Title: Geographic Differences in Early Kidney Transplant Access in Four US Regions

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KEY POINTS

Question: Is there geographic variation in dialysis facility-level rates of pre-transplant access (i.e., starting the medical evaluation within 6 months of referral) and being added to the waitlist for a kidney transplant across four US regions?

Findings: In this retrospective cohort study of 62,467 adults referred for kidney transplantation, region-specific median within-facility evaluation start ranged from 33.3% in the Ohio River Valley to 66.7% in New York**,** while for waitlisting ranged from 31.9% in the Southeast to 50% in the other regions.

Meaning: Geographic variation in pre-transplant access underscores the need for federal efforts to address inequities in access to pre-transplant care processes.

ABSTRACT

Importance: Research has highlighted variability in access to kidney transplant evaluation and waitlisting in the Southeast, yet little is known about variation in access across other U.S. regions, hindering broader efforts to improve access.

Objective: Describe geographic variation in dialysis facility-level rates of evaluation start and waitlisting across four U.S. regions.

Design: Retrospective cohort study of adults referred for transplantation and initiating transplant evaluation captured within the Early Steps to Transplant Access Registry (1/1/2015 to 12/31/2023), linked with the US Renal Data System, and waitlisting data from the Scientific Registry of Transplant Recipients with follow-up through 3/02/2024.

Setting: U.S. dialysis facilities

Participants: 62,467 adults (ages 18-79) referred from 2,471 dialysis facilities; 27,171 who started the evaluation from 2,188 referring dialysis facilities.

Exposures: Dialyzing in New England, New York, Southeast, and Ohio River Valley.

Main Outcome(s) and Measure(s): Dialysis facility-level rates of evaluation (within six months of referral) and waitlisting (within one year of evaluation start)**.**

Results: Among 62,467 patients within 2,471 dialysis facilities, the percentage of patients who started the transplant evaluation within six months varied from 0% to 100%; the median within-facility evaluation start rate was 50% (interquartile range (IQR): 33.3%-64.3%) across all four regions, ranging from 33.3% (18.2%-50%) in the Ohio River Valley to 66.7% (50%-76.7%) in New York. Waitlisting rates within one year of evaluation varied from 0% to 100% across 2,188 facilities; the median within-facility percentage of patients waitlisted within one year of evaluation start was 41.2% (26.0%-60%), with the lowest percentage in the Southeast (31.9% (20%−43.8%). Facilities in the lowest tertile of evaluation start (<39.13%) were more likely to treat patients living in high-poverty neighborhoods (36.8% vs 29.2%), had

a higher patient-to-social worker ratio (49.2 vs. 46.26), and were more likely for profit (82.4% vs 73.5%) than the highest tertile (>58.33%). These characteristics varied by region. After accounting for patient case-mix, facility-level clustering explained 12.2% (95% CI: 10.5–13.5) of the variation in evaluation start and 8.2% (6.7–9.2) of the variation in waitlisting across dialysis facilities.

Conclusions and Relevance: There is substantial variation in early transplant access among U.S. dialysis facilities, which differs by geographic region.

INTRODUCTION

Kidney transplantation is the preferred treatment option for most individuals with end-stage kidney disease (ESKD), offering increased life expectancy, improved quality of life, and lower costs relative to in-center dialysis.[1-3] However, access to transplantation is limited and variable, with long-standing racial, socioeconomic, and geographic disparities at all steps of the transplant process.[4-13] Drivers of these disparities are multi-faceted, and barriers exist at the patient, provider, neighborhood, and health system levels.[13-15] Although barriers to transplant post-waitlisting are well-documented, less is known about access to pre-waitlisting care steps (e.g., referral, evaluation start) owing to a lack of national surveillance data on these critical steps.

What is known about pre-waitlisting access largely comes from studies using the Early Steps to Transplant Access Registry (E-STAR), which has collected referral and evaluation start data from all transplant centers in the Southeast US for over a decade.[5,16] Across 690 Southeastern dialysis facilities, we have shown substantial variation in referral and evaluation start rates, both ranging from 0% to 100% across dialysis facilities, with a median one-year referral rate of 33.7% and only 16.1% of patients started the medical evaluation process within six months of referral during 2012-2018.[5] Geographic variations in time to waitlisting and rates of deceased donor kidney transplant have also been found in national analyses across the 57 donor service areas.[17,18]

Given the known geographic variability in transplant access and the critical role that dialysis facilities play in pre-transplant care — including education and referral for transplant evaluation — understanding variability in access and factors associated with high or low rates of access both within and between geographic regions[19] is essential to inform and standardize policies. In 2019, E-STAR expanded to include 10 additional states in the Northeast and Midwest, enabling the examination of geographic variation in pre-transplant care steps. Therefore, using this new data, we extend our prior research to describe regional variation in dialysis facility-level rates of evaluation start and waitlisting. Results may inform the Health Resources and Services Administration's (HRSA) recent national pre-waitlisting data collection efforts and support new federal initiatives – such as the implementation of the bipartisan-

supported 2023 Securing the U.S. Organ Procurement and Transplantation Network (OPTN) Act,[20] calling for substantial increases in access to transplantation. Findings may also aid in implementing and evaluating the new Increasing Organ Transplant Access Model (IOTA),[21] a performance-based incentive model aimed at improving transplant access.

METHODS

Data Sources

Patient-level referral and evaluation data (n=321,871 referral records representing ~217,000 patients) were collected from transplant referral forms and electronic medical records at 36 of the 48 transplant centers in New England (Network 1: CT, MA, ME, NH, RI, VT – 10/14 centers, 71%), New York (Network 2: NY – 10/13 centers, 77%), the Southeast (ESRD Network 6: GA, NC, SC – 11/11 centers, 100%), and the Ohio River Valley (Network 9: IN, KY, OH – 5/10 centers, 50%) from 1/1/2012, through 12/31/2023. Transplant center data availability varied due to openings, closures, and other administrative reasons (**eTables 1 and 2**). Detailed methods of the data collection process are available elsewhere.[5]

Patient-level characteristics reported by clinicians on the CMS Medical Evidence Form (2728 form) within 45 days of dialysis initiation were obtained via linkage to the United States Renal Data System (USRDS), a registry of all individuals initiating kidney replacement therapy (dialysis or transplant) in the US. Data on all adults waitlisted for kidney transplantation were obtained via the Scientific Registry of Transplant Recipients and linked to USRDS data via a unique patient identifier. Facility-level characteristics were obtained from the annual USRDS facility survey. Characteristics of patients' residential neighborhood via 5-digit ZIP code tabulation area linkage were obtained from 2014-2018 American Community Survey data

The Institutional Review Boards at Emory (IRB00113572) and Indiana (IRB #18998) Universities approved this study.

Study population

The two study cohorts included all adults (ages 18-79 years at dialysis) who were referred (Cohort 1) and/or started the evaluation (Cohort 2) at one of 36 E-STAR-participating transplant centers from 1/1/2015 to 12/31/2023 (3/2/2023 for evaluation). Patients were assigned to the first facility where they received dialysis services.[5] Preemptively (i.e., before dialysis initiation) referred (n=10,060), evaluated (n=141), or waitlisted (n=154,456) individuals, as well as individuals whose first treatment modality did not involve dialysis (i.e., died, had unknown dialysis status, recovered kidney function, received a preemptive transplant, were lost to follow-up, or nursing home hemodialysis, n=260,447) and those with less than six months of follow-up (n=631) were excluded. The final analytic samples comprised 62,467 adults referred (Cohort 1) and 27,171 who started the evaluation (Cohort 2; **Figure 1**).

Study Outcomes

The primary outcome was evaluation start within six months of first referral. Here, we broadly define evaluation start as the date when a patient initiated a required component of the transplant evaluation process (a more complete definition is in the eAppendix and **Table S3**). Individuals were followed from date of first referral until evaluation date or 12/31/2023 (end of follow-up in E-STAR). The secondary outcome was waitlisting within one year of evaluation start, defined using date of first placement on the kidney waitlist. We examined dialysis facility-level variation by grouping patients by dialysis facility and calculating the percentages of each of our outcomes. Individuals were followed from evaluation start date until waitlisting or 3/02/2024 (end of follow-up in SRTR). Detailed information on data availability for follow-up for our outcomes by center can be found in the **Supplement**.

Covariates

Patient characteristics included race and ethnicity (non-Hispanic White, Black, Hispanic White, other race or ethnicity: American Indian/Alaska Native, Native Hawaiian/Pacific Islander, Multiracial, and Pacific Islander, Middle Eastern Subcategory, and Indian Subcategory), age, sex, cause of ESKD, and comorbidities (see **Table 1**). Patient-level proxies for socioeconomic status included receipt of pre-ESKD

nephrology care (yes, no) and primary source of health insurance at dialysis start (Medicare, Medicaid, employer group coverage, other coverage, no coverage). A hierarchy of employer group coverage, Medicare, Medicaid, other, and no coverage was used to assign a single primary source of coverage for individuals with multiple sources of health insurance listed. Measures of neighborhood socioeconomic status using the patients' residential 5-digit ZIP code included the proportion of black residents, residents aged ≥25 years without a high school degree or equivalent, and neighborhood poverty, defined as ≥20% or <20% of households living below the poverty level. Dialysis facility characteristics included the annual number of patients per facility, the patient-to-social worker ratio, profit status (for-profit, non-profit), and hospital-based versus freestanding facility.

Statistical Analyses

Patient and dialysis-facility characteristics at dialysis start were summarized overall and by region (New York, New England, Southeast, Ohio River Valley) using analysis of variance (ANOVA) and chi-squared tests for continuous and categorical variables, respectively. Waterfall plots illustrate the distribution of these percentages of each of our outcomes at the facility-level by region. An intraclass correlation coefficient estimated the proportion of total variance in the outcome attributable to facility-level clustering. Facilities were stratified into tertiles based on these percentages, and facility and aggregated patient characteristics were compared to assess whether they differed by high, middle, and low tertiles overall, and whether these patterns varied by region. To further examine regional differences, we used cumulative incidence functions to estimate the probabilities of each outcome by region, treating death as a competing risk and censoring for loss to follow-up or study end. Unadjusted and adjusted[22]) and time to each event. We calculated crude and adjusted sub-distribution hazard ratios with 95% confidence intervals (CI) for each outcome, accounting for death as a competing risk, and including a random intercept for facility-level heterogeneity and interaction terms by region.

RESULTS

Baseline Characteristics

Among the 62,467 referred individuals in E-STAR, the mean age at dialysis start was 53 years (SD: 14; **Table 1**). In the Southeast, 64.9% of referred patients were Black, while in New England (53.9%) and the Ohio River Valley (55.9%) the majority were non-Hispanic white. New York had a greater proportion of individuals identified as Hispanic white and other racial and ethnic groups compared to other regions. Among the 2,471 referring dialysis facilities, 83.5% were for-profit, 92.1% were freestanding, and the mean patient-to-social worker ratio was 64.3. Other baseline characteristics were largely similar across regions (**Table 1**).

Dialysis-Facility-Level Variation in Rates of Evaluation Start and Waitlisting

Among 2,471 dialysis facilities, the median percentage of patients starting the evaluation within six months was 50.0% (interquartile range (IQR): 33.3%-64.3%). The median within-facility proportions of evaluation start within six months of referral were lowest in the Ohio River Valley at 33.3% (18.2%−50.0%) and greatest in New York, at 66.7% (50.0%−76.7%). The median proportion of patients starting the evaluation within 6 months of referral was 52.7% (39.1%−66.7%) in New England and 50% (38.5%−60.0%) in the Southeast. For waitlisting within one year of evaluation start among 2,188 facilities, the median percentage was 50.0% (38.9%−72.4%), 50.0% (33.3%−75%), 50.0% (33.3%−70.0%), and 31.9% (20%−43.8%) in New England, New York, the Ohio River Valley, and the Southeast, respectively. Across all regions, both outcomes varied significantly across the dialysis facilities, ranging from 0% to 100% (**Figure 2**). After accounting for patient mix, facility-level clustering explained 12.2% (95% CI: 10.5–13.5) of the variation in evaluation start and 8.2% (95% CI: 6.7–9.2) of the variation in waitlisting.

Characteristics of facilities in the highest (i.e. highest evaluation rates) versus lowest tertile of evaluation rates varied. For example, facilities in the lowest tertile had a higher patient-to-social worker ratio (49.2 [95% CI: 47.13-51.28) vs. 46.26 [43.71-48.82]), a higher proportion of adults aged 60–80, fewer Black adults (40.0% [95% CI: 37.7–42.3] vs. 45.0% [42.8–47.2]), a greater proportion of adults

with diabetes as the attributed cause of ESKD (42.0% [40.3–43.6] vs. 36.4% [34.9–38.0]), and higher prevalence of most comorbidities examined. The lowest tertile had a higher proportion of adults with Medicare or no health insurance coverage at dialysis start, while employer-sponsored insurance was more common in the highest tertile. The lowest-tertile also facilities treating adults residing in neighborhoods with fewer Black residents (21.0% [19.7–22.3] vs 25.9% [24.5–27.3]), higher poverty (36.8% [34.6–39.1] vs 29.2% [27.2–31.1]), and had a greater mean patient volume and a higher proportion of for-profit dialysis centers (82.4% vs 73.5%; **Table 2**). Characteristics of facilities in the lowest tertile of waitlisting rates were similar to those with low evaluation start (**Table 3**).

Differences between facilities with low or high tertiles of evaluation and waitlisting rates were observed across regions (results not shown). For example, in New England and the Ohio River Valley, the lowest tertile facilities had a higher proportion of older adults, while no age differences were observed in the Southeast. Facilities in the lowest tertile for evaluation start in New York and the Southeast had a lower proportion of patients with Medicaid or no health insurance, while in New England and the Ohio River Valley, no significant differences were observed across these insurance groups. For-profit dialysis centers were more common in the lowest tertile in New England, New York, and the Ohio River Valley, but in the highest tertile in the Southeast. The lowest tertile of waitlisting rates in New England, New York , and the Ohio River Valley had higher mean patient volume and patient-to-social worker ratios, whereas these characteristics were greater in the highest tertile in the Southeast.

Results examining the cumulative incidence of our outcomes (**eTable 4; eFigure 1 and 2**), along with unadjusted and multivariable-adjusted competing risk analyses comparing access to each outcome for individuals in the Southeast versus the other three regions, yielded findings consistent with the crude rates (**eTable 5**).

DISCUSSION

This is the first study to assess variation in dialysis-facility rates of evaluation start and waitlisting across four regions of the US. We show substantial variation across regions, with within-facility rates in

these steps ranging from 0% to 100% across dialysis facilities. The within-facility median percentage of referred patients starting the evaluation within six months was 50%, ranging widely from 33.3% in the Ohio River Valley to 66.7% in New York. Median within-facility rates of waitlisting within 1 year of evaluation start were relatively consistent but lowest in the Southeast, a region with historically low rates of timely waitlisting.[17] Importantly, characteristics of facilities with high and low evaluation start and waitlisting rates differed by region, suggesting that region-specific strategies may be needed. For example, in New England, New York, and the Ohio River Valley, for-profit dialysis centers were more common in the lowest tertile of evaluation start but more common in the highest tertile in the Ohio River Valley. These results suggest that barriers in access to evaluation vary across geographic regions, emphasizing the importance of federal, regional, and local interventions to improve kidney transplant access.

Our findings highlight that, at the median, half of referred individuals start the evaluation within six months of referral in the Southeast and New England. In contrast, we report for the first time that only one-third of individuals start the evaluation within six months of referral in the Ohio River Valley, while two-thirds start the evaluation in New York. Regional differences in evaluation start may be explained by greater population density and concentration of large volume transplant centers in the Northeast compared to the Southeast and Ohio River Valley. Transportation barriers may further contribute to these differences. A review by Harding *et al.* reported several non-medical barriers to pre-waitlisting steps, including distance to the transplant center, travel time, and transportation access.[13] Lack of transportation has been linked with missed appointments and delayed healthcare access,[23] and is more commonly faced among individuals residing in non-urban areas compared to those in urban areas,[24] such as New York City, who have greater access to transportation resources to attend the evaluation appointment.[25] Some geographic variation can likely be explained by differences in patient experiences of medical mistrust, racism, and discrimination — previously linked to lower access to evaluation start[26]— along with other difficult-to-measure influences on access. Differences in the racial composition of patients across the four regions in the present study can influence how these barriers manifest.

Numerous dialysis facility-level factors may prevent referred patients from starting the evaluation in a timely manner. One of the most common contributors to patient drop-off after referral is a lack of understanding of the evaluation process.[27] A recent study of individuals with chronic kidney disease across these same 4 regions highlighted variability in education practices about transplantation for patients between health systems as a major barrier to the pursuit of a kidney transplant.[28] In addition to variability in patient education and knowledge, transplant-center-specific policies and practices related to the prioritization of referrals[29] and referral closure likely have a large role in evaluation start and dialysis facility practices post-referral.

Aligning with prior studies[5,16] we show similar patient- and facility-level factors associated with lower and higher rates of evaluation start and waitlisting within dialysis facilities. However, our findings also highlight regional differences. We found that facilities in the highest tertile of evaluation start and waitlisting performance had a higher proportion of patients with employer-sponsored insurance across all regions, while facilities within the lowest tertiles had a greater proportion of patients residing in areas of high-poverty neighborhoods in New England, New York, and the Southeast. These results highlight the complex relationship between socioeconomic factors and healthcare access, where residing in high-poverty neighborhoods can limit individuals' progression. Areas of high concentrations of poverty, such as in New York and the Southeast, also often have greater challenges with insurance access, social support, transportation access, and overall health status that facilitate navigating the transplant steps.[30-33]

Results from this study underscore the importance of pre-waitlisting data, including the collection of social risk factors, to elucidate factors influencing access to these key steps. Identifying the multi-level barriers to evaluation start and waitlisting for individuals with ESKD can help pinpoint individuals who may need targeted interventions to improve equity and access. Thus, our findings have important policy implications and highlight the significance of the forthcoming national data collection on pre-waitlisting steps.[34] Notably, pre-waitlisting data collection within the CMS-2728 form began in October 2024 and HRSA-directed national collection of pre-waitlisting data is anticipated to start soon;[35 34] however, several

years of follow-up and time to overcome data lags will be needed to fully assess regional differences using these data.[34] As these data emerge, transplant centers may face increased scrutiny to improve transplant access and equity therein. These data can be used to monitor upstream factors contributing to the observed variability in access to improve access to transplantation among all individuals with kidney failure.

Our findings must be interpreted in the context of their limitations. First, data are limited to centers voluntarily submitting to E-STAR, potentially excluding patients evaluated or waitlisted at non-E-STAR centers and affecting generalizability to other regions with distinct patient demographics and care practices.[16] However, the observed variation aligns with national studies of geographic variation in other transplant steps.[8,17,18,36] Second, value-based care models with geographically varying implementation were introduced during the study period, such as Kidney Care Choices and ESRD Treatment Choices, may have influenced access and disparities, warranting future investigation. Given overlap with the COVID-19 pandemic, disruptions in healthcare delivery likely influenced referral and evaluation behaviors.[37] Additionally, the lack of a standardized definition of evaluation start could confound findings of variation in rates, as could differences in how centers define referral and close referrals. However, 94% of E-STAR centers define evaluation start as the patient's initial contact with the center. Patient-level data captured on the CMS-2728 Medical Evidence Form at dialysis start may be underreported or have changed between dialysis start and progression through referral, evaluation, and waitlisting. Lastly, there is potential for residual confounding by unmeasurable factors influencing patient eligibility and access in the current analysis due to the reliance on patient-level data captured within USRDS.

In summary, substantial variation in timely evaluation and waitlisting exists between individuals treated for kidney failure across four US regions, with barriers differing by step and region. These findings demonstrate how pre-waitlisting surveillance data can be used to better understand this variation and to promote equity in access to transplantation through interventions and policy changes, such as the new federal payment policy (IOTA) and implementation of the OPTN Modernization Act.

AUTHOR CONTRIBUTIONS

Ms. Buford, Ms. Di, and Dr. Patzer had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

Study concept and design: All authors

Acquisition, analysis, or interpretation of data: All authors

Drafting of the manuscript: Buford, Patzer, Di, Harding

Critical revision of the manuscript for important intellectual content: All authors.

Statistical analysis: Buford, Di, Patzer

Obtained funding: Patzer, Pastan.

Administrative, technical, or material support: Patzer, Buford, Di, Harding, Drewry, Wilk, Pastan

DISCLOSURES

None.

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The study funder/sponsor had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; or decision to submit the manuscript for publication.

DATA SHARING STATEMENT

The data reported here have been supplied in part by the USRDS. Deidentified data from the Early Steps to Transplant Access Registry are available upon request and with a signed data use agreement with the Regenstrief Institute and Indiana University.

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SUPPLEMENTARY MATERIAL

eAppendix. Definition of Transplant Medical Evaluation Start.

eAppendix. Factors Associated With Patient Evaluation Start and Waitlisting

eTable 1. Overview of Data Availability for Each Outcome by De-Identified Transplant Center: Logistic Regression Analysis

eTable 2. Overview of Data Availability for Each Outcome by De-Identified Transplant Center: Multivariable-adjusted competing risk analysis

eTable 3. Overview of Evaluation Start Definition by De-Identified Transplant Center

eTable 4. Cumulative incidence of evaluation start within six months of referral among those referred for a kidney transplantation and waitlisting within 1 year of evaluation start among those that started the evaluation, accounting for the competing risk of death, displayed by end-stage renal disease network.

eTable 5. Competing risks modeling results for the association of ESRD Network with evaluation start among those referred and waitlisting among those who started evaluation in ESRD Networks 1, 2, 6, and 9: 2015-2024.

eFigure 1. Cumulative incidence of evaluation start within six months of referral among those referred for a kidney transplantation (dashed line), accounting for the competing risk of death (solid line), displayed by end-stage renal disease network.

eFigure 2. Cumulative incidence of waitlisting within one year of evaluation start among those who started the evaluation for a kidney transplantation (dashed line), accounting for the competing risk of death (solid line), displayed by end-stage renal disease network.

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Table 1. Baseline Dialysis Facility- and Patient-Level Characteristics of Patients Referred for a Transplant: 2015-2023

		ESRD Network			
	Total Study Population (N=62,467)	**New England N=8,797**	**New York N=9,893**	**Southeast N=30,874**	**Ohio River Valley N=12,903**
Facility-Level Characteristics[b]					
No. of patients per facility, mean (SD)[c]	88.4 (56.9)	96.1 (56.2)	120.1 (74.1)	83.6 (50.8)	70.3 (44.4)
Patient to social worker ratio, mean (SD)[d]	64.3 (33.3)	68.3 (34.1)	80.2 (40.1)	63.1 (31.5)	52.4 (27.8)
Freestanding facility, N (%)[g]	57,380 (91.9%)	7,592 (86.3%)	7,747 (78.3%)	29,939 (97.0%)	12,102 (93.8%)
Profit Status, n (%)[h]					
Non-profit	10,262 (16.4%)	1,465 (16.7%)	3,152 (31.9%)	4,126 (13.4%)	1,519 (11.8%)
For-profit	52,048 (83.3%)	7,261 (82.5%)	6,703 (67.8%)	26,722 (86.6%)	11,362 (88.1%)
Characteristics of Patients within Facility					
Mean age in years, mean (SD)	52.7 (13.9%)	53.0 (14.2)	52.7 (0.5%)	52.8 (13.8)	52.3 (14.0)
Age category in years, N (%)[i]					
18-30	4,434 (7.1%)	700 (8.0%)	707 (7.1%)	2,062 (6.7%)	965 (7.5%)
30-40	7,494 (12.0%)	986 (11.2%)	1,179 (11.9%)	3,703 (12.0%)	1,626 (12.6%)
40-50	11,805 (18.9%)	1,516 (17.2%)	1,839 (18.6%)	6,031 (19.5%)	2,419 (18.7%)
50-60	16,329 (26.1%)	2,299 (26.1%)	2,588 (26.2%)	8,071 (26.1%)	3,371 (26.1%)
60-70	15,847 (25.4%)	2,297 (26.1%)	2,525 (25.5%)	7,758 (25.1%)	3,267 (25.3%)
70-80	6,391 (10.2%)	977 (11.1%)	1,028 (10.4%)	3,155 (10.2%)	1,231 (9.5%)
Male sex, N (%)	38,088 (61.0%)	5,600 (63.7%)	6,263 (63.3%)	18,181 (58.9%)	8,044 (62.3%)
Race, N (%)[j]					
White, non-Hispanic	23,570 (37.7%)	4,605 (52.3%)	2,850 (28.8%)	8,935 (28.9%)	7,180 (55.6%)
Black	31,780 (50.9%)	2,414 (27.4%)	4,305 (43.5%)	20,043 (64.9%)	5,018 (38.9%)
White, Hispanic	4,039 (6.5%)	1,102 (12.5%)	1,537 (15.5%)	982 (3.2%)	418 (3.2%)
Other race/ethnicity	2,659 (4.3%)	429 (4.9%)	1,156 (11.7%)	834 (2.7%)	240 (1.9%)
Attributed cause of ESKD, N (%)[k]					
Diabetes	26,767 (42.8%)	3,813 (43.3%)	4,239 (42.8%)	12,890 (41.8%)	5,825 (45.1%)
Hypertension	19,528 (31.3%)	1,842 (20.9%)	2,751 (27.8%)	11,559 (37.4%)	3,376 (26.2%)
Glomerulonephritis	7,361 (11.8%)	1,432 (16.3%)	1,279 (12.9%)	2,997 (9.7%)	1,653 (12.8%)
Cystic Kidney	1,470 (2.4%)	325 (3.7%)	253 (2.6%)	525 (1.7%)	367 (2.8%)
Other	7,253 (11.6%)	1,368 (15.6%)	1,351 (13.7%)	2,865 (9.3%)	1,669 (12.9%)
Facility % of incident patient clinical and laboratory measures					
Comorbidities, N (%)					
Obese (BMI ≥ 35 kg/m2)	15,893 (25.4%)	1,779 (20.2%)	1,993 (20.1%)	8,304 (26.9%)	3,817 (29.6%)
Congestive heart failure	14,453 (23.1%)	2,136 (24.3%)	2,178 (22.0%)	7,044 (22.8%)	3,095 (24.0%)
Atherosclerotic heart disease	5,800 (9.3%)	1,270 (14.4%)	1,283 (13.0%)	1,981 (6.4%)	1,266 (9.8%)
Other cardiac disease	8,784 (14.1%)	1,403 (15.9%)	1,192 (12.0%)	4,069 (13.2%)	2,120 (16.4%)
Cerebrovascular disease (stroke)	4,299 (6.9%)	586 (6.7%)	637 (6.4%)	2,196 (7.1%)	880 (6.8%)
Peripheral vascular disease	4,300 (6.9%)	915 (10.4%)	670 (6.8%)	1,766 (5.7%)	949 (7.4%)
Hypertension	55,556 (88.9%)	7391 (84.0%)	8,789 (88.8%)	2,7978 (90.6%)	11,398 (88.3%)
Diabetes	34,156 (54.7%)	4,510 (51.3%)	5,177 (52.3%)	17,333 (56.1%)	7,136 (55.3%)
Chronic obstructive pulmonary disease	3,571 (5.7%)	554 (6.3%)	453 (4.6%)	1,571 (5.1%)	993 (7.7%)

Tobacco use	4,916 (7.9%)	625 (7.1%)	484 (4.9%)	2,513 (8.1%)	1,294 (10.0%)
Cancer	2,537 (4.1%)	452 (5.1%)	397 (4.0%)	1,085 (3.5%)	603 (4.7%)
Patient socioeconomic characteristics					
Pre-ESKD nephrology care, N (%)	40,362 (64.6%)	6,057 (68.9%)	5,805 (58.7%)	19,773 (64.0%)	8,727 (67.6%)
Patient has been informed of kidney transplant options, N (%)[l]	54,165 (86.7%)	6,835 (77.7%)	8,970 (90.7%)	26,996 (87.4%)	11,364 (88.1%)
Primary health insurance provider, N (%)[m]					
Medicaid	19,048 (30.5%)	3,578 (40.7%)	4,505 (45.5%)	6,814 (22.1%)	4,151 (32.2%)
Medicare	17,140 (27.4%)	2,098 (23.8%)	2,033 (20.5%)	9,417 (30.5%)	3,592 (27.8%)
Employer group	14,984 (24.0%)	1,961 (22.3%)	2,283 (23.1%)	7,236 (23.4%)	3,504 (27.2%)
Other coverage	4,788 (7.7%)	618 (7.0%)	710 (7.2%)	2,630 (8.5%)	830 (6.4%)
No coverage	6,001 (9.6%)	268 (3.0%)	312 (3.2%)	4,647 (15.1%)	774 (6.0%)
Patient neighborhood (ZIP code) characteristics					
Average % black, mean (SD)[e]	29.2 (25.9)	14.2 (18.2)	28.3 (27.7)	36.8 (24.2)	21.9 (26.3)
Average % high school graduates, mean (SD)[f]	85.5 (7.5)	87.0 (8.1)	83.3 (8.8)	85.1 (6.8)	87.4 (6.7)
Neighborhood poverty (% ZIP code residents below poverty), N (%)[g, h]					
<20% below poverty	38,678 (61.9%)	6,523 (74.2%)	6,336 (64.0%)	17,663 (57.2%)	8,156 (63.2%)
≥20% below poverty	23,162 (37.1%)	2,181 (24.8%)	3,521 (35.6%)	12,778 (41.4%)	4,682 (36.3%)

Abbreviations: SD, standard deviation; ESKD, end-stage kidney disease; BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); COPD, Chronic obstructive pulmonary disease

[a] Data shown as the total number of patients (No.) and the percentage (%), unless indicated otherwise.

[b]Obtained from data from the CMS ESRD Annual Facility Survey and the CDC Dialysis Surveillance Survey within the USRDS facility dataset

[c]Information on number of patients within dialysis facility missing for 157 patients (0.3%).

[d]Number of patients for every 1 social worker. Information on dialysis facility patient-to-social worker ratio was missing for 735 patients (1.2%). Calculated only among those facilities that have social workers and whose information on the number of patients and social workers was not missing.

601 (1.0%) missing average percent black.

[f]601 (1.0%) missing average percentage of high school graduates.

[g]157 (0.3%) missing facility type.

[h]157 (0.3%) missing facility profit status.

iInfomation on patient age at kidney replacement therapy initiation missing for 167 patients (0.3%).

jRace and ethnicity information missing for 419 patients (0.7%).

[k]Patient attributable cause missing for 88 patients (0.1%).

lInformation on whether patient has been informed of kidney transplant options missing for 2460 patients (3.9%).

[m]Insurance information missing for 506 patients (0.8%).

[n]Obtained from American Community Survey Data, 2014-2018.

[o]Information on neighborhood poverty missing for 627 (1.0%).

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Table 2. Characteristics of dialysis facilities with low, moderate, and high evaluation start for kidney transplantation within 6 months of referral: 2015-2023

Characteristic	Overall	Tertile of Transplant Evaluation Start, Median (Range)			P-value[a]
		Lowest 25.00 (0-39.13)	Middle 50.00 (39.29-58.18)	Highest 71.10 (58.33-100)	
Facilities, No.	2471	822	819	830	
Total No. of patients	62467	16945	26389	19133	
Facility-Level Characteristics					
No. of patients per facility, mean (95% CI)	56.11 (54.28-57.95)	46.88 (44.2-49.55)	62.89 (59.91-65.86)	58.49 (54.79-62.2)	**<.001**
Patient to social worker ratio, mean (95% CI)	48.78 (47.51-50.05)	41.31 (39.45-43.16)	52.52 (50.47-54.57)	52.4 (49.84-54.96)	**<.001**
Freestanding facility, N (%)	2081 (86.06)	708 (88.39)	723 (89.37)	650 (80.45)	**<.001**
Profit Status, N (%)					**<.001**
Non-profit	507 (20.97)	141 (17.6)	152 (18.79)	214 (26.49)	
For-profit	1911 (79.03)	660 (82.4)	657 (81.21)	594 (73.51)	
Facility Incident Patient-Level Characteristics					
Age category in years, mean % (95% CI)					
18-30	10.12 (9.37-10.86)	9.18 (7.86-10.5)	8.47 (7.54-9.39)	12.67 (11.13-14.21)	**<.001**
30-40	13.27 (12.63-13.9)	13.4 (12.18-14.61)	12.11 (11.35-12.88)	14.27 (13.01-15.53)	**0.02**
40-50	18.35 (17.69-19.02)	18.83 (17.48-20.18)	17.96 (17.13-18.79)	18.27 (17.06-19.47)	0.57
50-60	24.52 (23.81-25.22)	24.2 (22.89-25.51)	25.46 (24.55-26.38)	23.89 (22.51-25.27)	0.17
60-70	23.93 (23.21-24.65)	23.78 (22.4-25.16)	25.74 (24.75-26.73)	22.3 (20.98-23.62)	**0.001**
70-80	9.82 (9.33-10.31)	10.61 (9.66-11.57)	10.26 (9.57-10.95)	8.59 (7.72-9.46)	**0.002**
Male sex, mean % (95% CI)	62 (61.17-62.82)	61.66 (60.07-63.25)	61.67 (60.59-62.74)	62.66 (61.09-64.23)	0.53
Race, mean % (95% CI)					
White, non-Hispanic	45.81 (44.51-47.1)	53.04 (50.71-55.37)	43.87 (41.86-45.88)	40.65 (38.36-42.93)	**<.001**
Black	44.36 (43.08-45.63)	40.04 (37.74-42.34)	47.96 (45.89-50.02)	45.01 (42.79-47.24)	**<.001**
Hispanic White	6.06 (5.57-6.55)	4.38 (3.63-5.14)	4.67 (4.04-5.29)	9.08 (8.01-10.15)	**<.001**
Other	3.78 (3.39-4.16)	2.54 (1.93-3.14)	3.51 (2.97-4.05)	5.26 (4.45-6.07)	**<.001**
Attributed cause of ESKD, mean % (95% CI)					
Diabetes	40.16 (39.27-41.04)	41.98 (40.3-43.67)	42.15 (40.97-43.33)	36.38 (34.75-38.02)	**<.001**
Hypertension	29.23 (28.35-30.11)	28.89 (27.28-30.51)	30.27 (29.03-31.51)	28.54 (26.84-30.24)	0.25
Glomerulonephritis	13.75 (13.04-14.47)	12.6 (11.34-13.86)	12.25 (11.36-13.14)	16.37 (14.91-17.84)	**<.001**
Cystic Kidney	2.82 (2.5-3.13)	2.9 (2.23-3.56)	2.58 (2.2-2.95)	2.98 (2.43-3.52)	0.56
Other	14.04 (13.35-14.73)	13.62 (12.34-14.91)	12.75 (11.88-13.63)	15.73 (14.38-17.08)	**0.002**
Facility % of incident patient clinical and laboratory measures					
Comorbidities, mean % (95% CI)					
Obese (BMI ≥ 35 kg/m2)	25.95 (25.2-26.7)	29.4 (27.89-30.9)	26.47 (25.52-27.41)	22.06 (20.72-23.4)	**<.001**
Congestive heart failure	22.29 (21.56-23.03)	24.47 (23.01-25.93)	22.57 (21.54-23.59)	19.89 (18.59-21.18)	**<.001**
Atherosclerotic heart disease	9.75 (9.15-10.34)	10.41 (9.29-11.53)	9.18 (8.37-10)	9.67 (8.54-10.79)	0.25
Other cardiac disease	15.04 (14.38-15.7)	16.75 (15.44-18.06)	15.1 (14.22-15.99)	13.3 (12.1-14.49)	**<.001**
Cerebrovascular disease (stroke)	6.74 (6.33-7.16)	7.48 (6.6-8.36)	7.08 (6.53-7.64)	5.69 (4.99-6.39)	**0.001**
Peripheral vascular disease	7.1 (6.61-7.59)	8.28 (7.26-9.29)	6.96 (6.29-7.63)	6.09 (5.28-6.9)	**0.002**
Hypertension	89.43 (88.88-89.97)	89.41 (88.36-90.47)	89.89 (89.15-90.64)	88.97 (87.96-89.99)	0.40
Diabetes	53.36 (52.46-54.26)	55.46 (53.74-57.18)	54.46 (53.25-55.67)	50.21 (48.55-51.88)	**<.001**

Chronic obstructive pulmonary disease	6.23 (5.81-6.64)	7.99 (7.18-8.81)	6.15 (5.58-6.71)	4.58 (3.86-5.29)	**<.001**
Tobacco use	8.13 (7.63-8.62)	9.87 (8.86-10.87)	9.17 (8.4-9.93)	5.39 (4.63-6.14)	**<.001**
Cancer	4.4 (4.04-4.77)	4.84 (4.14-5.54)	3.98 (3.57-4.39)	4.39 (3.66-5.12)	0.1688
Patient socioeconomic characteristics	90.3 (89.61-90.98)	88.81 (87.45-90.17)	88.8 (87.63-89.96)	93.26 (92.29-94.22)	**<.001**
Patient has been informed of kidney transplant options, mean % (95% CI)					
Pre-ESKD nephrology care, mean % (95% CI)	90.3 (89.61-90.98)	88.81 (87.45-90.17)	88.8 (87.63-89.96)	93.26 (92.29-94.22)	0.08
No					0.49
Yes	16.94 (16.29-17.6)	16.06 (14.82-17.3)	17.89 (16.9-18.88)	16.88 (15.71-18.05)	0.12
Unknown	65.18 (64.19-66.17)	65.63 (63.78-67.47)	65.59 (64.16-67.03)	64.33 (62.51-66.16)	
Primary health insurance provider, mean % (95% CI)	17.88 (16.95-18.8)	18.31 (16.56-20.06)	16.52 (15.19-17.84)	18.79 (17.07-20.5)	0.42
Medicaid					**0.006**
Medicare	29.4 (28.52-30.29)	29.81 (28.21-31.42)	28.56 (27.34-29.78)	29.84 (28.11-31.56)	**<.001**
Employer group	29.9 (29.07-30.73)	31.81 (30.24-33.37)	29.23 (28.16-30.3)	28.7 (27.07-30.34)	0.45
Other coverage	24.53 (23.76-25.31)	22.1 (20.68-23.52)	24.74 (23.64-25.84)	26.7 (25.22-28.18)	**<.001**
No coverage	7.94 (7.43-8.45)	7.47 (6.6-8.35)	8.14 (7.35-8.94)	8.2 (7.23-9.17)	**<.001**
Patient neighborhood (ZIP code) characteristics					
Average % black, mean (95% CI)	24.29 (23.52-25.05)	20.99 (19.7-22.27)	25.92 (24.64-27.21)	25.94 (24.56-27.32)	**<.001**
Average % high school graduates, mean (95% CI)	86.1 (85.9-86.29)	86.15 (85.84-86.46)	86.05 (85.73-86.38)	86.08 (85.72-86.44)	0.92
Neighborhood poverty (% ZIP code residents below poverty), mean % (95% CI)	24.29 (23.52-25.05)	20.99 (19.7-22.27)	25.92 (24.64-27.21)	25.94 (24.56-27.32)	
<20% below poverty	65.72 (64.53-66.91)	63.16 (60.94-65.38)	63.1 (61.15-65.06)	70.84 (68.9-72.78)	**<.001**
≥20% below poverty	34.28 (33.09-35.47)	36.84 (34.62-39.06)	36.9 (34.94-38.85)	29.16 (27.22-31.1)	**<.001**

Abbreviations: CI, confidence interval; ESKD, end-stage kidney disease; BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); COPD, Chronic obstructive pulmonary disease.

[a]Statistical significance indicated in bold. The P value is <0.05

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Table 3. Characteristics of dialysis facilities with low, moderate, and high waitlisting within one year of evaluation start: 2015-2024

Characteristic	Overall	Tertile of Transplant Evaluation Start, Median (Range)			P-value[a]
		Lowest 20 (0-32.5)	Middle 41.67 (32.56-50)	Highest 75 (50.55-100)	
Facilities, No.	2290	763	789	738	
Total No. of patients	32174	10956	14239	6979	
Facility-Level Characteristics					
No. of patients per facility, mean (95% CI)	58.43 (56.53-60.34)	57.42 (54.71-60.13)	69.26 (65.81-72.72)	47.45 (43.94-50.97)	**<.001**
Patient to social worker ratio, mean (95% CI)	50.48 (49.16-51.79)	49.2 (47.13-51.28)	55.17 (52.97-57.36)	46.26 (43.71-48.82)	**<.001**
Freestanding facility, N (%)	1945 (86.44)	710 (93.79)	722 (91.74)	513 (72.66)	**<.001**
Profit Status, N (%)					
Non-profit	464 (20.62)	96 (12.68)	120 (15.25)	248 (35.13)	**<.001**
For-profit	1786 (79.38)	661 (87.32)	667 (84.75)	458 (64.87)	**<.001**
Facility Incident Patient-Level Characteristics					
Age category in years, mean % (95% CI)					
18-30	10.79 (9.96-11.62)	6.08 (5.12-7.03)	7.42 (6.65-8.19)	19.26 (17.14-21.38)	**<.001**
30-40	14.25 (13.46-15.04)	10.61 (9.5-11.71)	13.71 (12.71-14.71)	18.6 (16.77-20.43)	**<.001**
40-50	18.42 (17.65-19.19)	17.4 (16.06-18.74)	18.92 (17.97-19.88)	18.95 (17.29-20.61)	0.18
50-60	25.15 (24.26-26.04)	27.67 (26.07-29.28)	26.4 (25.26-27.54)	21.21 (19.39-23.03)	**<.001**
60-70	24.23 (23.35-25.11)	28.51 (26.91-30.12)	26.02 (24.82-27.22)	17.89 (16.24-19.55)	**<.001**
70-80	7.16 (6.62-7.69)	9.73 (8.52-10.95)	7.53 (6.83-8.23)	4.09 (3.34-4.84)	**<.001**
Male sex, mean % (95% CI)	63.39 (62.38-64.4)	60.53 (58.76-62.3)	63.03 (61.79-64.28)	66.73 (64.57-68.9)	**<.001**
Race, mean % (95% CI)					
White, non-Hispanic	44.56 (43.14-45.99)	38.06 (35.67-40.45)	45.93 (43.72-48.13)	49.85 (47.11-52.6)	**<.001**
Black	44.64 (43.23-46.05)	53.01 (50.53-55.49)	44.07 (41.88-46.26)	36.56 (34.05-39.08)	**<.001**
Hispanic White	6.78 (6.16-7.4)	5.78 (4.7-6.86)	6.12 (5.37-6.88)	8.52 (7.18-9.86)	**0.001**
Other	4.02 (3.58-4.46)	3.15 (2.47-3.83)	3.88 (3.3-4.47)	5.06 (4.07-6.05)	**0.002**
Attributed cause of ESKD, mean % (95% CI)					
Diabetes	39 (37.97-40.04)	42.74 (40.92-44.57)	41.85 (40.51-43.19)	32.1 (30.02-34.18)	**<.001**
Hypertension	29.06 (28.02-30.11)	34.23 (32.31-36.15)	29.38 (27.96-30.81)	23.39 (21.4-25.38)	**<.001**
Glomerulonephritis	14.87 (14.04-15.69)	9.21 (8.14-10.28)	13.08 (12.13-14.04)	22.61 (20.68-24.54)	**<.001**
Cystic Kidney	2.95 (2.58-3.32)	2.26 (1.7-2.83)	2.89 (2.42-3.37)	3.72 (2.89-4.56)	**0.01**
Other	14.11 (13.32-14.91)	11.56 (10.3-12.82)	12.79 (11.86-13.71)	18.18 (16.34-20.01)	**<.001**
Facility % of incident patient clinical and laboratory measures					
Comorbidities, mean % (95% CI)					
Obese (BMI ≥ 35 kg/m2)	23.5 (22.61-24.38)	26.91 (25.24-28.57)	24.51 (23.36-25.66)	18.87 (17.14-20.6)	**<.001**
Congestive heart failure	19.89 (19.06-20.73)	23.37 (21.77-24.98)	20.53 (19.45-21.61)	15.58 (13.99-17.17)	**<.001**
Atherosclerotic heart disease	8.73 (8.08-9.39)	8.74 (7.51-9.96)	8.72 (7.83-9.6)	8.75 (7.47-10.04)	1.00
Other cardiac disease	13.81 (13.06-14.55)	14.42 (13.04-15.79)	13.99 (12.92-15.06)	12.97 (11.52-14.42)	0.29
Cerebrovascular disease (stroke)	5.46 (5.04-5.89)	6.64 (5.81-7.46)	5.84 (5.26-6.43)	3.83 (3.04-4.62)	**<.001**
Peripheral vascular disease	6.27 (5.73-6.81)	6.63 (5.55-7.71)	6.33 (5.61-7.05)	5.84 (4.84-6.83)	0.50
Hypertension	89.28 (88.62-89.95)	90.23 (89.14-91.31)	89.17 (88.26-90.09)	88.42 (86.97-89.87)	0.10
Diabetes	52.15 (51.08-53.21)	58.31 (56.5-60.11)	53.81 (52.47-55.16)	43.94 (41.75-46.14)	**<.001**

Chronic obstructive pulmonary disease	4.65 (4.2-5.1)	5.74 (4.84-6.64)	4.98 (4.33-5.63)	3.16 (2.39-3.94)	**<.001**
Tobacco use	6.87 (6.32-7.43)	8.84 (7.63-10.04)	6.67 (5.98-7.36)	5.06 (4.15-5.97)	**<.001**
Cancer	4.12 (3.68-4.55)	4.45 (3.62-5.28)	3.92 (3.38-4.47)	3.99 (3.12-4.85)	0.57
Patient socioeconomic characteristics					
Patient has been informed of kidney transplant options, mean % (95% CI)	91.06 (90.32-91.8)	89.27 (87.81-90.72)	91.3 (90.24-92.36)	92.71 (91.41-94.02)	**0.001**
Pre-ESKD nephrology care, mean % (95% CI)					
No	17.79 (16.96-18.61)	20.13 (18.53-21.73)	18.71 (17.6-19.82)	14.37 (12.84-15.91)	**<.001**
Yes	66.43 (65.3-67.55)	62.85 (60.75-64.96)	67.53 (65.99-69.07)	68.94 (66.79-71.09)	**<.001**
Unknown	15.79 (14.82-16.75)	17.02 (15.19-18.84)	13.76 (12.47-15.05)	16.68 (14.81-18.56)	**0.01**
Primary health insurance provider, mean % (95% CI)					
Medicaid	27.77 (26.74-28.8)	28.23 (26.39-30.08)	27.74 (26.33-29.14)	27.32 (25.23-29.41)	0.78
Medicare	27.82 (26.83-28.8)	30.38 (28.59-32.16)	26.81 (25.6-28.02)	26.24 (24.18-28.31)	**0.001**
Employer group	28 (27.01-28.99)	22.33 (20.82-23.84)	28.36 (27.1-29.62)	33.49 (31.28-35.69)	**<.001**
Other coverage	8.02 (7.43-8.62)	7.62 (6.73-8.51)	8.8 (7.9-9.69)	7.61 (6.32-8.9)	0.18
No coverage	8.4 (7.81-8.98)	11.45 (10.24-12.65)	8.3 (7.49-9.11)	5.34 (4.4-6.28)	**<.001**
Patient neighborhood (ZIP code) characteristics					
Average % black, mean (95% CI)	24.44 (23.63-25.25)	30.08 (28.58-31.57)	24.48 (23.14-25.82)	18.56 (17.34-19.77)	**<.001**
Average % high school graduates, mean (95% CI)	86.08 (85.87-86.29)	85.26 (84.92-85.61)	86.32 (86-86.65)	86.66 (86.24-87.08)	**<.001**
Neighborhood poverty (% ZIP code residents below poverty), mean % (95% CI)					
<20% below poverty	66.09 (64.78-67.4)	59.43 (57.06-61.8)	66.73 (64.75-68.71)	72.3 (69.93-74.68)	**<.001**
≥20% below poverty	33.91 (32.6-35.22)	40.57 (38.2-42.94)	33.27 (31.29-35.25)	27.7 (25.32-30.07)	**<.001**

Abbreviations: CI, confidence interval; ESKD, end-stage kidney disease; BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); COPD, Chronic obstructive pulmonary disease.

[a]Statistical significance indicated in bold. The P value is <0.05

Figure 1. Flow diagram of study inclusion and exclusion criteria for study population (2015–2023).

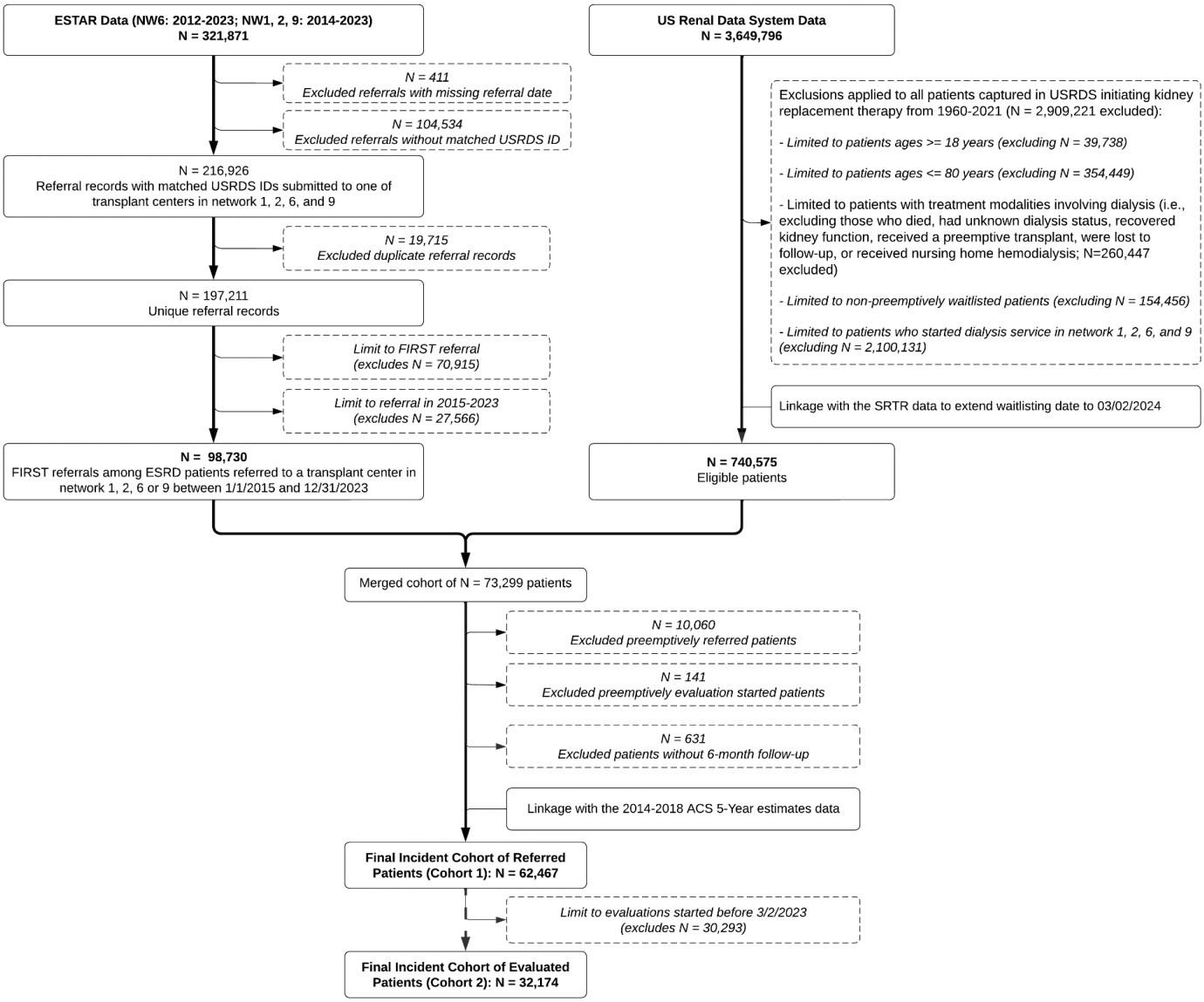
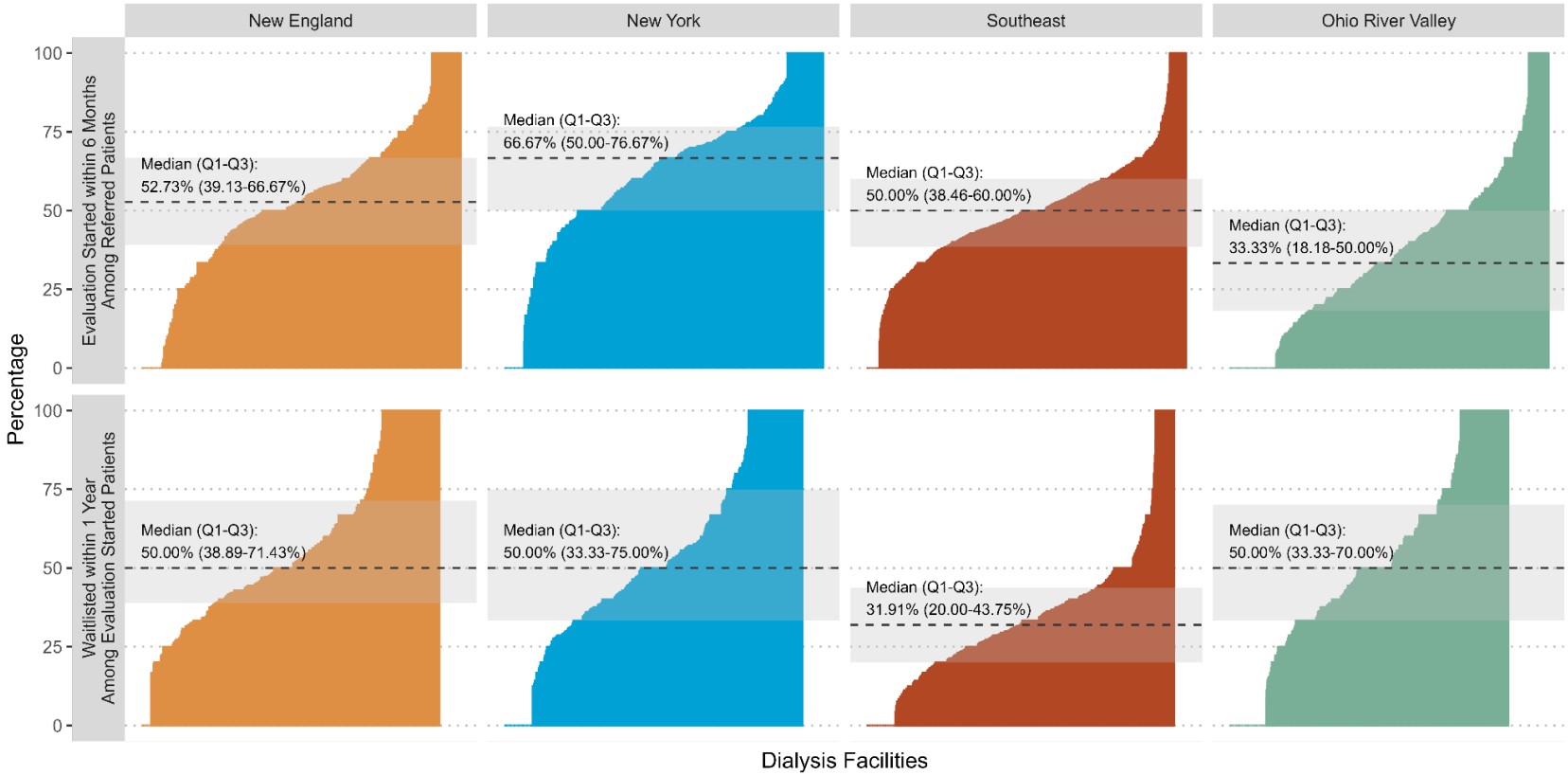


Figure 2. Percentage of patients that started the evaluation within six months of referral for kidney transplantation and waitlisted within one year of evaluation start within dialysis facilities in ESRD Networks 1, 2, 6, and 9: 2015-2024[a, b, c]

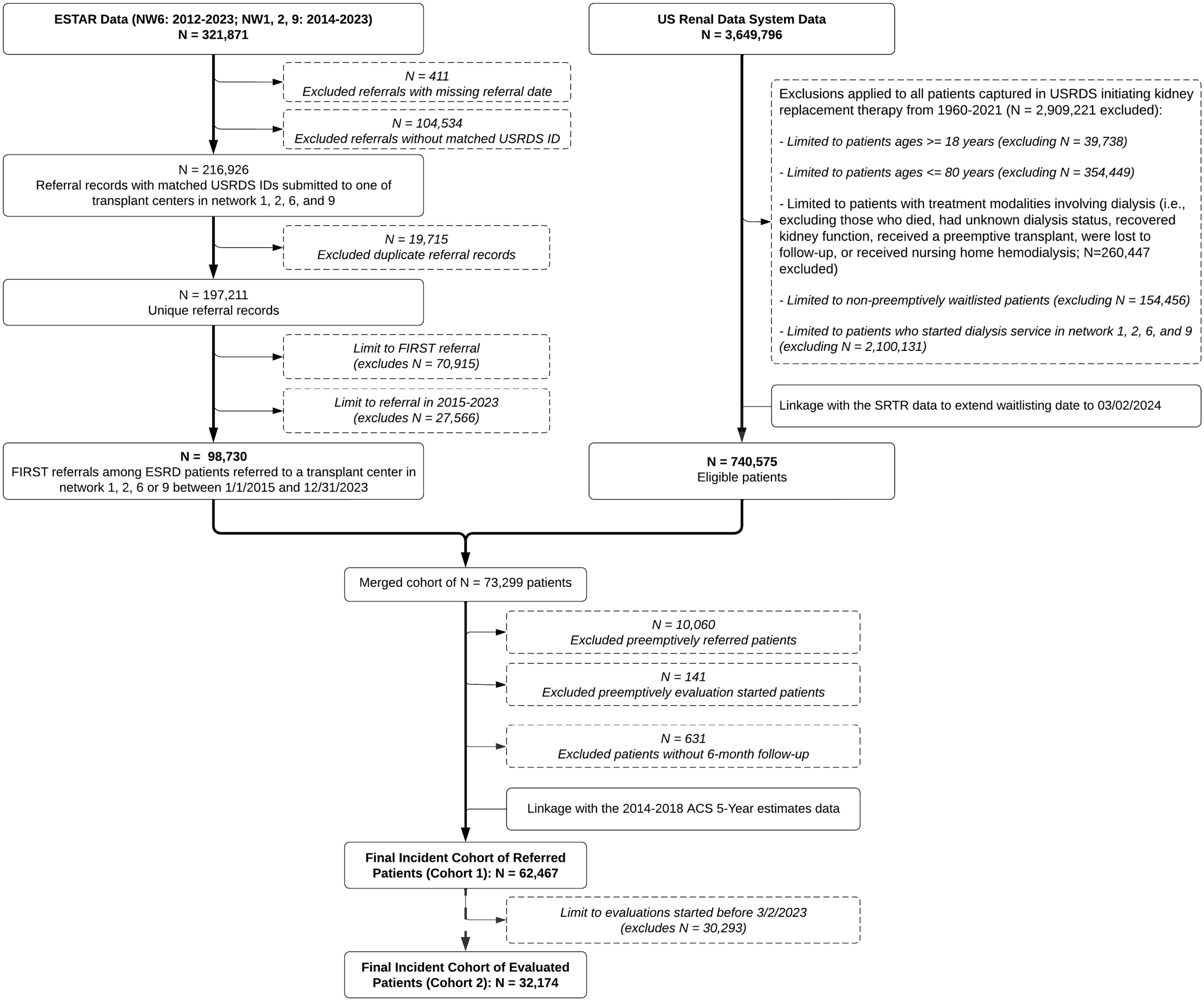


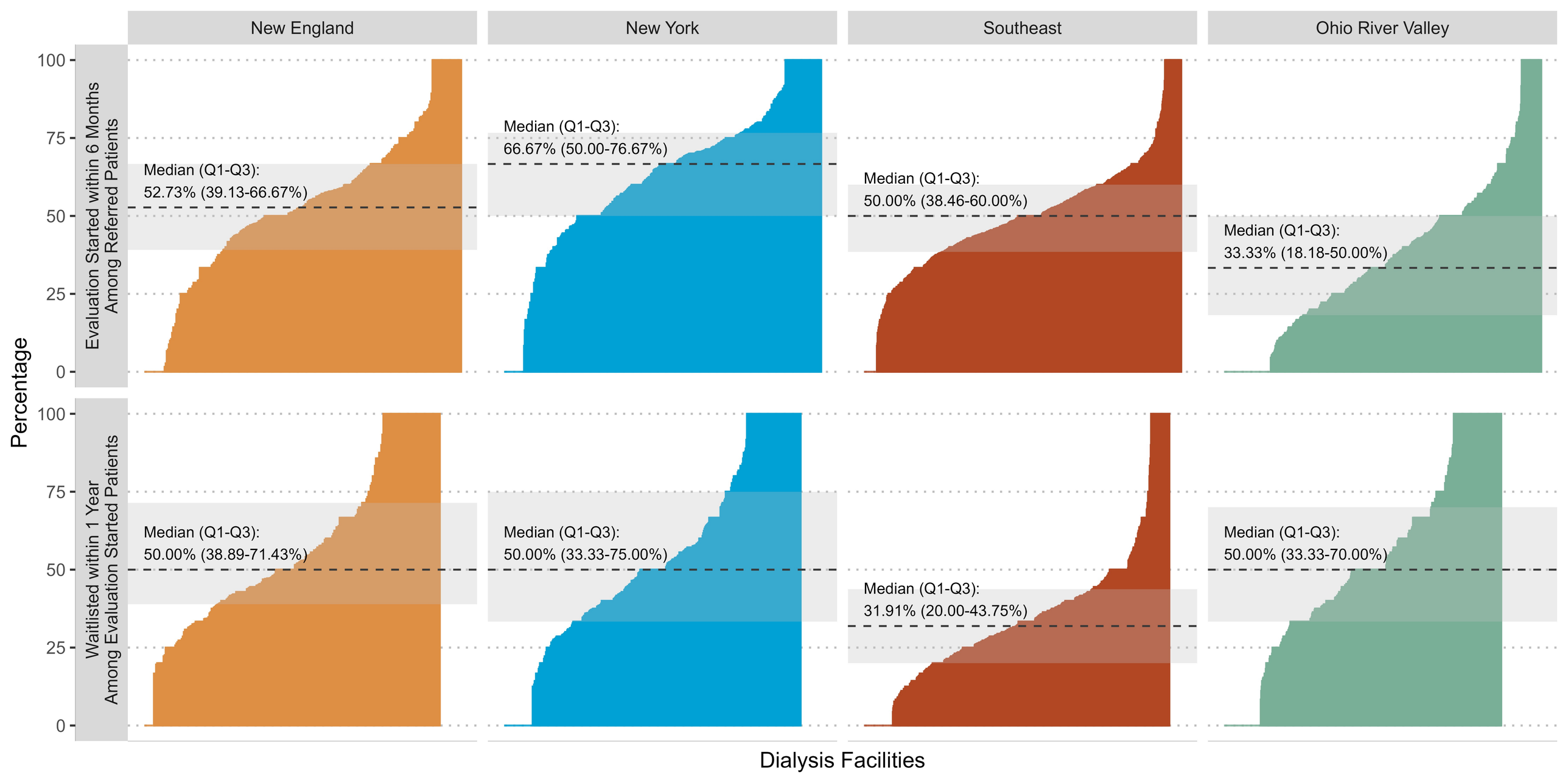
[a]Each bar represents an individual dialysis facility. Dialysis facilities are ordered sequentially based on the percentage of patients with each outcome. Each figure additionally displays the median (dotted line) and interquartile range (Q1-Q3) for the outcomes within each region.

[b]Small dialysis facilities (# of dialysis patients <20) were excluded.

[c]The denominator for calculating each outcome differed depending on data availability from each transplant center. See table S1 for a detailed description of data availability for each participating center.

Figure 1


ESTAR Data (NW6: 2012-2023; NW1, 2, 9: 2014-2023)
N = 321,871
N = 411
Excluded referrals with missing referral date
N = 104,534
Excluded referrals without matched USRDS ID
N = 216,926
Referral records with matched USRDS IDs submitted to one of transplant centers in network 1, 2, 6, and 9
N = 19,715
Excluded duplicate referral records
N = 197,211
Unique referral records
Limit to FIRST referral
(excludes N = 70,915)
Limit to referral in 2015-2023
(excludes N = 27,566)
N = 98,730
FIRST referrals among ESRD patients referred to a transplant center in network 1, 2, 6 or 9 between 1/1/2015 and 12/31/2023
US Renal Data System Data
N = 3,649,796
Exclusions applied to all patients captured in USRDS initiating kidney replacement therapy from 1960-2021 (N = 2,909,221 excluded):
- Limited to patients ages >= 18 years (excluding N = 39,738)
- Limited to patients ages <= 80 years (excluding N = 354,449)
- Limited to patients with treatment modalities involving dialysis (i.e., excluding those who died, had unknown dialysis status, recovered kidney function, received a preemptive transplant, were lost to follow-up, or received nursing home hemodialysis; N=260,447 excluded)
- Limited to non-preemptively waitlisted patients (excluding N = 154,456)
- Limited to patients who started dialysis service in network 1, 2, 6, and 9 (excluding N = 2,100,131)
Linkage with the SRTR data to extend waitlisting date to 03/02/2024
N = 740,575
Eligible patients
Merged cohort of N = 73,299 patients
N = 10,060
Excluded preemptively referred patients
N = 141
Excluded preemptively evaluation started patients
N = 631
Excluded patients without 6-month follow-up
Linkage with the 2014-2018 ACS 5-Year estimates data
Final Incident Cohort of Referred Patients (Cohort 1): N = 62,467
Limit to evaluations started before 3/2/2023
(excludes N = 30,293)
Final Incident Cohort of Evaluated Patients (Cohort 2): N = 32,174


New England
New York
Southeast
Ohio River Valley
Evaluation Started within 6 Months Among Referred Patients
Waitlisted within 1 Year Among Evaluation Started Patients
Percentage
100
75
50
25
0
Median (Q1-Q3):
52.73% (39.13-66.67%)
Median (Q1-Q3):
66.67% (50.00-76.67%)
Median (Q1-Q3):
50.00% (38.46-60.00%)
Median (Q1-Q3):
33.33% (18.18-50.00%)
Median (Q1-Q3):
50.00% (38.89-71.43%)
Median (Q1-Q3):
50.00% (33.33-75.00%)
Median (Q1-Q3):
31.91% (20.00-43.75%)
Median (Q1-Q3):
50.00% (33.33-70.00%)
Dialysis Facilities