 2022. Available from: https://www.ismp-canada.org/download/MedRec/MedRec-AcuteCare-GSK-EN.pdf
19. Okuyan B, Ozcan V, Balta E, Durak-Albayrak O, Turker M, Sancar M, Yavuz BB, Uner S, Ozcebe H. The impact of community pharmacists on older adults in Turkey. J Am Pharm Assoc (2003). 2021;61:e83-e92.
20. Agency for Healthcare Reseacrh and Quality. Health Literacy Universal Precautions Toolkit, 2nd edition. Accessed Date: 27 April 2022. Available from: https://www.ahrq.gov/health-literacy/improve/precautions/tool5.html
21. Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. J Chronic Dis. 1987;40:373-383.
22. Audurier Y, Roubille C, Manna F, Zerkowski L, Faucanie M, Macioce V, Castet-Nicolas A, Jalabert A, Villiet M, Fesler P, Lohan-Descamps

L, Breuker C. Development and validation of a score to assess risk of medication errors detected during medication reconciliation process at admission in internal medicine unit: SCOREM study. Int J Clin Pract. 2021;75:e13663.

23. van Walraven C, Dhalla IA, Bell C, Etchells E, Stiell IG, Zarnke K, Austin PC, Forster AJ. Derivation and validation of an index to predict early death or unplanned readmission after discharge from hospital to the community. CMAJ. 2010;182:551-557.
24. Almanasreh E, Moles R, Chen TF. The medication discrepancy taxonomy (MedTax): the development and validation of a classification system for medication discrepancies identified through medication reconciliation. Res Social Adm Pharm. 2020;16:142-148.
25. Cornish PL, Knowles SR, Marchesano R, Tam V, Shadowitz S, Juurlink DN, Etchells EE. Unintended medication discrepancies at the time of hospital admission. Arch Intern Med. 2005;165:424-429.
26. Salameh L, Abu Farha R, Basheti I. Identification of medication discrepancies during hospital admission in Jordan: prevalence and risk factors. Saudi Pharm J. 2018;26:125-132.
27. Abu Farha R, Abu Hammour K, Al-Jamei S, AlQudah R, Zawiah M. The prevalence and clinical seriousness of medication discrepancies identified upon hospital admission of pediatric patients. BMC Health Serv Res. 2018;18:966.
28. Marinović I, Marušić S, Mucalo I, Mesarić J, Bačić Vrca V. Clinical pharmacist-led program on medication reconciliation implementation at hospital admission: experience of a single university hospital in Croatia. Croat Med J. 2016;57:572-581.
29. Dei Tos M, Canova C, Dalla Zuanna T. Evaluation of the medication reconciliation process and classification of discrepancies at hospital admission and discharge in Italy. Int J Clin Pharm. 2020;42:1061-1072.
30. Guo Q, Guo H, Song J, Yin D, Song Y, Wang S, Li X, Duan J. The role of clinical pharmacist trainees in medication reconciliation process at hospital admission. Int J Clin Pharm. 2020;42:796-804.
31. Masse M, Yelnik C, Labreuche J, André L, Bakhache E, Décaudin B, Drumez E, Odou P, Dambrine M, Lambert M. Risk factors associated with unintentional medication discrepancies at admission in an internal medicine department. Intern Emerg Med. 2021;16:2213-2220.
32. Cadman B, Wright D, Bale A, Barton G, Desborough J, Hammad EA, Holland R, Howe H, Nunney I, Irvine L. Pharmacist provided medicines reconciliation within 24 hours of admission and on discharge: a randomised controlled pilot study. BMJ Open. 2017;7:e013647.