**Appendix S1**

Patient Variables (Level 1)

The level 1 patient variables included in the model were categorized as follows:

* Age (categorized as 18-29, 30-39, 40-49, 50-59, 60-64 and 65-75)
* Gender (Male/Female)
* Ethnicity (White, Asian, Back and Other)
* BMI (categorized as (< 20, 20 - <25, 25 - <30, 30 - <35, 35 - <40 and ≥ 40)

Other demographic and socioeconomic variables (categorised as Y/N unless

otherwise specified):

* Born in UK
* English First Language
* Need Help with Reading (Never, Always, Often, Rarely and Sometimes)
* Accommodation (Owned by you, Other, Part rent, Part owned and Rented

Privately from Council / Housing Association)

* Education (GCSE, A-level or NVQ 1-3, Degree, Higher or NVQ 4-5 and No

Qualifications)

* Employment (Working full time, Long term sick/disabled, Looking after

family home, Not in work for some other reason, Retired from paid work,

Student (includes those in training), Unemployed and Working part time)

* Car ownership
* Civil Status (Single, Divorced, Living with Partner, Married, Separated and

Widowed)

* Children in household (None, One or more)
* Adults in household (One, Two or more), Total in household (One, Two or

more).

Comorbidities (categorised as Y/N unless otherwise specified):

* Diabetes
* Heart disease
* Heart failure
* Atrial fibrillation
* Cardiac valve replacement
* Pacemaker
* Vascular disease
* Abdominal aortic aneurysm
* Respiratory disease
* Liver disease
* Blood borne viruses
* Previous Malignancy
* Smoking (categorised as No, Current, Ex-smoker and Don’t know)
* Mental illness
* Dementia

Other independent patient variables:

* Time Since First Seen by Nephrologist (categorized as (<1 Year, 1-3 Years and >3 Years)
* Previous transplant (Y/N)
* Primary Renal Disease (Diabetes, Glomerulonephritis, Hypertension,

Polycystic, Pyelonephritis, Renal vascular disease, Uncertain and Other)

* Dialysis modality (categorized as HD, HDF, APD and CAPD)

Centre Variables (Level 2)

The level 2 Centre variables included in the model were categorized as follows:

* Number of whole time equivalent Consultant Nephrologists (as continuous)
* Number of whole time equivalent Consultant Nephrologists (categorical)
* Number of Patients Receiving RRT at centre (continuous)
* Number of Patients Receiving RRT (categorical)
* Transplanting Centre (categorical - Y/N)
* Use of Low Clearance Clinic (categorical - Always, Sometimes and Never)
* Transplantation Discussed with All Patients (categorical – Y/N)
* Location of Assessment (categorical-locally or referred to another centre)
* Patients Seen by a Surgeon before wait-listing (Categorical - Y/N)
* Presence of a written protocol to assess suitability (categorical – Y/N)
* Presence of an MDT for listing purposes (categorical Y/N)
* Use of MDT to List All Patients (categorical – Y/N)
* Audit of CKD 5 Patients Listing Status (categorical – Y/N)
* The presence of a named cardiologist to discuss wait-listing (categorical –

Y/N)

**Appendix S2**

Univariate logistic regression for patient level effects on pre-emptive listing.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Patient Variable** | **Odds Ratio** | **Confidence Interval** | **Degrees of Freedom** | **p-value** |
| **Age Group** |  |  | 5 | <.0001 |
| 18-29 | 1 | - |  |  |
| 30-39 | 0.98 | (0.64, 1.48) |  |  |
| 40-49 | 0.85 | (0.58, 1.24) |  |  |
| 50-59 | 0.58 | (0.40, 0.83) |  |  |
| 60-64 | 0.39 | (0.26, 0.58) |  |  |
| 65-75 | 0.18 | (0.12, 0.26) |  |  |
| **Gender** |  |  | 1 | 0.008 |
| Male | 1 | - |  |  |
| Female | 1.27 | (1.06, 1.52) |  |  |
| **Ethnic Group** |  |  | 3 | 0.0002 |
| White | 1 | - |  |  |
| Asian | 0.66 | (0.49, 0.89) |  |  |
| Black | 0.54 | (0.37, 0.81) |  |  |
| Other | 0.41 | (0.14, 1.18) |  |  |
| **BMI (grouped)** |  |  | 5 | <.0001 |
| <20 | 0.69 | (0.47, 1.01) |  |  |
| 20- <25 | 1 | - |  |  |
| 25- <30 | 1.18 | (0.95, 1.46) |  |  |
| 30- <35 | 0.7 | (0.53, 0.91) |  |  |
| 35- <40 | 0.29 | (0.18, 0.46) |  |  |
| ≥ 40 | 0.1 | (0.05, 0.24) |  |  |
| **Time since first seen(categorical)** |  |  | 2 | <.0001 |
| <1 Year | 1 | - |  |  |
| 1-3 Years | 4.53 | (3.21, 6.38) |  |  |
| >3 Years | 7.52 | (5.51, 10.27) |  |  |
| **Diabetes** |  |  | 2 | <.0001 |
| No | 1 | - |  |  |
| Type 1 | 0.88 | (0.66, 1.17) |  |  |
| Type 2 | 0.18 | (0.14, 0.24) |  |  |
| **Heart disease** | 0.25 | (0.19, 0.35) | 1 | <.0001 |
| **Heart failure** | 0.11 | (0.05, 0.23) | 1 | <.0001 |
| **Atrial fibrillation** | 0.35 | (0.18, 0.65) | 1 | 0.0002 |
| **Cardiac valve replacement** | 0.81 | (0.35, 1.90) | 1 | 0.63 |
| **Pacemaker** | 0.3 | (0.11, 0.84) | 1 | 0.007 |
| **Vascular disease** | 0.15 | (0.09, 0.28) | 1 | <.0001 |
| **Cerebrovascular disease** | 0.3 | (0.19, 0.47) | 1 | <0.0001 |
| **Abdominal aortic aneurysm** | 0.26 | (0.09, 0.73) | 1 | 0.002 |
| **Respiratory disease** | 0.57 | (0.42, 0.77) | 1 | 0.0001 |
| **Liver disease** | 0.34 | (0.15, 0.74) | 1 | 0.002 |
| **Blood borne viruses** | 0.46 | (0.23, 0.90) | 1 | 0.01 |
| **Malignancy** | 0.35 | (0.25, 0.50) | 1 | <.0001 |
| **Smoking** |  |  | 3 | <.0001 |
| Non-smoker | 1 | - |  |  |
| Current | 0.45 | (0.34, 0.60) |  |  |
| Ex-smoker | 0.69 | (0.56, 0.85) |  |  |
| Don’t know | 0.64 | (0.49, 0.84) |  |  |
| **Mental Illness** | 0.6 | (0.42, 0.85) | 1 | 0.003 |
| **Dementia** | 0.4 | (0.05, 3.24) | 1 | 0.34 |
| **Born in UK** | 1.84 | (1.43, 2.37) | 1 | <0.0001 |
| **English first language** | 1.76 | (1.30, 2.37) | 1 | 0.0001 |
| **Read help** |  |  | 4 | <0.0001 |
| Always | 0.31 | (0.19, 0.49) |  |  |
| Never | 1 | - |  |  |
| Often | 0.28 | (0.14, 0.59) |  |  |
| Rarely | 0.65 | (0.44, 0.96) |  |  |
| Sometimes | 0.54 | (0.37, 0.78) |  |  |
| **Accommodation** |  |  | 3 | <.0001 |
| Owned by you (Outright or with a Mortgage) | 1 | - |  |  |
| Other | 0.65 | (0.45, 0.96) |  |  |
| Part rent, Part owned (shared ownership) | 0.52 | (0.27, 1.01) |  |  |
| Rented Privately from Council / Housing Association | 0.42 | (0.34, 0.52) |  |  |
| **Education** |  |  | 2 | <0.0001 |
| GCSE, A-level or NVQ 1-3 | 2.65 | (2.14, 3.27) |  |  |
| Degree, Higher or NVQ 4-5 | 3.02 | (2.33, 3.90) |  |  |
| No Qualifications | 1 | - |  |  |
| **Employment status** |  |  | 4 | <0.0001 |
| Working PT/FT | 1 | - |  |  |
| Long term sick/disabled | 0.23 | (0.18, 0.29) |  |  |
| Retired | 0.16 | (0.13, 0.20) |  |  |
| Unemployed | 0.27 | (0.18, 0.40) |  |  |
| Other | 0.73 | (0.49, 1.08) |  |  |
| **Car ownership** | 3.54 | (2.74, 4.59) | 1 | <0.0001 |
| **Civil status** |  |  | 5 | <0.0001 |
| Divorced | 0.67 | (0.48, 0.93) |  |  |
| Living with Partner | 1.51 | (1.09, 2.10) |  |  |
| Married | 1 | - |  |  |
| Separated | 0.45 | (0.24, 0.84) |  |  |
| Single (never married) | 1.02 | (0.81, 1.28) |  |  |
| Widowed | 0.27 | (0.15, 0.47) |  |  |
| **Children in household** |  |  | 2 | <0.0001 |
| 0 | 1 | - |  |  |
| 1 | 1.85 | (1.41, 2.43) |  |  |
| 2 or more | 1.7 | (1.29, 2.23) |  |  |
| **Adults in household** |  |  | 2 | <0.0001 |
| 0-1 | 1 | - |  |  |
| 2 | 1.93 | (1.54, 2.42) |  |  |
| 3 or more | 1.81 | (1.38, 2.36) |  |  |

**Appendix S3**

Univariate logistic regression for centre level effects on pre-emptive listing/transplant, adjusting for patient level factors

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Centre Variable** | **Odds Ratio** | **Confidence Interval** | **Degrees of Freedom** | **p-value** |
| **Number of Consultant Nephrologists** | 1.06 | (1.04, 1.09) | 1 | <0.0001 |
| **Number of Consultant Nephrologists (categorical)** |  |  | 1 | <0.0001 |
| <6 | 1 | - |  |  |
| ≥6 | 2.71 | (1.81, 4.06) |  |  |
| **Number of Patients Receiving RRT** | 1.001 | (1.001, 1.001) | 1 | <0.0001 |
| **Number of Patients Receiving RRT (categorical)** |  |  | 1 | <0.0001 |
| <850 | 1 | - |  |  |
| ≥850 | 2.96 | (2.17, 4.02) |  |  |
| **Transplanting Centre** | 3.3 | (2.46, 4.42) | 1 | <0.0001 |
| **Use of Low Clearance Clinic** |  |  | 2 | 0.98 |
| Always | 0.78 | (0.54, 1.13) |  |  |
| Sometimes | 0.77 | (0.52, 1.12) |  |  |
| Never | 1 | - |  |  |
| **Transplantation Discussed with All Patients** | 1.46 | (1.12, 1.90) | 1 | 0.091 |
| **Location of Assessment** |  |  | 1 | 0.00061 |
| Local | 1 | - |  |  |
| Non-local | 0.46 | (0.28, 0.76) |  |  |
| **Patients Seen by a Surgeon** | 0.96 | (0.61, 1.52) | 1 | 0.12 |
| **Written Protocol** | 1.22 | (0.89, 1.68) | 1 | 0.21 |
| **Use of MDT** | 1.7 | (1.23, 2.36) | 1 | 0.003 |
| **MDT used to List All Patients** | 1.42 | (1.09, 1.84) | 1 | 0.012 |
| **Audit of CKD 5 Patients Listing Status** |  |  | 4 | 0.00088 |
| No | 1 | - |  |  |
| Yes, 1 to 2 per year | 0.89 | (0.64, 1.23) |  |  |
| Yes, 3 or more per year | 1.41 | (0.98, 2.02) |  |  |
| Other | 0.62 | (0.39, 0.99) |  |  |
| **Named Cardiologist** | 1.75 | (1.36, 2.24) | 1 | <0.0001 |

**Appendix S4**

Multivariable logistic regression model for the probability of being pre-emptively listed adjusting for both patient and centre factors

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Effect** | **N** | **Odds Ratio** | **95% Wald** | | **p-value** |
| **Confidence Limits** | |
| **Age** |  |  |  |  |  |
| 18-29 | 131 | 1 | - | - |
| 30-39 | 197 | 0.81 | 0.44 | 1.49 | 0.49 |
| 40-49 | 386 | 0.84 | 0.47 | 1.48 | 0.54 |
| 50-59 | 557 | 0.64 | 0.36 | 1.13 | 0.13 |
| 60-64 | 302 | 0.53 | 0.27 | 1.02 | 0.057 |
| 65-75 | 660 | 0.2 | 0.1 | 0.4 | <0.0001 |
| **Ethnic Group** |  |  |  |  |  |
| White | 1827 | 1 | - | - |  |
| Asian | 228 | 0.52 | 0.34 | 0.79 | 0.0022 |
| Black | 151 | 0.45 | 0.27 | 0.76 | 0.0029 |
| Other | 27 | 0.22 | 0.06 | 0.77 | 0.18 |
| **Time Since First Seen by Nephrologist** |  |  |  |  |  |
| <1 Year | 549 | 1 | - | - |  |
| 1-3 Years | 516 | 8.75 | 5.65 | 13.55 | <0.0001 |
| >3 Years | 1168 | 12.22 | 8.27 | 18.05 | <0.0001 |
|
| **BMI** |  |  |  |  |  |
| Less than 20 | 152 | 0.72 | 0.42 | 1.22 | 0.24 |
| 20 - <25 | 667 | 1 | - | - |  |
| 25 - <30 | 706 | 1.41 | 1.05 | 1.9 | 0.024 |
| 30 - <35 | 395 | 0.99 | 0.69 | 1.44 | 0.97 |
| 35 - <40 | 189 | 0.25 | 0.14 | 0.46 | <0.0001 |
| ≥ 40 | 124 | 0.11 | 0.04 | 0.27 | <0.0001 |
| **Education** |  |  |  |  |  |
| GCSE, A-level or NVQ 1-3 | 939 | 1.3 | 0.96 | 1.75 | 0.089 |
| Degree, Higher or NVQ 4-5 | 402 | 1.04 | 0.72 | 1.51 | 0.84 |
| No Qualifications | 892 | 1 | - | - |  |
| **Car ownership** | 577 | 1 | - | - |  |
| No |  |  |  |  |  |
| Yes | 1656 | 1.9 | 1.34 | 2.69 | 0.0003 |
| **Accommodation** |  |  |  |  |  |
| Owned by you (Outright or with a Mortgage) | 1289 | 1 | - | - |
| Other | 136 | 0.58 | 0.33 | 1.04 | 0.066 |
| Part rent, Part owned (shared ownership) | 48 | 0.28 | 0.11 | 0.68 | 0.0049 |
| Rented Privately from Council / Housing Association | 760 | 0.49 | 0.36 | 0.68 | <0.0001 |
| **Employment** |  |  |  |  |  |
| Working full time/ part time | 571 | 1 | - | - |
| Long term sick/disabled | 628 | 0.41 | 0.29 | 0.58 | <0.0001 |
| Retired from paid work | 774 | 0.61 | 0.39 | 0.96 | 0.032 |
| Unemployed | 156 | 0.5 | 0.3 | 0.85 | 0.011 |
| Other | 104 | 0.98 | 0.56 | 1.72 | 0.95 |
| **Malignancy** |  |  |  |  |  |
| No | 1978 | 1 | - | - |
| Yes | 255 | 0.27 | 0.17 | 0.43 | <0.0001 |
| **Smoking** |  |  |  |  |  |
| No | 976 | 1 | - | - |
| Current | 326 | 0.56 | 0.37 | 0.85 | 0.0057 |
| Ex-smoker | 670 | 0.91 | 0.67 | 1.22 | 0.51 |
| Don’t know | 261 | 0.84 | 0.56 | 1.26 | 0.41 |
| **Vascular Disease** |  |  |  |  |  |
| No | 2061 | 1 | - | - |
| Yes | 172 | 0.2 | 0.1 | 0.44 | <0.0001 |
| **Heart Disease** |  |  |  |  |  |
| No | 1834 | 1 | - | - |
| Yes | 399 | 0.49 | 0.33 | 0.74 | 0.0008 |
| **Heart Failure** |  |  |  |  |  |
| No | 2086 | 1 | - | - |
| Yes | 147 | 0.19 | 0.08 | 0.5 | 0.0007 |
| **Diabetes** |  |  |  |  |  |
| No | 1402 | 1 | - | - |
| Type 1 | 213 | 1.19 | 0.78 | 1.8 | 0.43 |
| Type 2 | 618 | 0.37 | 0.26 | 0.53 | <0.0001 |
| **Cerebrovascular Disease** |  |  |  |  |  |
| No | 2052 | 1 | - | - |
| Yes | 181 | 0.4 | 0.22 | 0.74 | 0.003 |
| **Respiratory Disease** |  |  |  |  |  |
| No | 1970 | 1 | - | - |  |
| Yes | 263 | 0.72 | 0.47 | 1.11 | 0.13 |
| **Liver Disease** |  |  |  |  |  |
| No | 2185 | 1 | - | - |  |
| Yes | 48 | 0.35 | 0.12 | 1.02 | 0.053 |
|  |  |  |  |  |  |
| **Centre Level Variables** |  |  |  |  |  |
| **Transplanting Centre** |  |  |  |  |  |
| No | 48 | 1 |
| Yes | 23 | 2.96 | 2.21 | 3.96 | <0.0001 |
| **No. of Consultant Nephrologists** |  |  |  |  |  |
| <6 | 30 | 1 |
| >6 | 41 | 2.23 | 1.52 | 3.28 | <0.0001 |
| **Transplantation Discussed with All Patients** |  |  |  |  |  |
| No | 20 | 1 | - | - |  |
| Yes | 51 | 1.46 | 1.11 | 1.91 | 0.0066 |

**Appendix S5** – Showing -2log likelihood results for statistical models analysed for association of patient and centre factors with pre-emptive listing.

|  |  |
| --- | --- |
| **Model** | **-2 log L** |
| **Null Model** | 2679.2 |
| **Multivariable Patient Factors Adjusted Model with Multiple Imputation\*** | 1772.2 |
| **Multivariable Patient and Centre Factors Adjusted Model with Multiple Imputation** | 1658.3 |

\* Of the  (2679.2-1658.3) 1020.9 difference in -2logL between the null model and model with patient and centre variables, 89% (907) of the difference was observed when including the patient factors only.

**Appendix S6**

Univariate Cox proportional hazard model for patient level effects on time to listing within 2 years of starting dialysis

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Factor** | **Hazard Ratio** | **Confidence Interval** | **Degrees of Freedom** | **p-value** |
| **Age Group** |  |  | 5 | <.0001 |
| 18-29 | 1 | - |  |  |
| 30-39 | 0.88 | (0.64, 1.21) |  |  |
| 40-49 | 0.5 | (0.37, 0.68) |  |  |
| 50-59 | 0.31 | (0.23, 0.41) |  |  |
| 60-64 | 0.2 | (0.14, 0.28) |  |  |
| 65-75 | 0.11 | (0.08, 0.15) |  |  |
| **Gender** |  |  | 1 | 0.013 |
| Male | 1 | - |  |  |
| Female | 0.8 | (0.67, 0.96) |  |  |
| **Ethnic Group** |  |  | 3 | <0.0001 |
| White | 1 | - |  |  |
| Asian | 1.76 | (1.42, 2.19) |  |  |
| Black | 1.4 | (1.06, 1.86) |  |  |
| Other | 2.08 | (1.17, 3.69) |  |  |
| **BMI (grouped)** |  |  | 5 | <.0001 |
| <20 | 0.85 | (0.61, 1.89) |  |  |
| 20-25 | 1 | - |  |  |
| 25-30 | 0.91 | (0.75, 1.11) |  |  |
| 30-35 | 0.64 | (0.50, 0.82) |  |  |
| 35-40 | 0.41 | (0.28, 0.59) |  |  |
| >40 | 0.13 | (0.06, 0.26) |  |  |
| **Time since first seen (categorical)** |  |  | 2 | 0.0063 |
| <1 Year | 1 | - |  |  |
| 1-3 Years | 0.8 | (0.64, 0.99) |  |  |
| >3 Years | 0.74 | (0.62, 0.90) |  |  |
| **Diabetes** |  |  | 2 | <0.0001 |
| No | 1 | - |  |  |
| Type 1 | 0.89 | (0.68, 1.17) |  |  |
| Type 2 | 0.38 | (0.31, 0.46) |  |  |
| **Heart disease** | 0.38 | (0.29, 0.49) | 1 | <0.0001 |
| **Heart failure** | 0.33 | (0.21, 0.53) | 1 | <0.0001 |
| **Atrial fibrillation** | 0.37 | (0.20, 0.69) | 1 | 0.0002 |
| **Cardiac valve replacement** | 0.13 | (0.02, 0.94) | 1 | 0.0027 |
| **Pacemaker** | 0.17 | (0.04, 0.68) | 1 | 0.0004 |
| **Vascular disease** | 0.35 | (0.23, 0.53) | 1 | <0.0001 |
| **Cerebrovascular disease** | 0.42 | (0.28, 0.61) | 1 | <0.0001 |
| **Abdominal aortic aneurysm** | 0.07 | (0.01, 0.51) | 1 | <0.0001 |
| **Respiratory disease** | 0.6 | (0.44, 0.80) | 1 | 0.0003 |
| **Liver disease** | 0.44 | (0.21, 0.92) | 1 | 0.012 |
| **Blood borne viruses** | 0.46 | (0.24, 0.90) | 1 | 0.009 |
| **Malignancy** | 0.26 | (0.17, 0.38) | 1 | <.0001 |
| **Smoking** |  |  | 3 | <.018 |
| Non-smoker | 1 | - |  |  |
| Current | 0.7 | (0.54, 0.91) |  |  |
| Ex-smoker | 0.84 | (0.69, 1.03) |  |  |
| Don’t know | 1.04 | (0.82, 1.32) |  |  |
| **Mental illness** | 0.69 | (0.50, 0.95) | 1 | 0.017 |
| **Dementia** | 0.43 | (0.06, 3.07) | 1 | 0.33 |
| **Born in UK** | 0.72 | (0.60, 0.87) | 1 | 0.001 |
| **English first language** | 0.65 | (0.53, 0.81) | 1 | 0.0001 |
| **Read help** |  |  | 4 | 0.0043 |
| Always | 0.54 | (0.38, 0.78) |  |  |
| Never | 1 | - |  |  |
| Often | 0.66 | (0.39, 1.10) |  |  |
| Rarely | 0.89 | (0.64, 1.25) |  |  |
| Sometimes | 0.92 | (0.69, 1.25) |  |  |
| **Accommodation** |  |  | 3 | 0.016 |
| Owned by you (Outright or with a Mortgage) | 1 | - |  |  |
| Other | 1.53 | (1.13, 2.07) |  |  |
| Part rent, Part owned (shared ownership) | 1.56 | (0.96, 2.55) |  |  |
| Rented Privately from Council / Housing Association | 0.96 | (0.81, 1.16) |  |  |
| **Education** |  |  | 2 | <.0001 |
| GCSE, A-level or NVQ 1-3 | 1.8 | (1.48, 2.19) |  |  |
| Degree, Higher or NVQ 4-5 | 2.85 | (2.28, 3.56) |  |  |
| No Qualifications | 1 | - |  |  |
| **Employment status** |  |  | 4 | <.0001 |
| Working PT/FT | 1 | - |  |  |
| Long term sick/disabled | 0.36 | (0.29, 0.45) |  |  |
| Retired | 0.18 | (0.15, 0.23) |  |  |
| Unemployed | 0.68 | (0.51, 0.90) |  |  |
| Other | 0.68 | (0.47, 0.98) |  |  |
| **Car ownership** | 1.26 | (1.05, 1.52) | 1 | 0.013 |
| **Civil status** |  |  | 5 | <.0001 |
| Divorced | 0.92 | (0.68, 1.25) |  |  |
| Living with Partner | 1.56 | (1.13, 2.15) |  |  |
| Married | 1 | - |  |  |
| Separated | 0.94 | (0.59, 1.49) |  |  |
| Single (never married) | 1.47 | (1.20, 1.80) |  |  |
| Widowed | 0.41 | (0.25, 0.66) |  |  |
| **Children in household** |  |  | 2 | <0.0001 |
| 0 | 1 | - |  |  |
| 1 | 2.05 | (1.60, 2.62) |  |  |
| 2 or more | 2.48 | (1.97, 3.12) |  |  |
| **Adults in household** |  |  | 2 | 0.078 |
| 0-1 | 1 | - |  |  |
| 2 | 1.14 | (0.94, 1.39) |  |  |
| 3 or more | 1.31 | (1.04, 1.65) |  |  |

**Appendix S7**

Univariate Cox proportional hazard models for centre level effects on listing within 2 years of starting dialysis, adjusting for patient level factors

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Factor** | **Hazard Ratio** | **Confidence Interval** | **Degrees of Freedom** | **p-value** |
| **Number of Consultant Nephrologists** | 1.02 | (1.00, 1.04) | 1 | 0.031 |
| **Number of Consultant Nephrologists (categorical)** |  |  | 1 | 0.03 |
| ≤6 | 1 | - |  |  |
| >6 | 1.31 | (1.02, 1.68) |  |  |
| **Number of Patients Receiving RRT** | 1 | (1.00, 1.00) | 1 | 0.1 |
| **Number of Patients Receiving RRT (categorical)** |  |  | 1 | 0.97 |
| <850 | 1 | - |  |  |
| >=850 | 1 | (0.82, 1.21) |  |  |
| **Transplanting Centre** | 1.08 | (0.89, 1.30) | 1 | 0.45 |
| **Use of Low Clearance Clinic** |  |  | 2 | 0.051 |
| Always | 1.3 | (0.97, 1.74) |  |  |
| Sometimes | 1.43 | (1.07, 1.93) |  |  |
| Never | 1 | - |  |  |
| **Transplantation Discussed with All Patients** | 0.95 | (0.79, 1.15) | 1 | 0.63 |
| **Location of Assessment** |  |  | 1 | 0.17 |
| Local | 1 | - |  |  |
| Non-local | 0.78 | (0.53, 1.13) |  |  |
| **Patients Seen by a Surgeon** | 1.1 | (0.78, 1.57) | 1 | 0.58 |
| **Written Protocol** | 0.8 | (0.64, 1.01) | 1 | 0.065 |
| **Use of MDT** | 1.16 | (0.92, 1.46) | 1 | 0.19 |
| **MDT used to List All Patients** | 1.16 | (0.95, 1.41) | 1 | 0.16 |
| **Audit of CKD 5 Patients Listing Status** |  |  | 4 | 0.0024 |
| No | 1 | - |  |  |
| Yes, 1 to 2 per year | 0.93 | (0.73, 1.19) |  |  |
| Yes, 3 or more per year | 1.48 | (1.13, 1.95) |  |  |
| Other | 0.96 | (0.70, 1.33) |  |  |
| **Named Cardiologist** | 0.99 | (0.82, 1.20) | 1 | 0.94 |

**Appendix S8**

Multivariable Cox proportional hazards model for the probability of being listed within 2 years of starting dialysis adjusting for both patient and centre factors

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **N** | **Hazard Ratio** | **95% Wald** | | **p-value** |
| **Confidence Limits** | |
| **Age** |  |  |  |  |  |
| 18-29 | 76 | 1 | - | - |
| 30-39 | 118 | 0.78 | 0.54 | 1.13 | 0.19 |
| 40-49 | 235 | 0.63 | 0.44 | 0.9 | 0.011 |
| 50-59 | 386 | 0.36 | 0.25 | 0.51 | <0.0001 |
| 60-64 | 227 | 0.3 | 0.19 | 0.47 | <0.0001 |
| 65-75 | 582 | 0.16 | 0.1 | 0.27 | <0.0001 |
| **Gender** |  |  |  |  |  |
| Male | 1075 | 1 | - | - |  |
| Female | 549 | 0.83 | 0.68 | 1.01 | 0.069 |
| **Ethnic Group** |  |  |  |  |  |
| White | 1296 | 1 | - | - |  |
| Asian | 178 | 1.62 | 1.18 | 2.22 | 0.0026 |
| Black | 127 | 1.09 | 0.76 | 1.55 | 0.64 |
| Other | 23 | 1.9 | 1 | 3.6 | 0.049 |
| **BMI** |  |  |  |  |  |
| Less than 20 | 117 | 1.01 | 0.71 | 1.45 | 0.94 |
| 20 - <25 | 460 | 1 | - | - |  |
| 25 - <30 | 458 | 1.19 | 0.96 | 1.48 | 0.12 |
| 30 - <35 | 300 | 0.84 | 0.64 | 1.11 | 0.22 |
| 35 - <40 | 171 | 0.44 | 0.3 | 0.65 | <0.0001 |
| ≥ 40 | 118 | 0.12 | 0.06 | 0.25 | <0.0001 |
| **Dialysis Modality** |  |  |  |  |  |
| Haemodialysis | 1327 | 1 | - | - | 1 |
| Peritoneal dialysis | 297 | 1.36 | 1.1 | 1.69 | 0.0054 |
| **Smoking** |  |  |  |  |  |
| No | 651 | 1 | - | - |
| Current | 268 | 0.7 | 0.52 | 0.94 | 0.018 |
| Ex-smoker | 508 | 1.14 | 0.91 | 1.41 | 0.25 |
| Don’t know | 197 | 0.96 | 0.72 | 1.28 | 0.79 |
| **English First Language** |  |  |  |  |  |
| Yes | 1393 | 1.29 | 0.96 | 1.73 | 0.091 |
| No | 231 | 1 | - | - |  |
| **Education** |  |  |  |  |  |
| GCSE, A-level or NVQ 1-3 | 623 | 1.01 | 0.81 | 1.27 | 0.91 |
| Degree, Higher or NVQ 4-5 | 256 | 1.42 | 1.09 | 1.84 | 0.0085 |
| No Qualifications | 745 | 1 | - | - |  |
| **Car ownership** |  |  |  |  |  |
| No | 510 | 0.75 | 0.6 | 0.93 | 0.0096 |
| Yes | 1114 | 1 | - | - |  |
| **Accommodation** |  |  |  |  |  |
| Owned by you (Outright or with a Mortgage) | 845 | 1 | - | - |
| Other | 102 | 0.72 | 0.5 | 1.02 | 0.067 |
| Part rent, Part owned (shared ownership) | 39 | 1.2 | 0.72 | 2.02 | 0.48 |
| Rented Privately from Council / Housing Association | 638 | 0.72 | 0.58 | 0.9 | 0.0041 |
| **Employment** |  |  |  |  |  |
| Working full time/ part time | 279 | 1 | - | - |
| Long term sick/disabled | 505 | 0.54 | 0.42 | 0.68 | <0.0001 |
| Retired from paid work | 661 | 0.56 | 0.4 | 0.79 | 0.0011 |
| Unemployed | 122 | 0.8 | 0.57 | 1.11 | 0.18 |
| Other | 57 | 0.7 | 0.46 | 1.06 | 0.094 |
| **Malignancy** |  |  |  |  |  |
| No | 1398 | 1 | - | - |
| Yes | 226 | 0.24 | 0.16 | 0.37 | <0.0001 |
| **Vascular Disease** |  |  |  |  |  |
| No | 1461 | 1 | - | - |
| Yes | 163 | 0.47 | 0.3 | 0.74 | 0.0011 |
| **Heart Disease** |  |  |  |  |  |
| No | 1261 | 1 | - | - |
| Yes | 363 | 0.73 | 0.54 | 0.98 | 0.037 |
| **Heart Failure** |  |  |  |  |  |
| No | 1481 | 1 | - | - |
| Yes | 143 | 0.61 | 0.37 | 0.98 | 0.04 |
| **Blood Borne Viruses** |  |  |  |  |  |
| No | 1577 | 1 | - | - |  |
| Yes | 47 | 0.34 | 0.17 | 0.69 | 0.0027 |
| **Diabetes** |  |  |  |  |  |
| No | 910 | 1 | - | - |  |
| Type 1 | 146 | 0.81 | 0.59 | 1.11 | 0.19 |
| Type 2 | 568 | 0.71 | 0.55 | 0.92 | 0.0082 |
|  |  |  |  |  |  |
| **Centre Level Variables** |  |  |  |  |  |
|  |  |  |  |  |  |
| **Consultant Nephrologists** |  |  |  |  |  |
| ≤6 | 30 | 1 | - | - |  |
| >6 | 41 | 1.26 | 1 | 1.59 | 0.054 |
| **Written Protocol** |  |  |  |  |  |
| No | 21 | 1 | - | - |  |
| Yes | 50 | 0.72 | 0.58 | 0.9 | 0.0033 |
| **MDT utilised** |  |  |  |  |  |
| No | 17 | 1 | - | - |  |
| Yes | 54 | 1.23 | 0.99 | 1.52 | 0.057 |

**Appendix S9** – Showing -2log likelihood results for statistical models analysed for association of patient and centre factors with listing within 2 years of starting dialysis

|  |  |
| --- | --- |
| **Model** | **-2 log L** |
| **Null Model** | 7166.2 |
| **Multivariable Patient Factors Adjusted Model with Multiple Imputation\*** | 6582.4 |
| **Multivariable Patient and Centre Factors Adjusted Model with Multiple Imputation** | 6566.8 |

\* Of the  (7166.2-6566.8) 599.4 difference in -2logL between the null model and model with patient and centre variables, 97% (583.8) of the difference was observed when including the patient factors only.