Provision of Transplant Education for Patients Starting Dialysis: Disparities Persist

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Abstract

Background: All patients starting dialysis should be informed of kidney transplant as a renal replacement therapy option. Prior research has shown disparities in provision of this information. In this study, we aimed to identify patient sociodemographic and dialysis facility characteristics associated with not receiving transplant information at the time of dialysis initiation. We additionally sought to determine the association of receiving transplant information with waitlist and transplant outcomes.

Methods: We retrospectively analyzed CMS-2728 forms filed from 2007 to 2019. The primary outcome was report of provision of information about transplant on the Centers for Medicare and Medicaid Services Form CMS-2728. For patients not informed at the time of dialysis, we collected the reported reason for not being informed (medically unfit, declined information, unsuitable due to age, psychologically unfit, not assessed, or other). Cox proportional-hazards model estimates were used to study determinants of addition to the waitlist and transplant (secondary outcomes).

Results: Fifteen percent of patients did not receive information about transplant (N=133,414). Non-informed patients were more likely to be older, female, white, and on Medicare. Patients informed about transplant had a shorter time between end-stage renal disease onset and addition to the waitlist; they also spent a shorter time on the waitlist before receiving a transplant. Patients at chain dialysis facilities were more likely to receive information, but this did not translate into higher waitlist or transplant rates. Patients at independent facilities acquired by chains were more likely to be informed but less likely to be added to the waitlist post acquisition.

Conclusions: Disparities continue to persist in providing information about transplant at initiation of dialysis. Patients who are not informed have reduced access to the transplant waitlist and transplant. Maximizing the number of patients informed could increase the number of patients referred to transplant

centers, and ultimately transplanted. However, policy actions should account for differences in protocols stemming from facility ownership.

Key Words: CMS-2728, Renal Transplant, Patient Education

Background

For the nearly one million patients with end stage renal disease (ESRD) in the United States, kidney transplant has several advantages over dialysis, including longer patient survival and improved quality of life.[1-4] Patient education is an important component of making informed decisions about ESRD treatment options, as early access to nephrology care has been shown to result in improved patient satisfaction with ESRD treatment and higher rates of kidney transplant.[5-8] Despite these benefits, a substantial number of patients with ESRD report limited discussions with their doctors about ESRD treatment options and a lack of knowledge about kidney transplant.[9-11]

For patients who lack early access to nephrology care, education about ESRD treatment options should occur at initiation of dialysis.[12] The Centers for Medicare and Medicaid Services (CMS) requires the submission of a Medical Evidence Form (CMS-2728) for all patients with ESRD within 45 days of initiating dialysis. In 2005, the form was amended to include a question about the provision of kidney transplant information; if information is not provided, the reason for not providing it must be specified. Prior research has found disparities in receipt of information about kidney transplant based on social determinants of health that include race, gender, and insurance status.[13-15] Since then, several important policy changes have occurred to improve patient education of chronic kidney disease (CKD), ESRD, and transplant, including the 2019 Advancing American Kidney Health Initiative.

We hypothesized that despite 15 years since the modifications to Form 2728, persistent disparities remain in which patients are provided information about transplant at initiation of dialysis. We also hypothesized that a lack of early information about transplant contributes to disparities in kidney transplantation. The purpose of this study was to (1) quantify the reported provision of transplant information as indicated on the Medical Evidence Form, (2) identify sociodemographic risk factors for not receiving transplant information at the time of dialysis initiation, (3) determine the association of dialysis facility characteristics with reported provision of transplant information, and (4) determine the association of reported transplant information with waitlist and transplant outcomes.

Methods

Study design and data source

This was a retrospective analysis of patients aged 18 to 75 with a newly filed Medical Evidence Form during the study period between 1/1/2008 to 1/1/2019 using data from the United States Renal Data System (USRDS). USRDS includes all patients in the United States who develop ESRD and require renal replacement therapy via either dialysis or a kidney transplant. This research was approved by the Duke University Health System Institutional Review Board under protocol 2017-0556.

Outcomes, exposures, and covariates

The primary outcome was reported provision of transplant information, as indicated on Medical Evidence Form 2728. For patients not informed at the time of dialysis, we collected the reason for not being informed (medically unfit, declined information, unsuitable due to age, psychologically unfit, not assessed, or other). Secondary outcomes were addition to the transplant waitlist and transplant rate.

Characteristics thought to be associated with the likelihood of receiving transplant education included the following: receiving nephrology care pre-ESRD, dialysis facility ownership, initial dialysis access, alcohol dependence, drug dependence, inability to ambulate, inability to transfer, and needing assistance with activities of daily living. The following dialysis facility characteristics were also considered: number of patients per registered nurse, number of patients per technician, and number of patients per social worker.

A complete list of characteristics can be found in Table 1. The models described below are estimated by controlling for all of these characteristics, while only major results and coefficients are reported in the Tables.

Informed about transplant

Logistic regression models were constructed in which the dependent variable is whether the patient has not been informed of transplant options and each reason for which the patient has not been informed. The models for each reason were run on the subset of patients who have not been informed of transplant options. The reference variables to calculate the odds ratio were the following for their respective categories: polycystic kidney for the variable "disease," arteriovenous fistula for the variable "vascular access," group (private) for the variable "insurance status (at the time of diagnosis)," white for the variable "race," employed full time for the variable "employment", and Midwest for the variable "region".

Time to waitlist

We calculated Cox proportional-hazards model estimates for the time to waitlist after a patient's signature of the Medical Evidence Form. We consider as study end date the latest addition date observed in the whole dataset (08/10/2018). For patients who do not reach the event of interest during the study observation period, we record when the patient was censored due to study end date or due to the occurrence of an event that prevents further follow-up of the patient (e.g., death).[16] We also restrict the dataset to patients whose Medical Evidence Form was submitted by 12/31/2015 to account for the fact that those patients who started dialysis towards the end of the study period were not given an adequate opportunity to be waitlisted. A hazard ratio above one indicates a covariate that is positively associated with the event probability (i.e., being added to the waitlist), and thus negatively associated with the time to waitlisting.

Time to transplant

We calculated Cox proportional-hazards model estimates for time to transplant after being added to the waitlist, which was conditional on being added to the waitlist. We consider as study end date the last time a transplant is observed in the dataset (08/10/2018). For patients who do not reach the event of interest during the study observation period, we record when the patient was censored due to study end date or due to the occurrence of an event that prevents further follow-up of the patient (e.g., death). We further

restrict the dataset to patients whose Medical Evidence Form was submitted by 12/31/2015 to account for the fact that those patients who started dialysis towards the end of the study period were not given an adequate opportunity to be transplanted. Pre-emptive transplant recipients were excluded from the analysis.

Results

Characteristics of non-informed patients

Between 2008 and 2019, 944,015 patients initiated renal replacement therapy. Reported provision of transplant information has increased over study time (**Figure 1**). Of all patients included, 133,414 (14.52%) did not receive information about kidney transplant (**Table 2**). Non-informed patients were more likely to be female (43 vs 42%, CIs [42.55;43.09] and [41.77;41.99]), white (52 vs 47%, CIs [51.96;52.49] and [46.89;47.11]), and obese (13 vs 12%, CIs [12.81;13.18] and [11.92;12.07]). Non-informed patients were about 3 years older than informed patients, on average. Socioeconomic characteristics were also associated with the reported provision of information: patients receiving information were more likely to be on private insurance at the time of diagnosis (18 vs 10%, CIs [18.00;18.17] and [9.97;10.30]), and being employed full time (12 vs 5%, CIs [11.99;12.14] and [5.29;5.54]).

Etiology and medical management of ESRD were also associated with whether patients would be reported to receive information: informed patients were more likely to have hypertensive nephropathy as the cause of ESRD, more likely to have pre-dialysis access to nephrology care, and more likely to receive dialysis at chain-owned centers. Finally, patients who were reported to be informed were less likely to live in the West, to have alcohol dependence, substance dependence, and limited functional status (West region 20 vs 22%, CIs [20.05;20.22] and [21.90;22.35]; inability to ambulate 5 vs 12%, CIs [5.10;5.20] and [11.68;12.03]; inability to transfer 3 vs 7%, CIs [2.48;2.55] and [6.90;7.17]; needing assistance 10 vs 18%, CIs and [9.85;9.98] and [18.09;18.51]).

Predictors of not being informed about transplant

Overall, the most common reasons for not providing information about transplant were "not assessed" (52%), followed by "medically unfit" (27%) (**Figure 2**). **Table 3** provides estimates of logistic regressions in which we control for several patient characteristics (a complete list can be found in **Table 1**). Characteristics that were strongly associated with being unassessed were race, ethnicity, and dialysis center ownership: American Indian, Black, and Hispanic patients (ORs 1.60 [1.02;1.32], 1.18 [1.14;1.22], 1.30 [1.24;1.37], respectively) and those undergoing dialysis at a chain facility (OR 1.45 [1.40;1.50]) were more likely to be uninformed for an unspecified reason (i.e., "not assessed"). Differences also appeared across geographic locations, as patients in the South and West are more likely to be unassessed. Not receiving information about transplant for being medically unfit was associated with BMI >40, having Medicare as insurance, alcohol dependence, inability to ambulate, inability to transfer, needing assistance in activities of daily living, and being located in the Northeast (ORs 1.31[1.25;1.36], 1.16 [1.08;1.24], 1.48 [1.35;1.62], 1.91 [1.79;2.03], 1.55 [1.43;1.67], 1.74 [1.67;1.82] and 1.31 [1.25;1.37], respectively). Being considered psychologically unfit was associated with Black race, being unemployed, drug dependence, needing assistance, and being unable to transfer (ORs 1.11 [1.02;1.21], 2.54 [1.81;3.57], 2.29 [1.94;2.71], 2.90 [2.65;3.18], and 1.18 [1.01;1.38]). Being excluded from information due to advanced age was associated with being older, having Medicare, and being retired (ORs 1.31 [1.30;1.32], 1.40 [1.13;1.75] and 1.52 [1.16;1.99]), as expected, but also with Asian race and Hispanic ethnicity (ORs 1.38 [1.19;1.60] and 1.60 [1.47;1.75]). Patients who declined to receive information were more likely to be white or American Indian, older than 70, retired, and to need assistance with activities of daily living.

Association between receiving information about transplant and time to waitlist and kidney transplant

The goal of estimating Cox proportional-hazards models is to evaluate whether patients who are reported to receive transplant information get added to the waitlist or transplanted at a faster rate than non-informed patients while controlling for other relevant characteristics. Patients who were reported to be informed about transplant had a shorter time between ESRD onset and addition to the kidney transplant

waitlist (hazard ratio 1.62 [1.58;1.65], **Table 4**). This can be seen graphically in Figure 3, which depicts adjusted survival curves based on regression estimates and the average covariate values in the study group. For example, the probability of not being added to the waitlist from the time the medical form is signed to year 2 is 84% for someone who is informed and 90% for someone who is not informed, holding other characteristics at their mean values. To verify the proportional hazard assumption, we ran a statistical test on scaled Schoenfeld residuals[17]; the test suggests that we should reject the assumption of proportionality. A visual investigation of the Schoenfeld residuals shows that the “cloud” of residuals is negatively sloped at early time points (Figure 4), or that the model underpredicts the marginal effect of transplant information at early time points. This implies that transplant information is especially important soon after it is received. Male, white, Hispanic, and Asian patients waited shorter times to be added to the waitlist relative to Black patients. Unemployed, retired, and homemakers waited longer to be added to the waitlist.

The time from addition to the waitlist to transplant was shorter for patients who received transplant information (see Figure 4), male patients, patients with alcohol dependence, and patients with glomerulonephritis. Again, the proportionality assumption is rejected for the variable "Patient Informed" after conducting a test on Schoenfeld residuals, implying that the relative importance of the variable changes over time. Minority patients had significantly longer times on the waitlist prior to transplant (Black 38%, Asian 33%, Hispanic 34%, Pacific Islanders 36% reductions in the hazard of receiving a transplant relative to white). Homemakers, unemployed, and retired patients had longer times from listing to transplant. Similarly, patients on Medicare and/or Medicaid had longer times on the waitlist.

Dialysis Center characteristics and access to information, waitlist, and transplant

Dialysis center ownership was a significant contributor to delivery of information to patients. A dialysis center is defined as chain dialysis center if it is owned by one of the two largest for-profit dialysis chains, DaVita and Fresenius, or by smaller chains; centers not affiliated to a chain were defined as “independent”. Patients who were reported to be informed about transplant were more likely to receive ESRD care at a

chain dialysis center than non-informed patients (Table 2) (83% vs 78% CIs [82.67;82.84] vs [78.13;78.60]). Characteristics of the center itself were not associated significantly with whether patients would be informed, as a higher per-patient ratio of nurses, technicians, and social workers did not correspond to a higher reported number of patients informed (**Table 2**). The effect of chain ownership also translated into a lower number of patients waitlisted and transplanted in patients undergoing dialysis at a private facility (patients at a chain center were 3% less likely to get listed (**Table 4**) and 5% less likely to get transplanted (**Table 4**). These results are further corroborated by logit models estimated on the subset of independent facilities (**Table 5**). In these models, the dummy variable "Acquired" takes value 1 after an independent facility is acquired by a chain. The odds ratios associated with this variable suggest that the average incident patient is more likely to be informed after acquisition, but also less likely to be added to the waitlist. The coefficients do not change substantially after adding facility and/or time fixed effects to the models, suggesting robustness of these results across different specifications.

Discussion

In our retrospective analysis of 944,015 patients who initiated dialysis between 2008 and 2019, we found that 14.52% did not receive information about kidney transplant at the time of dialysis initiation. Of these, 52% were not assessed for an unknown reason, and 27% were deemed medically unfit by the nephrologist managing dialysis. Irrespective of receiving information about transplant options, racial and ethnic minorities, unemployed, and publicly insured patients had longer wait times to transplant. Patients who were reported to be informed about kidney transplant were more likely to be added to the transplant waitlist (HR 1.62). Our findings demonstrate an improvement in the reported provision of transplant education since the work by Kucirka, who reported 69.9% patients were informed between 2005-2007.[18] Our results parallel the findings of Ku and colleagues, who recently reported that among ESRD patients, non-Hispanic Black and Hispanic patients had fewer medical contraindications to transplant but were relatively less likely to receive a kidney transplant than non-Hispanic White patients.[19]

Policy initiatives implemented during the study period may account for the improvement in access to information about kidney transplant at dialysis initiation. The Kidney Allocation System (KAS) was implemented in December 2014 with the goal of increasing graft survival by matching recipients with low expected post-transplant survival (EPTS) with kidneys with lower donor profile index (KDPI). KAS also changed the initiation of waitlist time to the start date of dialysis (compared to the date of waitlisting before KAS); this may account for differences in information provided, as after KAS implementation there is less urgency to refer a viable candidate to a transplant center as soon as possible. Additionally, it is possible that increased insurance coverage following the implementation of the Affordable Care Act (ACA) in 2010 may have decreased barriers related to insurance status, as suggested by studies that correlated ACA implementation and pre-emptive kidney transplant listing.[20,21] Despite this, we found that patients with Medicare and/or Medicaid were less likely to be informed about transplant, and patients with private insurance were more likely to be reported to receive information about kidney transplant and access to the waitlist and transplant (while controlling for several socioeconomic characteristics).[22-24] Older and female patients as well as racial and ethnic minorities spent a longer time on the waitlist, demonstrating that for some minorities the barriers to transplant are complex and not entirely overcome by gaining access to the waitlist.[25]

The focus of our study was to investigate provision of information about kidney transplant as reported to CMS. In our opinion, all patients with ESRD should receive this information, in accordance with CMS policy. Whether all patients should be referred to a transplant center is a subject of intense debate. Although not all ESRD patients are transplant candidates, the wide variation in eligibility criteria among US centers suggests that subjective assessments may be contributing to the disparity. Some authors have proposed an “opt-out” model as a way to reduce disparities in access to transplant.[26] Others have argued against default referrals, noting that these would increase cost and inefficiencies for transplant centers.[27] Reconciling these opposite arguments would be important to optimize referral of viable candidates while reducing disparities in access to transplant.

It is important to note how the persistent disparities in access to information mostly result from providers' choices, as only a small percentage of patients (less than 2% in all groups) declined information about kidney transplant. Although some groups were more likely to decline information (female, white, retired), their overall percentage remained small, indicating that not receiving information about transplant does not reflect an intentional decision by patients, but more commonly stems from providers' assessments of perceived barriers to transplant. Still, gender, age, employment status, type of insurance, type of dialysis center, and pre-dialysis nephrology care were all associated with the reported receipt of information about kidney transplant, as indicated on the CMS-2728 form. The fact that most patients were excluded from receiving information for a "not assessed" reason suggests that the decision not to inform patients may have been taken after a superficial "gestalt" evaluation. Even when a reason for exclusion was specified, it did not necessarily stem from an accurate evaluation of the patient. For example, of patients who were unable to ambulate, only 30.1% were not informed because they were deemed medically unfit. These findings suggest that there may be significant provider-driven bias when assessing eligibility for transplant. Another explanation for the high rate of non-assessment is lack of time, and prior studies have found that nephrologists treating predominantly Black, elderly, and Medicaid-insured patients report insufficient time as the primary barrier to transplant education.[28] To ensure fairness in the referral process and to decrease provider bias, some authors have proposed an opt-out referral model as a solution, although this is a subject of debate.[26]

We also found that dialysis center ownership was associated with reported provision of information about transplant to ESRD patients. Patients undergoing dialysis at chain facilities were more likely to be reported to have received information compared to patients treated at independent facilities, but this did not lead to higher rates of waitlisting and transplant. Moreover, independent facilities acquired by chain facilities change their practices considerably, as patients become more likely to be informed but less likely to be added to the waitlist after acquisition. Our finding suggests that, rather than differences in patient populations, chain units provide a lower quality of transplant education, as our analysis controls for several

medical and socioeconomic patient characteristics. That chains are more likely to inform patients of transplant options but less likely to place patients on the waitlist is consistent with prior work that found chain ownership comes with firm-wide standards (e.g., operation manuals that dictate treatment protocols) but also causes waitlist and transplant rates to fall; chains' explicit mandate to maximize profits may lead them to sacrifice patient outcomes in favor of higher reimbursements.[29] Of note, patients who were reported to have received information about transplant were treated in facilities with a slightly lower number of nurses and social workers when compared to patients who did not receive information, as well as higher patient-to-nurse and patient-to-technician ratios. These results are in contrast to a recent publication indicating that a lower patient-to-staff ratio is more likely to be associated with transplant education.[30]

Our study has several additional policy implications. With very limited exceptions, all patients with ESRD should receive access to information about kidney transplant. Ideally, this would occur well before initiation of dialysis, as pre-emptive transplant is the most-preferred renal replacement therapy and the Organ Procurement and Transplantation Network (OPTN) recommends referral to a transplant center when GFR approaches 30 mL/min/1.73m^2.[31]The purpose of the expanded reimbursement for transplant education and the accompanying change to the CMS-2728 form was to ensure patients are educated about their options for managing ESRD. These options include transplantation, and provision of education about transplant as an option does not require—and we argue should not include—an assessment of whether the patient is a suitable candidate for transplant, as initiation of renal replacement therapy is not the appropriate setting for a specialized screening. This is especially important considering a recent study showing that dialysis providers themselves had limited knowledge of barriers to transplant.[32]

It is likely that the CMS-2728 form falls short of its intended purpose—to ensure timely receipt of information about transplant for patients. One key component of the Advancing American Kidney Health Initiative is the performance payment adjustment, a positive or negative payment adjustment based on home dialysis rate and transplant rate.[33] The Center for Medicare & Medicaid Innovation additionally will

expand the use of the kidney disease education benefit to CKD stage 5. These initiatives lend credence to the previously established idea that progression of kidney disease occurs over time and that education about options for renal replacement therapy, including transplant, should happen at an earlier stage in the disease process. Although our research focused on Form 2728 as a way to quantify delivery of information about transplant and the disparities associated with it, the associated time point of 45 days after initiation of dialysis is probably not the most appropriate. Information about transplant should ideally happen earlier, although this would require a shift from the current policy system, where Form 2728 is the latest checkpoint at which all patients should be informed about transplant. Moreover, our analysis sheds light on differences in attitudes towards transplant information between chain and independent facilities. In fact, policy actions should account for facility ownership differences and ensure that chain protocols do not impede higher information rates to translate into higher waitlist and transplant rates.

Some limitations apply to our study. This was an observational analysis based on the CMS-2728 Form as part of the USRDS and is therefore subject to the limitations of large registry data reporting. Moreover, there may be inaccuracies in the way in which certain variables on the CMS-2728 Form are coded.[34] CMS-2728 forms are often filled by ancillary staff and this may limit the accuracy of the data reported. We limited our focus to documenting which patients were reported to receive information about kidney transplant—and did not study directly which patients received access to kidney transplant—based on the assumption that every patient with ESRD should be informed and that the evaluation and candidacy determination should be managed by transplant centers. In addition, the concept of receiving education about kidney transplant is vague, and there may be differences in what information is provided to patients as well as what information is actually retained by them;[30] a recent study found that a significant proportion of patients informed about kidney transplant by their physicians did not recall receiving the information.[35] Moreover, we did not assess disparities in pre-emptive listing, and it is also likely that patients may receive information about transplant from sources other than the provider responsible for form CMS-2728 submission. Finally, our data did not exclude patients with a prior kidney transplant.

Although these represent a small subset of the database analyzed, it is possible that their information practices may differ from first-time dialysis patients.

The decision not to inform a patient about kidney transplant is an important one, as it is associated with decreased rates of access to the waitlist and transplant. It should not be taken lightly. Transplant centers should be entrusted with screening and evaluating patients for transplant. More patient referrals to transplant centers could motivate patients with modifiable barriers to transplant to overcome them and increase the number of patients listed and ultimately transplanted.

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Tables

Table 1. Variables analyzed in the patient population.

Variables	Subcategories
Age	
Gender	M
	F
BMI	>40
	<=40
Race/ethnicity	Black
	White
	Asian
	American Indian/Alaskan
	Pacific Islander
	Hispanic
Insurance (at the time of diagnosis)	Private
	Medicaid
	Medicare
	Medicare&Medicaid
	Medicare&Other
	Other
Applying for Medicare	Yes
	No
Employment status	Employed full-time
	Emp part-time
	Homemaker or Unemployed
	Medical Leave of absence (LOA)
	Other
	Retired
ESRD case	Cystic Kidney
	Diabetes
	Glomerulonephritis
	Hypertension
	Other urologic
	Other cause
Nephrology care pre ESRD	Yes
	No
Facility ownership	Chain
	Independent
First access	Arteriovenous Fistula
	Indwelling catheter
	Arteriovenous Graft
	Other
Region	NE
	MW
	S

	W
Alcohol dependence	Yes
	No
Drug dependence	No
	Yes
Inability to ambulate	No
	Yes
Inability to transfer	No
	Yes
Needing assistance in ADLs	No
	Yes
Patients per registered nurse	
Patients per technician	
Patients per social worker	

Table 2. Medical and sociodemographic characteristics by kidney transplant education

Patient characteristics n (%) [95% CI]		Informed	Not informed	CIs (95%)
All patients		785,382 (85.48%) [85.41;85.55]	133,414 (14.52%) [14.45;14.59]	
Gender	F	328,884 (41.88%) [41.77;41.99]	57,122 (42.82%) [42.55;43.09]	
	M	410,285 (58.12%) [58.01;58.23]	93,467 (57.18%) [56.91;57.45]	
BMI	<=40	686,098 (88.01%) [87.93;88.08]	114,935 (87.01%) [86.82;87.19]	
	>40	93,495 (11.99%) [11.92;12.07]	191,191 (12.99%) [12.81;13.18]	
Race/ethnicity	Asian	29,726 (3.78%) [3.74;3.83]	4,148 (3.11%) [3.02;3.20]	
	Black	237,382 (30.23%) [30.12;30.33]	37,585 (28.17%) [27.93;28.42]	
	Hispanic	130,634 (16.63%) [16.55;16.72]	18,636 (13.97%) [13.78;14.16]	
	Other	18,533 (2.36%) [2.33;2.39]	3,367 (2.52%) [2.44;2.61]	

	White	369,093 (47.00%) [46.89;47.11]	69,672 (52.22%) [51.96;52.49]	
Insurance (at the time of diagnosis)	Private	141,114 (18.09%) [18.00;18.17]	13,453 (10.13%) [9.97;10.30]	
	Medicare	129,922 (16.65%) [16.57;16.73]	24,052 (18.12%) [17.91;18.32]	
	Other	509,235 (65.26%) [65.16;65.37]	95,254 (71.75%) [71.51;71.99]	
Employment status	Employed full-time	94,750 (12.06%) [11.99;12.14]	7,225 (5.42%) [5.29;5.54]	
	Homemaker or Unemployed	233,369 (29.71%) [29.61;29.82]	38,527 (28.88%) [28.63;29.12]	
	Other	457,263 (58.22%) [58.11;58.33]	87,662 (65.71%) [65.45;65.96]	
Region	MW	154,641 (20.03%) [19.94;20.11]	27,671 (21.02%) [20.80;21.24]	
	NE	121,539 (15.74%) [15.66;15.82]	21,698 (16.48%) [16.28;16.68]	
	S	340,563 (44.10%) [43.99;44.21]	53,167 (40.38%) [40.12;40.65]	
	W	155,485 (20.13%) [20.05;20.22]	29,123 (22.12%) [21.90;22.35]	
ESRD case	Diabetes	394,704 (51.25%) [51.13;51.36]	65,199 (50.54%) [50.27;50.82]	
	Hypertension	206,324 (26.79%) [26.69;26.89]	32,440 (25.15%) [24.91;25.39]	
	Other	169,179 (21.97%) [21.87;22.06]	31,355 (24.31%) [24.07;24.54]	
Nephrology care pre ESRD	No	199,619 (29.12%) [29.02;29.23]	44,414 (39.48%) [39.19;39.76]	
	Yes	485,790 (70.88%) [70.77;70.98]	68,090 (60.52%) [60.24;60.81]	

Facility ownership	Chain	586,132 (82.75%) [82.67;82.84]	93,514 (78.36%) [78.13;78.60]	
	Independent	122,144 (17.25%) [17.16;17.33]	25,820 (21.64%) [21.40;21.87]	
Alcohol dependence	No	766,783 (98.18%) [98.15;98.20]	128,821 (97.20%) [97.11;97.29]	
	Yes	14,251 (1.82%) [1.80;1.85]	3,713 (2.80%) [2.71;2.89]	
Drug dependence	No	769,087 (98.47%) [98.44;98.50]	129,560 (97.76%) [97.67;97.84]	
	Yes	11,947 (1.53%) [1.50;1.56]	2,974 (2.24%) [2.16;2.33]	
Inability to ambulate	No	740,830 (94.85%) [94.80;94.90]	116,829 (88.15%) [87.98;88.32]	
	Yes	40,204 (5.15%) [5.10;5.20]	15,705 (11.85%) [11.68;12.03]	
Inability to transfer	No	761,401 (97.49%) [97.45;97.52]	123,211 (92.97%) [92.83;93.10]	
	Yes	19,633 (2.51%) [2.48;2.55]	9,323 (7.03%) [6.90;7.17]	
Needing assistance in ADLs	No	703,595 (90.09%) [90.02;90.15]	108,278 (81.70%) [81.49;81.91]	
	Yes	77,439 (9.91%) [9.85;9.98]	24,256 (18.30%) [18.09;18.51]	
Patients per registered nurse		17.05 [17.03;17.07]	16.36 [16.31;16.40]	
Patients per technician		12.68 [12.65;12.70]	12.26 [12.22;12.31]	
Patients per social worker		76.74 [76.66;76.82]	73.44 [73.25;73.63]	
Age		57.46 [57.43;57.48]	60.86 [60.80;60.92]	

Workers are part time or full time, at the facility level.

Abbreviations: ADLs: activity of daily living; ESRD: end-stage renal disease; CI: confidence interval

Table 3. Predictors of reasons for patients not being informed about kidney transplantation

Characteristics	Not informed	Medically unfit	Declined	Unsuitable due to age	Unassessed	Physically unfit	Other
Alcohol dependence,							
OR	1.121	1.478	1.269	0.938	0.785	1.694	0.721
95% CI	[1.069,1.176]	[1.348,1.620]	[0.907,1.775]	[0.716,1.227]	[0.718,0.859]	[1.428,2.011]	[0.611,0.851]
p-value	(0.000)	(0.000)	(0.164)	(0.639)	(0.000)	(0.000)	(0.000)
Drug dependence							
OR	1.313	1.222	1.157	0.853	0.693	2.288	1.235
95% CI	[1.245,1.385]	[1.096,1.363]	[0.749,1.787]	[0.503,1.447]	[0.626,0.766]	[1.935,2.706]	[1.059,1.439]
p-value	(0.000)	(0.000)	(0.512)	(0.556)	(0.000)	(0.000)	(0.007)
Inability to ambulate							
OR	1.341	1.906	1.147	0.960	0.632	0.857	0.862
95% CI	[1.296,1.387]	[1.794,2.026]	[0.933,1.410]	[0.858,1.075]	[0.594,0.672]	[0.747,0.984]	[0.760,0.976]
p-value	(0.000)	(0.000)	(0.194)	(0.480)	(0.000)	(0.029)	(0.019)
Inability to transfer							
OR	1.348	1.546	0.728	1.005	0.673	1.182	0.890
95% CI	[1.292,1.406]	[1.432,1.669]	[0.560,0.946]	[0.878,1.152]	[0.621,0.729]	[1.013,1.378]	[0.758,1.045]
p-value	(0.000)	(0.000)	(0.018)	(0.938)	(0.000)	(0.034)	(0.156)
Needs assistance							
OR	1.282	1.740	1.446	1.023	0.615	2.904	0.806
95% CI	[1.252,1.313]	[1.666,1.818]	[1.247,1.677]	[0.946,1.106]	[0.589,0.642]	[2.648,3.184]	[0.739,0.878]
p-value	(0.000)	(0.000)	(0.000)	(0.569)	(0.000)	(0.000)	(0.000)
Age at incidence							
OR	1.019	1.025	1.028	1.305	0.967	0.989	0.987
95% CI	[1.019,1.020]	[1.023,1.027]	[1.021,1.036]	[1.295,1.315]	[0.966,0.969]	[0.985,0.993]	[0.984,0.989]
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Male							
OR	0.972	1.005	0.862	0.842	1.028	1.045	1.091
95% CI	[0.958,0.987]	[0.975,1.037]	[0.772,0.962]	[0.797,0.889]	[0.999,1.057]	[0.968,1.129]	[1.036,1.149]
p-value	(0.000)	(0.740)	(0.008)	(0.000)	(0.062)	(0.259)	(0.001)
BMI over 40							
OR	1.101	1.305	0.840	0.767	0.922	0.502	0.987
95% CI	[1.077,1.125]	[1.249,1.364]	[0.709,0.995]	[0.697,0.846]	[0.885,0.961]	[0.438,0.577]	[0.915,1.064]
p-value	(0.000)	(0.000)	(0.044)	(0.000)	(0.000)	(0.000)	(0.735)
Diabetes							
OR	1.511	1.672	1.051	1.026	0.707	0.655	1.204
95% CI	[1.412,1.616]	[1.397,2.001]	[0.603,1.831]	[0.755,1.393]	[0.611,0.819]	[0.465,0.923]	[0.933,1.554]
p-value	(0.000)	(0.000)	(0.861)	(0.870)	(0.000)	(0.016)	(0.154)
Glomerulonephritis							
OR	1.528	1.854	0.720	0.942	0.595	0.629	1.339
95% CI	[1.423,1.642]	[1.536,2.237]	[0.393,1.318]	[0.679,1.306]	[0.509,0.694]	[0.434,0.912]	[1.025,1.749]
p-value	(0.000)	(0.000)	(0.287)	(0.719)	(0.000)	(0.014)	(0.032)
Hypertension							
OR	1.466	1.443	0.974	1.030	0.736	0.825	1.228
95% CI	[1.369,1.569]	[1.203,1.730]	[0.556,1.706]	[0.757,1.401]	[0.635,0.854]	[0.584,1.165]	[0.949,1.589]
p-value	(0.000)	(0.000)	(0.925)	(0.851)	(0.000)	(0.274)	(0.118)
Other cause							
OR	2.294	3.574	0.815	0.681	0.349	0.548	1.468
95% CI	[2.140,2.458]	[2.979,4.289]	[0.461,1.441]	[0.498,0.933]	[0.300,0.405]	[0.385,0.780]	[1.132,1.903]
p-value	(0.000)	(0.000)	(0.482)	(0.017)	(0.000)	(0.001)	(0.004)
Other urologic							

PERSONAL/NONWORK // EXTERNAL

OR	1.814	2.614	0.811	0.984	0.464	1.139	1.325
95% CI	[1.660,1.982]	[2.117,3.227]	[0.398,1.655]	[0.679,1.425]	[0.387,0.557]	[0.753,1.721]	[0.962,1.825]
p-value	(0.000)	(0.000)	(0.565)	(0.932)	(0.000)	(0.538)	(0.085)
Cath							
OR	1.347	1.297	0.943	0.894	0.890	0.828	1.020
95% CI	[1.317,1.377]	[1.235,1.363]	[0.799,1.113]	[0.828,0.965]	[0.852,0.929]	[0.732,0.936]	[0.940,1.107]
p-value	(0.000)	(0.000)	(0.488)	(0.004)	(0.000)	(0.003)	(0.635)
Graft							
OR	1.208	1.336	0.679	0.945	0.809	1.154	1.011
95% CI	[1.153,1.266]	[1.210,1.475]	[0.454,1.015]	[0.807,1.107]	[0.738,0.885]	[0.923,1.442]	[0.849,1.204]
p-value	(0.000)	(0.000)	(0.059)	(0.486)	(0.000)	(0.208)	(0.898)
Other							
OR	1.452	1.041	0.963	0.622	0.929	0.404	1.453
95% CI	[1.243,1.696]	[0.744,1.457]	[0.304,3.047]	[0.337,1.147]	[0.689,1.254]	[0.127,1.286]	[0.915,2.308]
p-value	(0.000)	(0.815)	(0.949)	(0.128)	(0.632)	(0.125)	(0.113)
Nephrologist care							
OR	0.752	0.989	0.878	1.085	1.035	0.759	0.869
95% CI	[0.741,0.764]	[0.957,1.022]	[0.782,0.987]	[1.022,1.152]	[1.004,1.067]	[0.700,0.823]	[0.823,0.917]
p-value	(0.000)	(0.503)	(0.029)	(0.008)	(0.028)	(0.000)	(0.000)
American Indian/Alaskan							
OR	0.923	0.829	1.428	0.999	1.159	0.753	1.053
95% CI	[0.864,0.986]	[0.721,0.953]	[0.933,2.185]	[0.737,1.352]	[1.019,1.317]	[0.508,1.116]	[0.848,1.308]
p-value	(0.018)	(0.008)	(0.101)	(0.993)	(0.024)	(0.158)	(0.641)
Asian							
OR	0.830	0.718	0.865	1.380	1.060	0.974	1.354
95% CI	[0.796,0.866]	[0.653,0.789]	[0.618,1.212]	[1.191,1.600]	[0.976,1.152]	[0.778,1.221]	[1.189,1.541]
p-value	(0.000)	(0.000)	(0.400)	(0.000)	(0.164)	(0.821)	(0.000)
Black							
OR	0.895	0.794	0.845	1.179	1.182	1.110	0.915
95% CI	[0.880,0.911]	[0.765,0.824]	[0.736,0.970]	[1.101,1.261]	[1.142,1.224]	[1.017,1.213]	[0.858,0.976]
p-value	(0.000)	(0.000)	(0.017)	(0.000)	(0.000)	(0.020)	(0.007)
Hispanic							
OR	0.772	0.558	0.981	1.601	1.303	0.708	1.270
95% CI	[0.754,0.790]	[0.529,0.589]	[0.821,1.173]	[1.466,1.747]	[1.244,1.365]	[0.619,0.809]	[1.178,1.370]
p-value	(0.000)	(0.000)	(0.834)	(0.000)	(0.000)	(0.000)	(0.000)
Other							
OR	1.181	1.029	1.000	1.310	1.401	0.685	0.402
95% CI	[0.965,1.444]	[0.680,1.557]	[1.000,1.000]	[0.621,2.765]	[0.942,2.085]	[0.212,2.220]	[0.148,1.094]
p-value	(0.106)	(0.893)	(.)	(0.478)	(0.096)	(0.529)	(0.075)
Pacific Islander							
OR	1.014	1.117	0.457	1.222	0.794	1.541	1.138
95% CI	[0.943,1.090]	[0.961,1.299]	[0.203,1.030]	[0.880,1.699]	[0.691,0.911]	[1.104,2.150]	[0.911,1.422]
p-value	(0.706)	(0.150)	(0.059)	(0.231)	(0.001)	(0.011)	(0.256)
Medicaid							
OR	1.226	1.154	1.056	1.335	0.777	2.723	1.028
95% CI	[1.187,1.266]	[1.073,1.242]	[0.808,1.381]	[1.024,1.741]	[0.728,0.829]	[2.176,3.407]	[0.923,1.144]
p-value	(0.000)	(0.000)	(0.688)	(0.033)	(0.000)	(0.000)	(0.614)
Medicare							
OR	1.135	1.156	0.895	1.404	0.764	1.812	1.007
95% CI	[1.100,1.170]	[1.080,1.238]	[0.697,1.148]	[1.126,1.751]	[0.718,0.813]	[1.442,2.278]	[0.903,1.121]
p-value	(0.000)	(0.000)	(0.383)	(0.003)	(0.000)	(0.000)	(0.906)
Medicare&Medicaid							
OR	1.396	1.267	0.769	1.437	0.702	3.766	0.903

PERSONAL/NONWORK // EXTERNAL

95% CI	[1.352,1.442]	[1.182,1.359]	[0.593,0.996]	[1.149,1.796]	[0.659,0.748]	[3.023,4.690]	[0.807,1.010]
p-value	(0.000)	(0.000)	(0.047)	(0.001)	(0.000)	(0.000)	(0.074)
Medicare&Other							
OR	1.280	1.194	0.900	1.345	0.767	1.040	0.954
95% CI	[1.236,1.325]	[1.110,1.286]	[0.691,1.173]	[1.076,1.681]	[0.716,0.821]	[0.801,1.351]	[0.843,1.080]
p-value	(0.000)	(0.000)	(0.437)	(0.009)	(0.000)	(0.769)	(0.458)
Other							
OR	1.189	1.036	1.018	1.564	0.853	1.339	1.108
95% CI	[1.156,1.222]	[0.973,1.104]	[0.809,1.281]	[1.258,1.945]	[0.806,0.903]	[1.074,1.670]	[1.009,1.216]
p-value	(0.000)	(0.273)	(0.880)	(0.000)	(0.000)	(0.010)	(0.032)
Applying for Medicare							
OR	0.963	1.052	0.887	0.932	1.062	0.902	0.852
95% CI	[0.947,0.979]	[1.017,1.088]	[0.789,0.997]	[0.882,0.985]	[1.029,1.096]	[0.829,0.982]	[0.805,0.901]
p-value	(0.000)	(0.004)	(0.044)	(0.013)	(0.000)	(0.018)	(0.000)
Emp pt-time							
OR	1.031	1.241	1.222	1.384	0.779	1.017	1.258
95% CI	[0.968,1.098]	[1.061,1.451]	[0.710,2.105]	[0.946,2.024]	[0.682,0.889]	[0.555,1.866]	[1.040,1.522]
p-value	(0.340)	(0.007)	(0.469)	(0.094)	(0.000)	(0.955)	(0.018)
Med LOA							
OR	1.218	1.716	1.260	1.092	0.686	0.844	1.003
95% CI	[1.157,1.283]	[1.517,1.941]	[0.797,1.990]	[0.682,1.750]	[0.615,0.764]	[0.486,1.467]	[0.851,1.182]
p-value	(0.000)	(0.000)	(0.323)	(0.713)	(0.000)	(0.548)	(0.975)
Other							
OR	1.079	1.355	1.388	2.125	0.802	0.511	0.593
95% CI	[0.900,1.293]	[0.814,2.254]	[0.188,10.246]	[0.351,12.861]	[0.518,1.242]	[0.069,3.784]	[0.316,1.116]
p-value	(0.413)	(0.243)	(0.748)	(0.412)	(0.323)	(0.511)	(0.105)
Homemaker or Unemployed							
OR	1.396	1.505	1.057	1.124	0.706	2.542	1.113
95% CI	[1.347,1.447]	[1.373,1.651]	[0.756,1.478]	[0.849,1.489]	[0.654,0.763]	[1.809,3.571]	[0.991,1.249]
p-value	(0.000)	(0.000)	(0.746)	(0.414)	(0.000)	(0.000)	(0.070)
Retired							
OR	1.429	2.008	1.280	1.515	0.614	2.361	0.780
95% CI	[1.380,1.480]	[1.836,2.197]	[0.925,1.770]	[1.155,1.986]	[0.569,0.662]	[1.681,3.315]	[0.695,0.877]
p-value	(0.000)	(0.000)	(0.137)	(0.003)	(0.000)	(0.000)	(0.000)
Chain status							
OR	0.778	0.643	1.065	0.897	1.446	0.821	1.041
95% CI	[0.764,0.792]	[0.621,0.667]	[0.931,1.217]	[0.840,0.958]	[1.396,1.496]	[0.752,0.896]	[0.978,1.109]
p-value	(0.000)	(0.000)	(0.358)	(0.001)	(0.000)	(0.000)	(0.206)
NE							
OR	0.951	1.306	0.837	0.485	0.877	1.357	0.886
95% CI	[0.928,0.974]	[1.246,1.369]	[0.709,0.987]	[0.443,0.531]	[0.838,0.918]	[1.214,1.517]	[0.812,0.967]
p-value	(0.000)	(0.000)	(0.035)	(0.000)	(0.000)	(0.000)	(0.007)
S							
OR	0.954	0.797	0.746	0.901	1.249	0.818	1.001
95% CI	[0.935,0.973]	[0.766,0.830]	[0.649,0.858]	[0.842,0.966]	[1.203,1.298]	[0.738,0.907]	[0.933,1.073]
p-value	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)	(0.980)
W							
OR	1.168	0.801	0.758	0.669	1.306	0.822	1.129
95% CI	[1.141,1.196]	[0.764,0.841]	[0.641,0.897]	[0.614,0.728]	[1.249,1.366]	[0.725,0.931]	[1.043,1.221]
p-value	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.002)	(0.003)
Constant							
OR	0.026	0.029	0.004	0.000	19.463	0.029	0.174

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95% CI	[0.024,0.028]	[0.023,0.037]	[0.002,0.008]	[0.000,0.000]	[16.069,23.574]	[0.017,0.049]	[0.127,0.239]
p-value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	611211	91193	91074	91193	91193	91193	91193
chi2	19851.5	13171.2	271.2	13634.0	11296.2	2415.9	1076.7
chi2type	LR	LR	LR	LR	LR	LR	LR

Abbreviation: CI: confidence interval; OR: odds ratio

Table 4. Cox proportional-hazards model estimate of time to waitlist and time to transplant

Characteristics	Time to waitlist	Time to transplant
Patient informed	1.617	1.032
	[1.582,1.652]	[0.999,1.067]
	(0.000)	(0.057)
Alcohol dependence	0.719	1.131
	[0.678,0.763]	[1.034,1.238]
	(0.000)	(0.007)
Drug dependence	0.361	0.892
	[0.335,0.389]	[0.795,1.002]
	(0.000)	(0.055)
Inability to ambulate	0.447	0.811
	[0.416,0.479]	[0.715,0.919]
	(0.000)	(0.001)
Inability to transfer	0.678	1.170
	[0.603,0.763]	[0.958,1.429]
	(0.000)	(0.123)
Needs assistance	0.603	0.894
	[0.582,0.625]	[0.842,0.949]
	(0.000)	(0.000)
Age at incidence	0.965	0.984
	[0.965,0.966]	[0.983,0.985]
	(0.000)	(0.000)
Male	1.138	1.024
	[1.124,1.152]	[1.005,1.043]
	(0.000)	(0.013)
BMI over 40	0.428	0.782
	[0.418,0.438]	[0.754,0.811]
	(0.000)	(0.000)
Diabetes	0.455	0.787
	[0.443,0.468]	[0.759,0.816]
	(0.000)	(0.000)
Glomerulonephritis	0.664	1.050
	[0.644,0.684]	[1.011,1.091]
	(0.000)	(0.011)
Hypertension	0.495	0.891
	[0.481,0.509]	[0.858,0.925]
	(0.000)	(0.000)
Other cause	0.415	1.070
	[0.401,0.430]	[1.024,1.118]
	(0.000)	(0.003)
Other urologic	0.454	0.888
	[0.427,0.483]	[0.819,0.963]
	(0.000)	(0.004)
Cath	0.652	1.118
	[0.642,0.661]	[1.094,1.142]
	(0.000)	(0.000)
Graft	0.805	1.038
	[0.776,0.835]	[0.983,1.095]
	(0.000)	(0.179)
Other	0.750	1.241
	[0.667,0.842]	[1.062,1.451]

	(0.000)	(0.007)
Nephrologist care	1.499	1.041
	[1.477,1.521]	[1.019,1.064]
	(0.000)	(0.000)
American Indian/Alaskan	0.794	0.659
	[0.748,0.842]	[0.600,0.724]
	(0.000)	(0.000)
Asian	1.476	0.672
	[1.436,1.517]	[0.645,0.700]
	(0.000)	(0.000)
Black	0.943	0.616
	[0.929,0.957]	[0.603,0.630]
	(0.000)	(0.000)
Hispanic	1.207	0.662
	[1.186,1.229]	[0.644,0.680]
	(0.000)	(0.000)
Other	1.033	0.616
	[0.897,1.189]	[0.501,0.758]
	(0.652)	(0.000)
Pacific Islander	0.943	0.639
	[0.888,1.002]	[0.580,0.704]
	(0.057)	(0.000)
Medicaid	0.519	0.746
	[0.508,0.531]	[0.722,0.771]
	(0.000)	(0.000)
Medicare	0.534	0.806
	[0.521,0.548]	[0.775,0.838]
	(0.000)	(0.000)
Medicare&Medicaid	0.467	0.722
	[0.454,0.480]	[0.691,0.754]
	(0.000)	(0.000)
Medicare&Other	0.727	0.915
	[0.706,0.749]	[0.875,0.956]
	(0.000)	(0.000)
Other	0.700	0.868
	[0.688,0.713]	[0.847,0.888]
	(0.000)	(0.000)
Applying for Medicare	1.032	1.038
	[1.017,1.047]	[1.016,1.061]
	(0.000)	(0.001)
Emp full-time	1.000	1.000
	[1.000,1.000]	[1.000,1.000]
	(.)	(.)
Emp pt-time	0.961	0.993
	[0.932,0.992]	[0.952,1.036]
	(0.013)	(0.750)
Med LOA	0.838	0.888
	[0.816,0.859]	[0.857,0.920]
	(0.000)	(0.000)
Other	0.743	1.040
	[0.695,0.794]	[0.959,1.128]
	(0.000)	(0.345)
Homemaker or Unemployed	0.639	0.851
	[0.626,0.652]	[0.828,0.875]

	(0.000)	(0.000)
Retired	0.636	0.877
	[0.623,0.649]	[0.853,0.902]
	(0.000)	(0.000)
Chain status	0.973	0.948
	[0.959,0.988]	[0.928,0.969]
	(0.000)	(0.000)
NE	1.340	0.794
	[1.315,1.366]	[0.773,0.816]
	(0.000)	(0.000)
S	0.866	0.886
	[0.851,0.881]	[0.865,0.908]
	(0.000)	(0.000)
W	1.007	0.753
	[0.987,1.027]	[0.732,0.775]
	(0.512)	(0.000)
Observations	478746	109048

Table 5. Logit model estimate of transplant information and addition to the waitlist (conditional on independent facilities)

Characteristics	Not informed	Added to waitlist
Acquired	0.322	0.711
	[0.257,0.404]	[0.588,0.861]
	(0.000)	(0.000)
Alcohol dependence	1.020	0.756
	[0.929,1.120]	[0.673,0.851]
	(0.678)	(0.000)
Drug dependence	1.645	0.270
	[1.492,1.814]	[0.232,0.314]
	(0.000)	(0.000)
Inability to ambulate	1.481	0.409
	[1.386,1.583]	[0.357,0.468]
	(0.000)	(0.000)
Inability to transfer	1.339	0.508
	[1.235,1.452]	[0.409,0.632]
	(0.000)	(0.000)
Needs assistance	1.263	0.543
	[1.206,1.323]	[0.507,0.582]
	(0.000)	(0.000)
Age at incidence	1.018	0.948
	[1.017,1.020]	[0.946,0.949]
	(0.000)	(0.000)
Male	0.980	1.177
	[0.950,1.010]	[1.141,1.215]
	(0.185)	(0.000)
BMI over 40	1.085	0.372
	[1.037,1.134]	[0.352,0.393]
	(0.000)	(0.000)
Diabetes	1.655	0.292
	[1.435,1.907]	[0.268,0.318]
	(0.000)	(0.000)
Glomerulonephritis	1.774	0.555
	[1.528,2.061]	[0.505,0.610]
	(0.000)	(0.000)

Hypertension	1.564	0.346
	[1.354,1.807]	[0.317,0.378]
	(0.000)	(0.000)
Other cause	2.845	0.248
	[2.460,3.289]	[0.225,0.273]
	(0.000)	(0.000)
Other urologic	2.117	0.274
	[1.769,2.534]	[0.235,0.319]
	(0.000)	(0.000)
Cath	1.381	0.523
	[1.317,1.447]	[0.503,0.543]
	(0.000)	(0.000)
Graft	1.206	0.742
	[1.087,1.339]	[0.675,0.815]
	(0.000)	(0.000)
Other	1.358	0.588
	[0.976,1.890]	[0.427,0.809]
	(0.069)	(0.001)
Nephrologist care	0.752	1.627
	[0.727,0.776]	[1.570,1.687]
	(0.000)	(0.000)
American Indian/Alaskan	0.964	0.736
	[0.859,1.081]	[0.646,0.838]
	(0.528)	(0.000)
Asian	0.686	2.110
	[0.631,0.746]	[1.967,2.263]
	(0.000)	(0.000)
Black	0.853	1.048
	[0.822,0.885]	[1.009,1.088]
	(0.000)	(0.014)
Hispanic	0.681	1.495
	[0.649,0.716]	[1.428,1.564]
	(0.000)	(0.000)
Other	0.841	1.531
	[0.555,1.274]	[1.056,2.219]
	(0.414)	(0.025)
Pacific Islander	0.956	1.107
	[0.817,1.119]	[0.947,1.294]
	(0.574)	(0.202)
Medicaid	1.202	0.427
	[1.122,1.287]	[0.404,0.452]
	(0.000)	(0.000)
Medicare	1.238	0.455
	[1.158,1.324]	[0.427,0.484]
	(0.000)	(0.000)
Medicare&Medicaid	1.423	0.380
	[1.331,1.523]	[0.356,0.406]
	(0.000)	(0.000)
Medicare&Other	1.240	0.664
	[1.155,1.330]	[0.622,0.710]
	(0.000)	(0.000)
Other	1.337	0.651
	[1.261,1.418]	[0.622,0.681]
	(0.000)	(0.000)

PERSONAL/NONWORK // EXTERNAL

Applying for Medicare	0.927	1.050
	[0.894,0.960]	[1.011,1.091]
	(0.000)	(0.011)
Emp pt-time	1.114	0.876
	[0.984,1.262]	[0.804,0.955]
	(0.089)	(0.003)
Med LOA	1.376	0.761
	[1.238,1.529]	[0.706,0.819]
	(0.000)	(0.000)
Other	1.073	0.863
	[0.745,1.545]	[0.677,1.100]
	(0.705)	(0.234)
Homemaker or Unemployed	1.496	0.512
	[1.388,1.613]	[0.485,0.540]
	(0.000)	(0.000)
Retired	1.554	0.500
	[1.444,1.672]	[0.474,0.527]
	(0.000)	(0.000)
chain_status=1	1.771	1.031
	[1.407,2.230]	[0.850,1.251]
	(0.000)	(0.757)
NE	0.962	1.364
	[0.922,1.004]	[1.307,1.422]
	(0.074)	(0.000)
S	0.797	0.783
	[0.765,0.831]	[0.750,0.816]
	(0.000)	(0.000)
W	1.379	0.924
	[1.317,1.444]	[0.880,0.970]
	(0.000)	(0.002)
Constant	0.023	59.517
	[0.019,0.028]	[51.989,68.135]
	(0.000)	(0.000)
Observations	133888	133891
chi2	7202.1	28885.0
chi2type	LR	LR

Figure 1. Trends in the proportion of patients being informed

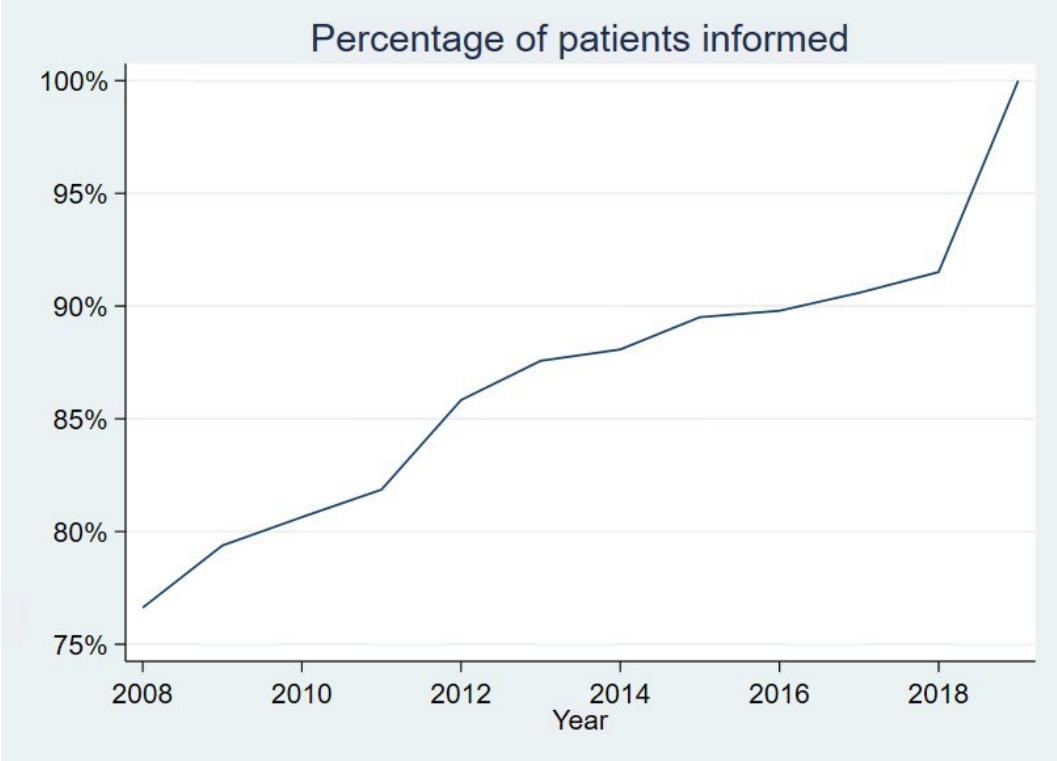

Figure 2. Combinations of frequency of reasons for not being informed

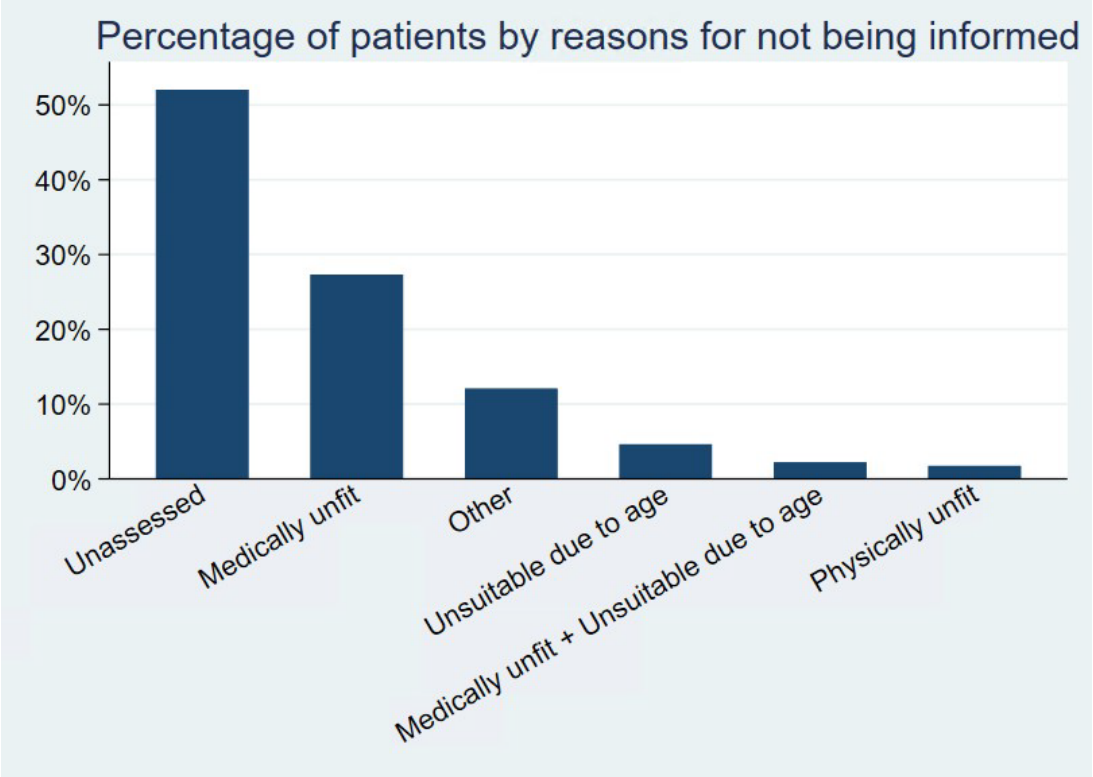

Figure 3. Probability of not being added to the waitlist by transplant information (Cox proportional hazards regression)

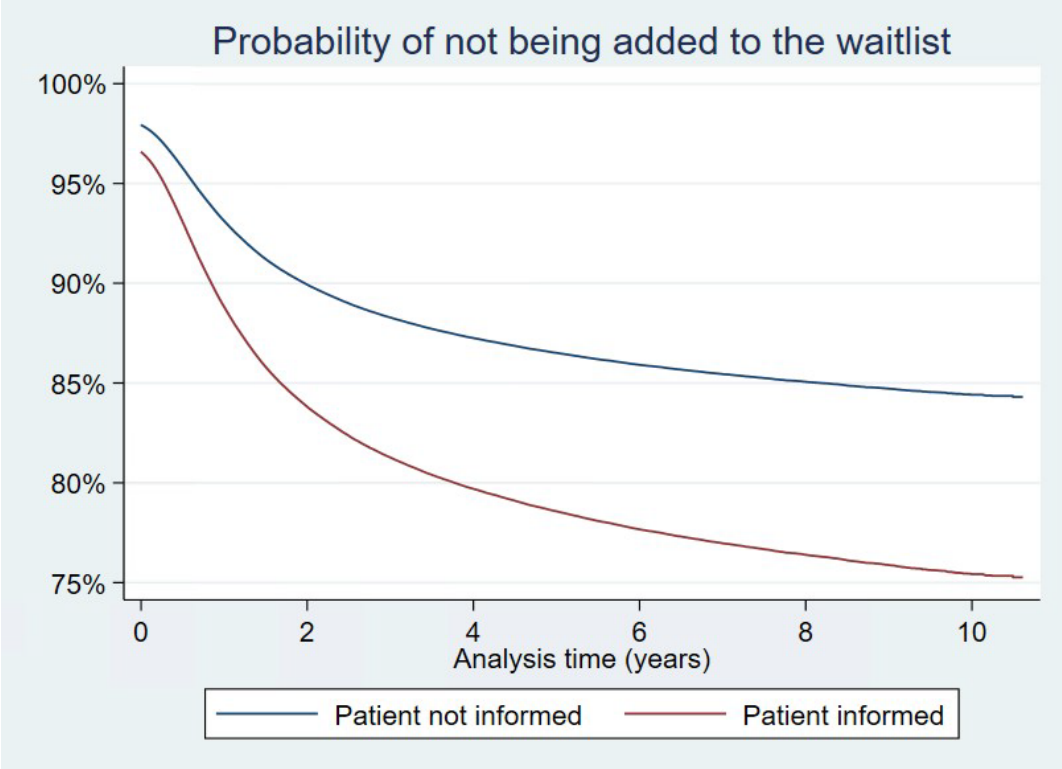

Figure 4. Testing proportional hazards (PH) assumption for the variable "Patient Informed"

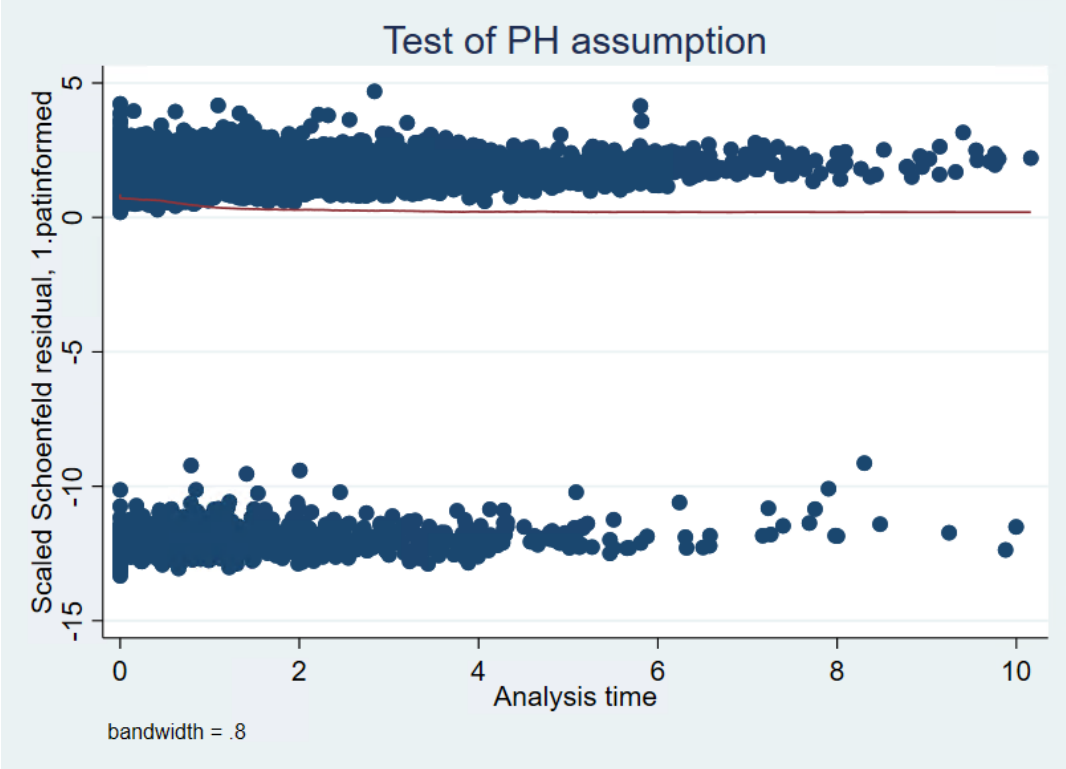

Figure 5. Probability of not being transplanted