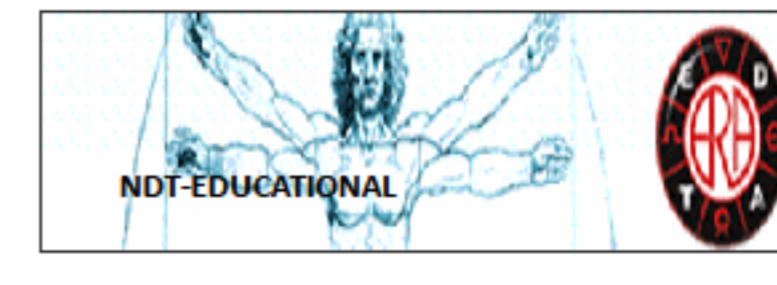


# THE USE OF HIGH-FLUX MEMBRANES IS NOT ASSOCIATED WITH IMPROVED SURVIVAL OF PATIENTS ON HEMODIALYSIS

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## BACKGROUND

Besides advances in haemodialysis technique, mortality rates are still high in chronic kidney disease patients on dialysis (CKD5D).

In this regard, the effect of the different haemodialysis membranes on survival is currently a subject of discussion.

Some studies suggest that the use of high-flux membranes could confer a significant survival benefit among women and patients with lower serum albumin or longer vintage.

## OBJECTIVE

To assess in COSMOS (Current management Of Secondary hyperparathyroidism: a Multicentre Observational Study) the relationship between the use of conventional low-flux or high-flux membranes and all-cause and cardiovascular mortality.

## METHODS

- **COSMOS** is a 3-year, open-cohort, observational, prospective, multicenter study carried out in 227 dialysis centers in 20 European countries including 6797 patients.
- After exclusion of patients with missing data and those using other dialysis techniques, the present study included **5141 haemodialysis patients** (3504 randomly selected at baseline) plus 1637 new patients less than 1 year on HD (31.8%) recruited to replace patients who died, were transplanted, switched to peritoneal dialysis or lost to follow-up.
- **Patient and facility-level analyses** were carried out by using Cox-regression analysis with **time-dependent variables**.

- Patient-level analysis included **multivariate analysis and propensity score matching**.
- The facility-level analysis used the **case-mix-adjusted facility percentage of patients treated with high-flux membranes as an instrumental variable**.
- The outcomes were **all-cause and cardiovascular mortality** and the exposure (time-dependent variable) the type of dialysis membrane (high-flux or low-flux) used in conventional haemodialysis.
- **Three multivariate models** that included up to **24 different variables** to make the necessary adjustments were used.

## RESULTS

Table 1: Patient characteristics

	All (N=5141)	All patients		P-value	Propensity Score matched patients		P-value
		Low flux (N=3168)	High flux (N=1973)		Low flux (N=1644)	High flux (N=1644)	
Sex (% men)	59.9	58.1	62.6	0.002	61.6	61.7	0.9
Age (years) (Mean±SD)	64.6±14.4	65.2±14.1	63.5±14.7	<0.001	63.2±14.5	63.4±14.6	0.7
BMI (kg/m <sup>2</sup> ) (Mean±SD)	25.3±5.8	25.2±6.0	25.6±5.4	0.008	25.5±5.1	25.5±5.3	0.8
Smokers (%)	13.7	12.7	15.2	0.010	15.4	14.7	0.6
Diabetics (%)	31.0	30.3	32.2	0.2	31.8	32.4	0.7
CVD history (%)	71.8	71.6	72.1	0.7	72.5	71.9	0.7
Parathyroidectomy (%)	4.7	3.6	6.4	<0.001	5.5	6.3	0.4
Vintage (months) (Mean±SD)	38.2±49.0	34.7±45.1	43.8±54.1	<0.001	42.1±54.0	42.7±52.3	0.7
Hours of dialysis per week (Mean±SD)	12.0±2.1	11.8±2.2	12.2±2.0	<0.001	12.2±2.3	12.2±2.0	0.7
Calcium concentration in dialysate				0.5			1.0
2.5 mg/L (%)	32.0	31.5	32.9		31.9	31.8	
3.0 mg/L (%)	47.7	48.2	46.8		47.5	48.0	
3.5 mg/L (%)	20.3	20.3	20.4		20.6	20.3	
Patients treated with P binders (%)	84.8	84.4	85.4	0.3	86.2	86.4	0.8
Patients treated with VDRAAs (%)	47.3	49.0	44.7	0.003	45.9	46.5	0.9
Patients treated with calcimimetics (%)	5.6	4.1	7.9	<0.001	6.0	6.3	0.7
Patients treated with ESAs (%)	90.5	90.3	90.8	0.6	90.8	90.6	0.9
PTH (pg/mL) (Median [IQR])	201.1[272.7]	192.0[259.6]	220.0[301.7]	0.035	197.0[275.8]	214.8[295.9]	0.9
Calcium (mgr/dL) (Mean±SD)	9.1±0.9	9.1±0.9	9.0±0.9	0.070	9.1±0.9	9.1±0.9	0.9
Phosphorus (mgr/dL) (Mean±SD)	5.4±1.7	5.4±1.7	5.3±1.7	0.49	5.4±1.7	5.4±1.7	0.8
Albumin (gr/dL) (Mean±SD)	3.8±0.5	3.8±0.5	3.8±0.5	0.1	3.8±0.5	3.8±0.5	0.8
Hemoglobin (gr/dL) (Mean±SD)	11.5±1.6	11.4±1.5	11.6±1.6	<0.001	11.5±1.5	11.5±1.6	0.4

Graphic 1: Unadjusted and adjusted mortality rates

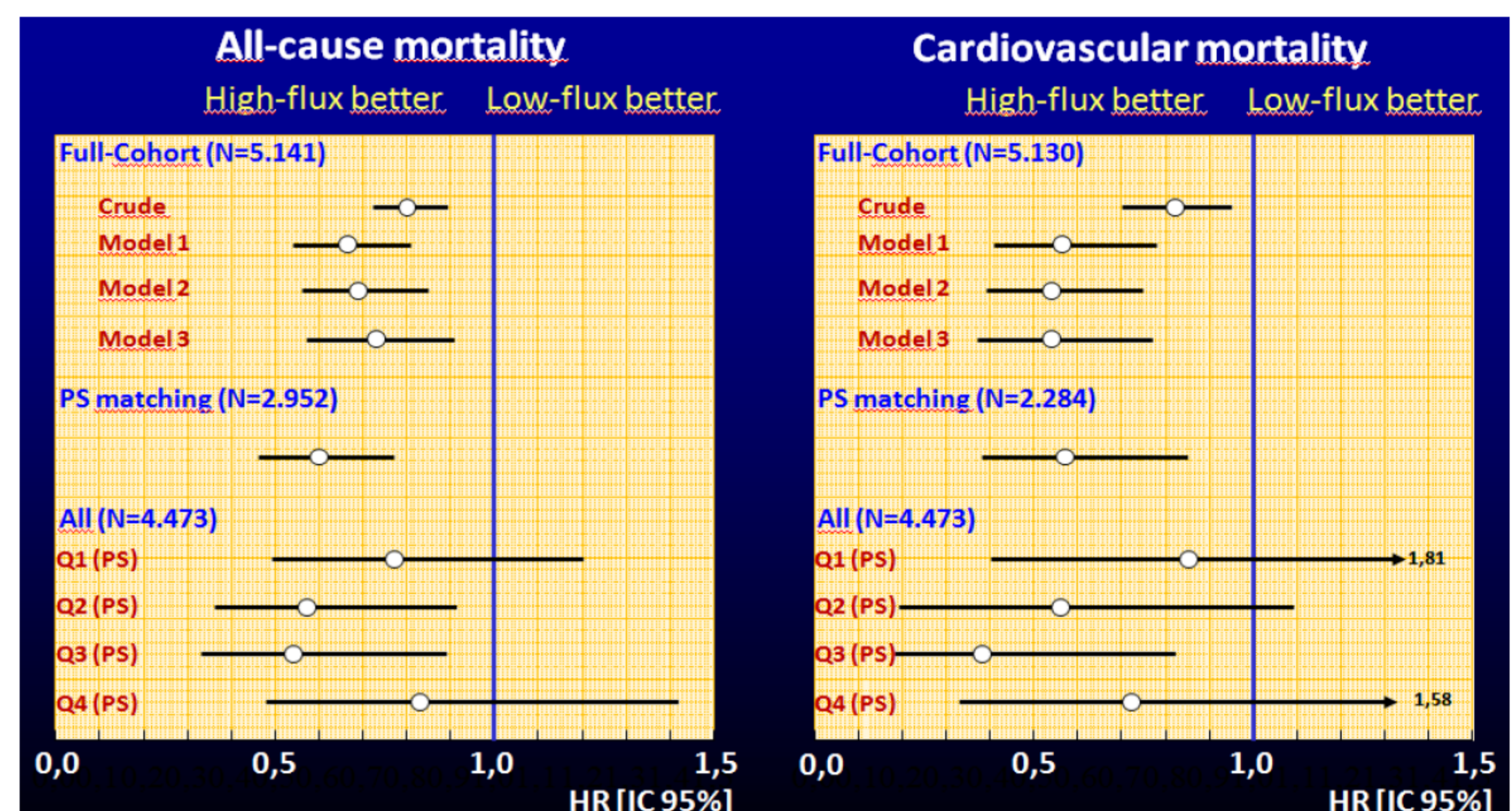


Table 2: Relative all-cause and cardiovascular mortality per every 10% increase in the case-mix-adjusted center percentage of high-flux dialyzer use

	All-cause mortality			Cardiovascular mortality		
	N	HR [IC95%]	P-value	N	HR [IC95%]	P-value
<b>Univariate</b>	5141	1.00 [0.99-1.01]	0.7	5130	0.99 [0.97-1.02]	0.6
<b>Model 1</b> (general and demographic characteristics)	5095	1.02 [0.99-1.02]	0.8	5081	1.00 [0.98-1.03]	0.9
<b>Model 2</b> (model 1 + treatments)	4850	1.01 [0.99-1.02]	0.6	4835	1.01 [0.98-1.03]	0.6
<b>Model 3</b> (models 1 + 2 + biochemical parameters)	4456	1.01 [0.99-1.02]	0.5	4440	1.01 [0.98-1.03]	0.6

## CONCLUSIONS

Although the univariate, the different multivariate adjustment and the propensity-score matching analysis showed the use of high-flux dialyzers was associated with improved survival, the facility-level analysis, that reduces the effect of unknown or unmeasured confounders, showed no benefit of the use of these type of membranes.

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