The Role of Pharmacists in CKD Care Teams

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The authors report no conflicts of interest.

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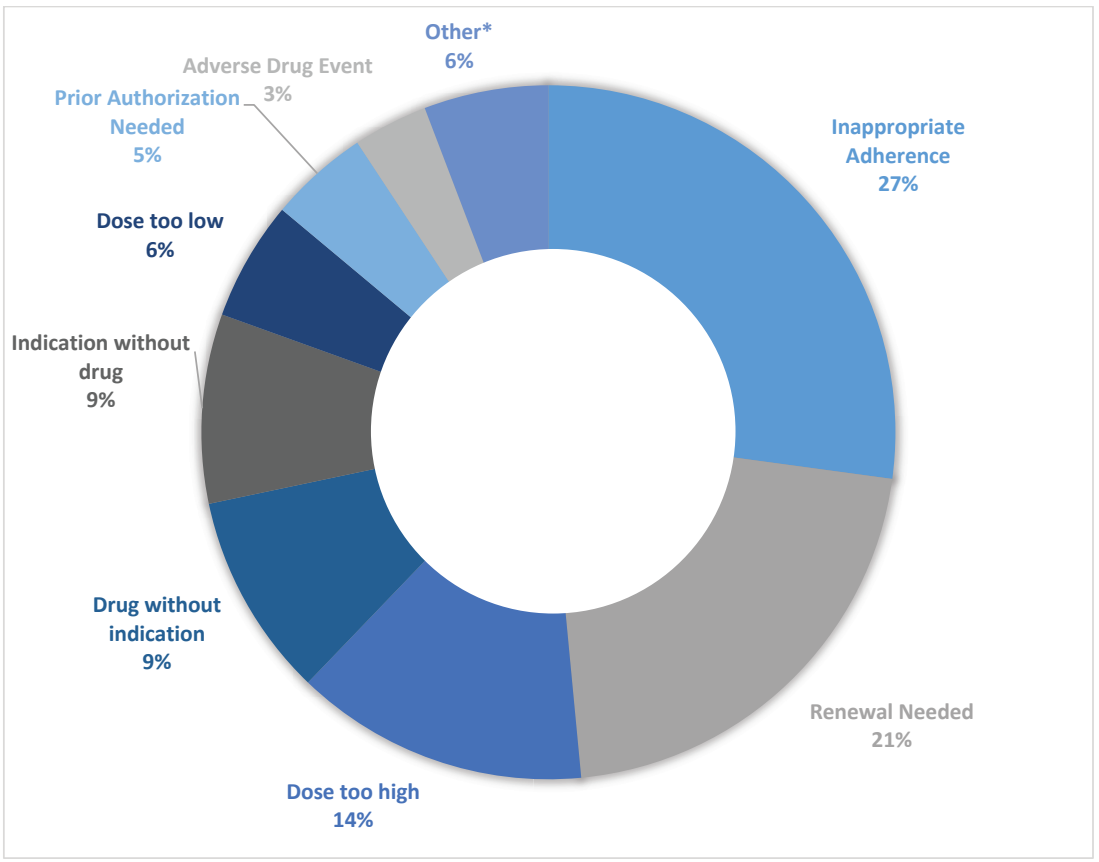
Figure 1. Types of medication-related problems in dialysis patients



Reprinted from Dyer et al. (3). *Drug interaction, therapeutic drug monitoring, and wrong drug.

Clinical Pharmacists in Nephrology: A Call for Action

By Linda Awdishu

Pharmacists are essential drug experts on the health care team, providing clinical services related to safe distribution, optimal selection, and use of medications and patient education in the community, ambulatory care, and acute care pharmacy environments.

Pharmacists are trained at accredited schools of pharmacy that require a minimum of 2–4 years of undergraduate education before entering a 3- to 4-year doctorate training program (PharmD). During their doctorate training, they are licensed as pharmacy interns and begin gaining practice experience in the community and acute care settings, working under the supervision of a licensed pharmacist. After completing the PharmD degree, although not required, the majority of PharmD graduates pursue postgraduate residency or fellowship training. Pharmacy residency programs are accredited nationally and include 1-year general postgraduate training in the community and ambulatory or acute care environments. Beyond the first year, pharmacists may pursue a second year of residency specializing in a disease state, such as but not limited to infectious disease, critical care, or solid organ transplantation in acute care settings.

Currently, there are no accredited residency programs or fellowships in nephrology for pharmacists. Many pharmacists interested in nephrology pursue training in other areas, such as ambulatory care, critical care, or solid organ transplantation. Beyond residency training, pharmacists may pursue board certification from the Board of Pharmacy Specialties to gain qualifications for advanced practice; however, specialty boards in nephrology are not yet developed. The lack of specialty training in nephrology is a major contributor to the limited number of pharmacists specializing in nephrology. In the United States, some states offer an advanced practice pharmacist designation and advanced pharmacist licensure, which expand the scope of practice for clinical pharmacists to perform patient assessments; order and interpret laboratory tests; refer patients; initiate, adjust, and discontinue drug therapy; and collaborate in the evaluation and management of diseases. However, insurers still do not routinely recognize pharmacists as health care providers for reimbursement of services. This has created a major barrier to the expansion of clinical pharmacist services.

Despite the limited pool of pharmacists specializing in nephology, studies have documented the positive impact of pharmacist services in the care of patients with acute kidney injury (AKI) or chronic kidney disease (CKD) or patients receiving chronic dialysis (Table 1) (1–10). Advocacy from professional organizations, such as ASN, is needed to improve insurance reimbursement of pharmacist services, improve the development of specialty programs in nephrology, and integrate the clinical pharmacist in the dialysis and CKD care teams, especially in light of the Advancing American Kidney Health Initiative (11). ■

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The author reports no conflicts of interest.

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Table 1. Studies of clinical pharmacy services in nephrology

Patient population	Intervention	Outcome	Reference
Hospitalized patients with AKI stage 3	Identification of AKI stage 3 using electronic alerts and delivery of multidisciplinary education and post-hospital discharge follow-up	18 Patients enrolled in intervention in 6-month time period; improvement in time to post-hospital discharge follow-up to less than 7 days	(1)
Patients with CKD stages 3 and 4	Training program for community pharmacists on use of medications in CKD and access to patient clinical information	The mean number of drug-related problems per patient decreased from 2.16 to 1.60 and from 1.70 to 1.62 in the intervention and control groups, representing a difference of −0.32 (95% CI, −0.63 to −0.01). Improvements in knowledge and clinical competencies were demonstrated.	(2)
CKD	Hypertension management by clinical pharmacists in physician offices	Pharmacist intervention achieved a model-adjusted SBP and DBP reduction of 8.64 and 2.90 mm Hg greater than the control group; improved blood pressure control by pharmacists: adjusted OR, 1.97 (95% CI, 1.01–3.86).	(3)
Patients with CKD stages 2–5	Interprofessional team-based care for CKD	High rates for clinical quality performance indicators, e.g., blood pressure control (85%), estimation of cardiovascular risk (100%), measurement of hemoglobin A1c (98%), and vaccination (93%)	(4)
CKD/chronic hemodialysis	Medication reconciliation conducted by pharmacist	Pharmacist identified medication discrepancy, of which 81% of recommendations were accepted by nephrologist, in 80% of patients; 25% of recommendations on drug and dose selection were accepted by nephrologist.	(5)
Chronic hemodialysis	Program services included medication delivery, refill management, medication list reviews, telephonic medication therapy management, and prior authorization assistance.	In the intention-to-treat analysis, patients who received pharmacy services were 8% less likely to die and accumulated 2% fewer hospital admissions and 6% fewer hospital days. In as-treated analyses, patients who received pharmacy services were 21% less likely to die and accumulated 7% fewer hospital admissions and 14% fewer hospital days.	(6)
Chronic hemodialysis	Anemia management by clinical pharmacist	Resulted in lower erythropoietin doses and reduction in expenditure of approximately $500,000	(7)
Chronic hemodialysis	Medication therapy management by clinical pharmacist	The most common potential medication-related problems were medication-dosing issues (31%), real or potential adverse drug reaction (29%), and unnecessary drug therapy (17%). Medication therapy management resulted in 55% lower risk of 30-day hospital readmission.	(8)
Chronic hemodialysis	Medication reconciliation by a clinical pharmacist in a single hemodialysis facility	The mean number of medication-related problems per patient and interventions was 8.96 and 6.1, respectively. This was associated with a cost savings of $447,355 in a 6-month period.	(9)
Chronic hemodialysis	Medication reconciliation and medication therapy management	Pharmacist conducted, on average, 3.5 medication reconciliations per patient, which took approximately 40 minutes. Medication-related problems were identified in 59%, and the most common ones included nonadherence (27%), prescription renewals (21%), and excessive drug doses (14%).	(10)

95% CI, 95% confidence interval; DBP, diastolic blood pressure; OR, odds ratio; SBP, systolic blood pressure.

Findings

Dietary Risk Factors for Kidney Stone Recurrence

A diet higher in calcium and potassium intake may help to reduce the risk of recurrent kidney stones, concludes a study in *Mayo Clinic Proceedings*.

The prospective study included 411 patients with their first episode of symptomatic kidney stones, with obstruction confirmed by imaging or stone passage, along with 384 stone-free controls. Both groups completed an electronic food frequency questionnaire during a baseline study visit. Dietary risk factors were compared between groups. Dietary associations with validated symptomatic recurrence were analyzed in proportional hazards models, with adjustment for fluid and energy intake and for nondietary risk factors.

Baseline characteristics associated with incident kidney stone formation included older age, White race, higher body mass index (BMI), lower educational level, more hypertension, history of working in hot temperatures, and history of urinary tract infection and chronic diarrhea. During a median follow-up of 4.1 years, 17.8% of patients had recurrent symptomatic kidney stones. Clinical factors associated with recurrence included higher BMI; retained, asymptomatic stones of computed tomography; and higher scores on the Recurrence of Kidney Stone prediction tool.

Kidney stone risk was higher for individuals with dietary calcium intake of less than 1200 mg/day and higher for those with fluid intake of less than 3400 mL/day. On adjusted analysis, recurrent stone risk was associated with lower calcium, potassium, caffeine, and phytate intake, as well as lower total fluid intake. Lower dietary calcium remained a significant predictor on analysis, including further adjustment. Dietary potassium was significant only among patients not using thiazide diuretics or calcium supplements.

Several studies have reported on dietary factors associated with incident kidney stones, but little is known about dietary factors that may increase the risk of recurrent stones. "Enriching diets in stone formers with foods high in calcium and potassium may help prevent recurrent symptomatic kidney stones," according to the authors. Although patients are not likely to change their diet to prevent initial kidney stones, the researchers add, "[they] may be eager to do so to prevent symptomatic recurrence" [Chewcharat A, et al. Dietary risk factors for incident and recurrent symptomatic kidney stones. *Mayo Clin Proc* 2022; 97:1437–1448. doi: 10.1016/j.mayocp.2022.04.016].

Study Shows Discrepancies in Estimated versus Measured GFR

Individual-level estimated glomerular filtration rate (eGFR) values differ substantially from measured GFR (mGFR) values, reports a study in the *Annals of Internal Medicine*.

The researchers analyzed data on 3223 participants in four US epidemiologic studies that included mGFR values. The mean age of participants was 59 years; 55% of participants were women, and 32% were Black.

The mGFR values were obtained using non-radiolabeled iothalamate in two studies, radiolabeled iothalamate in one study, and plasma clearance of iohexol in one study and were indexed to 1.73 m^2 of body surface area. The eGFR values were calculated from serum creatinine alone and with serum cystatin C. The magnitude and clinical significance of any differences in the paired mGFR and eGFR values were assessed.

The mean mGFR value was 68 mL/min/1.73 m^2. Nine percent of participants had an mGFR value of less than 30 mL/min/1.73 m^2. Overall eGFR values were higher than mGFR values; the median difference was −0.6 mL/min/1.73 m^2, with significant differences between groups. However, individual-level differences between values were large across subgroups defined by race, age, and sex.

At a creatinine-based eGFR of 60 mL/min/1.73 m^2, 50% of eGFR values were between 62 and 67 mL/min/1.73 m^2, 80% between 45 and 76 mL/min/1.73 m^2, and 95% between 36 and 87 mL/min/1.73 m^2. At an eGFR of 45 mL/min/1.73 m^2, 15% of participants had mGFR values outside the range of 30–60 mL/min/1.73 m^2, 30% outside the range of 35–45 mL/min/1.73 m^2, and 57% outside the range of 40–50 mL/min/1.73 m^2.

The discrepancies led to errors in classification of chronic kidney disease by mGFR versus eGFR. The misclassification rate was 42%, with 22% of participants placed in a lower eGFR category and 20% in a higher category. Analysis of cystatin C-based eGFR showed no meaningful improvement.

The results show "substantial individual discrepancy" between eGFR and mGFR values. "Our findings highlight the need to make direct GFR measurements available to patients who need them," the researchers conclude, noting that non-radiolabeled techniques have made GFR measurement simpler and more feasible for clinical use [Shafi T, et al. Quantifying individual-level inaccuracy in glomerular filtration rate estimation: A cross-sectional study. *Ann Intern Med*, published online ahead of print July 5, 2022. doi: 10.7326/M22-0610; https://www.acpjournals.org/doi/10.7326/M22-0610].