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ORIGINAL RESEARCH

The Impact of Real-Time Documentation of In-Hospital Medication Changes on Preventing Undocumented Discrepancies at Discharge and Improving Physician-Pharmacist Communication: A Retrospective Cohort Study and Survey

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Background: Transitional medication safety is crucial, as miscommunication about medication changes can lead to significant risks. Unclear or incomplete documentation during care transitions can result in outdated or incorrect medication lists at discharge, potentially causing medication errors, adverse drug events, and inadequate patient education. These issues are exacerbated by extended hospital stays and multiple care events, making accurate medication recall challenging at discharge.

Objective: Thus, we aimed to investigate how real-time documentation of in-hospital medication changes prevents undocumented medication changes at discharge and improves physician-pharmacist communication.

Methods: We conducted a retrospective cohort study in a tertiary hospital. Two pharmacists reviewed medical records of patients admitted to the acute medical unit from April to June 2020. In-hospital medication discrepancies were determined by comparing preadmission and hospitalization medication lists and it was verified whether the physician's intent of medication changes was clarified by documentation. By a documentation rate of medication changes of 100% and <100%, respectively, fully documented (FD) and partially documented (PD) groups were defined. Any undocumented medication changes at discharge were considered a "documentation error at discharge". Pharmacists' survey was conducted to assess the impact of appropriate documentation on the pharmacists.

Results: After reviewing 400 medication records, patients were categorized into FD (61.3%) and PD (38.8%) groups. Documentation errors at discharge were significantly higher in the PD than in the FD group. Factors associated with documentation errors at discharge included belonging to the PD group, discharge from a non-hospitalist-managed ward, and having three or more intentional discrepancies. Pharmacists showed favorable attitudes towards physician's documentation.

Conclusion: Appropriate documentation of in-hospital medication changes, facilitated by free-text communication, significantly decreased documentation errors at discharge. This analysis underlines the importance of communication between pharmacists and hospitalists in improving patient safety during transitions of care.

Plain language summary: During transitions of care, communication failures among healthcare professionals can lead to medication errors. Therefore, effective sharing of information is essential, especially when intentional changes in prescription orders are made. Documenting medication changes facilitates real-time communication, potentially improving medication reconciliation and reducing discrepancies. However, inadequate documentation of medication changes is common in clinical practice. This retrospective cohort study underlines the importance of real-time documentation of in-hospital medication changes. There was a significant reduction in documentation errors at discharge in fully documented group, where real-time documentation of medication changes

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was more prevalent. Pharmacists showed favorable attitudes toward the physician's real-time documenting of medication changes because it provided valuable information on understanding the physician's intent and improving communication and also saved time for pharmacists. This study concludes that physicians' documentation on medication changes may reduce documentation errors at discharge, meaning that proper documentation of medication changes could enhance patient safety through effective communication.

Keywords: medication reconciliation, medication safety, transitions in care, hospital information systems, hospital discharge, quality audit

Introduction

Transition of care, including hospital admission, transfer between wards, and hospital discharge,[1] increases the possibility of communication failures between healthcare professionals,[2] which can lead to medication errors.[3] This is attributable to inaccurate or insufficient sharing of information, especially medication history, resulting in discontinuity of care[4] and increased morbidity.[5]

Inevitably, medication changes occur in the acute medical phase of hospitalization (e.g., addition, discontinuation, and change in dosage or frequency of medications).[6] Maintaining appropriate medications throughout the in-hospital transition and after discharge is important, and improper resumption of preadmission medication must be avoided.[7] The sharing of information among healthcare professionals is of vital importance, especially when changes in prescription orders are made intentionally.[8–10] When the physician writes a daily order via the electronic health record (EHR), documenting the intent for medication changes enhances communication among hospital staff working across different shifts and locations. This documentation facilitates patient-centered, real-time communication without requiring extensive review of medical records by various healthcare professionals.[11] Moreover, such documentation aids in medication reconciliation (MR), to identify discrepancies and ensure accurate and complete information transfer during the transition of care.[3] Sharing up-to-date medication information promotes safe care and reduces erroneous medication discrepancies and communication gaps.[12–14]

However, despite its critical importance, effective communication through documentation of medication information remains a challenge in real-world clinical practice, with significant gaps in documentation identified in several studies. For instance, a case-controlled study reported that previous medication history was not properly documented at admission in 44.8% of patients.[15] An observational study reported that 63% of discharge letters had complete medication-related information.[4] Another study reported that 27% of medications withdrawn during hospitalization because of adverse events were re-prescribed after discharge, indicating poor transfer of information.[16] Yet, little is known about the factors influencing documentation practices in hospitals. However, recent research suggests that physicians who receive training for documentation are more likely to provide appropriate documentation, indicating the potential benefits of training in enhancing knowledge and familiarity with documentation guidelines.[17] Nonetheless, further investigation is required to elucidate the underlying reasons for under-documentation.

It is important to note that a discharge summary can effectively communicate the in-hospital medication changes of a patient upon discharge, although the quality of the content is often insufficient.[18,19] Scattered patient information across various parts of the EHRs and the vast amount of cumulative daily progressive notes make it difficult to write a high-quality discharge summary in a limited time of discharge process. Therefore, it is crucial to provide an accurate summary of medication changes, rather than solely focusing on the discharge medications list.[20,21] However, current EHRs separate the medical recording and prescription work, which often hinders physicians from integrating updated medication changes into discharge summary.

In light of these challenges, we hypothesized that real-time documentation of intent of physicians' on in-hospital medication changes may facilitate health professionals engaged in patient care, thus ultimately enhancing patient safety by reducing documentation errors at discharge. Therefore, we aimed to investigate the impact of documenting in-hospital medication changes on documentation errors at discharge and identify the factors associated with such errors. Additionally, we aimed to explore how such physicians' documentation improves communication between pharmacists and physicians from the pharmacist's perspective.

Methods

Study Design and Patient Selection

This was a retrospective cohort study conducted at acute medical unit (AMU) of the Hospital Medicine Centre of Seoul National University Bundang Hospital, a tertiary academic hospital in South Korea. Data were retrieved from the EHR. The collected data included demographics, medication lists (preadmission, in-hospital, discharge), progress notes, discharge summaries, diagnoses, comorbidities, laboratory data, and length of stay.

All patients admitted to the AMU of the Hospital Medicine Centre between April–June 2020 were included. The exclusion criteria were patients who were admitted for tests or surgeries, patients with no medication changes, patients who died or were readmitted during the study period, patients without preadmission medications, and patients who were transferred to the rehabilitation or surgical wards. The diagnoses at admission were classified using the International Classification of Diseases (ICD)-11 codes.

The AMU is a hospitalist-managed medical unit where approximately 200 internal medicine patients with acute illness are admitted through the emergency department (ED) or outpatient clinics every month. When admitted to the AMU, patients receive a rapid assessment, hospitalist management, and, if necessary, a specialist consultation. They are either discharged from the hospitalist-managed ward or transferred to a non-hospitalist-managed ward for further care.[22]

In the AMU, there are 9 hospitalists with clinical experience ranging from 7 to 19 years. They specialize in various fields such as gastroenterology, nephrology, rheumatology, endocrinology, geriatrics, infectious diseases, and others. Two designated pharmacists participate as team members in the AMU: a senior pharmacist with 9 years of clinical practice experience in hospital and a resident pharmacist who is trained by the senior pharmacist. Once created, medication lists with free-text documentation were validated daily during admission by corresponding physician. The designated pharmacists conducted a daily review of medication lists. Upon identifying undocumented medication discrepancies, they promptly contacted the corresponding physician to clarify whether the change was intentional or erroneous. Subsequently, pharmacists documented their findings in the MR tab within 24 hours of the patient's admission. The MR tab is a specialized section within our EHR system, as described by Park et al, which serves as a dedicated interface for communication between physicians and pharmacists regarding medication management.[23]

Appropriate Documentation of Medication Change

To identify any medication discrepancies during hospitalization, two designated pharmacists compared the preadmission and prescribed medication lists. Only scheduled medications were included, and pro re nata medications, over-the-counter medications, and medications for external use were excluded. Identified medication discrepancies were classified into "unintentional", "documented intentional", and "undocumented intentional". A discrepancy was classified as "documented intentional" if the medication change was documented in the patient's medical record (in the medication section and progress note) and clarified by free-text documentation in the electronic order entry system.

Further, we classified each discrepancy into "addition of new medication", "discontinuation of preadmission medication", "change of dose", "change of frequency", and "change of formulation". Only the first change of each medication per patient was included, even if they were changed multiple times compared with the preadmission medication list. The documentation rate of changed medication per patient was defined as follows:

$$\frac{Documented\ medication\ change}{Intentional\ medication\ change(documented + undocumented)} * 100(\%)$$

Patients were classified as "fully documented" (FD) if the documentation rate of changed medication was complete and otherwise as "partially documented" (PD).

Documentation Error at Discharge

We identified whether the information about in-hospital medication changes was documented in the discharge summary or discharge medication list. Any undocumented medication change between preadmission and discharge was considered a "documentation error at discharge" and was further classified based on the drug classes.

Pharmacists' Survey

To identify the impact of appropriate documentation on the pharmacists, we conducted an online survey with 13 clinical pharmacists who work as designated pharmacists. The survey had three themes, which were as follows: 1) improvement in understanding, 2) improvement in communication, and 3) improvement in time saving. For each theme, there was a 5-point Likert scale question measuring improvement, along with an open-ended question to express personal opinions and to allow the pharmacists to share their own experiences. All surveyed pharmacists provided informed consent.

Statistical Analysis

Descriptive statistics were used to express mean ± standard deviation for continuous variables and number and percentage for categorical variables. Univariate and multivariate logistic regression analyses were conducted to determine possible independent variables associated with documentation errors at discharge. The variables analyzed included age, Charlson comorbidity index (CCI), the total length of hospital stay, day of discharge, discharged ward, residence after discharge, the number of physicians attending the patient during hospitalization, the number of preadmission medications, and the appropriateness of documentation. The variables that were statistically significant in univariate logistic regression were included in the multivariate model. The results of the regression analyses were presented as odds ratios (ORs) and 95% confidence intervals (CIs), and statistical significance was set at $p < 0.05$. Data management and statistical analyses were performed using SAS version 9.4 (SAS Institute, Inc., Cary, NC, USA).

Results

Baseline Characteristics of the Study Population

Between April 2020 and June 2020, 731 patients were admitted to the AMU. Exclusions included patients admitted for tests or surgeries (n = 136), those without medication discrepancies (n = 39), readmissions during the study period (n = 23), deaths during the study period (n = 35), those without preadmission medication (n = 70), and those transferred to rehabilitation or surgical wards (n = 28). After these exclusions, 400 patients were enrolled in this study (Figure 1).

The mean age of total patients was 69.0 years (67.5 in FD and 71.5 in PD, $p < 0.01$) and 51.0% were female. The average number of preadmission medications was 7.6 (6.8 in FD and 8.8 in PD, $p < 0.01$). Of the total patients, 68.5% of the patients were discharged from hospitalist-managed ward. Characteristics of the study population are presented in Table 1.

Medication Discrepancies and Appropriateness of Documentation

In total, 1092 episodes of intentional medication discrepancies and 109 episodes of unintentional medication discrepancies were identified in 400 patients during hospitalization (Figure 1). About 25.7% of intentional medication discrepancies were undocumented.

On average, patients had at least 1.9 and 2.7 episodes of unintentional and intentional discrepancies during admission, respectively. The average rate of documenting in-hospital medication changes was 79.7% per patient. The addition of new medications was adequately documented in 89.9% of episodes, whereas the discontinuation of preadmission medications was documented only in 56.7% of cases (see Supplementary Figure 1). The classification of changed medications during hospitalization is presented in Supplementary Table 1.

Characteristics of FD and PD

After classifying patients according to the documentation rate of changed medications, the FD group accounted for 61.3% (n = 245) of the total population, and 38.8% (n = 155) belonged to the PD group (Figure 1). The mean age was significantly higher in the PD group than in the FD group (67.5 vs 71.5, $p < 0.01$). The average number of preadmission medications was also significantly higher in the PD group than in the FD group (6.8 vs 8.8, $p < 0.01$). There was no significant difference in the total length of hospital stay and length of AMU stay (Table 1).

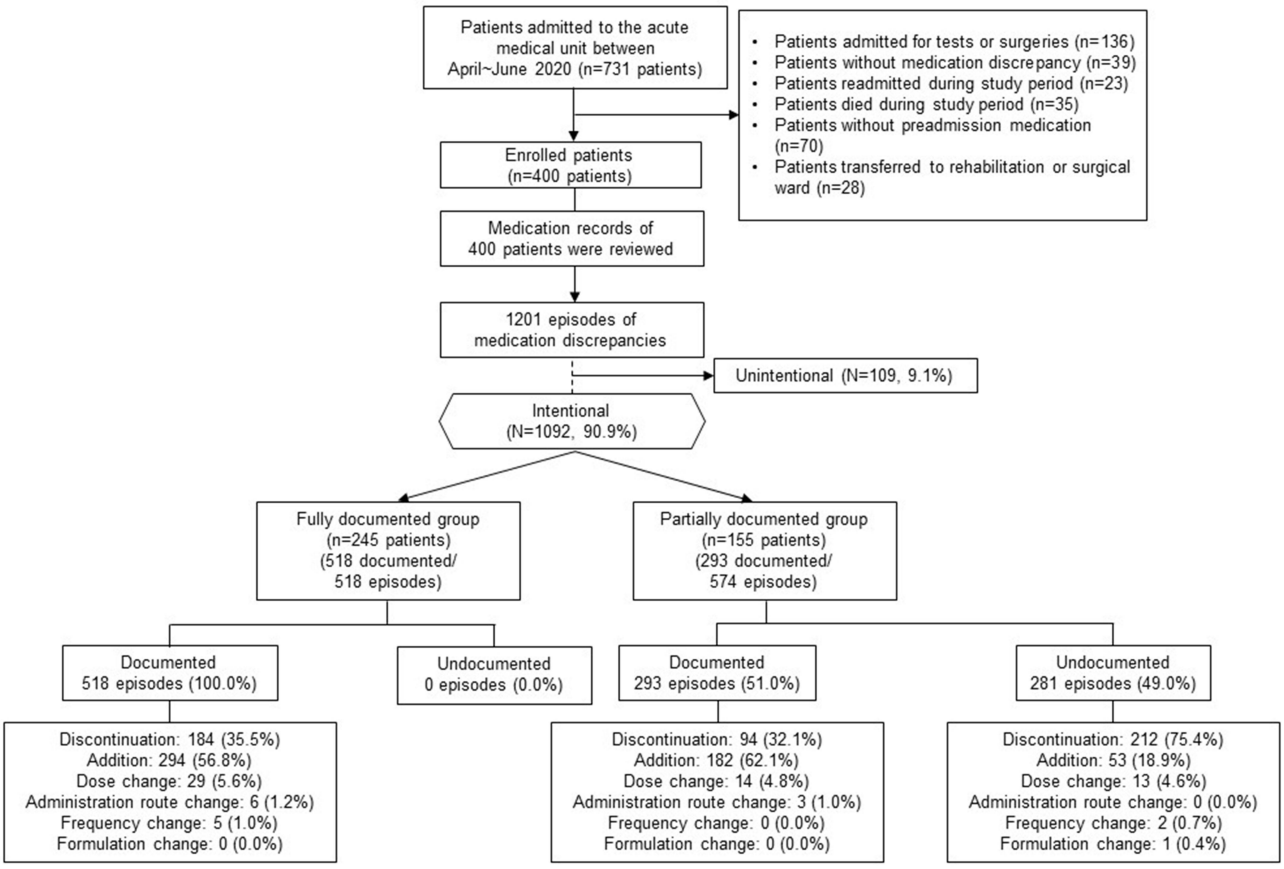

Figure 1 Flow chart of the study population and study design.

Documentation Errors at Discharge

Documentation errors at discharge occurred in 46.3% (n = 185) of total patients. In the FD group, 33.9% (83 of 245) had documentation errors at discharge, while 65.8% (102 of 155) in the PD group had documentation errors at discharge ($p < 0.001$)

Table 1 Baseline Characteristics of Study Population

Characteristics[a]	Total (n=400)	FD (n=245)	PD (n=155)	P value
Age, mean (SD), years	69.0 (14.2)	67.5 (14.8)	71.5 (13.1)	<0.01
<65	125 (31.3)	88 (22.0)	37 (9.3)	
65–79	180 (45.0)	108 (27.0)	72 (18.0)	
≥80	95 (23.8)	49 (12.3)	46 (11.5)	
Sex				0.545
Male	196 (49.0)	123 (30.8)	73 (18.3)	
Female	204 (51.0)	122 (30.5)	82 (20.5)	
Diagnoses at admission[b]				0.694
Cancer	119 (29.8)	75 (18.8)	44 (11.0)	
Gastrointestinal disease	81 (20.3)	34 (8.5)	47 (11.8)	
Kidney disease	48 (12.0)	15 (3.8)	33 (8.3)	
Respiratory disease	32 (8.0)	13 (3.3)	19 (4.8)	
Cardiovascular disease	18 (4.5)	8 (2.0)	10 (2.5)	
Endocrine and metabolic disease	13 (33.3)	3 (0.8)	10 (2.5)	
Others[c]	89 (22.3)	38 (9.5)	51 (12.8)	

(*Continued*)

Table 1 (Continued).

Characteristics[a]	Total (n=400)	FD (n=245)	PD (n=155)	P value
CCI, mean (SD)	5.0 (2.6)	4.9 (2.8)	5.1 (2.4)	0.380
0	16 (4.0)	13 (3.3)	3 (0.8)	
1–2	53 (13.3)	34 (8.5)	19 (4.8)	
3–4	331(82.8)	198 (49.5)	133 (33.3)	
Number of preadmission medications, mean (SD)	7.6 (4.4)	6.8 (4.1)	8.8 (4.5)	<0.01
<5	108 (27.0)	79 (19.8)	29 (7.3)	
5–9	168 (42.0)	106 (26.5)	62 (15.5)	
≥10	124 (31.0)	60 (15.0)	64 (16.0)	
Length of AMU stay (days), mean (SD)	6.9 (3.7)	7.0 (3.4)	6.9 (4.0)	0.845
Total length of hospital stay (days), mean (SD)	9.9 (6.2)	9.5 (6.1)	10.5 (6.4)	0.099
Day of discharge				0.720
Weekday	298 (74.5)	181 (45.3)	117 (29.3)	
Weekend or holiday	102 (25.5)	64 (16.0)	38 (9.5)	
Discharge ward				<0.05
Hospitalist-managed ward	274 (68.5)	179 (44.8)	95 (23.8)	
Non-hospitalist-managed ward	126 (31.5)	66 (16.5)	60 (15.0)	
Residence after discharge				0.529
Home	351 (87.8)	217 (54.3)	134 (33.5)	
Others[d]	49 (12.3)	28 (7.0)	21 (5.3)	

Notes: [a]Counts and percentages are shown for all variables unless defined otherwise. All percentages were calculated based on the total population. [b]Diagnoses at admission were classified using the International Classification of Diseases (ICD-11) codes. [c]Diagnoses of ICD-11 codes A00-B99, D00-D89, G00-H95, L00-M99, and N39-U99 were categorized as "others". [d]Nursing home, nursing hospital, and hospice hospital were categorized as "others".

Abbreviations: FD, fully documented group; PD, partially documented group; AMU, acute medical unit; CCI, Charlson comorbidity index; SD, standard deviation.

(Figure 2). We identified 602 episodes of documentation errors at discharge. Four major drug classes with documentation errors at discharge were identified: anti-infectives (150 episodes, 24.9%), anti-hypertensives (113 episodes, 18.8%), anti-diabetics (86 episodes, 14.3%), and nervous system drugs (85 episodes, 14.1%) (Figure 3).

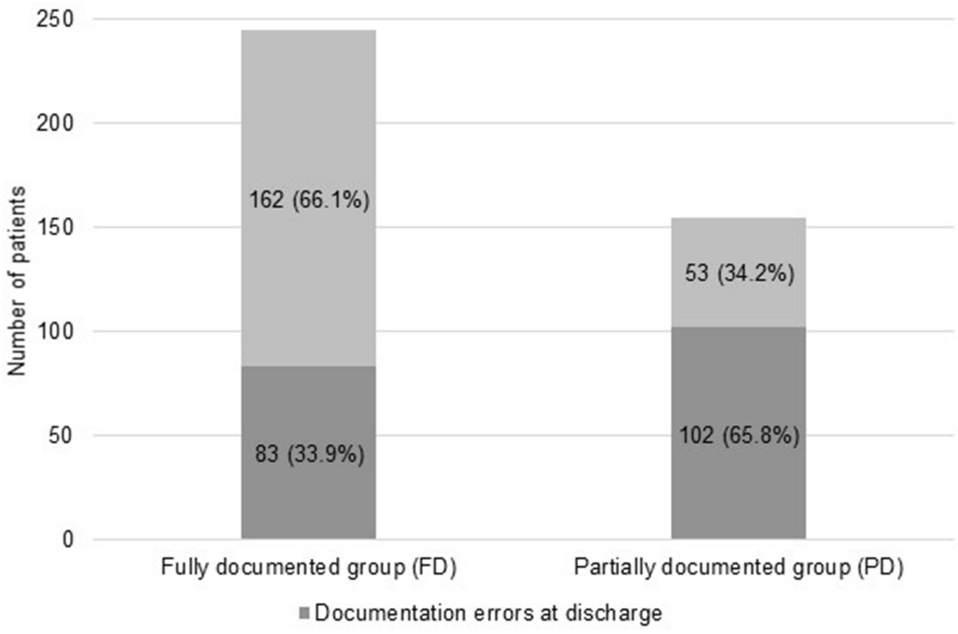

Figure 2 The difference in documentation errors at discharge between FD and PD.

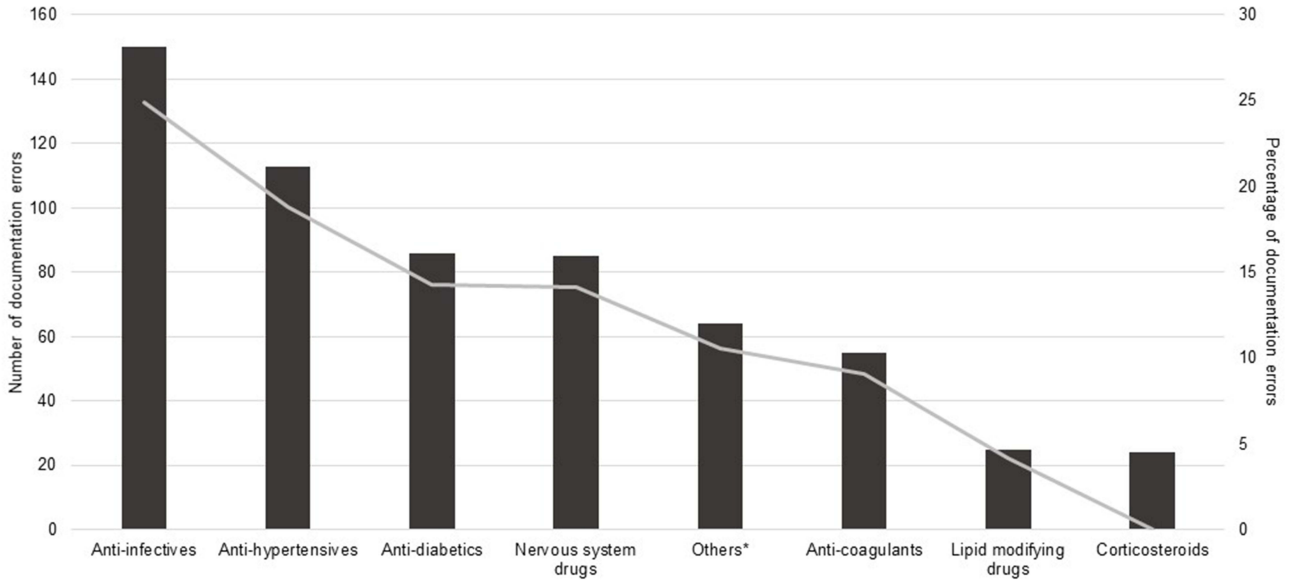

Figure 3 Number and percentages of documentation errors at discharge according to drug classes. *Gastrointestinal drugs, anti-hemorrhagics, urologicals, pituitary and hypothalamic hormones, thyroid drugs, anti-neoplastics, muscle relaxants, anti-gout drugs, and drugs for treating obstructive airway disease.

Factors Associated with Documentation Errors at Discharge

The univariate logistic regression analysis revealed that having more than three intentional medication discrepancies (OR, 3.82; 95% CI, 2.33–6.28), belonging to the PD group (OR, 3.76; 95% CI, 2.46–5.74), being discharged from a non-hospitalist-managed ward (OR, 2.66; 95% CI, 1.72–4.12), staying at the hospital for more than 11 days (OR, 2.62; 95% CI, 1.52–4.50), being discharged to a nursing or hospice hospital (OR, 2.44; 95% CI, 1.30–4.55), and being 80 years or older in age (OR, 1.71; 95% CI, 1.00–2.94) were the factors associated with documentation errors at discharge.

The multivariate logistic regression analysis revealed that three factors were significantly associated with documentation errors at discharge: belonging to the PD group (adjusted OR [aOR], 2.84; 95% CI, 1.75–4.62), being discharged from a non-hospitalist-managed ward (aOR, 1.96; 95% CI, 1.16–3.31), and having more than three intentional medication discrepancies compared with having one (aOR, 1.92; 95% CI, 1.08–3.42) (Table 2).

Table 2 Factors Associated with Documentation Errors at Discharge

Variables	Univariate Analysis		Multivariate Analysis	
	OR	95% CI	Adjusted OR	95% CI
Age				
<65	Ref		Ref	
65–79	1.06	0.67–1.69	0.77	0.46–1.29
≥80	1.71	1.01–2.94*	1.19	0.66–2.18
CCI				
0	Ref			
1–2	2.01	0.64–6.35		
≥3	1.38	0.49–3.89		
Total length of hospital stay (days)				
<6	Ref		Ref	
6–10	1.33	0.80–2.22	1.11	0.64–1.93
≥11	2.62	1.52–4.50**	1.39	0.71–2.71
Day of discharge				
Weekday	Ref			
Weekend or holiday	0.94	0.60–1.48		

(*Continued*)

Table 2 (Continued).

Variables	Univariate Analysis		Multivariate Analysis	
	OR	95% CI	Adjusted OR	95% CI
Discharge ward				
Hospitalist-managed ward	Ref		Ref	
Non-hospitalist-managed ward	2.66	1.72–4.12**	1.96	1.16–3.31*
Residence after discharge				
Home	Ref		Ref	
Others[a]	2.44	1.30–4.55**	1.79	0.88–3.64
Number of intentional discrepancies				
1	Ref			
2	1.77	1.01–3.11	1.36	0.74–2.49
≥3	3.82	2.33–6.28**	1.92	1.08–3.42*
Number of preadmission medications				
<5	Ref			
5–9	0.87	0.54–1.42		
≥10	1.20	0.72–2.01		
Appropriateness of documentation				
Fully documented group (FD)	Ref		Ref	
Partially documented group (PD)	3.76	2.46–5.74**	2.84	1.75–4.62**

Notes: *p <0.01, **p <0.05. [a]Nursing home, nursing hospital, and hospice hospital were categorized as "others".
Abbreviations: CCI, Charlson comorbidity index; CI, confidence interval; OR, odds ratio.

Impact of Documenting Medication Changes on Pharmacists' Workload

Ten out of 13 pharmacists (77%) chose "strongly agree" in both of improvement in understanding and communication. They said it was possible to understand the physician's intention of the changes in pre-admission medications and clearly identify medication changes according to the changes in lab data. For the communication improvement, they said they could define either the medication change was intended or an error, therefore they could avoid unnecessary confirmation procedures and instead, spend more effort to other more important communication. For the time efficiencies, 46% chose "strongly agree" and another 46% chose "agree". They were able to catch the medication changes right away, so it saved their time to additionally check other records. Furthermore, the average 9.3 minutes were saved due to the documentation (see Supplementary Figure 2 and Supplementary Table 2).

Discussion

In this study, we showed that appropriate documentation of medication changes during hospitalization was associated with a decreased rate of documentation errors at discharge. It is facilitated by timely free-text communication on electronic order entry system allowing up-to-date medication lists. This study underscores the value of real-time documentation in fostering effective interprofessional collaboration, improving communication efficiency, and streamlining medication management processes. By expediting the recognition and comprehension of medication changes, pharmacists can dedicate more time and resources to patient-centered care, ultimately leading to enhanced healthcare outcomes.

Ensuring continuous availability of relevant medication information is important for safe medication use, as incomplete or incorrect documentation of medication changes may contribute to improper clinical decision-making.[11,15] In our study, it was observed that patients in the PD group were older and had a higher medication count compared to those in the FD group. This can be explained by the fact that, as individuals age, they frequently require multiple medications to manage chronic conditions, which increases the medication burden. This heightened complexity may contribute to a higher likelihood of undocumented medications.[24] Our study found that patients in the FD group had fewer documentation errors at discharge compared to the PD group (33.9% vs 65.8%). This finding suggests that

documentation and sharing of in-hospital medication changes will increase the likelihood of documenting medication changes at discharge, thus reducing medication errors.

The reduced rate of documentation errors at discharge in patients with appropriate documentation of medication change is possibly attributable to several factors. First, the treatment of a patient during transition, especially in acute medical care, may involve many healthcare professionals and frequent changes in medication regimens.[25] Therefore, timely documentation of medication changes can help ensure the continuity of patient care by multidisciplinary team members and reduce errors. Moreover, during hand-offs, this documentation will aid the corresponding healthcare professionals in completing the discharge summary, and, specifically, the discharge prescription list.[25,26] Second, if physicians promptly document in-hospital medication changes using free-text function of electronic order entry system, writing discharge summaries will be easier and time-saving without needing to track the previous medical records. A study by Cornu et al showed that 47.6% of patients had inaccurate medication history in the discharge summary.[27] Discontinuity of medication information is a major contributing factor to discontinuity of care. The health and social care regulatory body of the United Kingdom has issued recommendations regarding the information provided on medication changes at discharge.[28] Indeed, patients were less likely to be readmitted when physicians had their prior discharge summaries, indicating that medication information and clinical outcomes are relevant especially after discharge.[29,30]

In the risk factor analysis, we found that patients who had three or more intentional medication discrepancies were more likely to experience documentation errors at discharge. This finding is consistent with a previous study, which reported that the increasing number of medications was associated with writing errors in discharge summaries.[24] Another study suggested a positive relationship between the number of changed medications and documentation errors at discharge.[31] In light of improving organizational and professional culture, these results suggest that prompt documentation of in-hospital medication changes by prescribers can enhance medication safety.[32]

Moreover, patients discharged from hospitalist-managed AMUs were less likely to have documentation errors at discharge compared to those discharged from non-hospitalist-managed wards. This might be partly explained by differences in ward characteristics. Currently, in our institution, hospitalists are the attending physicians as well as the primary care providers at AMUs, whereas resident doctors, still in training, are the primary care providers in non-hospitalist-managed wards. Previous studies have found that medication errors at discharge are more common with prescriptions by junior doctors with less than 3 years of experience,[33] who often omit medication details, especially medication changes, in discharge summaries.[34] In addition to time constraints owing to the workload and lack of knowledge, factors contributing to prescribing errors by junior doctors include inadequate training, low perceived importance of prescribing, lack of self-awareness of errors, and lack of communication.[35–37] Therefore, to engage physicians in thorough documentation and enhance patient safety, hospitals should provide education, streamline the documentation workflows, and emphasize the benefits of comprehensive documentation. Additionally, fostering a culture of accountability and providing incentives for documentation are crucial for encouraging physicians to maintain high standards in documentation practices. Implementing automated documentation system in the EHR, as suggested by Poldervaart et al,[38] could further improve medication change documentation, but optimizing the system to accurately reflect physician's intent is necessary.

Notably, the most frequently identified undocumented discrepancy was the discontinuation of medications. When the intended discontinuation is not documented, the discontinued medication can accidentally be restarted during the physician hand-off process,[39] which may result in adverse effects.[40] Previously, no studies have analyzed the various types of undocumented discrepancies; therefore, we could not compare this finding with others. However, we highlight the importance of proper documentation when discontinuing medications.

The major drug classes associated with documentation errors at discharge were similar to those reported in a previous study (ie, drugs for the cardiovascular system, central nervous system, and endocrine system).[37] However, in the present study, anti-infectives were associated with increased documentation errors at discharge. Since 68.3% of patients in AMU received anti-infectives, documentation errors were frequent in that drug class. Documenting clinical indications and duration of anti-infectives in EHR is recognized as a standard of good practice, preventing unnecessary and inappropriate use of anti-infectives.[41] By properly documenting the history and indications of the use of anti-infectives, physicians can

evaluate the appropriateness of the treatment and identify resistance patterns, making it easier to decide whether to stop or change the treatment.[42]

The online survey revealed that the majority of pharmacists expressed favorable attitudes toward physicians' real-time documentation of medication changes. This documentation provided valuable insights into the physicians' intentions and improved communication, ultimately saving time for pharmacists. While the roles of pharmacists may vary between hospitals, those in this hospital are responsible for both dispensing medications and clinical duties, leaving insufficient time for patient reviews. Survey responses from pharmacists indicated that appropriate documentation significantly reduces the time spent on patient reviews, thereby substantially alleviating their workload.

The present study has several limitations to be considered when interpreting its results. First, it was a retrospective study conducted at a single tertiary hospital, limiting generalizability of the findings. However, its retrospective nature ensured that physicians were unaware of this study when documenting, indicating no bias to the documentation activity. Second, we only analyzed patients who were admitted to the AMU via the emergency department or outpatient clinics. Therefore, our findings may not be comparable with the documentation practice in patients admitted directly to other wards. Third, FD and PD were arbitrarily defined to balance the number of patients in each group. As the documentation rate of more than half of the population was 100%, we set the cut-off rate at 100%. Fourth, we could not ascertain the specific reason for medication changes, as most documentations lacked this information. Documenting the reason for medication changes in medical records can facilitate decision-making for every patient, considerably saving time and enabling the physicians to attend to other patients in need.[25] Therefore, future studies should evaluate the impact of documenting reasons for medication changes. Finally, we could not investigate the impact of documentation errors at discharge on clinical outcomes. It is known that improved communication regarding medication changes across the continuum of care may reduce adverse effects[15] and may further decrease emergency department visits and unplanned hospital readmissions.[20] Therefore, further studies are needed to investigate the effect of documentation errors on clinical outcomes.

Our study possesses several strengths. First, to our knowledge, this is the first study conducted in Korea to analyze the impact of in-hospital documentation on medication safety at discharge. Second, we included consecutive hospitalized patients in the AMU over a specific period, effectively minimizing selection bias, increasing the validity of our findings. Additionally, the substantial sample size of 400 medication records enhances the generalizability of our findings. Third, we conducted a thorough review of patient's medical records, including progression notes, and MR tab to accurately identify medication discrepancies. This comprehensive approach allowed us to detect medication discrepancies with greater precision. Fourth, we demonstrated the effectiveness of communication via documentation on EHR between designated pharmacists and physicians. Such behavioral intervention, which incurs no cost and requires low technology, has culturally beneficial impacts on interprofessional communications, further promoting patient safety.

Conclusions

In conclusion, our study underscores the critical role of real-time documentation of in-hospital medication changes in enhancing patient safety during transitions of care. Through our retrospective cohort study, we observed a significant decrease in documentation errors at discharge among patients with fully documented medication changes, highlighting the importance of timely and accurate documentation. Pharmacists' favorable attitudes toward physicians' real-time documentation further emphasize the value of effective communication between pharmacists and physicians and information sharing in medication management. The findings of this study might help healthcare institutions develop strategies to improve documentation practices and enhance patient safety during hospitalization and discharge. Overall, our findings suggest that proper documentation of medication changes can lead to improved medication reconciliation, reduced discrepancies at discharge, and ultimately, enhanced communication between healthcare professionals during care transitions.

Abbreviations

EHR, electronic health record; MR, medication reconciliation; AMU, acute medical unit; ED, emergency department; ICD, International Classification of Diseases; FD, fully documented; PD, partially documented; CCI, Charlson comorbidity index; OR, odds ratio; CI, confidence interval; aOR, adjusted OR.

Ethics Approval

The Institutional Review Board of Seoul National University Bundang Hospital (IRB: B-2008-633-103, approval date August 06, 2020) approved this study.

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Disclosure

The authors report no conflicts of interest in this work.

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