

EFFECT OF HEMODIAFILTRATION ON SURVIVAL IN INCIDENT HEMODIALYSIS PATIENTS IN THE FRENCH REIN REGISTRY

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OBJECTIVES

Randomized trials about hemodiafiltration (HDF) consistently found lower mortality risk associated with higher convection volume. Recent dialysis monitors and membranes more constantly permit to reach a high convection volume. We used data from the REIN registry to investigate the relation between HDF and mortality in the recent period, specially looked if the benefit differed according to age and co-morbidities.

POPULATION AND METHODS

All incident patients who started hemodialysis from January 1, 2008 to December 31, 2011, were included and followed until end of 2012. Data from REIN included age, gender, 11 co-morbidities, laboratory data and dialysis modalities including HDF. Multivariable Cox analyses for all-cause and cardiovascular mortality used **HDF as a time dependent variable**, age as time-scale, were stratified by region, facility type and legal status and took into account facility clustering. Interactions with co-morbidities were tested. Proportional risk assumption was verified by the Schoenfeld residual testing. The log linearity of the continuous variables was tested by the spline method. Finally, to account for unmeasured confounders, facility-level analyses - using a Cox model adjusted for the yearly percentage of patients on HDF in each dialysis unit - were conducted with adjustment for patient co-morbidities and yearly percentage of catheter use by dialysis unit as another surrogate for practice center variable. Patients were censored for renal transplantation, dialysis weaning, transfer to peritoneal dialysis and move out of France. Sensitivity analyses looked at mortality risk associated with HDF according to gender, diabetes, BMI, cardio-vascular co-morbidities, cirrhosis, respiratory disease, dialysis on catheter, mGFR at dialysis start, Hb and albuminemia.

RESULTS

Out of 28,407 included patients, 5 526 were treated with HDF for a median period of 1.2 years (0.9-1.9) of whom 2254 were exclusively treated with HDF. At dialysis start, patients in the HDF group were older (70 vs 71y), more frequently diabetic (38 vs 46%), had more cardiac (22 vs 25%) and vascular co-morbidities (20 vs 23%), more frequently former smokers (26 vs 31%), more disability to walk (12 vs 14%), less likely to have polycystic kidney disease (6.7 vs 4.1%) and more likely a vascular (1.1 vs 1.8%) or diabetic kidney disease (22 vs 27%), more frequently started dialysis in emergency (30 vs 33%), with a catheter (47 vs 50%) and in an hospital based facility (89 vs 94%). The medians of follow-up were 1.87 years (1.13-2.90) for the standard dialysis group and 2.33 years (1.48-3.40) for the HDF group. For those not exclusively treated by HDF, they spent 55% of their dialysis vintage treated in HD and 45% in HDF.

In multivariable Cox analyses, HDF was associated with lower all-cause and cardiovascular mortality risks: HR [95% CI], 0.83 [0.77-0.90] and 0.74 [0.62-0.88], respectively (Table 1). In analysis restricted to patients exclusively treated with HDF versus never, all-cause mortality risk associated with HDF was 0.77 [0.69-0.87](Table 1). Interaction tests between co-morbidities and HDF were not significant.

In the facility-level analysis restricted to patients never dialyzed in self-care dialysis unit (n=21,945 of whom 4 825 treated by HDF), to increase the percentage of patients treated by HDF in a unit from 0% to 100% reduced all-cause and cardiovascular mortality: HR, 0.84 [0.75-0.96] and 0.71 [0.53-0.95], respectively (Table 1).

In the sensitivity analyses, there was no interaction between co-morbidities and HDF on survival (figure 1).

Table 1. Cox time-dependent regression analyses

	HR (95% CI)		
	All-cause mortality [†]	Cardiovascular mortality [†]	Other causes [†]
Crude model* HDF	0.81 (0.74-0.89)	0.71 (0.59-0.86)	0.86 (0.78-0.95)
Model fully adjusted* HDF	0.83 (0.77-0.9)	0.74 (0.62-0.88)	0.88 (0.81-0.96)
HDF exclusive vs never*	0.77 (0.69-0.87)	0.66 (0.51-0.86)	0.82 (0.73-0.92)
HDF Facility level analysis**	0.9 (0.8-1.01)	0.74 (0.56-0.98)	0.98 (0.86-1.11)
HDF Facility level analysis applied for overall population except those who have been dialyzed in self-dialysis **	0.84 (0.75-0.96)	0.71 (0.53-0.95)	0.92 (0.8-1.05)

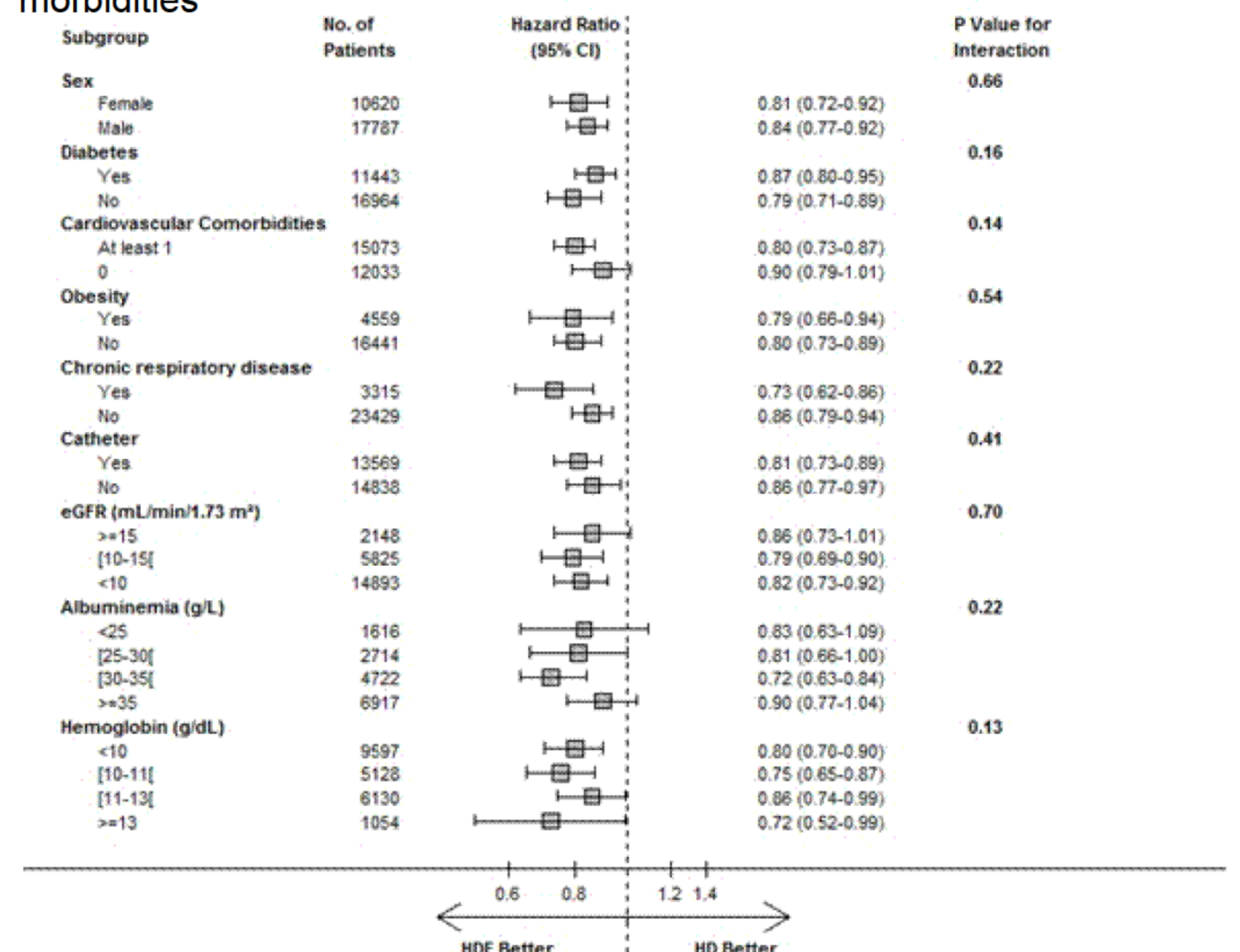
[†] Cox model for all cause mortality stratified on facility legal status, facility type and region; Cox models for cardiovascular mortality and other causes stratified on facility type and region and adjusted for facility legal status.

*Models at the patient level : HDF as a time dependent variable, age as time-scale, Cox model fully adjusted for gender, co-morbidities, first dialysis with catheter and laboratory data.

** Model at facility-level : % of participants treated by HDF by facility as a time dependent variable, age as time-scale; HR for mortality risk in 100% HDF units versus 100% HD units; model adjusted for gender, co-morbidities, first dialysis with catheter, laboratory data and yearly % of patients with catheter by facility.

Use of robust variance estimates to account for facility-clustering effects. HR for missing classes not shown.

Figure 1: Sensitivity analyses for all-cause mortality according to co-morbidities



CONCLUSIONS

Patients treated by HDF were older, have more cardiovascular co-morbidities and a lower transplantation rate. Despite a higher risk profile, in the last 6 years they experienced better survival, as studied both by patient-level and facility-level analyses. No co-morbidity influenced the relation HDF and survival.