



Scoping Review: Analysis Of Drug-Related Problems In Geriatric Patients With End-Stage Renal Disease

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Article Info	ABSTRACT
Received: 30-04-2026 Revised: 14-07-2026 Accepted: 29-07-2026 *Corresponding author: Kharina Anisya Email: kharinaanis@pharm.untan.ac.id	Background: Chronic Kidney Disease decreases the glomerular filtration rate eGFR <60 ml/minute/1.73 m² for three months. CKD can cause renal dysfunction, end-stage renal disease, and progression of cardiovascular disease. The increasing prevalence of chronic kidney disease(CKD) affects aging populations. The Elderly frequently present multiple comorbidities leading to polypharmacy and are vulnerable to medication-related problems. Objective: The aim of this scoping review to identify and describe drug-related problems (DRPs) in geriatric patients with end-stage renal disease (ESRD). Method: The research approach is a scoping review, which involves searching for publications published in journals about drug-related difficulties in geriatric patients or elderly with ESRD. Literature searches were conducted through electronic database searches, including PubMed, Science Direct, and Google Scholar. Journals were selected based on inclusion criteria. Results: The results led to 5 published journals that indicate DRPs in CKD patients statistically increase along with age due to comorbidities and polypharmacy. Conclusion: The most common DRPs found were inappropriate medication, side effects, non-prescribed drugs, contraindications, and medication prescribing errors. Healthcare providers must reassess each medication prescribed for every elderly patient to minimize the incidence of DRPs. Keywords: CKD advanced; drug-related problems; aging; polypharmacy; end-stage renal disease

INTRODUCTION

CKD was defined as a decrease in the glomerular filtration rate (GFR) / estimated Glomerular Filtration Rate (eGFR) <60 ml/min/1.73 m² for a period of 3 months (KDIGO, 2024) . CKD can causes to renal dysfunction and the development of end-stage renal disease and cardiovascular disease. Complications associated with CKD can contribute to accelerated disease progression and the risk of cardiovascular disease morbidity. In advanced stages, when kidney function is severely compromised, the patient can only be treated with dialysis or a transplant (Kim et al., 2021).

Elderly is one of the most significant factors that can cause medication errors or

contraindications to chronic kidney disease (CKD) (Arcoraci et al., 2021). Patients with kidney disease mostly experience changes in pharmacokinetic and pharmacodynamic parameters so that they are at high risk for impaired renal excretion and polypharmacy. This causes a high risk of developing DRPs including unnecessary drug therapy, requiring additional drug therapy, ineffective drug, dose too low, adverse drug reaction (ADR), dose too high and non-adherence. In addition, it is also caused by multiple medications that are prescribed simultaneously by different doctors. Non-adherence, side effects, drug interactions, and inappropriate doses are among the most

common DRPs in CKD patients (Quintana-Bárcena et al., 2018; Anisya et al., 2025b).

Drug related problems (DRPs) is one of the problems in patients that can be defined as an event or situation involving drug therapy that may potentially interfere with health outcomes. The occurrence of DRPs can prevent or delay patients from achieving the desired therapy and experience a decrease in the patient's quality of life, increase length of hospitalization and health care costs and even increase the risk of morbidity and mortality. As for the identification of DRPs, it is expected to minimize drug-related morbidity and mortality (Gayathri et al., 2018).

Chronic kidney disease (CKD) was the 27th leading cause of death globally in 1990 and increased to 18th in 2010 based on the 2010 Global Burden of Disease. According to the World Health Organization (WHO) 2013, chronic kidney disease has caused 850,000 deaths every year. This figure shows that chronic kidney disease is the 12th highest cause of death worldwide (Kemenkes RI, 2017).

Chronic kidney disease (CKD) is a complex disease that affects approximately 13% of the world's population (Garedow et al., 2019). Globally, the prevalence of CKD at stages 3-5 averages around 10.6% (Garedow et al., 2019; Hill et al., 2016). CKD prevalence is estimated at 9.1% worldwide, the prevalence of stage G3 is 3.9%, stage G4 is 0.2%, and stage G5 is 0.1% (Bikbov et al., 2020). In the United States in 2011, the prevalence of ESRD (End-Stage Renal Disease) was around 113,136 patients. The leading causes were diabetes and hypertension, with the highest number of cases found in people over 70.

In Indonesia, chronic kidney disease has increased from 2 per 1000 population or 499,800 Indonesian population to 3.8% per 1000 population (Kemenkes RI, 2018). Risesdas 2013 also show the average

prevalence of CKD in Indonesia is 0.2% (Kemenkes RI, 2017). Prevalence rises with age, with a substantial rise in the 65-74 age range (0.82%). Prevalence in males (0.42%) is higher than females (0.35%) (Kemenkes RI, 2018).

Despite the increasing global burden of chronic kidney disease (CKD) and the high prevalence of drug-related problems (DRPs), evidence regarding DRPs in geriatric patients with end-stage renal disease (ESRD) remains limited and fragmented. Previous reviews have mainly focused on the general CKD population, medication adherence, inappropriate prescribing, or pharmacist interventions, with limited attention to the spectrum of DRPs affecting older adults with ESRD. This population is particularly vulnerable to medication-related harm because of age-related physiological changes, multiple comorbidities, and polypharmacy, all of which increase the complexity of pharmacotherapy. Consequently, evidence describing the types, patterns, and contributing factors of DRPs in geriatric patients with ESRD has not been comprehensively synthesized. Therefore, this scoping review aims to map the existing evidence on DRPs in geriatric patients with ESRD, summarize the most frequently reported DRPs and their contributing factors, and identify knowledge gaps to support future research and optimize clinical pharmacy services and pharmaceutical care for this high-risk population.

METHODS

Study Design

A scoping review was conducted to systematically map and summarize the available evidence on drug-related problems (DRPs) among geriatric patients with end-stage renal disease (ESRD).

Search Strategy

Literature searches were conducted in PubMed, ScienceDirect, and Google Scholar databases using combinations of the following keywords: "drug-related

problems”, “chronic kidney disease”, “end-stage renal disease”, “elderly”, “geriatric”, and “polypharmacy”. The search was conducted from 2018-2025. The article selection process followed the PRISMA-ScR framework. Titles and abstracts were screened, followed by full-text assessment for eligibility. Duplicate articles were removed prior to screening. . There were 18 articles on PubMed, 95 on Science Direct, and 554 articles on Google Scholar data. Selecting the title and abstract of the article, then obtained 32. From this assessment, 27 articles were issued. The remaining 5 articles with complete manuscripts were considered suitable for a scoping review. This table consists of the discoveries from relevant articles, which include: authors, research objectives, research study design, samples, and research results.

Inclusion criteria

The inclusion criteria used in the scoping review were journals published from 2018 to 2025, patients with renal failure, geriatric or elderly, english articles, and the results obtained were the prevalence of DRPs.

Data Synthesis

The extracted information was mapped in tabular form and reported descriptively.

RESULTS AND DISCUSSION

Study Selection

The eligibility criteria for this scoping review included studies published between 2018 and 2021, involving geriatric or elderly patients with chronic kidney disease (CKD) or end-stage renal disease (ESRD), published in English, and reporting the prevalence or characteristics of drug-related problems (DRPs). The literature search identified 667 records, including 18 from PubMed, 95 from ScienceDirect, and 554 from Google Scholar. Following title and abstract screening, 32 articles were selected for full-text assessment. After applying the eligibility criteria, 27 articles were excluded, and the remaining five studies were included in this scoping review (Figure 1). The characteristics of the included studies are summarized in Table 1, including the authors, study objectives, study design, sample characteristics, and main findings.

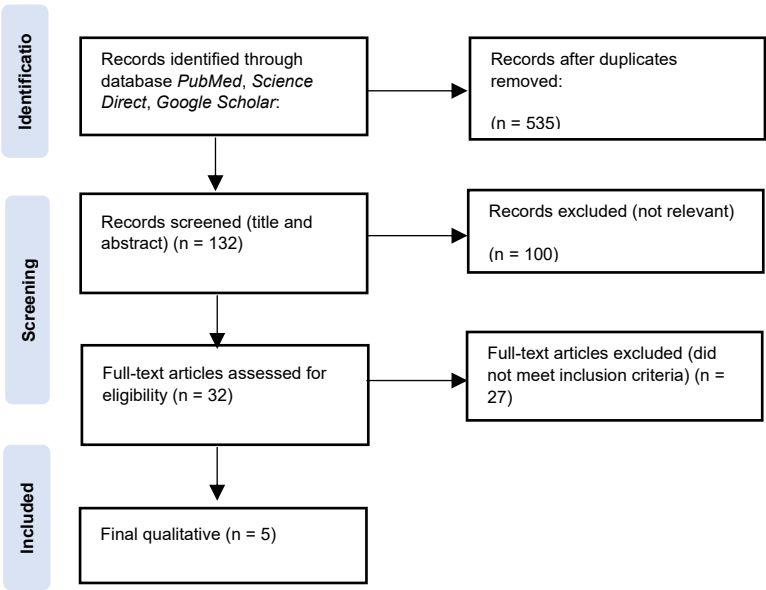


Figure 1. PRISMA scoping review study selection flow chart summarising the process of identification and screening of literature reports for inclusion

Study Characteristics

Five studies were included in this scoping review. The studies originated from Italy (n = 2), Spain (n = 1), France (n = 1), and

the Netherlands (n = 1) (Table 1). The included studies employed various study designs, including retrospective observational studies (n = 1), retrospective

descriptive studies (n = 1), cross-sectional studies (n = 1), pharmacist-led medication review studies (n = 1), and cluster randomized controlled trials (n = 1). Sample sizes ranged from 95 to 4,713 participants and mainly involved older adults with chronic kidney disease (CKD), particularly those with advanced CKD or end-stage renal disease (ESRD).

Table 1. Summary of Included Studies

Authors	Objective	Methods	Sample	Results
(Arcoraci et al., 2021)	The aim of this study was to evaluate the prescriptions of contraindicated drugs in older adults in CKD and to identify their associated factors in a hospital context.	An observational retrospective study was carried out using the REgistro Politerapie SIMI (REPOSI) database and considering all data collected from January 2010 to December 2016.	N = 4713	The number of patients treated with several inappropriate drugs increased from early to the end stages of CKD both at admission (G3a = 6.4%; G3b = 9.5%; G4 = 58.5%; G5 = 61.6%) and discharge (G3a = 6.4%; G3b = 8.4%; G4 = 50.8%; G5 = 52.1%). The probability of using at least one contraindicated drug in patients.
(Kim et al., 2021)	Describe the impact of drug management services (MMS/Medication Management Service) on the quality of drug use	This retrospective descriptive study included 95 patients who received geriatric MMS in an ambulatory care clinical a single tertiary-care teaching hospital from May 2019 to December 2019	N = 95	The average age of the patients was 74.9 ± 7.3 years; 40% of them had CKD Stage 4 or 5. Medication use quality was assessed in 87 patients. After providing MMS, the total number of medications and potentially inappropriate medications (PIMs) decreased from 13,5 ± 4,3 to 10,9 ± 3,8 and 1,6 to 1,4 (p <0,001), respectively), There were 345 DRPs identified, side effects and drugs that were not indicated were the most common DRPs.
(van Berlo-van de Laar et al., 2020)	The aim of this study was to evaluate pharmacist-led medication reviews in pre-dialysis and dialysis patients by determining the number and type of DRPs, nephrologist acceptance of pharmacist interventions and time investment	DRPs (drug mismatches, prescribing problems related to drug and dose selection, drug use problems) were identified using the pharmacist's expert opinion and STOPP/START criteria.	N = 125	One-hundred twenty five patients were reviewed: 37 pre-dialysis and 88 dialysis patients. In 100 (80%) patients 277 medication discrepancies were identified of which 224 (81%) were accepted by the nephrologist. Pharmacists suggested 422 interventions concerning drug or dose selection for 115 patients; 106 interventions were accepted by the nephrologist, which resulted in 60 patients

Authors	Objective	Methods	Sample	Results
				having medication changed
(Roux-Marson et al., 2020)	The aim of our study is to describe, first, the overall medication profile of patients ≥75 years with advancedCKD (eGFR < 20 ml/min/1.73 m2) from the multi-center French, and to the determine the prevalence of RIM and PIM.	This is a cross-sectional analysis of medication profiles of individuals aged ≥75 years with eGFR < 20 ml/min/1.73 m ²	N = 556	In 77% of these patients with advanced CKD had at least 1 medication prescribed that is either contraindicated orrequires dose adjustments/precautions due to advanced CKD; 57.6% of patients had at least 1 PIM and 45.5%has at least one medication that is both RIM and PIM. Renal misprescribing was demonstrated by the 39.5% of patients with at least one medication prescribed at an inappropriate dose.
(Quintana-Bárcena et al., 2018)	To describe the prevalence of DRPs by severity level in CKD patients and assess the effect of a training-and-communication network program in nephrology (ProFiL) on these DRPs	This is a secondary analysis of a cluster randomized controlled trial evaluating the effect of the ProFiL-program.	N = 494 pharmacist N = 442 patients	CKD patients followed by a multidisciplinary team of health care professionals in CKD clinics was high, with an average of approximately 2 DRPs per patient.

Drug-related Problems Identified

The study by Quintana-Bárcena et al. (2018) evaluated drug-related problems (DRPs) among older patients with chronic kidney disease receiving multidisciplinary care. The authors reported that DRPs remained highly prevalent despite multidisciplinary management, with the most common problems including adverse drug reactions, non-adherence, inappropriate medication administration, and the use of non-prescribed medications (Quintana-Bárcena et al., 2018). These findings suggest that continuous medication review is necessary even in settings where multidisciplinary care has been implemented.

Roux-Marson et al. (2020) investigated the appropriateness of medication use among elderly patients with

advanced CKD. The study found a high prevalence of contraindicated medications and drugs requiring dose adjustment according to renal function. Inappropriate prescribing became more common as CKD progressed, emphasizing the importance of routine assessment of renal function before prescribing medications in older adults (Roux-Marson et al., 2020).

Van Berlo-van de Laar et al. (2020) evaluated pharmacist-led medication review in elderly patients with CKD and identified numerous clinically significant medication discrepancies. Most pharmacist recommendations were accepted by nephrologists, demonstrating the value of pharmacist involvement in identifying prescribing problems and optimizing medication therapy (van Berlo-van de Laar et al., 2020).

Arcoraci et al. (2021) assessed potentially inappropriate medications (PIMs) in older adults with CKD and reported that the prevalence of inappropriate prescribing increased with worsening kidney function. The study highlighted that physiological changes associated with aging and declining renal function substantially increase the risk of medication-related problems, supporting the need for regular medication review in this population (Arcoraci et al., 2021).

Kim et al. (2021) evaluated a pharmacist-led Medication Management Service (MMS) for older patients with CKD. The intervention significantly improved medication appropriateness by reducing the number of potentially inappropriate medications and optimizing pharmacotherapy (Kim et al., 2021). These findings demonstrate that pharmacist-led medication management can play an important role in preventing DRPs and improving medication safety in geriatric patients with CKD.

Overall, the included studies consistently demonstrated that geriatric patients with CKD and ESRD are at high risk of experiencing DRPs because of polypharmacy, multiple comorbidities, and impaired renal function. The most frequently reported DRPs were potentially inappropriate medications, contraindicated drug use, medication discrepancies, inappropriate prescribing, adverse drug reactions, and medications requiring renal dose adjustment. Collectively, these findings underscore the importance of comprehensive medication review, individualized dose adjustment, and multidisciplinary collaboration involving pharmacists to improve medication safety and optimize therapeutic outcomes in this vulnerable population.

Pharmacist Interventions and Clinical Implications

Two of the included studies specifically evaluated pharmacist-led interventions to improve medication management among older patients with

CKD. Kim et al. (2021) demonstrated that a pharmacist-led Medication Management Service (MMS) significantly improved medication appropriateness by reducing potentially inappropriate medications and optimizing pharmacotherapy (Kim et al., 2021). Similarly, van Berlo-van de Laar et al. (2020) reported that pharmacist-led medication reviews successfully identified clinically significant medication discrepancies, with most recommendations being accepted by nephrologists (van Berlo-van de Laar et al., 2020). These findings highlight the important contribution of pharmacists in identifying and resolving drug-related problems (DRPs) through comprehensive medication review and close collaboration with other healthcare professionals.

In addition to pharmacist-led interventions, the included studies consistently emphasized the importance of individualized medication management in geriatric patients with CKD and ESRD. Age-related physiological changes, declining renal function, multiple comorbidities, and polypharmacy substantially increase the complexity of pharmacotherapy and the risk of medication-related harm. Therefore, routine medication review, appropriate renal dose adjustment, regular monitoring of medication safety, and interdisciplinary collaboration are essential to minimize DRPs and optimize therapeutic outcomes in this vulnerable population.

CONCLUSION

The findings indicate that they underscore the importance of comprehensive medication review, individualized dose adjustment based on renal function, and collaborative pharmaceutical care involving pharmacists and multidisciplinary healthcare teams to improve medication safety and optimize therapeutic outcomes in this high-risk population.

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CONFLICT OF INTEREST

No potential conflicts of interest have been reported by the authors.

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