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Review Article

Nurse-led education for adults receiving maintenance hemodialysis: A scoping review

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Abstract

Background: Adults receiving maintenance hemodialysis manage complex treatment schedules, medicines, vascular access, and dietary and fluid restrictions. Nurse-led education may support these tasks, but intervention formats and reported outcomes are heterogeneous.

Objective: To map the characteristics, delivery methods, educational components, and reported outcomes of nurse-led education for adults receiving maintenance hemodialysis.

Methods: Original quantitative, qualitative, or mixed-methods studies published in English from 2020 through 2026 were eligible when adults receiving maintenance hemodialysis were included and nurses led or coordinated the educational intervention. PubMed, ScienceDirect, CINAHL, and ProQuest were searched. The source records did not preserve a defensible database-specific last-search date. Study characteristics, intervention content and delivery, outcomes, and authors' reported findings were charted and synthesized descriptively. The number of independent reviewers and pilot-testing of the charting form were not documented in the source records.

Results: Of 245 records identified, 45 duplicates were removed, 200 records were screened, 40 full-text reports were assessed, and 9 studies were included. Interventions used individualized education, teach-back with booklets, theory-informed education, the 5A model, telephone or SMS follow-up, counseling, and hierarchical nurse-led management. Studies most often reported knowledge, self-management, treatment adherence, dietary or fluid management, quality of life, and hospitalization. Most studies reported improvement in at least one outcome, although designs, intervention intensity, measures, and follow-up varied.

Conclusion: Nurse-led education for hemodialysis was delivered through diverse, often individualized and longitudinal approaches. The mapped evidence suggests potentially useful strategies for routine nursing practice, but this scoping review does not establish comparative effectiveness. Future research should report intervention components and outcomes consistently and use robust controlled designs with longer follow-up.

Background

Chronic kidney disease (CKD) is a major cause of morbidity and premature mortality worldwide. Kidney failure requiring kidney replacement therapy imposes an especially demanding treatment burden, and maintenance hemodialysis remains a common modality. Beyond attending repeated dialysis sessions, patients must coordinate medicines, vascular-access care, symptom monitoring, dietary choices, and fluid restrictions (Bikbov et al., 2020; KDIGO CKD Work Group, 2024). These tasks occur largely outside the dialysis unit and require sustained understanding, motivation, and problem-solving; observational work also shows that health behaviors vary across people with CKD (Schrauben et al., 2020).

Limited health literacy is common in CKD and is associated with poorer self-management and clinical outcomes (Taylor et al., 2018). Health literacy extends beyond receiving information: patients must be able to access, understand, appraise, and apply information in everyday decisions (Nutbeam, 2000; Sørensen et al., 2012). Accordingly, patient education is central to person-centered kidney care and should be responsive to language, learning needs, cognitive status, treatment experience, and family or social support (Alemayehu et al., 2020; Narva et al., 2016).

Nurses are well positioned to deliver education because of their recurring contact with patients before, during, and after dialysis. In this review, nurse-led education is defined as an intervention in which a nurse has primary responsibility for

assessing learning needs, planning or tailoring content, delivering or coordinating education, and/or conducting follow-up. This definition distinguishes nurse-led interventions from generic patient information or multidisciplinary programs in which the nurse's educational leadership cannot be identified.

Available educational approaches range from individualized face-to-face sessions and printed resources to teach-back, theory-based behavior-change programs, structured self-management models, telephone counseling, and digital support. Prior reviews and intervention protocols have considered self-management across CKD stages, health literacy, or particular educational techniques (Donald et al., 2018; Griva et al., 2011; Havas et al., 2016; Jagodage et al., 2024). Medication adherence remains a persistent concern in kidney disease, and broader syntheses suggest that nurse-led interventions may support medication knowledge and adherence, although intervention and population heterogeneity remain substantial (Kim et al., 2023; Tesfaye et al., 2024). However, evidence specifically describing how nurse-led education is designed and delivered for adults already receiving maintenance hemodialysis remains dispersed across heterogeneous intervention studies. Existing work does not provide a current map linking educational leadership, delivery method, content, and outcome domains within this population.

A contemporary mapping was therefore needed to clarify the intervention landscape rather than to pool effects. The 2020–2026 window was selected to characterize recent delivery models, including remote follow-up and digitally supported education, while maintaining a focused and manageable evidence base. This review asked: What are the characteristics, delivery methods, educational components, and reported outcomes of nurse-led education interventions for adults receiving maintenance hemodialysis? The objective was to map these elements, identify evidence gaps, and inform nursing practice and future intervention research.

Methods

Study Design

A scoping review was conducted using the stages proposed by Arksey and O'Malley (2005), with methodological clarification from Levac et al. (2010) and updated JBI guidance (Peters et al., 2020): identifying the question, identifying relevant studies, selecting studies, charting data, and collating and reporting results. Reporting was guided by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) (Tricco et al., 2018), while the updated PRISMA statement informed flow terminology and PRISMA-S informed search reporting (Page et al., 2021; Rethlefsen et al., 2021). PRISMA-ScR was used as a reporting guideline rather than as the methodological framework. No prospectively registered protocol or registration identifier was documented for this review. This is reported transparently in accordance with PRISMA-ScR item 5.

Review Question and PCC Framework

The Population–Concept–Context framework comprised adults receiving maintenance hemodialysis (Population), nurse-led education (Concept), and hospital-based or outpatient hemodialysis services (Context). The review question was: What are the characteristics, delivery methods, educational components, and reported outcomes of nurse-led education interventions for adults receiving maintenance hemodialysis?

Eligibility Criteria

Studies were eligible when they: (1) included adults receiving maintenance hemodialysis; (2) evaluated an educational intervention led or coordinated by a nurse; (3) reported an identifiable educational component and at least one patient outcome; (4) used a quantitative, qualitative, or mixed-methods original research design; (5) were published in English between 2020 and 2026; and (6) were available as a complete report for eligibility assessment and data charting. Comparators were not required. Studies of CKD populations not receiving hemodialysis, peritoneal dialysis-only populations, generic multidisciplinary education without identifiable nursing leadership, reviews, editorials, commentaries, protocols without results, conference abstracts without sufficient data, and duplicates were excluded. Full-report availability was required to verify intervention leadership and extract study characteristics; this restriction may have introduced availability and language bias.

Information Sources and Search Strategy

The source manuscript documented searches of PubMed, ScienceDirect, CINAHL, and ProQuest for records published from 2020 through 2026. It did not preserve the platforms used for CINAHL, ScienceDirect, or ProQuest, database-specific search dates, an update-search date, or complete line-by-line strategies. These details cannot be reconstructed reliably and are therefore not invented. The preserved generic strategy was: ("hemodialysis patients" OR "chronic kidney disease" OR CKD) AND ("nurse-led education" OR "nursing education" OR "patient education" OR "self-management education" OR "health education") AND ("hemodialysis unit" OR "dialysis unit" OR "hospital-based dialysis"). Controlled vocabulary and field tags were not retained in the source documentation. Appendix A reports the preserved strategy and the resulting limitation.

Study Selection

Retrieved records were deduplicated and screened against the eligibility criteria at title/abstract and full-text levels. The source flow record documented 45 duplicates but did not identify the reference-management software, automated procedures, number of screeners, independent screening status, or disagreement-resolution method. Because these process details were not recorded, no claim of duplicate independent screening is made. Selection counts are reported in Figure 1.

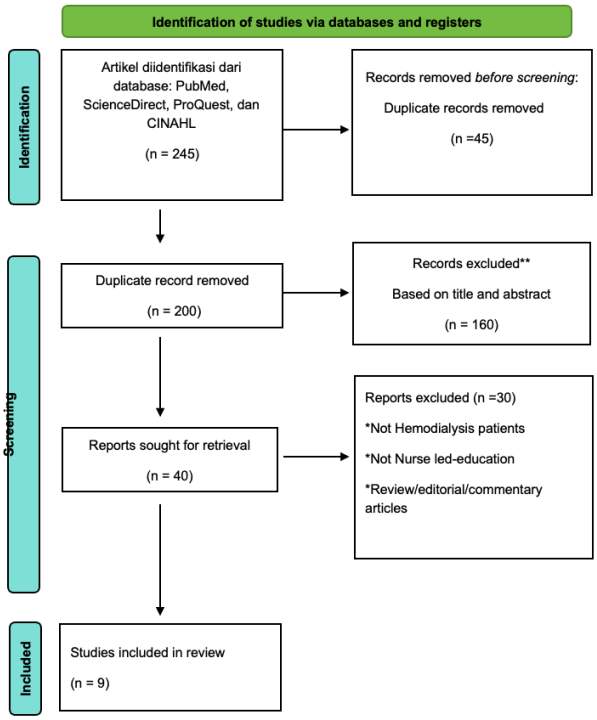

Figure 1. Prisma Flowchart

Data Charting

A structured charting form captured author, year, country, design, sample size, nurse-led intervention, educational content, delivery method, outcome domains, and authors' reported findings. The available documentation did not establish whether the form was piloted, whether charting was duplicated independently, or how disagreements were resolved; consequently, these procedures are not asserted. Table 1 presents the charted evidence.

Critical Appraisal

Methodological quality and risk of bias were not formally appraised. Critical appraisal is optional in a scoping review when the objective is to map the extent and characteristics of evidence rather than estimate a pooled effect (Tricco et al., 2018; Peters et al., 2020). Accordingly, findings are presented as outcomes reported by the included studies and are not interpreted as definitive estimates of effectiveness.

Data Synthesis and Analysis

Data were summarized using descriptive and narrative synthesis. Studies were grouped by delivery approach (individualized face-to-face education, teach-back and written materials, theory- or model-based education, remote follow-up and counseling, and hierarchical management) and by outcome domain (knowledge and learning needs, self-management and self-care, adherence, diet and fluid management, quality of life, and service use). Similarities, differences, and evidence gaps were identified through comparison of charted fields. Meta-analysis was not undertaken because study designs, interventions, measures, and follow-up periods were heterogeneous.

Results

The searches identified 245 records. After 45 duplicates were removed, 200 records underwent title and abstract screening; 160 were excluded. Forty reports were sought and assessed at full text. Thirty-one reports were excluded for aggregate reasons recorded in the source documentation: an ineligible population, absence of a nurse-led educational intervention, or an ineligible publication type. Nine studies met all

criteria. The original extraction incorrectly treated Atraca et al. (2025)—a multiple-case study of three people with CKD, not a hemodialysis intervention study—as a 44-participant pre–post study from China. It was therefore removed from the included evidence set.

The nine studies were conducted in Iran (n = 3), Morocco, Vietnam, Iraq, Türkiye, Egypt, and China. Designs included randomized or cluster-randomized trials (n = 5), quasi-experimental studies with or without a control group (n = 2), and single-group pre–post studies (n = 2). Sample sizes ranged from 30 to 302. All studies evaluated adults receiving hemodialysis, but intervention intensity, outcome measures, and follow-up differed substantially (Table 1).

Table 1. Characteristics of included studies

Study / country	Design	Intervention and delivery	Educational content	Outcomes	Authors' reported findings
Sajjadi et al. (2024) Iran	Single-blind RCT n = 102	Individualized education based on assessed learning needs and preferences Individual sessions led by an HD nurse; 3–6 sessions	Disease and treatment, diet/fluid, medicines, complications and access care	Patient Learning Needs Scale	Lower learning-needs scores immediately and at three months versus routine brochure education.
Ouirdani et al. (2026) Morocco	Single-arm quasi-experimental pre–post n = 30	Nurse-led nutrition education Structured face-to-face education	Dietary potassium, fluid control, thirst strategies, basic physical activity	Serum potassium and nutrition-related outcomes	The study reported improved potassium control after education; causal inference is limited by the single-arm design.
Nguyen et al. (2026) Vietnam	Single-group pre–post intervention n = 100	Self-management education Booklet plus teach-back led by dialysis nurses	Kidney disease knowledge, AV shunt care, dialysis and daily self-care	Knowledge and self-management	Post-intervention scores were higher than baseline; no concurrent control group was used.
Saeed & Baktash (2026) Iraq	RCT n = 60	Theory of Planned Behavior-based nurse-led education Theory-informed structured education	Knowledge, attitudes, subjective norms, perceived behavioral control, intention and medication adherence	Knowledge, medication adherence and TPB constructs	The intervention group showed reported improvements in knowledge, adherence and behavioral constructs.
Arad et al. (2021) Iran	Single-blind RCT n = 66	Patient education plus nurse-led follow-up Face-to-face education followed by telephone/SMS support	Dialysis attendance, medicines, fluid restriction and diet	Treatment adherence domains	The intervention group reported better adherence across dialysis attendance, medication, fluid and diet domains.
Tutur & Kır Biçer (2025) Türkiye	Randomized controlled experimental study n = 302	Telephone education and counseling Structured telephone education and counseling	Disease management, monitoring, self-care, adherence and support	Disease management, quality of life and self-care	The study reported better disease-management, quality-of-life and self-care outcomes in the intervention group.
Ibrahim et al. (2024) Egypt	Quasi-experimental pre–post control-group design n = 100	Educational nursing guidelines Guideline-based education with pre/post assessment	Self-management, fluid, diet, medicines, emotional control and dialysis care	Self-management and health-related quality of life	The intervention group showed reported gains in self-management and health-related quality of life.

Study / country	Design	Intervention and delivery	Educational content	Outcomes	Authors' reported findings
Keivan et al. (2023) Iran	Randomized clinical trial n = 60	5A self-management program Structured 5A sessions	Assess, advise, agree, assist and arrange	Quality of life	Selected quality-of-life domains improved, including cognitive function, sleep, social support and symptoms.
Zha et al. (2026) China	Prospective single-center cluster-randomized trial n = 80	Triangle-based hierarchical nurse-led management Tiered nurse-led management	Disease education, self-management, medicines, monitoring and complication prevention	Quality of life, self-management, adherence, knowledge and hospitalization	The intervention group had better reported patient-reported outcomes and fewer hospitalizations.

Intervention Approaches and Components

Individualization was a prominent strategy. Sajjadi et al. (2024) tailored sessions to assessed learning needs, preferences, age, education, cognitive status, and language. Nguyen et al. (2026) paired a dialysis-nurse booklet with teach-back, allowing the educator to identify misunderstandings about kidney disease, arteriovenous shunt care, and daily management.

Theory- and model-informed approaches included the Theory of Planned Behavior and the 5A model (assess, advise, agree, assist, and arrange). These programs addressed not only knowledge but also attitudes, perceived control, goal agreement, barrier management, and follow-up (Keivan et al., 2023; Saeed & Baktash, 2026).

Remote reinforcement extended education beyond dialysis sessions. Arad et al. (2021) combined initial education with nurse-led telephone or SMS follow-up, while Tutur and Kır Biçer (2025) delivered structured telephone education and counseling. Zha et al. (2026) embedded education in a hierarchical nurse-led management model. Across studies, commonly addressed topics were medicines, dialysis attendance, diet and fluid restriction, vascular-access care, symptom monitoring, and complication prevention.

Reported Outcome Domains

Included studies reported outcomes across knowledge or learning needs, self-management and self-care, medication and treatment adherence, dietary or fluid management, quality of life, and hospitalization. Most studies reported improvement in at least one measured outcome. However, the direction and magnitude of change cannot be compared reliably because measures, intervention intensity, follow-up, and study design varied; two studies lacked concurrent control groups. Findings are therefore mapped rather than interpreted as pooled evidence of effectiveness

Discussion

This review mapped nine recent studies of nurse-led education for adults receiving maintenance hemodialysis. Educational delivery was diverse, but three recurring features emerged: tailoring to individual learning needs, structured interaction that checks or supports understanding, and reinforcement over time. Reported outcomes extended beyond knowledge to self-management, adherence, quality of life, and service use. Nevertheless, heterogeneity and the absence of formal critical appraisal preclude conclusions about comparative or overall effectiveness.

Individualization addresses a central limitation of uniform written education: patients differ in health literacy, language, cognitive capacity, prior experience, goals, and readiness to change. CKD literature consistently links limited health literacy with difficulty applying treatment information (Alemayehu et al., 2020; Taylor et al., 2018). The individualized program mapped here operationalized a person-centered approach by assessing needs and preferences before selecting content and delivery (Sajjadi et al., 2024). This is consistent with broader calls for CKD self-management support that is collaborative rather than prescriptive (Donald et al., 2018; Havas et al., 2016).

Teach-back adds an observable feedback loop: patients explain information in their own words, enabling the nurse to correct misunderstanding. The mapped teach-back intervention reported gains in knowledge and self-management, which

aligns with a recent systematic review suggesting that teach-back can improve CKD knowledge, confidence, and skills, while also noting limitations in the evidence base (Jagodage et al., 2024). Teach-back should therefore be treated as a communication and comprehension-checking strategy, not simply as repetition (Akbar et al, 2025).

Theory-based and structured self-management models may strengthen the pathway from information to behavior. The Theory of Planned Behavior program targeted attitudes, norms, perceived control, and intention, whereas the 5A model incorporated assessment, advice, negotiated goals, assistance, and planned follow-up (Keivan et al., 2023; Saeed & Baktash, 2026). These elements are compatible with health-literacy models that emphasize application of information and with person-centered guidance encouraging shared decisions and patient activation (KDIGO CKD Work Group, 2024; Sørensen et al., 2012).

Telephone and SMS follow-up recognize that fluid, dietary, medication, and symptom-management decisions occur mainly between dialysis sessions. Remote reinforcement may offer timely clarification and motivational support without requiring additional travel. The included studies reported favorable adherence, self-care, and quality-of-life outcomes (Arad et al., 2021; Tutur & Kır Biçer, 2025). Digital support may be especially useful when paired with accessible content and an established clinical relationship, although equity considerations—including device access, language, digital literacy, and hearing or cognitive impairment—remain important (Isautier et al., 2022).

Clinical and service outcomes were less consistently represented than knowledge or self-management (Akbar & Ferdi, 2022). Nutrition-focused education reported improved potassium control, and hierarchical nurse-led management reported fewer hospitalizations (Ouirdani et al., 2026; Zha et al., 2026). These observations are clinically relevant but should remain attributed to the individual studies because designs and measures varied and this review did not appraise risk of bias. The evidence map identifies a need for agreed core outcomes, transparent intervention descriptions, and longer follow-up so future syntheses can compare approaches more meaningfully.

The principal contribution of this review is an updated, hemodialysis-specific map linking nursing leadership with delivery strategies, educational content, and outcome domains. It narrows the population more clearly than broader CKD self-management reviews and highlights that "nurse-led" should describe accountable educational leadership rather than the mere presence of a nurse. This conceptual precision can improve intervention reporting and evidence retrieval.

Implications for Practice and Research

Hemodialysis services may consider embedding a documented educational pathway that begins with learning-needs and health-literacy assessment, uses plain language and teach-back, addresses medicines, diet, fluid, access care and warning signs, and schedules reinforcement between dialysis sessions. Implementation should remain responsive to local staffing, language, technology access, and patient preferences. Future trials should specify who led each educational component, intervention dose and fidelity, comparator care, validated outcomes, adverse or unintended effects, and follow-up. Comparative studies and implementation research are needed before one model can be recommended over another.

Strengths and Limitations

This review used a clearly defined hemodialysis population, an explicit operational definition of nurse-led education, a PCC-framed question, and PRISMA-ScR-guided reporting. It also corrected a materially misclassified study and reconciled selection counts. Important limitations remain. The review was restricted to English-language full reports from four databases and may have missed relevant evidence. The source documentation did not preserve database-specific search dates, platforms, complete reproducible strategies, screening software, independent-review procedures, or charting-form pilot procedures. Full-text exclusion reasons were available only as aggregate categories. No formal critical appraisal was performed, so the certainty of individual findings was not judged. Publication through 2026 also represents an incomplete calendar-year

window. These limitations reduce reproducibility and require cautious interpretation.

Conclusion and Recommendation

Recent nurse-led education for adults receiving maintenance hemodialysis has used individualized sessions, teach-back and written materials, behavior-change frameworks, the 5A model, remote counseling, and hierarchical management. Included studies most often reported favorable changes in knowledge, self-management, adherence, diet or fluid management, quality of life, or hospitalization. Because the evidence is heterogeneous and was not critically appraised, these findings map promising approaches rather than establish effectiveness. Clearer reporting, common outcome measures, controlled designs, and longer follow-up are required to identify which educational components work best, for whom, and in which dialysis settings.

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Author Contributions
Fermata Sari: Conceptualization, formal analysis, writing—original draft, and writing—review and editing. Elsa Sylvia: Data curation, literature searching, data charting, and writing—review and editing. Neny Nursahaza: Formal analysis, visualization, and writing—review and editing. Ayu Prawesti Priambodo: Methodology, supervision, validation, and writing—review and editing.

Declaration of conflict of interest
The authors declare no competing interests.

Declaration on the Use of AI
No AI tools were used in the preparation of this manuscript.

Data Availability Statement
Data sharing is not applicable to this article.

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