

# Interventions Incorporating Therapeutic Alliance to Improve Hemodialysis Treatment Adherence in Black Patients with End-Stage Kidney Disease (ESKD) in the United States: A Systematic Review

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**Background:** In the US, Blacks with end-stage kidney disease (ESKD) have a four-fold higher prevalence rate of hemodialysis treatment and higher subsequent rates of hemodialysis treatment nonadherence and hospitalization compared to their White peers. Nonadherence to prescribed dialysis therapy is an underestimated life-threatening behavior, because of its association with increased morbidity and mortality. Few studies have specified and systematically evaluated targeted methods of increasing hemodialysis treatment adherence among Black hemodialysis patients with added focus on therapeutic alliance, a rewarding patient-centered relationship between patients and providers, based on common goals and objectives. This review seeks to evaluate the state of the science to determine the salience of a therapeutic alliance for the development of effective interventions positively impacting hemodialysis treatment adherence among Black patients.

**Methods:** Medline (via PubMed), Embase (OvidSP), Cumulative Index of Nursing and Allied Health Literature (CINAHL; EBSCOhost), and PsycInfo (ProQuest) databases were used to search for abstracts with the keywords “dialysis”, “therapeutic alliance”, and “treatment adherence and compliance”, including all underlying index terms and alternative variations of terms, in order to cover the entire scope of the field. Only randomized clinical trials and pre/postintervention studies published in the previous 10 years (2009–2019) and including a proportion of Black patients >25% were included for review.

**Results:** Only three intervention studies met these criteria, for a total aggregated sample of 130 — mean age 58.1 years and 53% female. None of these studies was composed exclusively of Black patients (range 62%–91.3%), nor did they present data specifically for Blacks. Despite the lack of robust data informing strategies to improve hemodialysis adherence among Blacks with ESKD, a limited number of intervention studies have reported positive effects on hemodialysis attendance.

**Discussion/Conclusion:** Further research is warranted to fill this significant gap in our understanding of theoretically based, therapeutic alliance-enhanced, and culturally tailored hemodialysis treatment-adherence interventions among Blacks.

**Keywords:** dialysis, adherence, ESKD, African Americans, systematic review, hemodialysis

## Introduction

End-stage kidney disease (ESKD) affects over 725,000 people in the US according to the latest US Renal Data Systems Annual Report.<sup>1</sup> High morbidity in ESKD results in high hospitalization rate as high as 1.73 per patient year, twice the hospitalizations of other age-matched patients with chronic conditions, with up to

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35% rehospitalizations.<sup>2</sup> The financial implication is daunting, with ESKD utilizing more than 7% of the Medicare budget at nearly \$40 billion each year, while accounting for <1% of the Medicare population.<sup>1-4</sup>

Nonadherence to prescribed hemodialysis therapy is a strong driver of poor outcomes among hemodialysis patients.<sup>5</sup> Missing one or more hemodialysis treatments versus not missing any treatments in 1 month is associated with ~68% higher mortality.<sup>6</sup> Up to 35% of hemodialysis patients miss their treatment appointments, and additionally 32% of those who make their hemodialysis appointments leave prior to their scheduled completion.<sup>5</sup> Missed treatments are broadly classified into those arising from situations outside a patient's control, such as transportation challenges and inclement weather, and those within a patient's behavioral decision control, ie. behavioral nonadherence.<sup>6</sup> Black patients treated with dialysis have a four-fold higher ESKD prevalence,<sup>2</sup> higher rates of nonadherence to prescribed dialysis treatments,<sup>7</sup> and four-fold higher hospitalization rates compared to Whites.<sup>5</sup> Nonetheless, despite its critical importance, there are scant data describing interventions addressing hemodialysis treatment nonadherence among Blacks.

Health behavior-change interventions are most successful when informed by behavioral theory.<sup>8</sup> A theory is a logical collection of ideas and concepts that organize, predict, and explain behavior.<sup>9</sup> Theoretical models of behavior facilitate the understanding of health behavior and assessment of effectiveness of an intervention.<sup>8</sup> In the context of improving patient adherence in chronic illness, application of behavioral theory has been recommended to aid better understanding of predictors of behavioral nonadherence and inform intervention development.<sup>8,10,11</sup> Such behavioral theories such as the theory of planned behavior, common-sense model, and motivational interviewing empower hemodialysis patients, promote patient engagement critical for patient care and improved outcomes, and offer insight into improving adherence in ESKD.<sup>12</sup> However, the frequency with which hemodialysis treatment-adherence studies incorporate interventions grounded in these or other pertinent theoretical models is not known.

Therapeutic alliance is an indirect predictor of nonadherence and self-care in ESKD.<sup>13</sup> In this alliance, the patient and provider prioritize patient-identified behaviors and beliefs and agree on intervention objectives by building confidence, skills, and motivation to implement and sustain behavioral change.<sup>8</sup> The likelihood of behavior change-intervention effectiveness is contingent upon the development of a therapeutic alliance, or a shared understanding of the behavioral problem between the patient

and provider. Improved therapeutic alliance is key to optimizing patient activation, an unaddressed opportunity in kidney-disease management.<sup>14</sup> Patient activation is very low among ESKD patients,<sup>15</sup> and Black patients with ESKD have lower patient-activation scores than their White peers.<sup>16</sup> Enhancing patient activation and self-care by strengthening therapeutic alliance could be an important strategy to mitigate racial/ethnic disparities in hemodialysis treatment adherence and improve overall outcomes for patients with ESKD.<sup>17</sup>

Despite the substantial evidence of reduced hemodialysis treatment adherence among Blacks, no report to our knowledge has systematically reviewed the hemodialysis treatment-adherence literature specifically on Blacks to garner input that will inform clinical practice and research. Nor do there appear to be any reports that have undertaken an assessment of the application of theoretical frameworks or the inclusion of therapeutic alliance to enhance the success of interventions targeting improvement in hemodialysis treatment adherence. The purpose of this paper is to systematically review experimental and quasiexperimental interventions employing a therapeutic alliance strategy to improve hemodialysis treatment adherence including among Blacks with ESKD undergoing hemodialysis, and to investigate the use of health-behavior theories to enhance the rationale and understanding of the findings specific to the tested interventions.

## Methods

This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist. Studies were limited to randomized trials and pre-post intervention studies published in English as fulltext articles between January 2009 and July 2019 evaluating interventions to improve adherence to hemodialysis in ESKD-patient populations comprised of over 25% Blacks. The timeline of this review was driven by the need to focus on more recent literature, especially given the existence of a previous systematic review of interventions to improve adherence to dialysis treatment, medication, fluid, and diet, which included randomized controlled trials conducted up to 2008, though not specific to the population of interest.<sup>18</sup> The cutoff of 25% Blacks in the selected studies was chosen because it inspired enough confidence that there were enough Blacks in the sample to deduce that the findings were applicable to our population of interest. The review was registered with, the International Prospective Register of Systematic Reviews (PROSPERO; CRD42019145736).

## Data Sources and Searches

Electronic database searches were performed on Medline (via PubMed), Embase (OvidSP), Cumulative Index of Nursing and Allied Health Literature (CINAHL; EBSCOhost), and PsycInfo (ProQuest) for relevant articles using standard search terms. Medline MeSH terms included combinations of “renal dialysis” or “hypertension” or “kidney failure, chronic” or “renal insufficiency” and “therapeutic alliance” or “motivational interviewing” or “social support” or “directive counseling” or “patient care team” or “patient care management” and “hospitalization/statistics and numerical data” OR “patient compliance” OR “treatment adherence and compliance”, including all underlying index terms and alternative variations of terms, in order to cover the entire scope of the field. Search results were restricted to English-language articles from 2009 to 2019. The search strategy used for Medline and other databases is provided in [Appendices 1–4](#). Titles and abstracts were evaluated by two independent reviewers (CB and RD) to identify articles to be included in the final review. Disagreement was resolved by discussion among all the authors until consensus was reached. Additionally, references of articles included and other previous reviews were hand-searched for articles that may have been missed by the database searches.

## Study Selection

Studies that described adult patients living with ESKD who were undergoing hemodialysis were considered. Studies were included if they described a pre–post quasi-experimental or experimental design, had >25% Blacks in the study population, reported data on one of the measures of hemodialysis adherence (hemodialysis attendance or length of hemodialysis session as a predefined primary or secondary outcome), and were conducted in the US. The reported measure of adherence could be indirect (self-reported adherence) or direct (chart review of attendance). Studies that assessed surrogate measures of treatment adherence, such as hospitalizations, morbidity, and mortality, were assessed in order to ensure an exhaustive search of hemodialysis treatment–adherence intervention studies.

## Data Extraction and Quality Assessment

A standard checklist developed by the full team of authors was used to extract the following data from the studies included: publication year, first author’s name, journal, study design, number of participants, study-population characteristics, study location, enrollment period and criteria, intervention

type, adherence measure, underlying theoretical model of behavior, and measures of adherence before and after the intervention. If the intervention resulted in improvement in the prespecified adherence measure, the study outcome was considered positive. One author (CB) extracted the information and another author (RD) verified its accuracy. An assessment of bias in included studies was done using modified versions of the Cochrane RoB 2.0 and ROBINS tools, modified by the team of authors, refined by two authors, and then utilized for evaluation of included studies.

## Data Synthesis and Analysis

We provide detailed description of the study design, study measures, outcome measures, methodology, theoretical framework, therapeutic alliance, and main findings of each study. Studies were included if they met the inclusion criteria. In addition to summarizing each study and identifying the limitations of our review, we describe patterns that emerged from looking across the studies and then discuss the strengths and weaknesses of this body of literature.

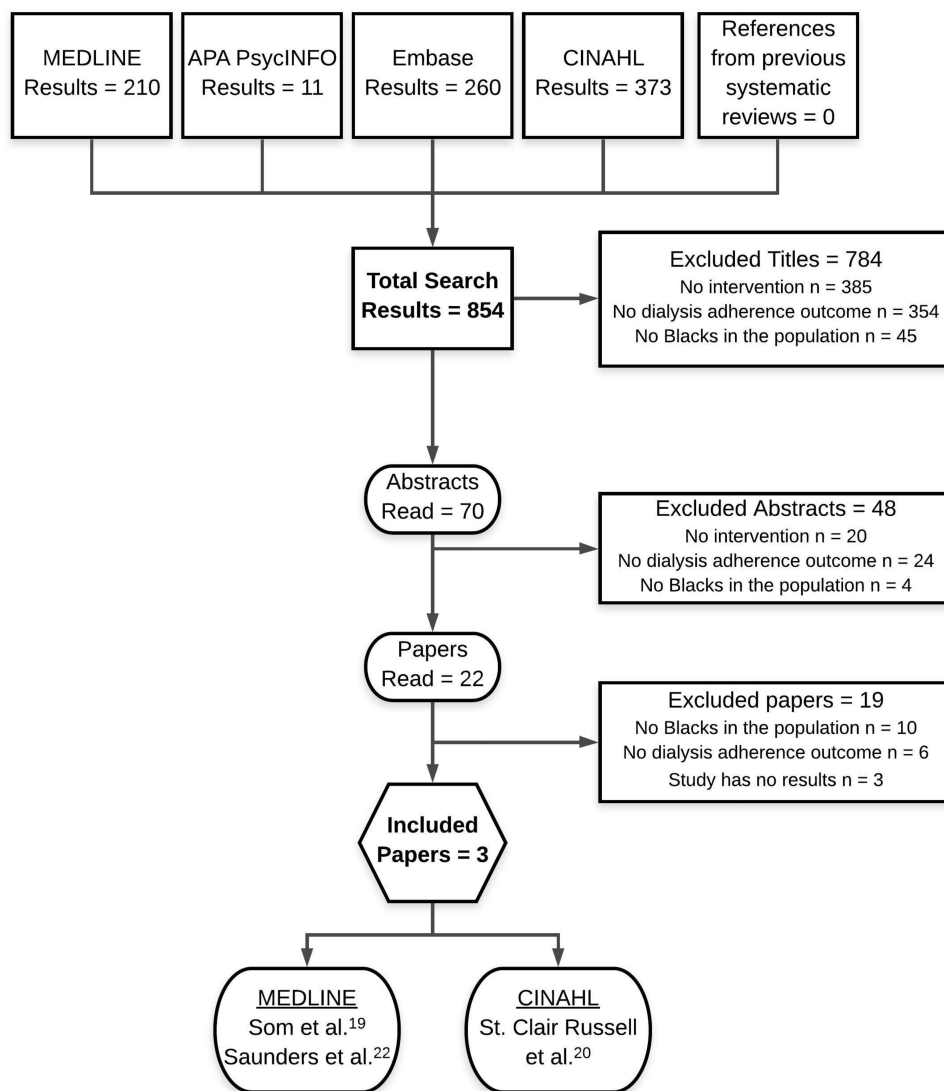
## Results

### Search Results

Electronic searches to identify relevant articles were completed on July 2, 2019 using the aforementioned search strategies. The broad electronic database search retrieved 854 citations, of which 70 potential studies were identified based on the inclusion criteria. After the abstracts for these 70 citations had been read, 22 studies were deemed eligible based on the inclusion and exclusion criteria. Hand-searching of references from systematic reviews pertinent to the topic did not yield any additional studies. Of these 22 papers, three were found to meet all the inclusion and exclusion criteria fully. Primary reasons for excluding the other 19 papers were failure to include hemodialysis treatment adherence as an outcome, failure to provide information on race categories in the demographics, and study location outside the US, predominantly in countries without any Blacks in the population ([Figure 1](#)).

### Study Characteristics

Of the three studies included in this review, one was a randomized controlled trial with a crossover design,<sup>19</sup> while the other two were pre–post single-arm intervention studies ([Table 1](#)).<sup>20,21</sup> All three studies were conducted in university-affiliated hemodialysis centers. Sample sizes ranged from 19 to 65 participants. Mean age was 58.1±6.9 years, and female patients constituted a slight majority (53%±8.9%) of the



**Figure 1** Flow diagram showing data sources and study-selection process.

study participants. All studies recruited patients undergoing in-center hemodialysis, with the exception of the mentor group in the study by St Clair Russell et al, who could also be home-hemodialysis patients or transplant recipients who had previously been dialyzed in the in-center hemodialysis facility.<sup>20</sup> Percentage of Black subjects in the studies ranged from 62% to 91.3%, and none of the studies exclusively targeted hemodialysis-adherence improvement in Blacks with ESKD.

## Risk of Bias

The overall risk of bias was judged medium<sup>20</sup> and high<sup>22</sup> for the pre-post studies and low for the randomized controlled trial.<sup>19</sup> The most common risk of bias in all three studies was in the domain of bias in measurement of outcome, given the chance of the outcome measure being

influenced by the knowledge of the intervention received. Additional details of the risk-of-bias assessment of individual studies and scoring system are provided in [Table 2](#) and [Appendix 5](#).

## Interventions

The first study evaluated the impact of mentoring.<sup>20</sup> St Clair Russell et al conducted a single-arm, 4-month, peer-to-peer mentoring program to improve self-management behaviors of hemodialysis patients. Improvement in adherence metrics, such as missed and shortened treatments and hospitalizations, were monitored.<sup>20</sup> In addition to basic kidney information, mentors were trained in leadership, communication skills, relationship-building, and active listening.

**Table 1** Descriptive Characteristics of Intervention Studies Assessing HD-Treatment Adherence in Populations with >25% Blacks

	<b>Improving Dialysis Adherence for High-Risk Patients Using Automated Messaging: Proof of Concept</b>	<b>Improving Patient Experience and Treatment Adherence in the Adult Outpatient Hemodialysis Population</b>	<b>A Peer-to-Peer Mentoring Program for in-Center Hemodialysis: a Patient-Centered Quality Improvement Program</b>
Authors	Som et al <sup>19</sup>	Saunders et al <sup>22</sup>	St Clair Russell et al <sup>20</sup>
Study design	Randomized control trial	Pre–post	Pre–post
Sample size	19	65	Mentors 23, mentees 23
% Black	84.2%	62%	Mentors 73.9%, mentees 91.3%
Age, years	50 (25–63)	65–74	Mentors 57, mentees 56
Setting	University-affiliated HD center in urban area	University-affiliated outpatient HD clinic	University-affiliated HD center in urban area
Dates of enrollment	February 2015	Not reported	March–June 2015
Inclusion criteria	<ul style="list-style-type: none"> <li>aged &gt;18 years,</li> <li>on chronic HD</li> <li>≥12 weeks at participating centers</li> <li>2–6 missed HD sessions over prior 12-week period</li> <li>planned HD for subsequent 16 weeks</li> <li>access to mobile or landline phone</li> <li>ability to provide informed consent</li> </ul>	<ul style="list-style-type: none"> <li>aged &gt;18 years,</li> <li>on chronic HD for ≥3 months</li> <li>no altered mental status</li> <li>not living in skilled-nursing or assisted-living facilities and managing their own medications</li> <li>life expectancy ≥6 months</li> </ul>	Mentees: <ul style="list-style-type: none"> <li>aged &gt;18 years with ESKD on HD at the facility,</li> <li>ability to provide informed consent</li> <li>comprehends English</li> <li>committed to duration of program</li> <li>no altered mental status</li> <li>no intellectual disability</li> </ul> Mentors: <ul style="list-style-type: none"> <li>on HD &gt;1 year</li> <li>on ≥ 6-month in-center HD</li> <li>on home dialysis or former patients of the facility</li> <li>completing all training activities</li> </ul>
Intervention type	Crossover design of SMS texts or voice-message reminders followed by a period of no intervention (or opposite)	Nurse-practitioner medication review	Mentor–mentee pairing
Dosing of intervention	3 times per week for 8 weeks	Once per month for 3 months	Weekly for 4 months
Period of baseline-data collection	12 weeks	Measurement before implementation	3 months
Postintervention data-collection period	8 weeks of intervention and 8 weeks of control	Measurement after stopping intervention	3 months
Theoretical basis	Not specified	Diffusion-of-innovation theory	Social cognitive theory
Adherence measure	Median number of missed dialysis sessions	End-Stage Renal Disease Adherence Questionnaire + medical records of dialysis attendance	Missed treatments and shortened treatments reported in the EHR
Prior to intervention	Median number of missed sessions: 4 treatments over prior 12 weeks	Dialysis attendance: 53.8% (n=35): number of patients coming to all HD treatments and completing the treatments	Mentees: <ul style="list-style-type: none"> <li>Missed HD: 7.14, ie, sum of missed HD sessions per 2-month time period divided by total prescribed HD sessions per time period</li> <li>Shortened sessions: 11.54, ie, sum of HD treatments shortened by ≥30 minutes per individual per 2-month time period divided by total prescribed HD sessions per time period</li> </ul> Mentors: <ul style="list-style-type: none"> <li>Missed sessions: 0.</li> <li>Shortened sessions: 12</li> </ul>

(Continued)

**Table 1** (Continued).

	<b>Improving Dialysis Adherence for High-Risk Patients Using Automated Messaging: Proof of Concept</b>	<b>Improving Patient Experience and Treatment Adherence in the Adult Outpatient Hemodialysis Population</b>	<b>A Peer-to-Peer Mentoring Program for in-Center Hemodialysis: a Patient-Centered Quality Improvement Program</b>
After intervention	Median number of missed sessions: 1 treatment during study period (8 weeks of intervention and 8 weeks of control)	Dialysis attendance: 71.9% (n=41); number of patients coming to all HD treatments and completing the treatments	Mentees: Missed sessions: 0 Shortened sessions: 13.46 Mentors: Missed sessions: 0, shortened sessions: 7.69

**Abbreviation:** HD, hemodialysis.

**Table 2** Assessment of Risk of Bias

Pre-post	Experimental design	No Confounding	No Selection Bias	No Bias in Measurement of Outcome	No Bias Due to Deviation from Intended Interventions	No Bias Due to Selective Reporting of Results	No Bias Due to Missing Outcome Data	Score
St Clair Russell et al <sup>20</sup>	0	0	1	0	1	1	1	Medium risk
Saunders et al <sup>22</sup>	0	0	1	0	1	1	0	High risk
RCT	Experimental design	Random-sequence generation	Allocation concealment	Blinding	Level of completion of outcome data	Similarity of groups at baseline	No loss of data	Score
Som et al <sup>19</sup>	1	1	1	0	1	1	1	Low risk

**Notes:** Scoring: 6–7 — low risk, 4–5 — medium risk, 1–3 — high risk.

Som et al initiated an intervention consisting of automated short message service (SMS) texts or voice messages delivered thrice weekly to the patient's preferred phone number.<sup>19</sup> These messages included details about the subject's upcoming hemodialysis session, a message of encouragement highlighting the clinic's supportive role, and an option for direct call routing to the hemodialysis center if the patient could not attend their scheduled hemodialysis. Data on missed treatments and hospitalizations were documented.

Saunders et al implemented a nurse practitioner-led education-and-feedback intervention to improve self-management in adults with ESKD on chronic hemodialysis at an outpatient hemodialysis unit.<sup>22</sup> A unique addition to this study was the provision of concurrent pharmacist access, known to improve adherence by reducing the risk of medication-record discrepancies and medication-related problems.<sup>23</sup> These different interventions targeted various barriers faced by ESKD

patients, especially Black patients, including lack of social or emotional support and limited health literacy preventing an in-depth understanding of medications and importance of hemodialysis treatments.

## Health-Behavior Theories and Therapeutic Alliance

Theory-informed interventions were tested in two of the three studies, and the underlying theories were social cognitive theory<sup>20</sup> and diffusion-of-innovation theory.<sup>22</sup> One of the studies incorporated a multidisciplinary care-focused therapeutic alliance in the form of nurse practitioner-led education and access to a pharmacist, resulting in improved overall self-management practices, including hemodialysis-treatment adherence, among other benefits.<sup>22</sup> The remaining two studies incorporated therapeutic alliance via text message and peer mentoring.

## Outcome Assessment

All the studies described adherence to hemodialysis treatment in terms of attendance at sessions, but two of the three studies also reported patients' shortening of hemodialysis sessions as a component of treatment adherence.<sup>20,22</sup> These studies also reported other ESKD measures of adherence, including medications and/or fluid restrictions, but these details were not included in this review.

## Outcome Efficacy

All three trialed interventions were effective in improving at least one of the hemodialysis treatment–adherence outcome measures, ie, attendance at hemodialysis and/or completion of hemodialysis treatments. Only one of the interventions yielded mixed results, with positive results in the domain of attendance, but not in that of reduction in number of shortened sessions.<sup>20</sup>

## Discussion

The purpose of this paper was to systematically review intervention studies designed to increase hemodialysis treatment adherence through improved patient–clinician interactions that included a significant number of Black patients with ESKD receiving hemodialysis. We found very limited published literature on this critical and timely topic associated with ESKD morbidity and mortality. All three studies incorporated therapeutic alliance via text messaging, peer mentoring, or nurse practitioner–led intervention.<sup>19,20,22</sup>

The likelihood of successfully enacting a positive behavior change and solving a clinical problem often depends on the use of appropriate theoretical models.<sup>9</sup> Two of the three studies included in this review were informed by theory: social cognitive theory<sup>20</sup> and diffusion-of-innovation theory.<sup>22</sup> St Clair Russell et al used the social cognitive theory as the premise for designing a peer-to-peer mentoring program to improve adherence and self-management practices among hemodialysis patients.<sup>20</sup> This theory has proven successful in improving adherence in other chronic conditions, such as HIV, by empowering HIV-positive patients and promoting the need for establishing supportive relationships to encourage adherence.<sup>24</sup> St Clair Russell et al operationalized the social cognitive theory by successfully identifying and improving key mediators, including self-efficacy, perceived social support, and hemodialysis social support, using the peer-to-peer mentoring program.<sup>20</sup> By pairing a poorly adherent hemodialysis patient with an already-adherent hemodialysis patient, the intervention was designed to achieve an improvement in hemodialysis

adherence. Unique aspects of the social cognitive theory, including vicarious reinforcement or reinforcement by rewarding adherence and observational learning or modeling<sup>24,25</sup> led to the observed improvement in self-efficacy and self-management behaviors.

Saunders et al<sup>22</sup> applied the diffusion-of-innovation theory to enhance existing medication-reconciliation processes and improve patient outcomes.<sup>26</sup> The diffusion-of-innovation theory has been historically used in intervention development, and evidence for its use is backed by robust conceptual and empirical data.<sup>27</sup> It was successfully operationalized in this study:<sup>27</sup> the simple but powerful act of thorough mediation reconciliation led by the nurse practitioner at each hemodialysis session was “the innovation” that led to a cascading positive effect on several adherence outcomes, including hemodialysis treatment adherence among the “adopters”, ie, the hemodialysis patients who quickly accepted and adopted the “diffusion” of self-management practices into the “social system”, ie, the outpatient hemodialysis unit, leading to improved communication between patients and members of the health-care team and improved patient outcomes.<sup>27,28</sup>

Changing health behavior is very complex, and even though the effectiveness and salience of behavior-change interventions can be enhanced by adapting interventions for minorities,<sup>29,30</sup> none of the three studies in this review was designed specifically to consider factors that may increase the salience and impact of the intervention for Blacks; however, even with the appropriate and effective use of health-behavior theory, considerable literature suggests that augmenting the theory guiding the behavioral intervention with program-planning approaches that explicitly consider cultural or ethnic factors (eg, PEN-3),<sup>31,32</sup> approaches that are specifically designed to enhance the cultural sensitivity of the intervention,<sup>33,34</sup> or cultural tailoring may enhance the salience and impact of the intervention. Cultural tailoring of interventions, a recognized priority for health promotion among racial/ethnic minorities,<sup>33,35</sup> ensures that behavioral interventions reach subcultural groups, in order to reduce health disparities effectively.<sup>29,35–37</sup> Cultural tailoring can be integrated into the therapeutic relationship between patients and providers. This critical relationship consistently predicts the outcome of the intervention<sup>38</sup> and reflects the strong bond between patients and providers.<sup>39</sup>

None of the existing studies focused on Blacks with ESKD, nor did any report adherence outcomes separately by race. Lack of representation of Blacks in clinical and biomedical research is a fundamental problem,<sup>40</sup> especially given the unique historical and ongoing experiences that lead to

fundamental sociocultural differences and medical mistrust that influence health outcomes.<sup>41–43</sup> Although few studies<sup>6–44–46</sup> have focused on specific barriers to adherence present in Black ESKD populations, none has proposed mechanisms for addressing these unique barriers to improve hemodialysis adherence and its health outcomes. Since the majority of the patients included in all three studies were Black, at best we can only extrapolate the results of these studies to estimate how Black hemodialysis patients would respond to the tested interventions. The absence of any studies focusing on interventions targeting hemodialysis-adherence improvement among Blacks exposes an unmet need in hemodialysis care.

In order to make a significant impact on improving hemodialysis treatment adherence, studies need to be rigorously designed with a well-defined target population, appropriate intervention, well-informed and precise intervention dose and duration, and adherence-specific intervention. Strategic efforts to recruit nonadherent subjects are necessary to increase the likelihood of achieving a measurable effect among a sample eligible to benefit from the intervention, and this was done in one of the studies.<sup>19,47</sup> Two of the three studies in this systematic review included younger patients in their mid-50s<sup>19,20</sup> while patients in the third study were mostly in their mid-60s to mid-70s.<sup>22</sup> Though no obvious efforts were made to recruit a certain age-group, the two studies that included younger patients were notably those that utilized technology<sup>19</sup> and peer-to-peer mentoring,<sup>20</sup> suggesting that younger patients were perhaps more interested in enrolling in these types of studies. Careful consideration of participants' age ranges will inform the choice of likely effective interventions and increase study enrollment and generalizability of study findings. This is especially relevant, since younger age has been identified as a unique predictor of dialysis-treatment nonadherence.<sup>6</sup>

The intervention dose varied by frequency of delivery across the three studies. It is unclear if the frequency of intervention delivery was informed by prior formative research (preferred) or such considerations as patient burden and budgetary and timeline considerations.<sup>48</sup> Duration of delivery of adherence interventions in all three studies was brief and follow-up relatively short, ranging 2–4 months. Long duration of delivery and follow-up, preferably up to 2 years, with multiple time points of outcome assessment and use of reinforcement strategies aid optimal assessment of adherence-behavior change in the setting of ESKD.<sup>18,49</sup> Interventions in the studies in this review were at risk of being too diffuse, because of multiple adherence targets, ie diet, medication, and hemodialysis treatment. While interventions can be designed to target change in multiple behaviors relevant to a specific outcome of

interest,<sup>50,51</sup> the ideal intervention should be hemodialysis treatment adherence-specific, rather than being bundled into a complex multilevel intervention targeting heterogeneous outcomes, because this limits the ability to draw meaningful conclusions regarding the efficacy of any intervention.

## Strengths

This review revealed a significant gap in knowledge about improving hemodialysis nonadherence in Blacks with ESKD, despite the association between hemodialysis treatment nonadherence and increased morbidity and mortality in this vulnerable population. Studies in this review reported at least one of the same measures of adherence (eg, attendance at hemodialysis), thereby allowing for standardized assessment and comparison of results. They demonstrated an improvement in adherence, with one of the studies even demonstrating improvement in a nonadherent population.

## Limitations

The major limitation in this systematic review is that most studies describing interventions to improve hemodialysis treatment adherence did not report the percentage of Blacks in the sample or outcome data by race. Other limitations include the small samples of all interventions, limiting power and increasing the risk of type II error,<sup>26</sup> brief study follow-up periods, limiting the ability to demonstrate sustained effects, lack of study populations comprised of 100% Blacks with ESRD, limiting the ability to make definitive conclusions about the most helpful types of interventions for this population, and heterogeneity of included outcomes, increasing chances of observed improvement in hemodialysis treatment adherence simply due to chance.<sup>49</sup>

## Conclusion

A few, but important, studies suggest that such interventions as text-message reminders, medication reconciliation, and peer mentoring may be effective in improving hemodialysis treatment adherence among Blacks, noting possible variations in the suitability and effectiveness of these interventions for younger versus older patients. Given the disproportionate burden of ESKD and worse hemodialysis treatment-adherence metrics in Blacks compared to Whites, there is a pressing need for studies with a specific focus on improving hemodialysis treatment adherence among Black patients and reporting outcomes by race. These studies should be guided by theoretical models of behavior informing intervention development, incorporate therapeutic alliance strategies, and employ cultural tailoring.

Eliminating the persistent devastating problem of nonadherence to hemodialysis treatments requires investment in building an evidence base to justify innovation and evolution in the delivery of hemodialysis.

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