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Impact of Medication Reconciliation by a Dialysis Pharmacist

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Key Points

- Integrating a pharmacist into a hemodialysis unit significantly reduced medication discrepancies and medication-related problems over time.
- Medication reconciliation for the Centers for Medicare and Medicaid Services End-Stage Renal Disease Quality Incentive Program can be optimally performed by a dialysis pharmacist.

Background

Patients with ESKD have complex medication regimens, taking an average of 12 medications daily, resulting in upwards of 17–25 doses per day (1). High pill burden places dialysis patients at risk for medication discrepancies and medication-related problems (MRPs).

As of January 1, 2020, the Centers for Medicare and Medicaid Services (CMS) added a quality metric to the End-Stage Renal Disease Quality Incentive Program (ESRD QIP) for medication reconciliation. The measure evaluates the percentage of patient months for which medication reconciliation was performed and documented by an eligible professional. CMS does not mandate the inclusion of pharmacists in the dialysis care team in the CMS Conditions for Coverage for ESRD Facilities (2), although several studies have shown the value of a pharmacist performing medication reconciliation in a dialysis unit (3–6). The University of California, San Diego Health (UCSDH) Outpatient Hemodialysis Unit incorporated a pharmacist into the interdisciplinary care team in 2018. Funding was generated from a medication delivery program in which the outpatient discharge pharmacy provided medications for the dialysis patients. The purpose of this study is to evaluate the effect of a dialysis pharmacist performing medication reconciliation in an in-center hemodialysis unit.

Methods

This is a retrospective, single-center study evaluating the number of medication discrepancies and MRPs addressed for patients receiving in-center chronic hemodialysis at UCSDH between October 1, 2018, and November 2, 2020, with at least two clinical pharmacist encounters for medication reconciliation. This study was approved by our Institutional Review Board for human subjects protection (IRB approval #200946) and was determined to be exempt from informed consent. Data collection was performed by manual chart review of pharmacists' notes, and demographics were obtained from CMS-2728 forms. Our hypothesis was that the number of medication discrepancies and MRPs addressed by the pharmacist would decrease over time as a pharmacist integrates themselves in the dialysis care team. Secondary outcomes for this study included the type of medication discrepancy and the type and severity of the MRP.

Medication reconciliation by the pharmacist was conducted for all patients approximately every 6 months. A standardized note template was developed by the clinical pharmacist based on the MARQUIS guide and was used for each patient encounter (7). The template included sources of medication information, patient allergies, changes made to home medication list (*e.g.*, added, removed, changed dose), patient adherence, dialysis related labs, and assessment of pertinent dialysis conditions. To validate the medication record, a minimum of two sources of medication information were used, including verbal patient report, outpatient pharmacy records, hospital electronic health record, prescription bottles, skilled nursing medication list, and Surescripts claim records.

The number of medication record discrepancies and MRPs addressed in each encounter was recorded for each patient. Medication record discrepancies were categorized as either unintentional discrepancy or undocumented intentional discrepancy (3). An unintentional discrepancy is a medication change made either inadvertently or deliberately by the patient without the knowledge of the healthcare team. An undocumented intentional discrepancy is a medication change made by another healthcare professional but not listed on the medication record. Subcategories include omission, commission, wrong drug, wrong dose, wrong frequency, dose/schedule not listed, or other. Omission is a missing medication, and commission is a medication incorrectly added to the list.

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MRPs were categorized as drug without indication, indication without drug, wrong drug, dose too low, dose too high, adverse drug reaction, inappropriate adherence, drug interactions, and other. MRPs were also categorized by safety severity using the gold standard medication error index from the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) (8). The index severity ranges from category A to category I, with category A representing events with the capacity to cause error, and category I representing errors that contributed to or resulted in patient death.

Once the medication reconciliation was performed, the pharmacist would resolve discrepancies and MRPs using a collaborative practice agreement. Dose adjustments were determined based on recommendations from package inserts, drug concentrations, and/or published literature. The attending nephrologist or primary care physician was consulted on complex problems or problems whose scope was outside of the collaborative practice agreement.

Descriptive statistics were calculated for each variable and reported as mean (SD), median (range), or counts (proportion) as appropriate. A Student's t test for paired data was conducted to determine if medication discrepancies or MRPs changed over time.

Results

A total of 135 patients with 479 unique pharmacist encounters were included. The mean age was 61.7 years (SD=14 years), 58% were male, 63% Caucasian, and the mean time on dialysis was 6.7 years (SD=6.4 years; Table 1). The most common ESKD etiology was diabetes (47%), and patients were taking an average of 13 (SD=6) medications at baseline (Table 1). The pharmacist conducted an average of 3.5 (SD=1.6) medication reconciliations per patient with a mean time spent of 39.7 minutes (SD=16 minutes), and 16% required an interpreter. Unintentional discrepancies were noted in 53% encounters, undocumented intentional discrepancies in 71%, and MRPs in 59%, and decreased significantly from the first to the second encounter (1.9 versus 0.9 [$P<0.001$], 1.9 versus 1.2 [$P<0.001$], and 1.1 versus 0.5 per patient [$P<0.001$], respectively, ; Table 2). Medication changes also reduced significantly between the first and second encounter (4.2 versus 2.2; $P<0.001$). The most common undocumented intentional discrepancies seen were omission (43%), wrong dose (30%), and commission (27%). Of the 431 MRPs identified, the most common types included nonadherence (27%), prescription renewals (21%), and excessive drug doses (14%; Figure 1). The most common severity category for MRPs was category C (57%), followed by category D (32%) and category E (6%; Figure 2).

Discussion

In this study, medication discrepancies and MRPs were reduced by approximately 50% between pharmacist encounters. Identifying unintentional discrepancies made by the patient allows providers to understand better the factors that affect patient adherence such as adverse effects. Identifying undocumented intentional discrepancies made

Table 1. Demographics

Variable	Total Cohort (N = 135)
Age, yr, mean (SD)	61.7 (14)
Self-reported sex, n (%)	
Men	78 (58)
Female	57 (42)
Self-reported race, n (%)	
White	85 (63)
Black	27 (20)
Asian	17 (13)
Pacific Islander	5 (4)
Other	1 (0.7)
Ethnicity, n (%)	
Hispanic	61 (45)
ESKD etiology, n (%)	
Diabetes	63 (47)
Other	45 (33)
Glomerulonephritis	26 (19)
Hypertension	1 (0.7)
Dialysis duration, yr, mean (SD)	6.7 (6.4)
Hemodialysis treatment time, h, mean (SD)	3.6 (0.3)
Comorbidities, n (%)	
Hypertension	53 (39)
Type 1 diabetes	11 (8)
Type 2 diabetes	28 (21)
Cardiovascular disease	17 (13)
Chronic heart failure	7 (5)
Chronic obstructive pulmonary disease	4 (3)
Peripheral vascular disease	2 (2)
Malignancy	2 (2)
Stroke	1 (0.7)
Number of medications, mean (SD)	13 (6)

by the provider helps prevent duplicate therapy and potential harm during care transitions. In our study, we found that that most common undocumented intentional discrepancies were omission (40%), wrong dose (30%), and commission (28%), which is similar to the findings of Patricia and colleagues who found omission to be the most common discrepancy (3).

Our results concur with previous literature that the most common MRPs seen in dialysis units are medication nonadherence and incorrect drug dosing (6,9). The average number of MRPs found in the first encounter for our dialysis unit was 1.1, which is significantly lower than the 4.5 MRPs reported by Pai and colleagues (10). Our lower average may be attributed to the active participation of the clinical pharmacist on the dialysis care team. MRPs were reduced by almost 50% between the first pharmacist encounter and second encounter, which may translate to improved patient safety.

This study demonstrates the need for clinical pharmacists to be added to chronic dialysis care teams. The pharmacist identified MRPs, resolved them by ordering prescription renewals, reduced drug doses for patients, provided medication counseling, and investigated barriers to adherence issues. This is the first study to categorize each MRP type using the gold standard NCC MERP safety index category. The majority of MRPs fell between

Table 2. Medication changes between pharmacist encounters

Variable	First Encounter (N = 135)	Second Encounter (N = 135)	*P* Value
Total medication changes	4.2 (3)	2.2 (2)	<0.01
Unintentional discrepancy	1.9 (2.4)	0.9 (1.4)	<0.01
Undocumented intentional discrepancy	1.9 (1.6)	1.2 (1.6)	0.01
Medication-related problems	1.1 (1.1)	0.5 (0.8)	<0.01

Data are presented as mean (SD).

categories C and D and did not cause patient harm. Approximately 6% of MRPs were rated category E or F, indicating an error occurred that resulted in temporary harm to the patient and required intervention. These MRPs were related to antihypertensive therapy adherence, one of which required hospitalization for a subacute stroke.

Obstacles encountered by the pharmacist included communication with outside providers and prescription insurance coverage. The pharmacist contacted outside providers *via* telephone to clarify medication selection and duration of therapy for drug classes such as antibiotics. This was time intensive, in some cases requiring 2 weeks to resolve. Insurance issues such as high co-payment and coverage denials were resolved by completing prior authorization requests, switching to preferred tier medications, and enrolling in patient assistance programs. The complexity of these issues and their time requirement further support the role of a clinical pharmacist in the dialysis care team.

Although our study has demonstrated significant value, we note a few limitations. First, we did not categorize discrepancies by drug class to identify priority areas for focused review. Second, we did not evaluate clinical outcomes associated with changes made by the pharmacist to determine if pharmacist engagement optimizes medication efficacy. Finally, this single-center study with a small sample may be limited in generalizability to other community-based hemodialysis units.

Conclusions

This study helps to provide additional framework for the CMS ESRD QIP medication reconciliation reporting measure and supports utilizing a clinical pharmacist to perform this task. This study also demonstrates the types of medication errors found in a dialysis population and highlights the types of discrepancies that should be addressed when performing medication reconciliation in a dialysis population.
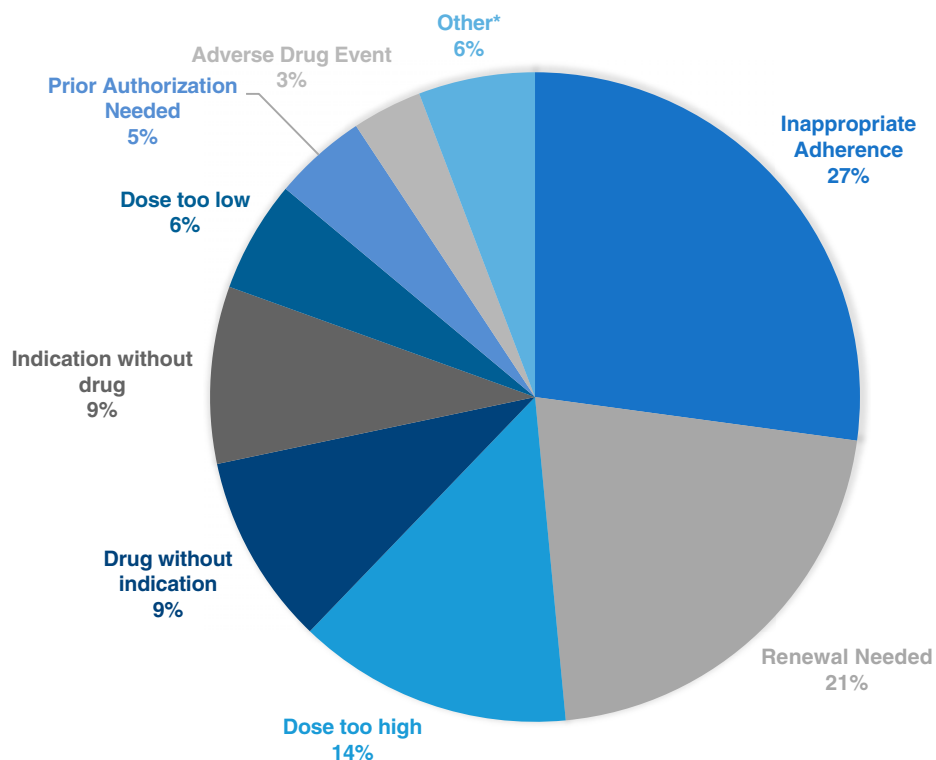
Figure 1. | Types of medication-related problems. *Drug interaction, therapeutic drug monitoring, and wrong drug.
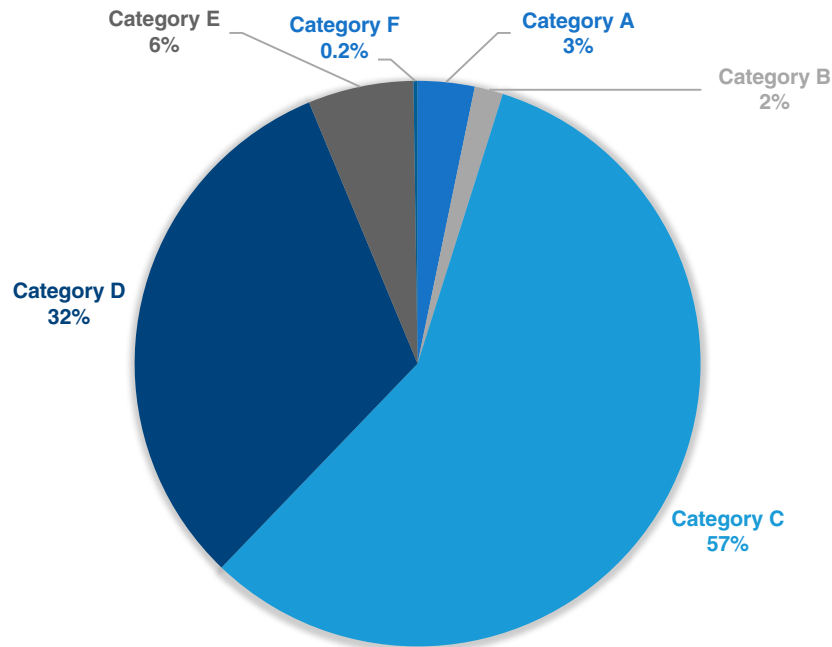
Figure 2. | **Medication-related problem safety category.** Category definitions: category A, circumstances or events that have the capacity to cause error; category B, an error occurred but the error did not reach the patient; category C, an error occurred that reached the patient but did not cause patient harm; category D, an error occurred that reached the patient and required monitoring to confirm that it resulted in no harm; category E, an error occurred that may have contributed to or resulted in temporary harm to the patient and required intervention; category F, an error occurred that may have contributed to or resulted in temporary harm to the patient and required initial or prolonged hospitalization (8).

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