



Informed Dialysis Modality Selection Among Veterans With Advanced CKD: A Community-Level Needs Assessment

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Rationale & Objective: The Advancing Americans Kidney Health Executive order has directed substantial increases in home dialysis use for incident kidney replacement therapy (KRT). Clinical guidelines recommend patients' self-selection of KRT modality through a shared decision-making process, which, at the minimum, requires predialysis nephrology care and KRT-directed comprehensive prekidney failure patient education (CoPE). The current state of these essential services among Americans with advanced (stages 4 and 5) chronic kidney disease (CKD) and their informed preferences for home dialysis are unknown.

Study Design: We conducted a community-based, cross-sectional, observational cohort study across a large regional Veteran Healthcare System from October 1, 2020, to September 30, 2021.

Setting & Participants: Of the 928 Veterans with advanced CKD, 287 (30.9%) were invited for needs assessment evaluations. Of the 218 (76% of invited cohort) responding, 178 (81.6%) were receiving nephrology care, with approximately half of those (43.6%) receiving such care from non-Veterans Affairs providers.

Outcomes: The study was targeted to assess the prevalent state of ongoing nephrology care and KRT-directed pre-kidney failure education among Veterans with advanced CKD. The secondary outcome included evaluation of dialysis decision-making state among Veterans with advanced CKD.

Analytical Approach: Veterans with advanced CKD with 2 sustained estimated glomerular filtration rates <30 mL/min/1.73 m² were identified through an electronic database query, and a randomly selected cohort was invited for their current state of and outstanding needs for

predialysis nephrology care and CoPE, essential for informed KRT selection.

Results: Basic awareness of kidney disease was high (92.2%) among Veterans with advanced CKD, although only 38.5% were aware of the severity of their CKD. KRT-directed education during clinical care was reported by 46.8% of Veterans, of which 21.1% reported having received targeted CoPE classes. Three-quarters (74.3%) of Veterans expressed interest in receiving CoPE services. Overall, awareness of CKD and its severity and receipt of KRT-directed education were significantly higher among Veterans with nephrology care than among those without. Of the 61 Veterans providing their KRT preferences, overall decision making was poor, with three-quarters (73.8%) of the cohort unable to choose any KRT modality, irrespective of ongoing nephrology care. Only 8 (13%) felt confident choosing home KRT modalities.

Limitations: The study results are primarily applicable to the Veterans with advanced CKD. Furthermore, a limited numbers of respondents provided data on their KRT decision-making state, prohibiting broad generalizations.

Conclusions: In a first-of-its-kind community-based needs assessment evaluation among Veterans with advanced CKD, we found that awareness of kidney disease is positively associated with nephrology care; however, the informed KRT selection capabilities are universally poor, irrespective of nephrology care. Our results demonstrate a critical gap between the recommended and prevalent nephrology practices such as KRT-directed education and targeted CoPE classes required for informed patient-centered home dialysis selection in advanced CKD.

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The Advancing American Kidney Health Executive Order has established an ambitious target of over 80% incident use of home dialysis or transplant by 2025 for patients with kidney failure in the United States.¹ Considering the structural limitations of kidney transplantation, an increase in home dialysis, which includes peritoneal dialysis and home hemodialysis, appears to be the dominant mechanism to achieve this goal.² Unfortunately, few health care systems across the world have achieved home dialysis utilization above 30%-40% of the total kidney failure population, primarily by having health

care policies that either favor or promote the home dialysis-first model.^{3,4} The mandated or facilitated home dialysis-first approach has limited stakeholder agreements in the US health care system, with professional kidney organizations recommending shared decision making between patients and providers for finalizing individuals' kidney replacement therapy (KRT) modalities.⁵ Pragmatic patient-centered preferences for home dialysis for health care systems that emphasize shared decision making to finalize KRT modality have not been systematically examined.

PLAIN-LANGUAGE SUMMARY

The Advancing American Kidney Health Executive Order recommended substantial, potentially unrealistic increases in societal home dialysis use. Unfortunately, we have not examined patient preferences for these targets to guide health care policies. Conducting a community-level needs assessment study among Veterans with advanced kidney disease, we found significant deficits in basic clinical care, namely the specialty nephrology care and dialysis-directed patient education services essential for informed patient-centered dialysis selection. This was expectedly associated with a sub-optimal state of dialysis decision making, with about three-quarters of those surveyed being unable to select any dialysis modality. Our results show a critical need for provider and system-level efforts to ensure universal availability of specialty kidney care and targeted education for all patients with advanced chronic kidney disease.

Expert opinions and professional societies have identified several patient-, provider-, and system-level barriers to home dialysis utilization in the United States.^{6,7} However, informed home dialysis use, at the minimum, requires patient confidence and ability to choose these modalities. As such, a universal opportunity for predialysis nephrology care and KRT-targeted comprehensive prekidney failure education, henceforth referred to as CoPE,⁸ are considered basic prerequisites for all patients with advanced chronic kidney disease (CKD).⁹ Unfortunately, repeated US Renal Data System (USRDS) reports have shown that nearly 40% of patients starting dialysis have either none or <6 months of predialysis nephrology care; <1% of incident dialysis patients receive dedicated predialysis CoPE services.¹⁰ Most importantly, these incident kidney failure data provide a retrospective view of health care services and do not help estimate the real-time deficiencies and patient preference patterns for these services and home dialysis in the target advanced CKD population.

Community-based needs assessments of target populations are used to examine the gap between the normative needs, defined as the evidence- or opinion-based recommendations for services in the target population, and felt needs, defined as the target population-perceived interest in receiving these services, and help target limited health care resources.^{11,12} Such assessments are difficult in the advanced CKD population in the United States due to multiple independent micro health care environments with variable patient-level insurance. The Veterans Health Administration (VHA) is a semi-longitudinal health care system mandated to provide health care for all eligible Veterans and frequently interdigitates with the conventional health care system. The VHA delivers specialty nephrology care through its large medical

centers with accommodations for non-VHA care for those with limited access to VHA facilities.^{13,14} Thus, examining service patterns and preferences among Veterans with advanced CKD can identify deficiencies in the essential services for the VHA and provide a glimpse into the broader US health care system.

We conducted a community-based cross-sectional study to identify all VHA-enrolled Veterans with advanced CKD and assess their current status and outstanding needs for specialty nephrology care and KRT modality education services. Participants eligible and interested in receiving KRT modality education were then assessed for their KRT preferences and enrolled into Trial to Evaluate and Assess the effects of Comprehensive pre-ESKD education on home dialysis among Veterans (TEACH-VET), a randomized study aimed to examine the impact of a community-based active provision of targeted CoPE versus passive provision of publicly available KRT modality education resources on informed selection and use of home dialysis among Veterans with advanced CKD.¹⁵

METHODS

This study was based on the recently published conceptual clinical model for advanced CKD care in the US with respect to home dialysis use (Fig 1).⁹ The model posits that compared with “no nephrology care,” “predialysis nephrology care,” “predialysis nephrology care with KRT modality education delivered during routine visits,” and “predialysis nephrology care supplemented by targeted CoPE classes” are ordinal escalations in the quality and intensity of advanced CKD clinical care influencing informed home dialysis utilization.

The study was conducted across a broad geographical region in the southeast United States covered by the North Florida South Georgia Veteran Healthcare System (NF/SG VHS). The institutional review board of the University of Florida (UF IRB: #201900870) provided regulatory approvals with a waiver for the documentation of informed consent. To capture an unbiased prevalent population with advanced CKD, we used our recently published, electronic health record-based opt-out enrollment strategy with all consecutive data from October 1, 2020, to September 30, 2021, represented.^{15,16} In brief, the investigative team constructed a source cohort of all Veterans with high-probability advanced (stage 4 and 5) CKD from the VHA corporate data warehouse and Veterans Affairs (VA) Informatics and Computing Infrastructure, with sustained reduction of estimated glomerular filtration rates (eGFRs) <30 mL/min/1.73 m² by the Modification of Diet in Renal Disease (MDRD) equation >90 days apart.¹⁷ Patients receiving dialysis were excluded using Current Procedural Terminology and International Classification of Diseases codes.¹⁷ Eligible participants, irrespective of their nephrology care status, were invited to participate. Veterans not opting out within the first 2 weeks were actively contacted by the study team for the needs assessment evaluations.

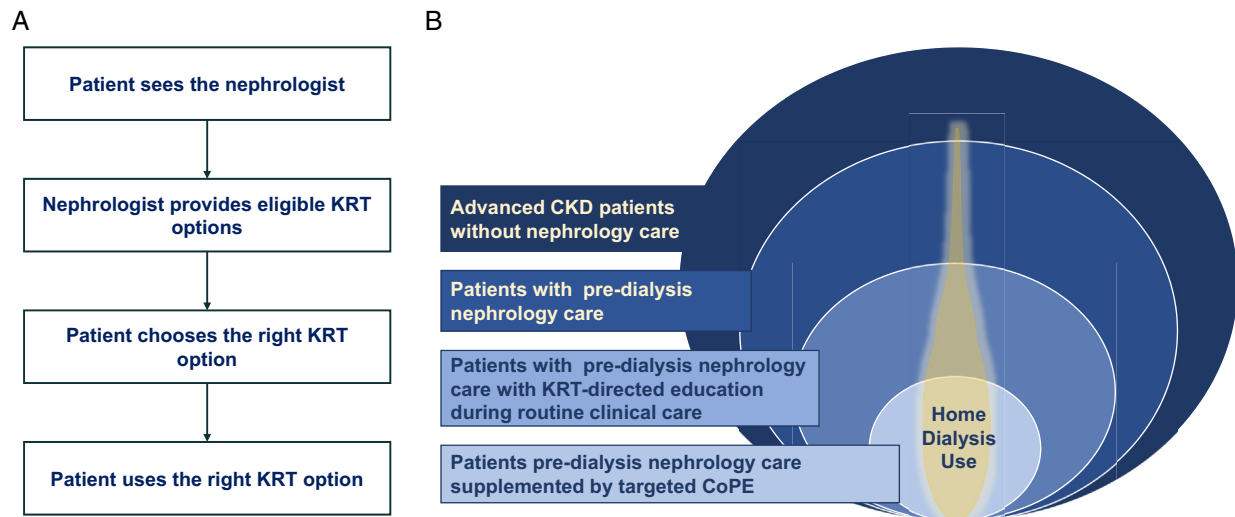


Figure 1. The conceptual models of advanced CKD care at patient and health care system levels. Panel A shows the parsimonious patient-level model highlights key steps for an individual to reach an informed KRT selection. Panel B shows the population-level model integrates the conceptual clinical model with health outcome data to create a system-level “Flame Model” in which the quality/intensity of prekidney failure clinical care is associated with progressively higher utilization of home dialysis therapies. Abbreviations: CKD, chronic kidney disease; CoPE, comprehensive prekidney failure education; eGFR, estimated glomerular filtration rate; ICD, *International Classification of Diseases*; KRT, kidney replacement therapy; NF/SG VHS, North Florida South Georgia Veteran Healthcare System.

Participant surveys were designed to evaluate the current state of, and outstanding needs for, nephrology care and CoPE services. Patient-level data, including age, sex, race, marital status, era of Veteran, residential zip codes, serum creatinine, eGFR, and albuminuria were extracted from the corporate data warehouse. Structured telephonic surveys were conducted by trained navigators with backgrounds in Social and Behavioral Science (SS and PS) after obtaining consent focusing on Veterans’ awareness of kidney disease, the existing state of nephrology care, and clinic-delivered and targeted CoPE services (Item S1). Based on the findings from the study by Tuot et al,¹⁸ the survey language was kept purposefully broad and used compound cues and multiple patient-centered terminologies to accurately determine patient awareness. A team of an anthropologist (JHG) and nephrologists (GC and AMS) reviewed and approved the final survey questions before collecting data. Finally, surveyors were educated on the fundamental aspects of CoPE, including the dialysis modalities. All participants were surveyed for their interest in and preference mode for (face-to-face versus telehealth) receiving CoPE services, if offered by the VHA. Participants eligible and interested in TEACH-VET¹⁵ were surveyed for KRT preference parameters (Item S1). Dialysis modality preference was evaluated by: “If I had to choose a dialysis modality option today, I would choose (a) peritoneal dialysis; (b) home hemodialysis; (c) in-center hemodialysis; (d) conservative care; I do not know,” with peritoneal dialysis and home hemodialysis aggregated as home dialysis.

Statistical analysis was performed using Excel (Microsoft), the open-source statistical computing package

pandas for Python, and R software version 4.1.2.¹⁹ Preliminary analyses included exploring the distributions of variables and demographics of the sample. In secondary analyses, Pearson’s χ^2 test and Fisher exact test were used to test for statistically significant differences between care groups (those receiving services inside versus outside the VA and those receiving specialty nephrology care versus those not currently receiving nephrology care) on key variables such as awareness of CKD and dialysis modality choice. Kruskal-Wallis 1-way analysis of variance was used to test for differences between groups in age.

RESULTS

Of the 133,756 active Veterans enrollees at NF/SG VHS, 93,216 had a measured creatinine value and at least 1 visit at NF/SG VHS within the prior 12 months, 1,759 Veterans were identified to have advanced CKD based on the latest eGFR <30 mL/min/1.73 m² or diagnosis codes, and 928 Veterans had sustained reduction <30 mL/min/1.73 m² >90 days apart. A cohort of 387 Veterans was randomly screened for needs assessment evaluation, leading to 287 eligible Veterans being mailed invitations for study participation, and 218 (76%) agreeing to participate in the needs assessment survey (Fig 2). The mean age of this predominantly male population ($n = 210$, 96.3%) was 75.8 ± 10.7 years. The majority of the respondents were White ($n = 148$, 67.9%), with latest mean eGFR of 23.3 ± 5.0 mL/min/1.73 m².

Examining the existing care patterns, 178 (81.7%) of the Veterans with advanced stage 4 or 5 CKD attested to having ongoing nephrology care, with 79 (36.2%)

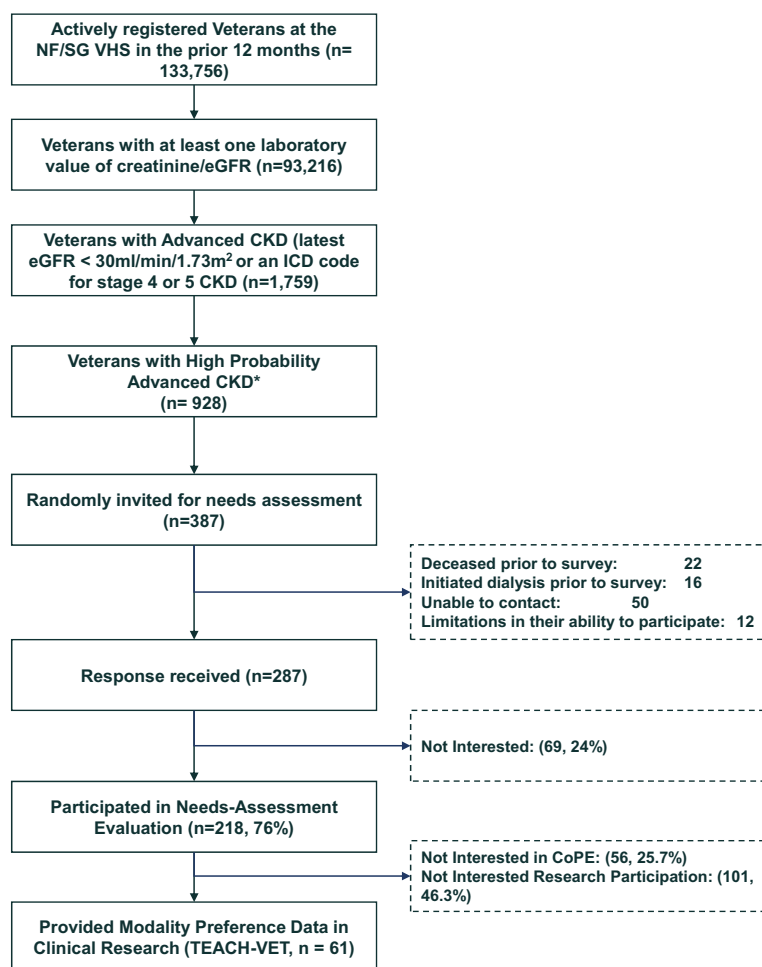


Figure 2. Participant selection diagram. Abbreviations: CKD, chronic kidney disease; CoPE, comprehensive prekidney failure education; eGFR, estimated glomerular filtration rate; ICD, *International Classification of Diseases*; NF/SG VHS, North Florida South Georgia Veteran Healthcare System.

receiving care from the VA, 95 (43.6%) receiving it from outside the VA, and 4 receiving from both sources. Forty (18.4%) Veterans with advanced CKD did not have ongoing nephrology care. There were no significant demographic differences between the Veterans with or without nephrology care or between those who received care within or outside the VHA system. Nearly half ($n = 123$, 56.4%) resided in rural areas as defined by Rural Urban Community Area codes with trends favoring specialty nephrology care from within the VHA among these Veterans (Table 1).

The vast majority of Veterans with advanced CKD ($n = 201$, 92.2%) were aware of their kidney disease; however, only 84 (38.5%) Veterans could correctly identify the severity of their CKD, either by stage or by eGFR. Basic awareness of kidney disease ($n = 26$, 65%) and awareness of the severity of CKD ($n = 9$, 22.5%) were substantially lower among Veterans without nephrology care than those with nephrology care; however, these parameters did not differ based on the source of the specialty care, from within or outside the VHA (Table 2).

Nearly half of Veterans ($n = 102$, 46.8%) attested having received information regarding KRT during their routine clinical care; however, only 46 (21.1%) Veterans reported having attended a dedicated CoPE session. CoPE attendance was higher among those with nephrology care ($n = 38$, 21.7%) than those without ($n = 5$, 12.5%); however, this was not statistically significant ($P = 0.1$). Of the 218 respondents, 162 (74.3%) desired receiving dedicated CoPE services, with half ($n = 81$, 50%) preferring to receive them through telemedicine and only a third ($n = 54$, 33.3%) preferring face-to-face CoPE. There was no difference in CoPE modality preferences between the groups receiving care in the VA and those receiving outside care. Of the 56 (25.7%) participants declining CoPE, 43 provided reasons for refusals: 11 (25.6%) because they received it from their provider, 5 (11.6%) nonagenarians suggested they were too old, 7 (16.3%) felt that their comorbidity burden prohibited further educational engagements, 5 (11.6%) were in denial of the severe CKD or dialysis, 2 (4.7%) denied due to feasibility (transportation/technology) issues, and the remainder with

Table 1. Sociodemographic Characteristics of the Veteran Participants With Advanced CKD

Characteristic	Total n = 218 ^a	VA Nephrology Care (n = 79, 36.2%) ^a	Non-VA Nephrology Care (n = 95, 43.6%) ^a	P Value ^b	No Nephrology Care (n = 40, 18.4%) ^a	P Value ^c
Age, y	75.8 (10.7)	74.4 (9.1)	76.6 (11.9)	0.2	77.2 (10.6)	0.4
Male sex	210 (96.3%)	77 (97.5%)	91 (95.8%)	0.6	38 (95.0%)	0.6
Race				0.8		0.6
White	148 (67.9%)	52 (65.8%)	67 (70.5%)		25 (62.5%)	
Black	46 (21.1%)	18 (22.8%)	19 (20.0%)		9 (22.5%)	
Other/unknown/no answer	24 (11.0%)	9 (11.4%)	9 (9.5%)		6 (15.0%)	
Marital status				0.6		0.3
Married	141 (64.7%)	50 (63.3%)	64 (67.4%)		23 (57.5%)	
Not married ^c	77 (35.3%)	29 (36.7%)	31 (32.6%)		17 (42.5%)	
Service era				0.5		0.2
Pre-Vietnam	38 (17.4%)	10 (12.7%)	17 (17.9%)		11 (27.5%)	
Vietnam	133 (61.0%)	53 (67.1%)	56 (58.9%)		22 (55.0%)	
Post-Vietnam	47 (21.6%)	16 (20.3%)	22 (23.2%)		7 (17.5%)	
Rural/highly rural	123 (56.4%)	51 (64.6%)	46 (48.4%)	0.03	24 (60.0%)	0.6
eGFR	23.2 (5.0)	23.2 (5.7)	23.1 (4.6)	0.9	24.1 (4.1)	0.2
CKD ICD code for stage 4 or 5	139 (63.8%)	64 (81%)	52 (54.7%)	<0.001	21 (52.5%)	0.1
Albuminuria estimation in 12 mo	53 (24.3%)	16 (20.3%)	23 (24.2%)	0.5	14 (35%)	0.1
Albuminuria estimation in 36 mo	69 (31.7%)	24 (30.4%)	31 (32.6%)	0.8	13 (32.5%)	0.9

Note: ICD refers to the presence of either ICD-9 or ICD-10 codes. Four Veterans were receiving care from both within and outside the VA and were excluded from the comparative analyses.

Abbreviations: CKD, chronic kidney disease; eGFR, estimated glomerular filtration rate; ICD, *International Classification of Diseases*; VA, Veterans Affairs.

^aData are presented as n (%), with the exception of age, which is presented as mean (standard deviation). For categorical variables, P values were calculated by either Pearson's χ^2 test or Fisher exact test. For continuous variables, P values were calculated by Kruskal-Wallis 1-way analysis of variance.

^bP value comparing between participants receiving the care from within or outside the VA.

^cP value comparing between participants with or without nephrology care.

Table 2. Factors Affecting KRT Selection Among Veterans With Advanced CKD

Characteristic	Total n = 218 ^a	VA Nephrology Care (n = 79, 36.2%) ^a	Non-VA Nephrology Care (n = 95, 43.6%) ^a	No Nephrology Care (n = 40, 18.4%) ^a	P Value ^b	P Value ^c
CKD awareness	201 (92.2%)	78 (98.7%)	93 (97.9%)	26 (65.0%)	0.7	<0.001
Accurate CKD stage	84 (38.5%) ^b	30 (38%)	42 (44.2%)	9 (22.5%)	0.4	0.02
Prior dialysis education					0.7	0.009
None	116 (53.2%)	41 (51.9%)	44 (46.3%)	30 (75%)		
Clinic-based	56 (25.7%)	23 (29.1%)	28 (29.5%)	5 (12.5%)		
Targeted CoPE classes	46 (21.1%)	15 (19%)	23 (24.2%)	5 (12.5%)		
Interested in education	162 (74.3%)	61 (77.2%)	71 (74.7%)	28 (70%)	0.7	0.5
Preferred education modality (n = 162)					0.6	0.9
Face-to-face	54 (33.3%)	23 (37.7%)	22 (31.0%)	9 (32.1%)		
Telehealth (CBOC, VVC)	81 (50.0%)	29 (46.8%)	35 (49.3%)	16 (57.1%)		
Unsure	27 (16.7%)	9 (14.5%)	14 (19.7%)	3 (10.7%)		

Note: Four Veterans were receiving care from both within and outside the VA and were excluded from the comparative analyses. Only Veterans interested in receiving education were surveyed for their preferences for the preferred education modality.

Abbreviations: CBOC, community-based outpatient clinic; CoPE, comprehensive prekidney failure education; KRT, kidney replacement therapy; VA, Veterans Affairs; VVC, VA Video Connect.

^aData are presented as n (%). For categorical variables, P values were calculated by either Pearson's χ^2 test or Fisher exact test. For continuous variables, P values were calculated by Kruskal-Wallis 1-way analysis of variance.

^bP value comparing between participants receiving care from within or outside the VA.

^cP value comparing between participants with or without nephrology care.

miscellaneous explanations not fitting any of these categories. Only 1 participant refused because of planned start of dialysis within days.

Of the 218 Veteran respondents, 61 participated in the TEACH-VET study and provided information on baseline KRT preferences (Table 3). The majority (n = 45, 73.8%) were unsure about their preferences for KRT, and only 8 (13.1%) preferred home dialysis, with the remaining evenly split between conservative or in-center hemodialysis.

DISCUSSION

Low use of home dialysis for the management of kidney failure among the general US population (~10%-12%) and among US Veterans (~5%) has been a long-standing focus of multiple healthcare policies, including the recent Advancing American Kidney Health Executive Order.^{1,13} Although US health care policies recommend patient-centered shared decision individual's KRT modality, informed patient preferences for home dialysis have never been evaluated for the target US advanced CKD population. For the first time, working through a conceptual model that prioritizes predialysis nephrology care and CoPE as the normative necessities for home dialysis, our findings highlight several system-level deficits in these essential services and a suboptimal state of informed KRT decision making among community-dwelling Veterans with advanced CKD. Through random sampling of Veterans receiving their care from non-VHA providers, we further provide an estimate of similar concerns in the broader nephrology community. These findings are important in several ways.

Prior studies show that the presence and duration of predialysis nephrology care is the strongest predictor of incident home dialysis use.^{10,20,21} Retrospective review of multiple USRDS reports shows that ~20% of the incident kidney failure population starts dialysis without predialysis nephrology care, with substantial sociodemographic disparities among those not receiving nephrology care.^{22,23} Real-time prevalence patterns and deficiencies in specialty care among patients with advanced CKD in the United States have not been examined. Fung et al²⁴ analyzed the VHA database and reported that only 37.8% of the Veterans with advanced CKD receive specialty nephrology care, with significant disparities among those who receive such care. Such a low prevalence of specialty care could have explained the substantially lower, nearly half of general population rates of home dialysis among Veterans. Our patient-level findings, however, sharply contrast these statistics and show a much higher (81.3%) prevalence of nephrology care, comparable to that of the general population, without evident sociodemographic disparities among Veterans with advanced CKD and argue against it being a dominant determinant of lower home dialysis use among Veterans. It further highlights the limitations of large database analysis for the VHA as nearly

Table 3. KRT Selection Patterns Among Veterans With Advanced CKD

Characteristic	Total n = 61 ^a	VA Nephrology Care n = 28 (37%)	Non-VA Nephrology Care n = 23 (44%)	P Value ^b	No Nephrology Care n = 10 (18%) ^a	P Value ^c
Dialysis preference				0.99		0.7
I do not know	45 (73.8%)	21 (75%)	17 (73.9%)		7 (70.0%)	
Conservative care	4 (6.6%)	1 (3.6%)	1 (4.3%)		2 (20.0%)	
Home dialysis ^d	8 (13.1%)	3 (10.7%)	4 (17.4%)		1 (10.0%)	
Home hemodialysis	6 (9.8%)	2 (7.1%)	4 (17.4%)		0 (0%)	
Peritoneal dialysis	2 (3.3%)	1 (3.6%)	0 (0%)		1 (10.0%)	
IC hemodialysis	4 (6.6%)	3 (10.7%)	1 (4.3%)		0 (0%)	

Abbreviations: CKD, chronic kidney disease; IC, in-center; KRT, kidney replacement therapy; VA, Veterans Affairs.

^aData are presented as n (%).

^bP value comparing between participants receiving the care from within or outside the VA.

^cP value comparing between participants with or without nephrology care.

^dOne participant with home dialysis preference demonstrated confidence levels of 0%-20% on the Likert scale; the remaining participants had high to very high levels of confidence in their KRT or conservative care selections.

half of the Veterans with advanced CKD under nephrology care receive such care from non-VHA sources. Nonetheless, lack of nephrology care for nearly 1 in 5 Veterans with advanced CKD is concerning and provides a remediable factor to improve home dialysis use.

Lack of patient awareness of CKD and its management options negatively impacts home dialysis utilization. A recent meta-analysis showed that only 1 in 5 (19.2%) from the general population and 1 in 4 with CKD (26.5%) are aware of their kidney disease.²⁵ Evaluating awareness across the spectrum of CKD severity, Chu et al²⁶ showed that awareness increases with CKD progression, with nearly half (49.6%) at the highest levels of kidney failure risk being aware of their CKD. To the authors' knowledge, kidney disease awareness has never been examined among the Veteran population. Using a patient-friendly list of words in the questionnaire, we found that the basic awareness of kidney disease is much higher (92%) among Veterans with advanced CKD. Importantly, most studies have not attempted to evaluate patients' awareness regarding the severity of their CKD. Inquiring about the severity using a combination of "percentage of kidney function," "eGFR," or "CKD stage," we realized that only 38.5% of Veterans with advanced CKD are aware of the severity of their kidney disease, with both the basic awareness and the accuracy of stage awareness being higher among those with ongoing specialty nephrology care than among those without. Together, our findings demonstrate the importance of nephrology care in patients' self-awareness of kidney disease. At the same time, it shows that the majority are unaware of the severity of their CKD, which likely impacts their behavior, motivation, and self-efficacy for informed dialysis decision making required for greater home dialysis use.

KRT-directed patient education has long been recognized as among the most important factors facilitating patient-centered home dialysis use and can be delivered during clinical care visits or in a dedicated CoPE session. In a recent USRDS analysis, we showed that predialysis nephrology care and dedicated CoPE are among the strongest independent predictors of incident and lifetime use of home dialysis.²¹ Unfortunately, the prevalence, community practice patterns, and comparative efficacy of predialysis KRT-directed education delivered as a part of routine clinical visits versus targeted CoPE classes has been difficult and not conducted for US patients with advanced CKD.⁸ In a recent USRDS analysis, we found that although CoPE nearly doubles home dialysis use, only a minority (<1%) of incident dialysis patients are provided these services. More importantly, home dialysis rates among CoPE nonrecipients are ~7%, indicating the occurrence of a more frequent but unmeasurable form of KRT-directed education delivered as a part of routine clinical care.¹⁰

For the first time, our data provide a glimpse into real-time VHA and non-VHA practice patterns of KRT-directed patient education efforts. Less than half of

Veterans with advanced CKD, even under nephrology care, reported receiving any KRT-related information in clinical care, and only one in 4-5 Veterans reported receiving targeted CoPE services. More importantly, we provide an estimate of the felt needs for CoPE among patients with advanced CKD; an overwhelming majority (74.3%) desire targeted CoPE, and there are several addressable factors evident even among those disinclined to receive these services. Our results further show that the real-world occurrence of CoPE within and outside the VHA is significantly higher (21.1%) than those evident in the USRDS analysis (<1%),¹⁰ indicating significant concerns regarding the coding and documentation of these services. Targeted studies are needed to identify barriers and facilitators to these essential services at a broad community level.

Finally, we provide an accurate population-level estimate for patient readiness for informed KRT selection among those most likely to need KRT. Few studies have prospectively examined the readiness for informed KRT selection among Americans with advanced CKD. In a recent randomized trial evaluating the impact of a decision aid on KRT decision making among older patients under nephrology care, Ladin et al²⁷ found that two-thirds of the enrolled patients with advanced CKD over the age of 70 have high levels of decisional conflicts surrounding KRT selection, and well above half cannot select any KRT modality. Unfortunately, only about a quarter of the approached population participated in the trial, limiting its generalizability, and the study did not assess patient interest in specific forms of dialysis modalities. Similarly, among the PREPARE-NOW study participants, DePasquale et al²⁸ showed that over three-quarters of CKD participants with ongoing nephrology care have significant KRT-related decisional conflict, with only 18% showing preferences for home dialysis. Unfortunately, only a minority of the study population had advanced CKD, with results showing lower decisional conflicts among those with advanced CKD. Additionally, over a third of participants selected transplantation as their preferred KRT, which precludes their interest in specific forms of dialysis therapy—a hard reality for over 97% of incident kidney failure patients.

Our study addresses several of these limitations. First, we employed a unique, electronic health record-based opt-out source cohort strategy, which allowed us to identify and approach all individuals with advanced CKD across the health care system irrespective of their nephrology care. This yielded a more valid estimate of care status and deficits and informed KRT and home dialysis preferences at population levels. Second, we targeted individuals with sustained reductions in eGFR, thereby capturing a cohort at the highest risk for kidney failure and most likely to have considered KRT options. Finally, considering the low probability of preemptive transplant as a viable option for incident KRT among Veterans, we primarily assessed their preferences for

different dialysis therapies. Our findings that nearly two-thirds of Veterans with advanced CKD are unable to select any KRT modality demonstrates a highly suboptimal state of KRT-related discussions in advanced CKD care and identifies a major modifiable risk factor affecting home dialysis use. These findings are also congruent with the recently published data by Ladin et al²⁷ and DePasquale et al²⁸ that suggest that most US patients with advanced CKD, including those under nephrology care, are ill-prepared to make an informed KRT selection. Overall, we show a highly suboptimal state of informed KRT selection among patients with advanced CKD, with only a quarter (26.2%) being confident in selecting any KRT, and a minority (13.1%) preferring home dialysis. This suboptimal KRT selection state in combination with the demonstration of huge deficits in the services essential to reach informed KRT selection render targets espoused in the Advancing American Kidney Health Executive Order untenable, while identifying an addressable factor contributing to home dialysis underutilization and strengthening the recent calls for policy and practice-level changes that facilitate universal nephrology care and targeted CoPE for all patients with advanced CKD.⁹

Our study has a few limitations. First, the prevalence and quality of prekidney failure care have substantial geographic variations, both within and outside the VHA. Although an unbiased population-level assessment has many strengths to identify deficiencies in recommended care, the regionality of our findings limits its broader implications across the VHA, and more importantly, for the non-Veteran population. In this regard, our randomly selected cohort with a large proportion (43%) receiving nephrology care from outside the VHA provides an unbiased glimpse of the patient education efforts in the non-VHA clinical care. Nonetheless, our methods provide a roadmap to conduct similar studies across the VHA or different health care systems with a differing population mix. Second, to provide easy replicability and a real-time estimate of outstanding needs, we have used a parsimonious kidney failure risk model incorporating only sustained reduction in eGFR to define high-probability advanced CKD.¹⁷ Prior studies have shown that albuminuria or proteinuria estimation is uncommon in many clinical databases, including the VHA database²⁹; however, such needs assessments can be easily adapted for a more advanced kidney failure risk predictive modeling, based on its pragmatic feasibility within the target health care system.³⁰ Third, we acknowledge the methodologic limitations of survey research, especially in the target population with limited health literacy. Although we cannot account for this confounding, the findings nonetheless provide the prevalent state of KRT readiness in a reliable manner. Finally, while we identify critical concerns related to informed KRT selection among patients with advanced CKD, the study does not provide evidence regarding the efficacy of the patient education efforts in promoting informed selection and use of home dialysis services. We

expect that some of these concerns will be addressed through the results of the ongoing randomized trials, including the TEACH-VET and PREPARE-NOW studies.¹⁵

In conclusion, we found that while the prevalence of nephrology care and awareness of CKD is significantly higher among Veterans with advanced CKD than the literature reports, these Veterans' readiness for informed KRT selection is poor, with only 1 in 4 able to choose a KRT modality. Our results further identify significant deficits contributing this poor decision-making state and support recent calls for provider- and policy-level changes to facilitate universal provision of KRT-directed education, preferably CoPE, for all patients with advanced CKD. Additionally, the methodology from this study can be replicated to generate evidence-based estimates of the deficits in these essential services across the VHA and non-VA health care systems to help policy makers allocate the resources necessary to improve informed home dialysis use and patient care quality.

SUPPLEMENTARY MATERIALS

Supplementary File (PDF)

Item S1: Needs Assessment Survey.

ARTICLE INFORMATION

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