

Supplementary Material for

Categorical state sequence analysis and regression tree to identify determinants of care trajectory in chronic disease: example of end-stage renal disease

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1 Sequence definition and heterogeneity

For each ESRD patient, his succession of treatments (i.e. trajectory of care) was translated into an ordered sequence of states. The duration of each state was the duration of each treatment phase. The death event was interpreted as an irreversible state. The event of being registered to the transplantation waiting list was defined as a punctual state (with 1-month duration). Overall seven states were possible: in-center hemodialysis [CENTER], hemodialysis in medical unit [MSU], autonomous hemodialysis [AUTO], peritoneal dialysis [PD], death [DIED], transplantation [GRAFT], registration point to the transplantation waiting list [WAITLISTED].

Care trajectories seemed heterogeneous with a diversity of switches between RTT and variations of time spent under each treatment. However, among the patients who had 4 or more switches, we note that they generally switched between the same treatments (Figure S1). Indeed around 40% had a mix of in-center hemodialysis, autonomous hemodialysis, hemodialysis in medical unit and graft.

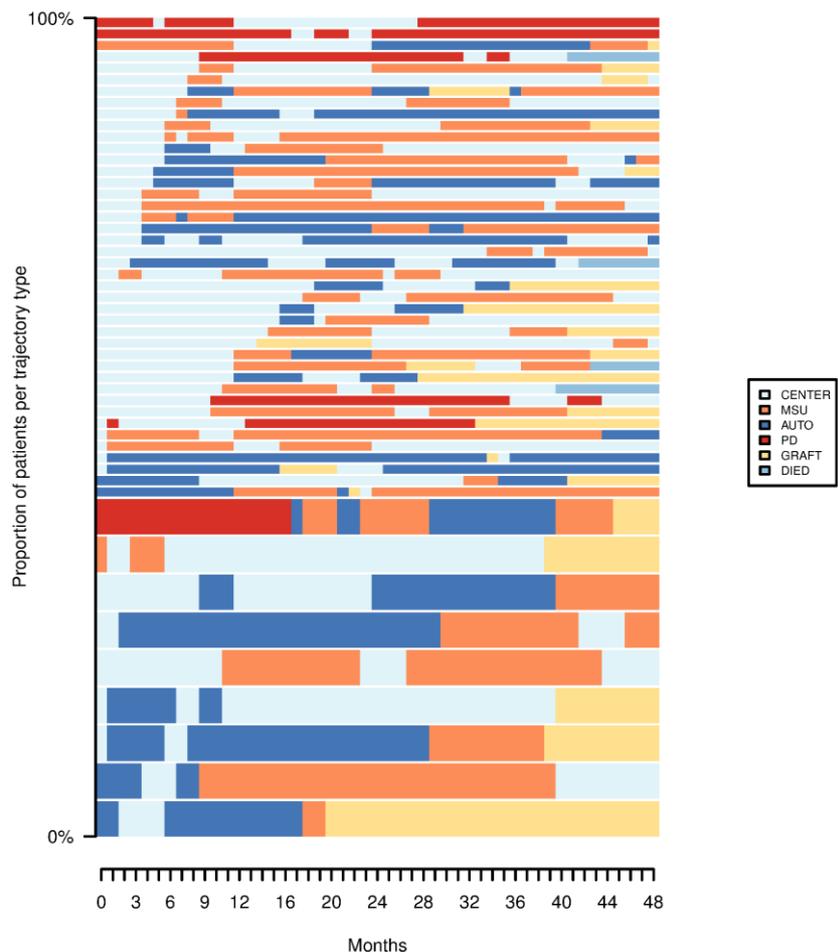


Figure S1. Percentage of ESRD patients per trajectory type who presented 4 or more switches over the 48-month follow-up period. The first horizontal bar at the bottom indicates that around 10% of the patients had for trajectory composed of 2 months in autonomous hemodialysis, 5 months in-center hemodialysis, 11 months in autonomous hemodialysis, 2 months of hemodialysis in medical unit, and their received a graft that last at least up to the end of the 48-month follow-up period. CENTER aqua blue; MSU orange; DP: red; AUTO dark blue; GRAFT yellow; DIED grey blue.

2 Missing data imputation

Missing data concerned the hemoglobin variable (4% and 12% in Bretagne and Ile-de-France, respectively). Within each region missing data occurred at random and the multiple imputation method was applied to estimate missing information with generation and integration of 10 complete datasets. Variables selected as predictors for the imputation are listed in Table S1. Computation was performed using the *mice* library (version 2.3.0) from the R statistical software (version 3.3.3).

Table S1. Variables selected as predictors for the imputation

Variable	Variable modalities
First treatment in emergency	1- 0
Catheter at initiation	1- 0
Nurse assistance	1- 0
Physical disabilities	1- 0
Cardiovascular diseases	0; 1; 2; >=3
Autonomous for dialysis	1- 0
Diabetes	1-0
Active malignancy	1-0
Behavior disorder	1-0
chronic respiratory disease	1-0
HIV infection	1-0
Hepatic disease	1-0
Autonomous for walking	1-0
Working	1-0

3 Treatment sequences during the first 48 months of RRT

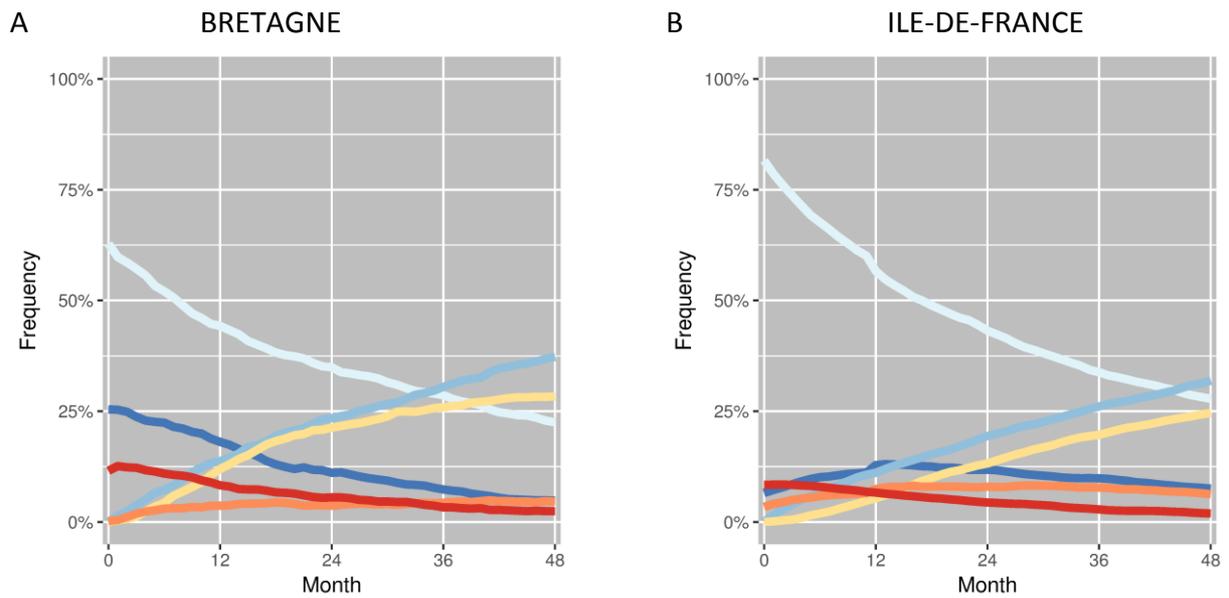


Figure S2. Proportion of patients under each treatment modalities over the 48-month period in Bretagne (A) and Ile-de-France (B). At initiation in Bretagne around 60% of the patients were in hemodialysis in center and at the end of the study period less than 25 % of the patients were take care of in center.

CENTER aqua blue; WAITLISTED black; MSU orange; DP: red; AUTO dark blue; GRAFT yellow; DIED grey blue.

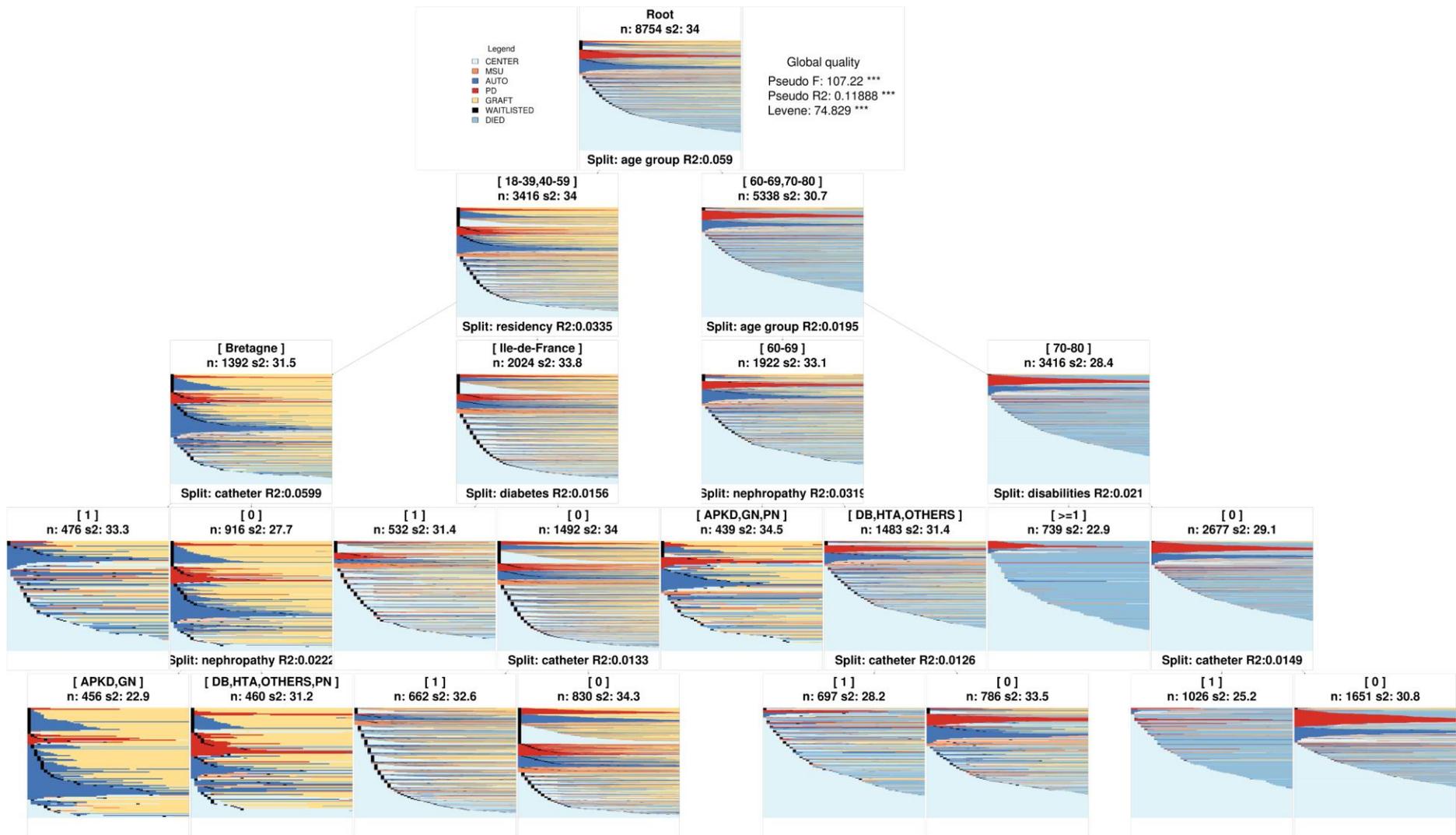


Figure S3. Determinants of homogeneous groups of RRT sequences among ESRD patients. In each panel, each row represents one patient care trajectory over the 48-month follow-up, sorted according to the first state (treatment modality).

CENTER aqua blue; WAITLISTED black; MSU orange; DP: red; AUTO dark blue; GRAFT yellow; DIED grey blue. Pseudo R2 or R2 shows the proportion of explained variance by the covariate. S2 is the variance of residuals. The pseudo F provides the statistical significance of the segmentation. The Levene's test gives the significance of variance equality within groups/panels. APKD: autosomal dominant polycystic kidney disease; Auto: autonomous hemodialysis; catheter: first dialysis with catheter; Center: in-center hemodialysis; DN: diabetic nephropathy; GN: glomerulonephritis; HTA: hypertensive and vascular nephropathy; MSU: hemodialysis in medical unit; OTHERS: other causes or unknown; PD: peritoneal dialysis; PN: pyelonephritis.



Figure S4. Average time spent in each RRT modalities per homogeneous group of ESRD patients care trajectory, group by their determinants. In each panel, a bar represents the average time (in months) spent in that RRT modality over the 48-month follow-up by the patients of the homogeneous group of care trajectory. For instance, at the root, i.e. including all patients, the average time spent in CENTER over the 48-month follow-up is 20 months.

CENTER light blue; WAITLISTED black; MSU orange; DP: red; AUTO dark blue; GRAFT yellow; DIED blue. Pseudo R2 or R2 shows the proportion of explained variance by the covariate. S2 is the variance of residuals. The pseudo F provides the statistical significance of the segmentation. The Levene's test gives the significance of variance equality within groups/panels. APKD: autosomal dominant polycystic kidney disease; Auto: autonomous hemodialysis; catheter: first dialysis with catheter; Center: in-center hemodialysis; DN: diabetic nephropathy; GN: glomerulonephritis; HTA: hypertensive and vascular nephropathy; MSU: hemodialysis in medical unit; OTHERS: other causes or unknown; PD: peritoneal dialysis; PN: pyelonephritis.

