



## ORIGINAL ARTICLE

# Effect of ethnicity and socioeconomic deprivation on uptake of renal supportive care and dialysis decision-making in older adults

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## ABSTRACT

**Background.** Renal supportive care has become an increasingly relevant treatment option as the renal patient population ages. Despite the prevalence of kidney disease amongst ethnic minority and socioeconomically deprived patients, evidence focused on supportive care and dialysis decision-making in these groups is limited.

**Methods.** This retrospective study selected older patients referred to a low clearance or supportive care service between 1 January 2015 and 31 December 2019. A descriptive analysis of clinical and socioeconomic characteristics according to treatment choice was produced and multivariate logistic regression models used to identify predictive factors for choosing supportive care. Surrogate markers for the success of decision-making processes were evaluated, including time taken to reach a supportive care decision and risk of death without making a treatment decision or within 3 months of starting kidney replacement therapy (KRT). Finally, the association between ethnicity and socioeconomic status and hospital admission rates was compared between treatment groups.

**Results.** Amongst 1768 patients, 515 chose supportive care and 309 chose KRT. Predictive factors for choosing supportive care included age, frailty and a diagnosis of cognitive impairment. However, there was no association with ethnicity or deprivation. Similarly, these factors were not associated with time taken to make a supportive care decision or the mortality outcome. Amongst those on KRT, more socially advantaged patients had decreased rates of hospital admissions compared with those less advantaged (incident rate ratio 0.96, 95% confidence interval 0.92–0.99).

**Conclusion.** Predictive factors for choosing supportive care were clinical, rather than socioeconomic. Lower socioeconomic status was associated with increased rates of hospitalization in the KRT group. This is a possible signal that these groups experienced greater morbidity on KRT versus supportive care, an association not demonstrated amongst higher socioeconomic groups.

## LAY SUMMARY

Renal supportive care involves holistic treatment of the symptoms and complications of advanced kidney disease without dialysis. For older people who are frail or have other health problems, dialysis may not offer a survival benefit and can be a burdensome treatment, with a negative impact on quality of life. Supportive care may therefore better suit the priorities of some patients. Access to supportive care amongst ethnic minorities and socioeconomically deprived groups has not previously been studied. Our study included 1768 older people with advanced kidney disease. We concluded that the predictive factors for choosing supportive care are clinical, rather than socioeconomic, but did find evidence for higher hospitalization rates amongst more deprived patients receiving dialysis compared with those

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on supportive care. This effect was not noted amongst more socially advantaged patients, and may suggest that more deprived patients experience greater adverse effects on health whilst on dialysis.

**Keywords:** dialysis decision, elderly, ethnic minorities, renal supportive care, socioeconomic deprivation

## INTRODUCTION

Kidney supportive care can be defined as a planned and holistic approach to the treatment of end-stage kidney disease (ESKD), which includes psychosocial support, advanced care planning, and active management of the symptoms and complications of kidney failure without dialysis [1, 2]. The provision of robust supportive care treatment pathways is becoming increasingly relevant as nephrologists care for an aging and progressively more frail population [3]. Comparative studies are limited, however there is evidence to suggest that whilst patients over age 75 years who choose dialysis can expect to live longer than those who choose supportive care, this survival benefit is significantly diminished in those with higher degrees of comorbidity and frailty [4–7] and comes at the expense of increased hospitalization rates and time receiving healthcare [8]. In addition, studies suggest that for older and more functionally limited patients, dialysis does not improve quality of life and may prove an additional burden [9–11]. Supportive care may therefore offer a treatment option better placed to serve the values and priorities of some older patients.

Black, Asian and Minority Ethnic (BAME) patients are disproportionately affected by kidney disease [12, 13]. In addition, low socioeconomic status is associated with development of ESKD and increased rate of decline in estimated glomerular filtration rate (eGFR) [14, 15]. Whilst some studies have demonstrated reduced access to advance care planning and palliative care in these groups, there is minimal literature focused specifically on supportive care pathways. Based on the existing body of evidence, we hypothesized that in a cohort of patients with advanced chronic kidney disease (CKD), those from ethnic minority and lower socioeconomic groups would encounter additional barriers to access to supportive care and, arguably, successful treatment decision-making.

This study aims first to describe the demographics of a cohort of older patients with advanced CKD, as it relates to their treatment choice, and specifically to examine the socioeconomic factors associated with choosing supportive care treatment. Secondly, we aim to examine surrogate markers for the success of dialysis decision-making amongst a diverse population of patients. The correct treatment pathway for any individual patient is near impossible to define in a binary way. This study, therefore, used undesirable clinical outcomes and markers of morbidity as objective surrogates for the perceived success of a treatment decision.

## MATERIALS AND METHODS

### Setting and data collection

This retrospective, observational study took place within the renal unit at the Royal Free London National Health Service (NHS) Foundation Trust, a tertiary centre located within a diverse urban area in the UK. This project formed part of a service development initiative and no ethical approval was sought.

This centre runs a dedicated ‘low clearance’ clinic, which focuses on management of the complications of advanced CKD but also importantly provides education and decision-making support for those approaching kidney replacement therapy (KRT). Patients and families receive education (covering dialysis modalities, transplantation and supportive care) from both nursing and medical teams. Appropriate reading material is provided but formal decision aids are not used. Patients’ decisions are recorded on the electronic patient record in real time.

The electronic patient record was used to select all patients over 65 years of age, who had entered a ‘low clearance’ or supportive care service between 1 January 2015 and 31 December 2019. Age, sex, ethnicity, primary renal disease, comorbidities (diabetes mellitus, cardiovascular disease, cancer diagnosis and cognitive impairment) and date of death were recorded for each patient. eGFR at time of entry into the low clearance service was recorded as it was reported on the electronic patient record (automatically calculated from creatinine using the 2009 CKD Epidemiology Collaboration equation [16]). Patient post-codes were used to obtain Index of Multiple Deprivations (IMD) deciles [17]. These provide an official measure of relative deprivation for small areas in UK and were used as a marker of socioeconomic status in this study. Additional recorded information included whether the patient reported a religious affiliation, use of an interpreter during consultations (whether formal or informal), and whether patients lived alone or with family. The Clinical Frailty Scale (CFS) [18] was used as a measure of functional capacity. Emergency hospital admissions at our centre were also recorded. Finally, treatment modalities were recorded for each patient. These were identified by time-stamped status changes made on the electronic record by the clinical team.

### Outcomes

The first aim of the study was to describe the demographics of a group of patients with advanced CKD, as it pertained to their treatment choice, and to identify associations with choosing supportive care.

Second, we aimed to objectively evaluate the effect of ethnicity and socioeconomic status on clinical markers of morbidity, which acted as potential surrogates for the success of treatment decision-making processes. This included the time taken to reach a decision to have supportive care and the risk of death before a treatment decision had been made or within 3 months of starting KRT. This outcome was chosen on the premise that in patients for whom KRT is medically inadvisable, having a treatment decision delayed or dying without committing to a supportive care treatment pathway may compromise the nature and quality of care received in their final months and is a probable marker of difficulty in the decision-making process. Likewise, death shortly after starting KRT may signal a suboptimal treatment choice for that individual.

Finally, we examined time spent in hospital amongst those on a supportive care pathway, those receiving KRT and those remaining in a low clearance clinic. The rationale was that

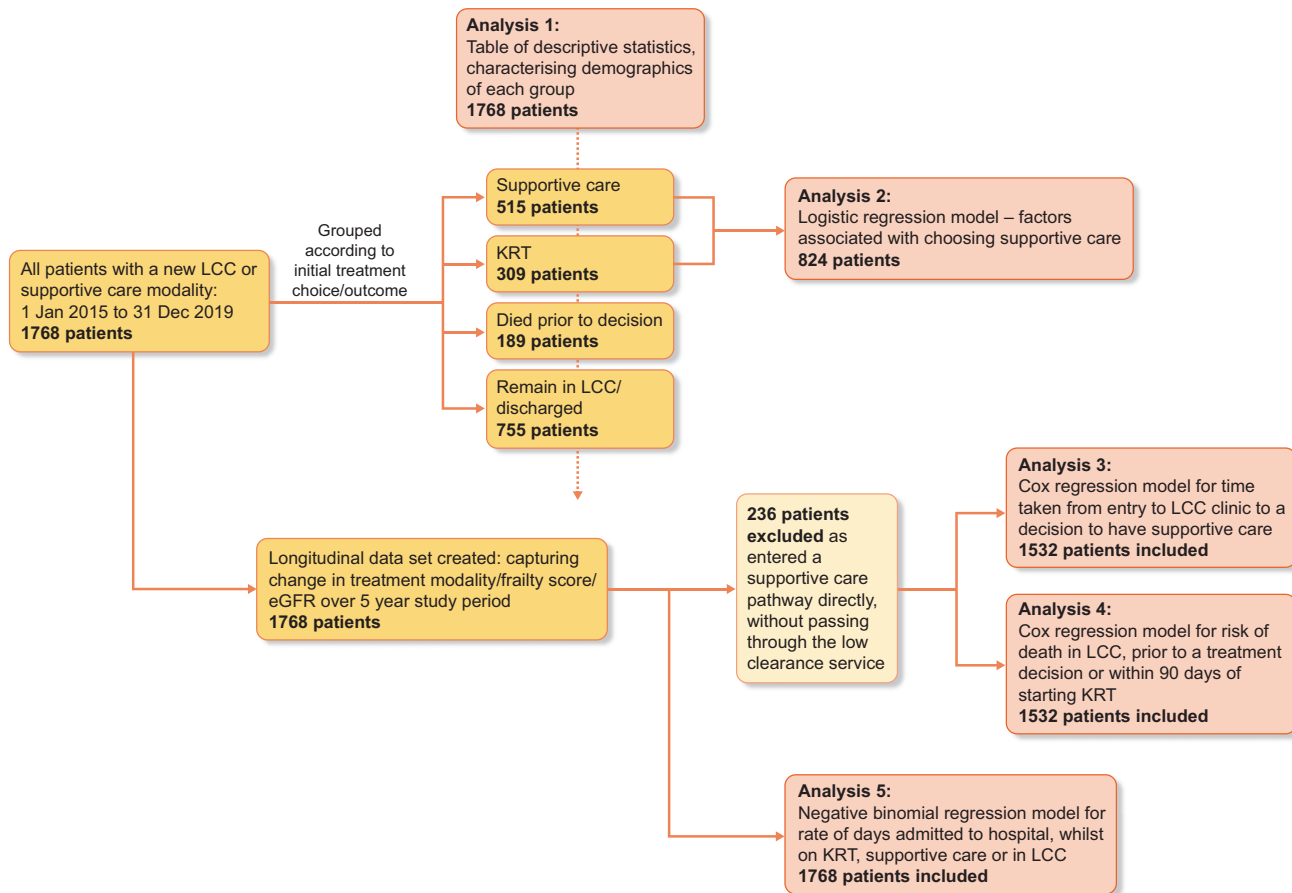


Figure 1: Flow chart showing study design and statistical analyses.

increased time spent in hospital is likely to infer an adverse effect on quality of life.

### Statistical analyses

Data were analysed using Stata 17™. A significance level of 5% was applied throughout. Patients were excluded from analysis in the case of missing data points.

#### Analysis 1

Patients who entered the low clearance service during the specified time period were placed in one of four groups, according to outcome—those who chose supportive care, those who chose KRT (including haemodialysis, peritoneal dialysis and transplantation), those who died prior to making a treatment decision, and those who remained in low clearance, were discharged or lost to follow-up (Fig. 1). Patients who received emergency start dialysis, with no prior contact with the low clearance clinic, were excluded. Time spent in the low clearance clinic was calculated as number of days from referral to low clearance to a confirmed supportive care decision, start of KRT, death, discharge or end of study period. Continuous variables were compared between the four groups using a one-way ANOVA. Categorical variables were compared between groups using a chi-squared test. The descriptive analyses were repeated with the exclusion of those patients in whom an eGFR of  $\leq 15$  mL/min/1.73 m<sup>2</sup> was never recorded.

#### Analysis 2

A binary logistic regression model was used to determine associations with choosing a supportive care pathway versus KRT. Patients who chose supportive care or started KRT were included. Treatment choice is influenced by clinical factors, including age, frailty and comorbidities, and potentially by the urgency of that decision (as eGFR declines) and the time available to deliberate. We aimed to test the effect of socioeconomic factors, whilst attempting to control for clinical confounders. Exposures including ethnicity, IMD decile (treated as a continuous variable), use of an interpreter and religious affiliation were therefore each modelled with and without adjustment for age, sex, comorbidities, baseline eGFR (at entry into low clearance clinic), time spent in low clearance and baseline CFS. An odds ratio (OR) and 95% confidence interval (95% CI) was produced for each exposure. Ethnicity and IMD decile were mutually adjusted for in one model, in order to ensure that one factor was not confounding the other. Patient living arrangements (i.e. with family or alone) were excluded from this analysis due to the high proportion of missing data.

#### Analysis 3

A time-to-event analysis was used to evaluate time from entry into the low clearance clinic to the point a decision to have supportive care was made. Patients who went directly into supportive care, without passing through the low clearance service, were

therefore excluded. A Cox proportional hazards model was used to assess the effect of each exposure on time taken to reach a decision. Ethnicity and IMD decile were in turn modelled with and without adjustment for age, sex, comorbidities, baseline CFS and baseline eGFR. The aim was to evaluate the association of socioeconomic factors with time to decision independent of clinical factors, which may have influenced decision-making. IMD decile and ethnicity were once again mutually adjusted in one model. Results were expressed as a hazard ratio (HR) and 95% CI. Proportional hazards assumption was met, as determined by a Kaplan–Meier curve. An additional sensitivity analysis was performed by repeating these models with the exclusion of those patients in whom an eGFR of  $\leq 15$  mL/min/1.73 m<sup>2</sup> was never recorded.

#### Analysis 4

A time-to-event analysis was used to evaluate risk of death prior to a treatment decision being made or within 90 days of starting KRT. Patients who did not pass through the low clearance service were excluded. A Cox proportional hazards model was used to assess the risk of death associated with each exposure, whilst adjusting for clinical factors that would influence mortality. Ethnicity and IMD decile were in turn modelled with and without adjustment for age, sex, comorbidities, baseline CFS and baseline eGFR, and mutually adjusted in one model. An HR and 95% CI were produced for each variable. Proportional hazards assumption was met, as determined by a Kaplan–Meier curve. The analysis was repeated with the exclusion of patients who had never had a recorded eGFR of  $\leq 15$  mL/min/1.73 m<sup>2</sup>.

#### Analysis 5

A negative binomial regression model was used to analyse time spent in hospital whilst on KRT, on supportive care treatment or in the low clearance clinic. A random effects model was chosen in order to account for variation in the dispersion of hospital admissions between patients, for reasons which could not be identified or measured. All patients were included in this analysis and most patients appeared in more than one group (given patients transitioned between low clearance and KRT/supportive care and in some cases treatment choice changed over time). Results were expressed as an incident rate ratio (IRR) and 95% CI. Ethnicity and IMD decile were in turn modelled with and without adjustment for age, sex and comorbidities in each of the three treatment groups (in order to control for factors which may influence morbidity and therefore hospital admissions). The interaction between ethnicity/IMD decile and treatment group was then tested using a Wald chi-squared test.

## RESULTS

### Patient characteristics

The study included 1768 patients. The majority, 49.66%, were white, whilst 9.1% of patients were Black, 14.65% were South Asian and 7.13% were of other ethnic minorities. The remaining 19.46% of patients had no recorded ethnicity. The mean age of the population was 77.9 years. Black and South Asian patients (mean in both groups 76.4 years) were younger than white patients (mean 78.7 years). Male patients made up 57.6% of the cohort. Black patients were more deprived than all other groups, with a mean IMD decile of 3.6 versus 5.7 amongst white patients.

Mean CFS for the whole population was 3.99 and this did not differ significantly between ethnic groups.

### Characteristics of the supportive care population

Within the study population 515 patients (29.13%) chose a supportive care pathway, whilst 309 went on to receive KRT (17.48%) and 189 patients died prior to making a treatment decision (10.89%). The final 755 patients (42.7%) included those who remained under the low clearance service and those who were discharged or lost to follow-up. Baseline characteristics of these four outcome groups are summarized in Table 1.

The supportive care group was older than the KRT group, with a mean age of 82 years [standard deviation (SD) 6.7] versus 73.3 years (SD 5.5). A greater proportion of female patients chose supportive care (32.8%), in comparison with male patients (26.4%). Mean CFS was higher amongst those who chose supportive care ( $4.76 \pm 1.63$ ) than those choosing KRT ( $3.72 \pm 1.53$ ).

A smaller proportion of Black patients chose supportive care in comparison with other groups (24.22%), whilst this was a more common choice in patients from other ethnic minorities (39.68%). Mean IMD decile did not differ significantly across the groups.

### Factors associated with choosing supportive care

In fully adjusted models, older age, higher baseline CFS and a documented diagnosis of cognitive impairment were associated with choosing supportive care. Male sex was negatively associated with a supportive care treatment choice. There was no association between ethnicity or IMD decile and treatment choice. Similarly, religious affiliation and use of an interpreter showed no association with supportive care treatment (Table 2).

### Time taken to make a supportive care decision

Mean time taken to make a supportive care decision was 212 days (SD 328 days) amongst the whole cohort (Table 1). In a fully adjusted time-to-event analysis, older age, cognitive impairment and a higher baseline frailty score were associated with a shorter time to committing to a supportive care decision. IMD decile was not associated with time to decision. Patients in the 'other ethnic minorities' group demonstrated a shorter time to supportive care decision than other groups, however there were no other associations between ethnicity and time to decision noted (Table 3). The model was repeated in a restricted group, which excluded those patients in whom an eGFR of  $\leq 15$  mL/min/1.73 m<sup>2</sup> was never recorded. The observed associations were unchanged (Supplementary data, Table S2).

### Risk of death prior to treatment decision or within 3 months of starting KRT

Risk of death prior to a treatment decision or within 3 months of starting KRT was not associated with ethnicity or IMD decile (Table 4). Results were unchanged when the model was repeated in a restricted group, excluding those patients without an eGFR of  $\leq 15$  mL/min/1.73 m<sup>2</sup> at any time (Supplementary data, Table S3).

Table 1: Clinical and socioeconomic characteristics of patients as defined by treatment choice.

	Supportive care	KRT	Died prior to decision	Remain in LCC/discharged	Total	P-value
Age, years (mean ± SD)	82.6 ± 6.7	73.3 ± 5.5	78.6 ± 7.4	76.4 ± 6.8	77.8 ± 7.42	<.001
Sex						.001
Female	246	105	73	326	750	<.001
%	32.8	14	9.73	43.47	100	
Male	269	204	116	429	1018	
%	26.42	20.04	11.39	42.14	100	
eGFR at referral to low clearance, mL/min/1.73 m <sup>2</sup>						
Mean ± SD	22.09 ± 7.82	19.69 ± 7.02	21.72 ± 7.34	24.62 ± 8.38	22.71 ± 8.39	.005
Ethnicity						
White	255	152	98	373	878	
%	29.04	17.31	11.16	42.48	100	
Black	39	38	21	63	161	
%	24.22	23.6	13.04	39.13	100	
South Asian	73	53	32	101	259	
%	28.19	20.46	12.36	39	100	
Other	50	23	8	45	126	
%	39.68	18.25	6.35	35.71	100	
Unknown	98	43	30	173	344	
%	28.49	12.5	8.72	50.29	100	
Primary renal disease						<.001
Glomerular disease	9	23	3	14	49	
%	18.37	46.94	6.12	28.57	100	
Tubulointerstitial disease	12	14	5	35	66	
%	18.18	21.21	7.58	53.03	100	
Systemic disease effecting the kidney—non-diabetes	77	55	29	91	252	
%	30.56	21.83	11.51	36.11	100	
Diabetic kidney disease	102	109	38	168	417	
%	24.46	26.14	9.11	40.29	100	
Familial/hereditary nephropathies	2	7	3	8	20	
%	10	35	15	40	100	
Miscellaneous renal disorders	313	101	111	439	964	
%	32.47	10.48	11.51	45.54	100	
Comorbidities						
Diabetes mellitus	297	174	101	488	1060	.005
%	28.02	16.42	9.53	46.04	100	
Cardiovascular disease	333	155	140	377	1005	<.001
%	33.13	15.42	13.93	37.51	100	
Cancer diagnosis	111	62	56	160	389	.189
%	28.53	15.94	14.4	41.13	100	
Cognitive impairment	78	11	10	19	118	<.001
%	66.1	9.32	8.47	16.1	100	
Baseline frailty score						<.001
Mean ± SD	4.76 ± 1.63	3.72 ± 1.53	4.52 ± 1.5	3.5 ± 1.47	3.99 ± 1.63	
Index of multiple deprivations (deciles)						.183
Mean ± SD	5.3 ± 2.39	4.97 ± 2.45	5.17 ± 2.49	5.06 ± 2.52	5.1 ± 2.47	.949

Table 1: Continued

	Supportive care	KRT	Died prior to decision	Remain in LCC/discharged	Total	P-value
Reported religion						
Yes	154	98	59	229	540	
%	28.52	18.15	10.93	42.41	100	
No	361	211	130	526	1 228	
%	29.4	17.18	10.59	42.83	100	
Use of interpreter						
Yes	36	18	13	29	96	.071
%	37.5	18.75	13.54	30.21	100	
No	479	291	176	726	1672	
%	28.65	17.4	10.53	43.42	100	
Living arrangements						
Lives with family	82	131	30	161	404	
%	20.3	32.43	7.43	39.85	100	
Lives alone or no NOK	75	100	19	116	310	
%	24.19	32.26	6.13	37.42	100	
Missing data	358	78	140	478	1054	
%	33.9	7.4	13.3	45.4	100	
Time spent in LCC clinic (number of days)						
Mean ± SD	212 ± 328	423 ± 360	347 ± 298	812 ± 578	519 ± 524	<.001
Total	515	309	189	755	1768	
%	29.13	17.48	10.69	42.7	100	

LCC, low clearance clinic; NOK, next of kin.

Table 2: Association of socioeconomic factors with choosing supportive care versus KRT.

	Model 1 (demographics) <sup>a</sup> [OR (95% CI)]	Model 2 (mutually adjusted for IMD decile and ethnicity) <sup>b</sup> [OR (95% CI)]	Model 3 (demographics and comorbidities) <sup>b</sup> [OR (95% CI)]	Model 4 (demographics, comorbidities, baseline eGFR and time in LCC) <sup>c</sup> [OR (95% CI)]	Model 5 (demographics, comorbidities, eGFR, time in LCC and CFS) <sup>d</sup> [OR (95% CI)]
Ethnicity (ref. white)					
Black	0.88 (0.48–1.62)	0.81 (0.42–1.56)	0.77 (0.41–1.46)	0.91 (0.48–1.74)	0.89 (0.44–1.77)
South Asian	1.22 (0.73–2.04)	1.13 (0.66–1.92)	1.12 (0.66–1.92)	1.12 (0.65–1.94)	1.31 (0.74–1.32)
Other	1.57 (0.79–3.16)	1.53 (0.74–3.13)	1.52 (0.74–3.12)	1.51 (0.73–3.17)	1.74 (0.76–3.98)
Unknown	1.59 (0.96–2.64)	1.53 (0.9–2.6)	1.48 (0.88–2.5)	1.52 (0.89–2.6)	1.61 (0.91–2.84)
IMD decile (per decile)	1.01 (0.93–1.08)	1.02 (0.94–1.11)	1.02 (0.94–1.1)	1.01 (0.93–1.09)	1.03 (0.94–1.11)
Religious affiliation documented	0.71 (0.48–1.06)		0.72 (0.48–1.08)	0.72 (0.48–1.09)	0.76 (0.49–1.17)
Used an interpreter	1.19 (0.58–2.45)		1.09 (0.52–2.29)	1.13 (0.53–2.39)	0.97 (0.44–2.16)

<sup>a</sup>Adjusted for age and sex (n = 824).<sup>b</sup>Adjusted for age, sex, cardiovascular disease, diabetes, cognitive impairment and cancer (n = 824).<sup>c</sup>Adjusted for age, sex, cardiovascular disease, diabetes, cognitive impairment and cancer, baseline eGFR and number of days in low clearance clinic (n = 818).<sup>d</sup>Adjusted for age, sex, cardiovascular disease, diabetes, cognitive impairment and cancer, baseline eGFR, number of days in low clearance clinic and baseline CFS (n = 736).

LCC, low clearance clinic.

### Time spent in hospital according to treatment modality

In the fully adjusted model, Black patients within the low clearance clinic were shown to have a higher rate of hospital admissions compared with white patients (IRR 1.82, 95% CI 1.11–2.99). There was no association between ethnicity and rate of admis-

sions in the supportive care group. In the KRT group, patients of unknown ethnicity had a lower rate of hospital admissions (IRR 0.63, 95% CI 0.41–0.95) but no other associations were shown. Despite these disparities, a Wald chi-squared test showed no interaction between ethnicity and admission rate across the three treatment groups (Table 5).

Table 3: Association of ethnicity and IMD decile with time taken to make a supportive care decision.

	Model 1 (demographics) <sup>a</sup> [HR (95% CI)]	Model 2 (mutually adjusted for IMD decile and ethnicity) <sup>b</sup> [HR (95% CI)]	Model 3 (demographics and comorbidities) <sup>b</sup> [HR (95% CI)]	Model 4 (demographics, comorbidities and eGFR) <sup>c</sup> [HR (95% CI)]	Model 5 (demographics, comorbidities, eGFR and CFS) <sup>d</sup> [HR (95% CI)]
Ethnicity (ref. white)					
Black	1.23 (0.83–1.84)	1.18 (0.78–1.78)	1.13 (0.76–1.69)	1.2 (0.68–1.54)	1.18 (0.73–1.19)
South Asian	1.27 (0.9–1.78)	1.32 (0.93–1.88)	1.31 (0.93–1.86)	1.33 (0.93–1.89)	1.37 (0.89–2.09)
Other	1.97 (1.29–2)	1.88 (0.95–1.78)	1.86 (1.21–2.84)	1.94 (1.25–3.03)	2.76 (1.67–4.56)
Unknown	1.26 (0.93–1.69)	1.3 (0.95–1.78)	1.28 (0.95–1.73)	1.36 (0.99–1.85)	1.43 (0.97–2.09)
IMD decile (per decile)	1 (0.95–1.05)	1.01 (0.97–1.07)	1 (0.96–1.05)	1 (0.96–1.05)	1.01 (0.96–1.07)

<sup>a</sup>Adjusted for age and sex (n = 1529).

<sup>b</sup>Adjusted for age, sex, cardiovascular disease, diabetes, cognitive impairment and cancer (n = 1529).

<sup>c</sup>Adjusted for age, sex, cardiovascular disease, diabetes, cognitive impairment and cancer, and baseline eGFR (n = 1423).

<sup>d</sup>Adjusted for age, sex, cardiovascular disease, diabetes, cognitive impairment and cancer, baseline eGFR and baseline CFS (n = 1170).

Table 4: Association of ethnicity and IMD decile with death prior to a treatment decision or within 90 days of starting KRT.

	Model 1 (demographics) <sup>a</sup> [HR (95% CI)]	Model 2 (mutually adjusted for IMD decile and ethnicity) <sup>b</sup> [HR (95% CI)]	Model 3 (demographics and comorbidities) <sup>b</sup> [HR (95% CI)]	Model 4 (demographics, comorbidities and eGFR) <sup>c</sup> [HR (95% CI)]	Model 5 (demographics, comorbidities, eGFR and CFS) <sup>d</sup> [HR (95% CI)]
Ethnicity (ref. white)					
Black	1.04 (0.67–1.61)	1.05 (0.66–1.65)	1.07 (0.68–1.67)	1.02 (0.62–1.68)	1.21 (0.67–2.19)
South Asian	0.9 (0.61–1.32)	1.05 (0.71–1.57)	1.06 (0.71–1.57)	0.94 (0.61–1.45)	1.07 (0.65–1.75)
Other	0.59 (0.29–1.21)	0.61 (0.3–1.25)	0.61 (0.3–1.26)	0.64 (0.3–1.38)	0.52 (0.16–1.67)
Unknown	0.79 (0.55–1.13)	0.85 (0.58–1.22)	0.86 (0.6–1.24)	0.83 (0.56–1.23)	0.79 (0.48–1.28)
IMD decile (per decile)	0.99 (0.95–1.05)	0.99 (0.94–1.04)	0.99 (0.94–1.05)	0.99 (0.94–1.06)	1.01 (0.94–1.08)

<sup>a</sup>Adjusted for age and sex (n = 1520).

<sup>b</sup>Adjusted for age, sex, cardiovascular disease, diabetes, cognitive impairment and cancer (n = 1520).

<sup>c</sup>Adjusted for age, sex, cardiovascular disease, diabetes, cognitive impairment and cancer, and baseline eGFR (n = 1413).

<sup>d</sup>Adjusted for age, sex, cardiovascular disease, diabetes, cognitive impairment and cancer, baseline eGFR and baseline CFS (n = 1111).

Table 5: Incidence rate of days in hospital according to treatment modality.

	Low clearance clinic	Supportive care	KRT	Wald $\chi^2$ , P-value
Ethnicity				6.95, P = .14
Black	1.82 (1.11–2.99)	1.29 (0.09–18.29)	0.78 (0.58–1.03)	
South Asian	1.27 (0.83–1.96)	1.12 (0.15–8.05)	0.88 (0.68–1.14)	
Other	0.99 (0.5–1.98)	1.14 (0.12–15.84)	0.81 (0.51–1.28)	
Unknown	0.68 (0.41–1.12)	0.13 (0.01–1.84)	0.63 (0.41–0.95)	
IMD decile	0.93 (0.87–1.00)	1.39 (1.01–1.93)	0.96 (0.92–0.99)	3.94, P = .047
Total number of patients included	1555	530	337	

Results are expressed as IRR (95% CI). Each exposure (ethnicity/IMD decile) modelled against age, sex, cardiovascular disease, diabetes, cognitive impairment and cancer.

Higher IMD decile was associated with lower admission rates in the KRT group (IRR 0.96, 95% CI 0.92–0.99), but higher admission rates in the supportive care group (IRR 1.39, 95% CI 1.01–1.93). Interaction testing confirmed an association between IMD decile and admission rate across the three groups (Wald chi-squared value 3.94, P-value .047).

## DISCUSSION

Our findings provide evidence against the hypothesis that BAME patients and those in lower socioeconomic groups are less likely

to choose supportive care treatment. The major predictive factors were in fact clinical, rather than socioeconomic, and included advancing age, higher frailty score and a diagnosis of cognitive impairment.

In an analysis of surrogate markers for the success of treatment decision-making, neither ethnicity nor socioeconomic status were associated with the time taken to commit to a supportive care treatment pathway or with increased risk of death before a treatment decision or within 3 months of starting KRT. An additional sensitivity analysis, which excluded those patients in whom an eGFR of  $\leq 15$  mL/min/1.73 m<sup>2</sup> was never recorded, showed consistent results.

The results suggested that Black ethnicity was associated with a higher admission rate for patients in the low clearance clinic only. However, there was no evidence of an association between ethnicity and treatment group when the interaction was tested. Socioeconomic deprivation (i.e. lower IMD decile) was associated with higher admission rates whilst receiving KRT, but lower admission rates for those on supportive care. The latter appears to be driven in part by a higher rate of admissions amongst less deprived supportive care patients. This is in contrast to previous studies, which report socioeconomic deprivation as a risk factor for hospital admission in older patients and those reaching end of life [19, 20]. Less deprived patients may be more likely to report symptoms and seek medical expertise than those more deprived (a phenomenon referred to as the 'inverse care law') and this may be reflected here [21, 22]. In addition, this result may in part reflect less robust family support given that higher IMD decile groups are perhaps less likely to live in multi-generational households.

Evidence focused on uptake of renal supportive care amongst ethnic minority patients is extremely limited. Our hypothesis was therefore based on previous studies of participation in advance care planning, access to palliative care and dialysis withdrawal amongst ethnic minorities, largely based in US populations. Foley *et al.* showed that BAME patients are less likely to withdraw from dialysis at end of life [23] whilst Wen *et al.* showed that Black and Hispanic dialysis patients are less likely to be referred to palliative care services [24]. Smaller qualitative studies have suggested that Black patients with CKD are less likely than other ethnic groups to support withdrawal of dialysis at end of life and are more likely to show preference for life sustaining treatments, regardless of health state [25–27].

Similarly, previous studies have suggested that lower socioeconomic status is associated with lower rates of participation in advanced care planning [28, 29] and additional barriers to palliative care access [30]. Lewis *et al.* published a review which highlights the predominance of US literature in this area and the associated complexity related to cost and affordability of palliative care. In the US system curative and palliative treatments are often financially separated, which the authors suggest contributes to stigma and distrust of services [30].

There is a small body of existing work focused on successful dialysis decision-making. However, these are largely qualitative studies with small sample sizes and there is a gap in evidence examining the relationship between ethnicity or socioeconomic factors and decision-making [31–34]. In addition, whilst qualitative data are undoubtedly of value in this area, there is limited quantitative evidence evaluating the success of dialysis decisions, as they pertain to ethnicity and socioeconomic status.

This study adds value by characterizing the socioeconomic factors that may influence dialysis decisions within a diverse, urban population in the UK and within a centre with an established supportive care programme available to all patients. Whilst evidence looking at access to palliative care and advanced care planning in kidney disease exists, this is the first study to specifically examine uptake of renal supportive care within ethnic minority and low socioeconomic groups. It adds to the relatively small body of European-based evidence in this area, an important consideration given the significance of social, economic and political context when addressing questions related to health inequality. Our study is set within the universal healthcare system provided by the NHS and the removal of financial pressure from treatment choice may have contributed to our findings. Another possible explanation is that our centre benefits from access to a dedicated 'low clearance' service,

which is available to all patients and offers equitable education to all attendees. Furthermore, this study is to our knowledge the first to attempt to objectively evaluate the association between ethnicity and socioeconomic status and clinical surrogates for the success of dialysis decision-making.

The strength of this study lies in its large sample size and the relative diversity of the population. All patients referred to the low clearance service in the 5-year study period were included and selection bias was therefore minimal. The study is limited by its retrospective design. Its reliance on accurate recording of treatment modalities and diagnoses by clinical staff in real time and the presence of missing data are potential sources of bias. Almost 20% of patients had no recorded ethnicity, whilst living arrangements were also poorly reported. In addition, only admissions data from our own centre were available to us. Potential admissions to other hospitals were, therefore, not included. Finally, socioeconomic status was categorized by IMD decile, which gives an estimate of relative deprivation in a small area based on postcode, but does not necessarily reflect individual household income.

We provide evidence against the hypothesis that BAME patients and those from lower socioeconomic groups are less likely to choose to have supportive care. It is not clear whether this result reflects success in achieving equity at our centre or the difficulty of capturing the challenges faced by these more vulnerable groups with a retrospective design. Certainly we can conclude that existing evidence cannot be generalized to all populations and there is scope for further work on a national or international scale to investigate the effect of socioeconomic factors on dialysis decision-making and access to supportive care amongst older people with advanced CKD.

We report higher rates of hospital admissions amongst more deprived patients in non-supportive care groups. This is an important signal that these patients may be more likely to be committed to a treatment pathway that does not fully acknowledge their health status, than those from higher income groups. Further qualitative and quantitative work is required to understand the circumstances underlying these disparities, to examine barriers to supportive care on a broader scale and to understand the complexities of decision-making on an individual level.

## SUPPLEMENTARY DATA

Supplementary data are available at [ckj](#) online.

## DATA AVAILABILITY STATEMENT

The data underlying this article will be shared on reasonable request to the corresponding author.

## CONFLICT OF INTEREST STATEMENT

None declared.

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