

Chapter 12: USRDS Special Study Center on Transition of Care in CKD

Introduction

In patients with very-late-stage non-dialysis dependent chronic kidney disease (NDD-CKD; eGFR <25 ml/min/1.73 m²), the optimal transition of care to kidney replacement therapy (KRT, i.e., dialysis or transplantation) is not known. Significant knowledge gaps have persisted pertaining to differential or individualized transitions of care across varying age groups, sociodemographic status, and pre-KRT comorbid conditions and events in several key areas related to the (1) best timing for KRT transition, (2) the optimal KRT type and modality, and (3) the post-KRT impact of pre-KRT comorbid conditions and events including blood pressure and glycemic control, acute kidney injury (AKI) episodes, and pre-KRT management of CKD-specific conditions. Given the major changes occurring in our health care system, the escalating costs of dialysis therapy with persistently poor outcomes, and the heightened expenses and mortality risk particularly during the period of transition to KRT, there is an urgent need to answer these important questions related to transitions from NDD-CKD to KRT.

Given the limitations of prior United States Renal Data System (USRDS) reports that lacked most core data preceding the KRT transition intercept, this USRDS Special Study entitled “Transition of Care in CKD” (TC-CKD, 2014-2019) has been developed to provide innovative linkages between the USRDS and two exceptionally rich and large longitudinal databases of NDD-CKD patients, i.e., the national (entire United States [U.S.]) Veterans Affairs (VA) database and the regional (Southern California) Kaiser Permanente (KP-SC) database, each consisting of thousands of NDD-CKD patients who transition to KRT each year. In the first phase of this Special Study, we will examine the recent national veterans and KP-SC cohorts of incident end-stage renal disease (ESRD) patients and provide pre-KRT data on all recent KRT transitions since 10/1/2007 among Veterans and since 1/1/2008 among KP-SC patients. In subsequent years

we will provide annual linkages to projected data from thousands of incident ESRD patients who transition to KRT from 2013 to 2016. During this five-year USRDS project we will also examine the hypotheses that a pre-KRT data-driven individualized approach to the transition of care into KRT in very-late-stage NDD-CKD is associated with more favorable outcomes including greater survival, fewer hospitalizations and reduced costs, particularly if the decision is based on pre-KRT factors such as clinical and laboratory variables including the CKD progression rate, comorbid conditions, and demographics. We will also develop and validate scoring systems derived from these pre-KRT data to better ascertain the timing, preparation and modality of KRT associated with better outcomes.

Given the late project start of mid-2014, our report this year is limited to data from approximately 52,000 incident ESRD veterans who transitioned to KRT between 10/1/2007 and 9/30/2011. We will also present a brief overview of KP-SC data that will be examined in the following years.

The Veterans Health Administration

The current U.S. veteran population is estimated to be approximately 22 million, of whom 8.9 million U.S. veterans are enrolled in the Veterans Health Administration (VHA), and of whom 5.8 million receive their healthcare in one of the VHA facilities. During the fiscal year of 2013 there were 86.4 million outpatient visits and 694,700 inpatient admissions at Veterans Affairs (VA) healthcare facilities¹.

Whereas approximately 90 percent of the current U.S. veteran population consists of males, the sex distribution is changing, and it is estimated that by 2040 approximately 18 percent of the VA population will be females. Minority veterans made up about 21 percent of the total veteran population in 2011. The majority of minority veterans were Black (11 percent), with Hispanics as the second largest group (6 percent)².

The VHA facility network consists of 150 hospitals, along with 820 community-based outpatient clinics and 300 veterans' centers³. Services provided by the VA department and VHA facilities include comprehensive medical care, life insurance, disability compensation, home loans, educational benefits, pensions and vocational rehabilitation training.

Management of ESRD in the VHA

The VHA provides comprehensive medical care for patients with kidney disease, including acute kidney injury (AKI) and all stages of CKD. Management of kidney disease that does not require KRT is typically provided by VA personnel at one of the nationwide VHA facilities, or by local private providers (paid by the VHA) in cases where the VHA cannot provide adequate care (for reasons such as prohibitive distance or lack of adequate resources).

Veterans who develop ESRD are eligible to receive KRT from the VHA. Dialysis care is a covered benefit under VA's Medical Benefits Package for veterans enrolled in the VA, irrespective of their service connectedness⁴. For patients requiring in-center dialysis treatment, the VHA provides renal replacement therapy both through dialysis units maintained and operated by individual VA facilities, or by purchasing dialysis services from private dialysis providers (in cases where the distance from a VA facility is prohibitive for thrice-weekly dialysis, or when the capacity of the VA facility-operated dialysis unit is exceeded). There are currently 71 VA facilities nationwide which maintain and operate an in-house (in-center) dialysis center⁵. Most such dialysis units provide both chronic outpatient and acute inpatient dialysis treatments in the same center and simultaneously. The majority of ESRD veterans, however, receive dialysis treatment in non-VHA facilities including dialysis chains (see below).

Veterans who elect to perform home-based dialysis therapies and who are medically acceptable candidates are provided with the necessary training, medical equipment and supplies, and home support required to perform home dialysis (home hemodialysis (HD) or peritoneal dialysis (PD) by the VHA. Both types must be made available to veterans by the VHA or through non-VA care if the VA facility is unable to provide that service⁶. Besides dialysis therapy, veterans are also eligible to receive kidney transplantation at one of four designated facilities⁷, and also post-transplant care including necessary medications.

In addition to providing KRT, other benefits offered by the VHA to veterans with kidney disease include beneficiary travel support, long term care in hospice services, respite care, domiciliary care, and adult day health care as needed, and assistance for home improvements necessary for the continuation of treatment under the Home Improvements and Structural Alterations (HISA) Program⁶ (e.g. for veterans performing home HD).

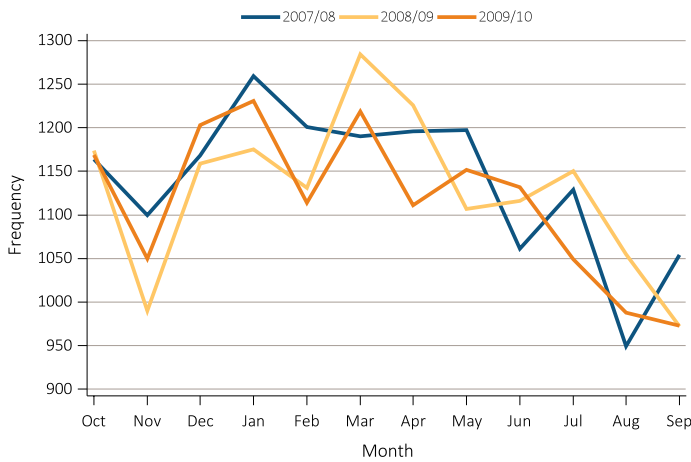
Highlights of Data of Incident ESRD Veterans between 10/1/2007 and 9/30/2011

Between 10/1/2007 and 9/30/2011 (four fiscal years), a total of 52,172 veterans transitioned to KRT. Their mean \pm SD age was 70.3 \pm 12.1 years old, and they were comprised of 24.1 percent Blacks and six percent Hispanics. Diabetes mellitus (DM) and hypertension (HTN) were the cause of ESRD in 41.7 percent and 31.4 percent of patients, respectively. During the first three months of KRT, 10.4 percent of all incident ESRD veterans died and 1.4 percent received a kidney transplantation. At three months, 92.3 percent of the incident ESRD veterans were on HD and 6.1 percent on PD; less than one percent received home HD.

ESRD Rate and Seasonal Variation Among Veterans

During the four-year observation periods, the average rate of transition to ESRD among veterans was 1,087 patients per months. During the four-year observation period, 13,668, 13,539, and 13,391 veterans transitioned to dialysis or preemptive transplantation in years one, two, and three, respectively, which yielded an ESRD transition rate of 1,128 patients per month for the first three years. The annual ESRD transition census for the fourth observation year (10/1/2010-9/30/2011) is slightly lower than prior years (n=11,573). Since it is not certain as to whether this is a true decline in trend versus under-reporting of data in the final months of the fourth year, the seasonal (month-by-month) variations are presented for the first three years (see Figure 12.1.). In general the highest transition rates are observed during the months of December through May, whereas the transition rates tend to be lower during June through November of each year.

vol 2 Figure 12.1 Monthly variation in patient enrollment in 52,172 incident ESRD veterans 10/1/2007-9/30/2011

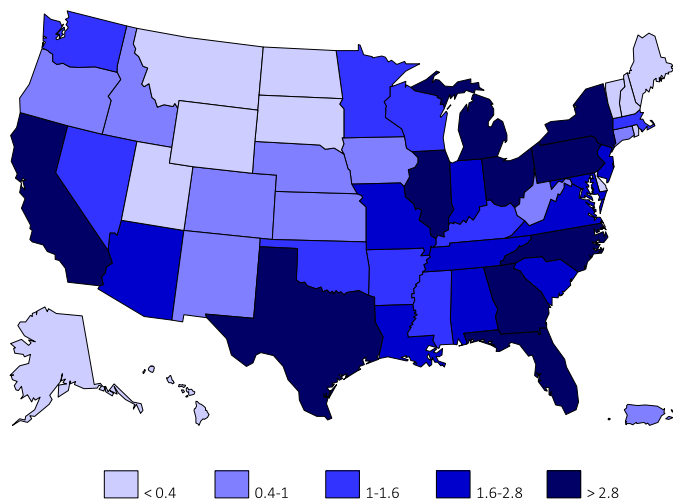


Data source: USRDS ESRD Database. Transition rates are reported for each month. Abbreviations: ESRD, end-stage renal disease.

Distribution of Incident ESRD Veterans in the United States

One-third (n=17,951, 34.4 percent) of 52,172 veterans who transitioned to KRT during the four-year period (10/1/2007-9/30/2011), lived in five states including California (n=4,618, 8.9 percent), Florida (n=4,022, 7.7 percent), Texas (n=3,718, 7.1 percent), New York (n=2,915, 5.6 percent), and Pennsylvania (n=2,678, 5.1 percent). Less than five percent of the incident ESRD veterans resided in each of the other states and territories (see Figure 12.2).

vol 2 Figure 12.2 Distribution and density of the 52,172 incident ESRD veterans across states and territories of the United States 10/1/2007-9/30/2011

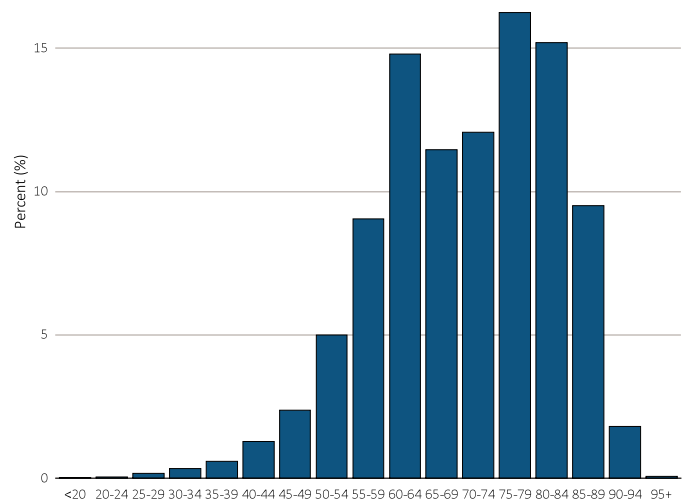


Data source: USRDS ESRD Database. States and territories of the United States of America. Abbreviations: ESRD, end-stage renal disease.

Age, Sex and Race Distribution of Incident ESRD Veterans

The mean \pm SD age of incident ESRD veterans are 70.3 \pm 12.1 years. A bimodal age distribution exists among 60- <65 and 75- <85 year old veterans (see Figure 12.3), whereas among the 22.3 million veterans a non-bimodal age distribution is observed with the mode in the 70- <75 year age group in 2011⁸. Among all states, Rhode Island, Massachusetts and Maine had the highest mean ages of 75.6, 75.4 and 73.8 years, respectively.

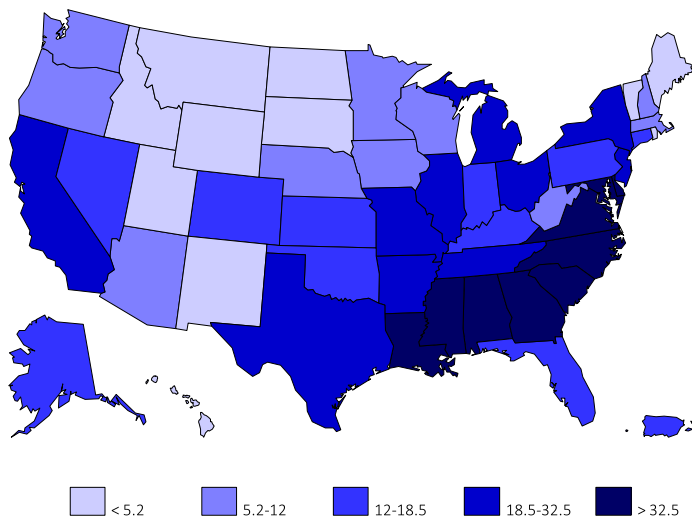
vol 2 Figure 12.3 Age in 5-year increments at first ESRD service in 52,172 incident ESRD veterans, 10/1/2007-9/30/2011



Data source: USRDS ESRD Database. Age groups are in 5-year increments except for <20 and >95 years or older. Abbreviations: ESRD, end-stage renal disease.

Only 5.7 percent of the ESRD veterans were women (n=2,955) during this period. Blacks constituted 24.1 percent of the incident ESRD population (n=12,584), as compared to 12.0 percent of all veterans being Black in 2011⁸. There was a substantially smaller proportion of Asians (n=957, 1.8 percent) and Native Americans (n=543, 1.0 percent). Most Southeast states had larger proportions of Black incident ESRD veterans. Among mainland states and territories, District of Columbia had 91.7 percent Blacks, followed by Maryland (55.0 percent), Georgia (49.4 percent) and South Carolina (45.8 percent; see Figure 12.4).

vol 2 Figure 12.4 Distribution of Black incident ESRD veterans in the United States, 10/1/2007-9/30/2011

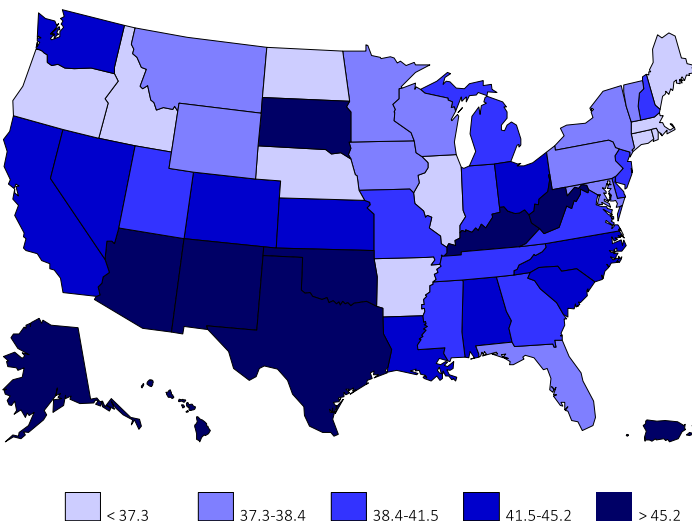


Data source: USRDS ESRD Database. States and territories of the United States of America. Abbreviations: ESRD, end-stage renal disease.

Primary Disease Causing ESRD Among Veterans

Among all incident ESRD veterans, 41.7 percent (n=21,736) had DM and 31.4 percent (n=16,403) had HTN as the primary etiology of ESRD. Among states and territories with more than 100 incident ESRD veterans during the observation period, Hawaii (62.0 percent), Puerto Rico (59.8 percent) and West Virginia (50.2 percent) harbored the largest proportion of diabetic patients, followed by Southern states (see Figure 12.5).

vol 2 Figure 12.5 Distribution of diabetes mellitus as the primary cause of kidney disease among incident ESRD veterans in the United States, 10/1/2007-9/30/2011

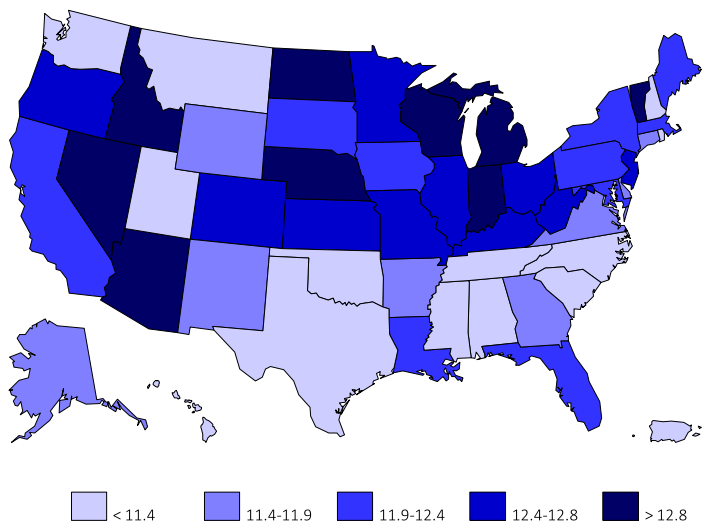


Data source: USRDS ESRD Database. States and territories of the United States of America. Abbreviations: ESRD, end-stage renal disease.

Estimated GFR upon Transition to KRT

Among 52,172 veterans, the mean \pm SD eGFR upon transition to KRT was 12.1 \pm 5.1 (mean \pm SD) ml/min/1.73m². There were geographic variations in the starting eGFR as shown in Figure 12.6. Among the 50 states, Hawaii, Rhode Island and South Carolina had the lowest eGFRs at the start of KRT, i.e., 9.5, 10.2 and 10.4 ml/min/1.73m², respectively; whereas North Dakota, Idaho and Vermont exhibited the highest eGFRs of 14.1, 13.4 and 13.3 ml/min/1.73m², respectively. These variations may suggest differences in practice patterns related to the timing of dialysis therapy initiation.

vol 2 Figure 12.6 Distribution of eGFR upon KRT in 52,172 incident ESRD veterans in the United States, 10/1/2007-9/30/2011



Data source: USRDS ESRD Database. States and territories of the United States of America. Abbreviations: ESRD, end-stage renal disease.

First 90 Days after Transition to ESRD

Table 12.1 shows the status of incident ESRD veterans during the first 90 days after transition to KRT from 10/1/2007 to 9/30/2011. On Day 1 of ESRD service, over 80 percent of the 52,172 veterans received in-center HD treatment (n=43,256, 82.9 percent), whereas the number of PD patients at this time was less than five percent (n=2,552, 4.9 percent). There were 589 preemptive kidney transplant recipients (1.1 percent). Of note 201 veterans (0.4 percent) were already declared deceased on Day 1 of ESRD service initiation.

After 90 days of service, 44,320 of the original 52,172 incident ESRD veterans were still undergoing dialysis treatment, whereas 7,852 (15.2 percent) were not, including 10.3 percent who died in the first three months (n=5,348; see first-year mortality data below) and 1.3 percent who received a kidney transplantation

(n=701). A total of 1,789 veterans (3.5 percent) recovered from ESRD and stopped dialysis therapy by the end of the 90 days, mostly during the second and third month after transition to ESRD.

vol 2 Table 12.1 Status of 52,172 incident ESRD veterans during the first 90 days after transition to KRT, 10/1/2007-9/30/2011

	Day 1		Day 30		Day 60		Day 90	
	n	%	n	%	n	%	n	%
Dialysis modality								
In-center	43,256	82.9	43,258	82.9	43,163	82.7	40,918	78.4
Home HD	260	0.5	260	0.5	259	0.5	258	0.5
CAPD	1,405	2.7	1,405	2.7	1,398	2.7	1,302	2.5
CCPD	1,174	2.2	1,174	2.2	1,182	2.3	1,395	2.7
Uncertain*	5287	10.1	3,495	6.7	612	1.2	447	0.9
Outcomes**								
Death	201	0.4	1,561	3	3,672	7	5,348	10.3

Data source: USRDS ESRD Database. * Uncertain groups have no known dialysis modality. ** n for outcomes is cumulative for subsequent periods after Day 1. Abbreviations: CAPD, continuous ambulatory peritoneal dialysis; CCPD, continuous cycling peritoneal dialysis ESRD, end-stage renal disease; HD hemodialysis.

vol 2 Table 12.1 Status of 52,172 incident ESRD veterans during the first 90 days after transition to KRT, 10/1/2007-9/30/2011

Transplant	589	1.1	654	1.3	679	1.3	701	1.3
Lost to follow-up	n/a	.	3	<0.1	3	<0.1	5	<0.1
Recovered	n/a	.	362	0.7	1,204	2.3	1,798	3.5
Total	52,172	100	100		100		52,172	100

Data source: USRDS ESRD Database. * Uncertain groups have no known dialysis modality. ** n for outcomes is cumulative for subsequent periods after Day 1. Abbreviations: CAPD, continuous ambulatory peritoneal dialysis; CCPD, continuous cycling peritoneal dialysis ESRD, end-stage renal disease; HD hemodialysis.

Dialysis Providers upon Transition to ESRD

Table 12.2 shows the status of incident ESRD veterans on Day 1 of ESRD service according to the type of dialysis provider. Upon transition to KRT among 52,172 veterans over the four-year period, only 9.9 percent (n=5,157) received dialysis therapy in one of the in-center dialysis units based at VHA medical centers. Over half of all veterans (52.1 percent) who transitioned to KRT received maintenance dialysis therapy in a for-profit “large dialysis organization” (LDO), which included Fresenius Medical Care (FMC, 27.6 percent) and DaVita (DVT, 24.5 percent); 13.1 percent of veterans underwent dialysis therapy in other dialysis chains and 21.1 percent received treatment in

a dialysis unit that did not belong to any chain (i.e. free-standing and hospital based units). Among 3.9 percent of these veterans, the dialysis provider could not be identified on Day 1; over a quarter of the latter group (26.4 percent) had received a preemptive kidney transplantation and 10 percent of them were declared dead on Day 1.

The mean age of veterans who received dialysis treatment in a VHA medical center was on average 5.8 years younger than the mean age of all incident ESRD veterans, and only 43.4 percent of these patients were older than 65 years as compared to 66.3 percent of all incident ESRD veterans. VHA medical centers had a larger proportion of Black patients (41.3 percent) as compared to all incident ESRD veterans who received dialysis (24.1 percent).

Table 12.3 shows the status of the ESRD veterans on Day 90 of ESRD service according to their type of dialysis provider. This table also includes selected outcome data over the first three months of post-KRT including mortality, transplantation and recovered kidney function.

After three months among surviving ESRD veterans, over half of the veterans (52.4 percent) continued to receive dialysis therapy in a for-profit LDO (FMC or DVT), 13.2 percent in other dialysis chains, and 21.1 percent in independent (non-chain) dialysis centers; 10.7 percent received dialysis in one of the 68 VHA medical centers. Racial and sex differences continued to exist between VHA and non-VHA dialysis providers.

Mortality of Veterans after Transition to ESRD

As shown in Table 12.1, 10.4 percent (n=5,348) of all incident ESRD veterans died after three months of KRT. This is equivalent to an annualized mortality rate of 41.6 percent for these three months. Figure 12.7 shows monthly mortality during the first 24 months after transition to KRT. Mortality during the second, third, and fourth months were even higher than the first month mortality, but this discrepancy may be related to inadequate ESRD ascertainment of deceased patients during Month 1, since many of these patients might not have been registered under the ESRD program upon death.

vol 2 Table 12.2 Day 1 of ESRD service in 52,172 incident ESRD veterans upon transition to KRT, 10/1/2007-9/30/2011

	All veterans	VHA	FMC	DVT	Other Chains	Non-Chain	Provider not known
Veterans, n (%)	52,172 (100%)	5,157 (9.9%)	14,380 (27.6%)	12,766 (24.5%)	6,850 (13.1%)	11,007 (9.9%)	2,010 (3.9%)
Number of facilities	5504	68	1686	1352	793	1425	
Age, year (SD)	70.3 (12.1)	64.6 (11.4)	70.7 (11.8)	70.3 (12.1)	71.2 (11.9)	72.1 (11.8)	68.3 (13.6)
Older than 85 yrs (%)	11.4	4.6	11.1	11.3	12.2	14.3	12.3
Females (%)	5.7	2.5	6.1	6	6.1	5.7	7.6
Race/ethnicity							
Native American (%)	1	0.7	0.8	1.1	0.8	1.5	1.1
Asian (%)	1.8	1.8	1.3	1.7	3.4	1.2	5
Black/Af Am (%)	24.1	41.3	23.4	24.9	22.1	18.5	18.3
White (%)	72.6	55.7	74.3	72.1	73.6	78.6	69.9
Hispanic (%)	6	8.8	5.9	5.4	6.1	5.3	6.7
Primary cause of ESRD							
Diabetes (%)	41.7	47	42.6	42.7	41.7	40.1	23.7
Hypertension (%)	31.4	22.2	34.2	32.8	32.6	32.3	18.2
GN (%)	5.5	7.8	5.1	4.9	5.6	5	7.8
Cystic kidney (%)	1.5	1.6	1.5	1.5	1.3	1.4	3.7
KRT modality							
HD (%)	82.9	90.6	84.8	84.6	84.9	78.2	51.6
PD (%)	4.9	3.6	4.9	5.1	4.9	5.7	3.2
Mortality (%)	0.4	0	0	0	0	0	10
Transplant (%)	1.1	1.1	0	0	0	0	26.4
Recovered function	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Laboratory data							
Hemoglobin (g/dL)	10.0 (1.6)	9.8 (1.6)	10.0 (1.6)	10.0 (1.6)	10.1 (1.6)	10.1 (1.5)	10.5 (1.7)
Albumin (d/dL)	3.2 (0.7)	3.2 (0.7)	3.2 (0.7)	3.2 (0.7)	3.2 (0.7)	3.2 (0.7)	3.4 (0.7)
Creatinine (mg/dL)	6.0 (2.9)	6.9 (3.1)	6.0 (2.9)	6.0 (2.9)	5.9 (2.9)	5.8 (2.8)	5.4 (2.6)
eGFR (ml/min/1.73m ²)	12.1 (5.1)	10.9 (4.4)	12.1 (5.1)	12.2 (5.1)	12.3 (5.2)	12.4 (5.2)	13.1 (5.3)
BMI (kg/m ²) (SD)	28.3 (6.7)	28.6 (6.8)	28.6 (6.9)	28.2 (6.6)	28.0 (6.6)	28.0 (6.6)	28.6 (5.8)

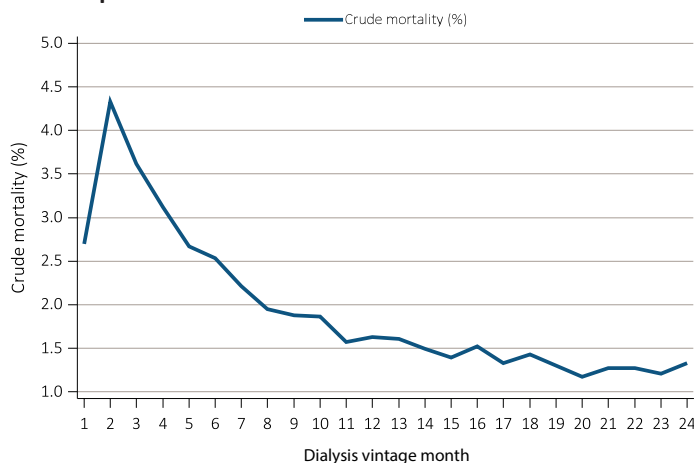
Data source: USRDS ESRD Database. Percentages and standard deviation values are in parentheses. Abbreviations: Af Am, African American; BMI, body mass index; DVT, DaVita; eGFR, estimated glomerular filtration rate; ESRD, end-stage renal disease; FMC, Fresenius Medical Care; GN, glomerulonephritis; HD, hemodialysis; KRT, kidney replacement therapy; PD, peritoneal dialysis; SD, standard deviation; VHA, Veterans Health Administration.

vol 2 Table 12.3 Status of ESRD service after 3 months among 44,220 ESRD veterans after transitioning to KRT, including selected outcomes over the first 3 months in veterans who transitioned to KRT during 10/1/2007-9/30/2011

	All veterans	VHA	FMC	DVT	Other Chains	Non-Chain	Provider not known
Veterans, n (%)	44,220 (100%)	4,714 (10.7%)	12,313 (27.8%)	10,900 (24.6%)	5,838 (13.2%)	9,339 (21.1%)	1,116 (2.5%)
Number of facilities	5494	68	1686	1530	792	1418	.
Age, year (SD)	69.8 (12.0)	64.4 (11.2)	70.2(11.8)	69.8 (12.0)	70.7 (12.0)	71.6 (11.8)	69.6 (12.6)
Older than 85 yrs (%)	10.3	4.2	10	10.1	11.5	13.1	11.2
Female (%)	5.7	2.5	6.3	6.1	6.2	5.9	6
Race/ethnicity							
Native American (%)	1.1	0.6	0.9	1.2	0.9	1.6	0.6
Asian (%)	1.9	1.6	1.5	1.8	3.6	1.2	3.9
Black/Af Am (%)	25.9	42.6	24.9	26.6	23.8	19.6	22
White (%)	70.8	54.7	72.5	70.2	71.7	77.4	65.4
Hispanic (%)	6.3	9.1	6.2	5.8	6.1	5.5	8
Primary cause of ESRD							
Diabetes (%)	44	49.1	44.3	44.9	43.7	42	30.6
Hypertension (%)	31.9	22.5	34.4	33.2	33	32.3	21.5
GN (%)	5.7	8	5.5	5.2	6	5.4	4.1
Cystic kidney (%)	1.6	1.6	1.6	1.6	1.5	1.6	0.8
KRT modality							
HD (%)	92.3	96.1	93.5	92.8	93.3	91	65.1
PD (%)	6.1	3.9	5.9	6.4	6.2	7.3	4.7
Mortality (%)	10.4	5.9	10.3	10.3	10.7	4	48.8
Transplant (%)	1.4	1.2	0.1	0.2	0.1	0.1	24.6
Recovered function	3.5	0.9	4.1	4.3	4	3.1	0.8

Data source: USRDS ESRD Database. Percentages and standard deviation values are in parentheses. Abbreviations: Af Am, African American; DVT, DaVita; ESRD, end-stage renal disease; FMC, Fresenius Medical Care; GN, glomerulonephritis; HD, hemodialysis; KRT, kidney replacement therapy; PD, peritoneal dialysis; VHA, Veterans Health Administration.

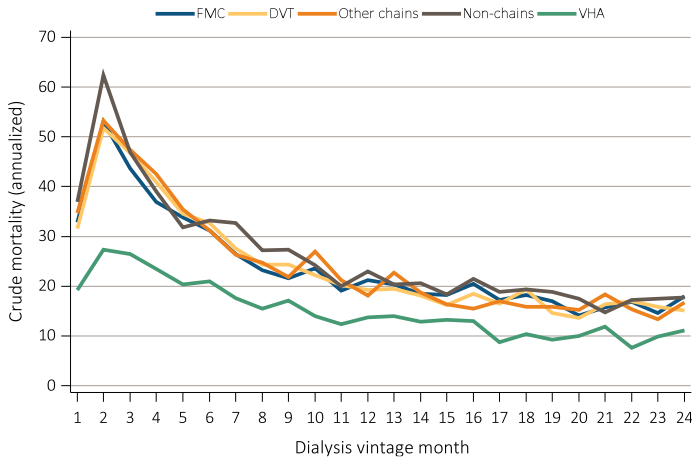
vol 2 Figure 12.7 Monthly crude mortality among 52,172 incident ESRD veterans who transitioned to KRT during 10/1/2007-9/30/2011 and who were followed for up to 24 months post-KRT



Data source: USRDS ESRD Database. All mortality rates are crude and without any adjustment. Abbreviations: ESRD, end-stage renal disease; KRT, kidney replacement therapy.

Figure 12.8 shows the annualized monthly mortality of the first two years post-KRT across dialysis providers. The second-month mortality was the highest (>60 percent per year) in non-chain units and lowest (<30 percent per year) in VHA based dialysis clinics. Nevertheless, the same pattern existed across dialysis providers such that the mortality was highest during the first several months after transition to KRT. It is important to note that the death rates are crude and do not account for differences in demographics or comorbid conditions.

vol 2 Figure 12.8 Annualized monthly crude mortality of incident ESRD veterans who transitioned to KRT during 10/1/2007-9/30/2011 and who were followed for up to 24 months, by dialysis provider.



Data source: USRDS ESRD Database. All mortality rates are crude and without any adjustment. Abbreviations: ESRD, end-stage renal disease; KRT, kidney replacement therapy.

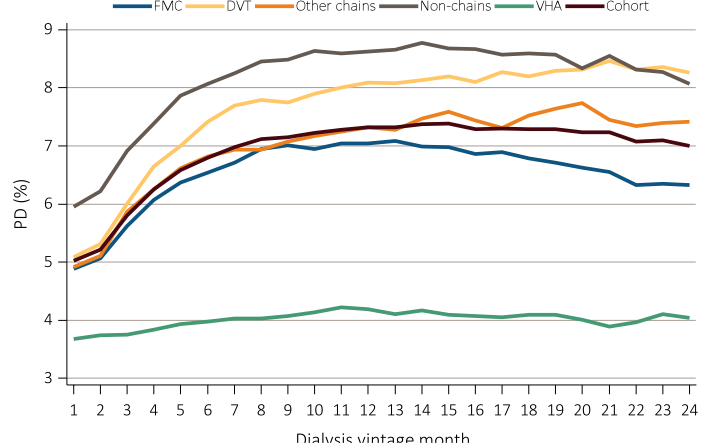
Recovered Kidney Function after Transition to ESRD

Over the first 24 months after KRT transition, 2,538 (4.9 percent) of the 52,172 incident ESRD veterans had recovered their kidney function and stopped dialysis therapy including 1,819 during the first 3 months (71.7 percent). Of those remaining until the end of the 24th month, 1,777 maintained recovered kidney function, whereas 761 veterans had alternative outcomes which included 192 patients who returned to dialysis with a known modality (188 HD, 4 PD) 41 patients who returned to dialysis with an unknown modality, 526 who died, and 2 who received kidney transplantation.

Dialysis Modality in Veterans After Transition to ESRD

As shown in Table 12.1 above, only 4.9 percent of incident ESRD veterans transitioned to PD on Day 1 of the ESRD service. This proportion, however, increased to above seven percent after six months and remained approximately seven percent over the first 24 months, as shown in Figure 12.9. Variations in practice were observed among dialysis providers, such that the rate of PD was the lowest among veterans who received dialysis therapy in a VHA based dialysis unit.

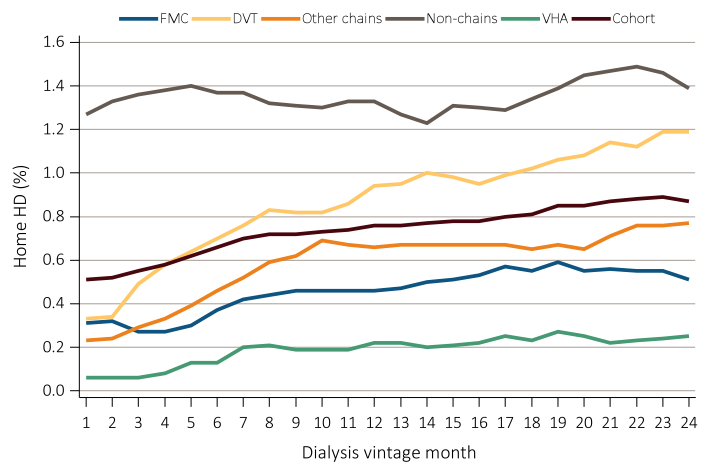
vol 2 Figure 12.9 Peritoneal dialysis among incident ESRD veterans who transitioned to KRT during 10/1/2007-9/30/2011 and who were followed for up to 24 months according to dialysis provider.



Data source: USRDS ESRD Database. All rates are crude and without any adjustment. Abbreviations: ESRD, end-stage renal disease; KRT, kidney replacement therapy.

Home HD constituted less than one percent of the dialysis modality throughout the entire first 24 months (Figure 12.10). Among dialysis providers, the lowest prevalence of home HD was observed in VHA based dialysis units (<0.3 percent) whereas the highest prevalence was observed among independent (non-chain) dialysis units (~1.4 percent).

vol 2 Figure 12.10 Home hemodialysis among incident ESRD veterans who transitioned to KRT during 10/1/2007-9/30/2011 and who were followed for up to 24 months according to dialysis provider.



Data source: USRDS ESRD Database. All rates are crude and without any adjustment. Abbreviations: ESRD, end-stage renal disease; KRT, kidney replacement therapy.

Kaiser Permanente of Southern California

California is the most populous (38 million) and racially/ethnically diverse U.S. state. It is home to one out of eight Americans, and it possesses the largest economy in the nation and 8th largest in the

world. Southern California (SC) is the most populous mega-region of California with 23 million people (60 percent of California’s population), and bears four of the nation’s 50 most populated cities (Los Angeles, San Diego, Fresno, and Long Beach), and encompasses Los Angeles Metropolitan (including LA and Orange Counties combined, with >17 million people and, the fifteenth largest economy in the world), Inland Empire, and Greater San Diego. In addition to substantial socioeconomic diversity, SC has remarkable racial/ethnic diversity (38 percent Hispanics, 14 percent Asians, and seven percent Blacks).

The Kaiser Permanente of Southern California (KP-SC) Health System is an integrated health care system that provides comprehensive health services for ~4 million residents of Southern California. The population served by KP-SC is socioeconomically diverse and broadly representative of the racial/ethnic groups in Southern California. KP-SC is one of KP’s largest regions, which provides care at 13 hospitals and >190 medical offices by a partnership of >5,300 physicians who comprise the entire range of medical specialists (see Figure 12.11). The system provides an ideal environment for population-based epidemiologic, clinical and health services research, owing largely to the underlying population, model of care delivery and information infrastructure that can be leveraged for research purposes.

vol 2 Figure 12.11 Kaiser Permanente of Southern California (KP-SC) centers

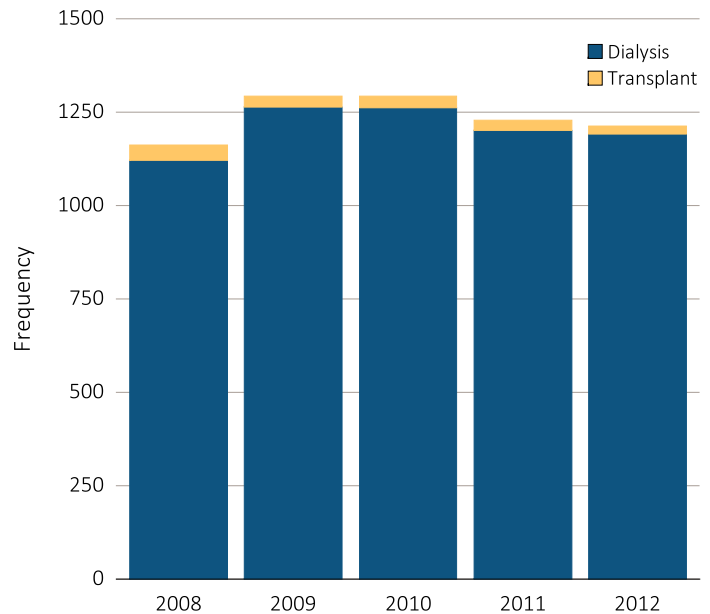


KP-SC has a state-of-the-art electronic health record (EHR) to support clinical management. Thus, information on virtually all aspects of care delivered is captured and routinely extracted for research.

Transition to ESRD in Kaiser Permanente of Southern California

Between 1/1/2008 and 12/31/2012, 6189 KP-SC patients transitioned to KRT (see Figure 12.12). The rate of KRT transition was approximately 1100 to 1200 patients per year.

vol 2 Figure 12.12 Frequency of transition to KRT among 6,189 KP-SC patients, 1/1/2008-12/31/2012



Data source: Kaiser Permanente Southern California Electronic Health Records. Abbreviations: KP-SC, Kaiser Permanente of Southern California; KRT, kidney replacement therapy.

Table 12.4 shows the demographic of 6,189 patients who transitioned to ESRD in KP-SC between 1/1/2008 and 12/31/2012. Their mean age was 62.4 years and included 41.8 percent females, 20.7 percent Blacks and 35.3 percent Hispanics.

vol 2 Table 12.4 Demographics of 6,189 KP-SC patients who transitioned to KRT, 1/1/2008-12/31/2011

	Dialysis	Pre-emptive Transplant	Total
n	6,038	151	6,189
Age, year (SD)	62.8 (14.5)	45.1 (15.6)	62.4 (14.8)
Gender			
Female	2522 (41.8%)	65 (43.0%)	2587 (41.8%)
Male	3516 (58.2%)	86 (57.0%)	3602 (58.2%)
Race/ethnicity			
White	1852 (30.7%)	55 (36.4%)	1907 (30.8%)
Black/Af Am	1267 (21.0%)	11 (7.3%)	1278 (20.7%)

Data source: Kaiser Permanente Southern California Electronic Health Records. Abbreviations: Af Am, African American; KP-SC, KRT, kidney replacement therapy; Kaiser Permanente of Southern California; SD, standard deviation.

vol 2 Table 12.4 Demographics of 6,189 KP-SC patients who transitioned to KRT, 1/1/2008-12/31/2011

Hispanic	2126 (35.2%)	56 (37.1%)	2182 (35.3%)
Asian	708 (11.7%)	23 (15.2%)	731 (11.8%)
Other	39 (0.6%)	2 (1.3%)	41 (0.7%)
Unknown	46 (0.8%)	4 (2.7%)	50 (0.8%)

Data source: Kaiser Permanente Southern California Electronic Health Records. Abbreviations: Af Am, African American; KP-SC, KRT, kidney replacement therapy; Kaiser Permanente of Southern California; SD, standard deviation.

Table 12.5 shows the number of incident ESRD patients who had their serum creatinine measured prior to transition to KRT. The frequent serum creatinine measurements will allow for accurate estimation of eGFR and rates of CKD progression in years prior to ESRD transition. These data will be analyzed and presented during the TC-CKD Special Study.

vol 2 Table 12.5 Number of serum creatinine tests and the eGFR prior to transition to KRT in 6,189 KP-SC patients, 1/1/2008-12/31/2012

Years prior to KRT transition	Number of incidence ESRD patients having serum creatinine test	Mean number of tests per patient	Mean serum creatinine (ml/dL)	Mean eGFR (ml/min/1.73m ²)
1	5,693 (92.0%)	7.2	4	20.9
2	5,076 (82.0%)	5.3	2.6	31.1
3	4,754 (76.8%)	4.6	2.2	38.1
4	4,429 (71.6%)	4.1	1.9	43.5
5	4,104 (66.3%)	3.8	1.8	48

Data source: Kaiser Permanente Southern California Electronic Health Records. Abbreviations: eGFR, estimated glomerular filtration rate; ESRD, end-stage renal disease; KRT, kidney replacement therapy.

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