

Outcomes of nocturnal hemodialysis in a large case-matched cohort

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Gemeinnützige Körperschaft

Background

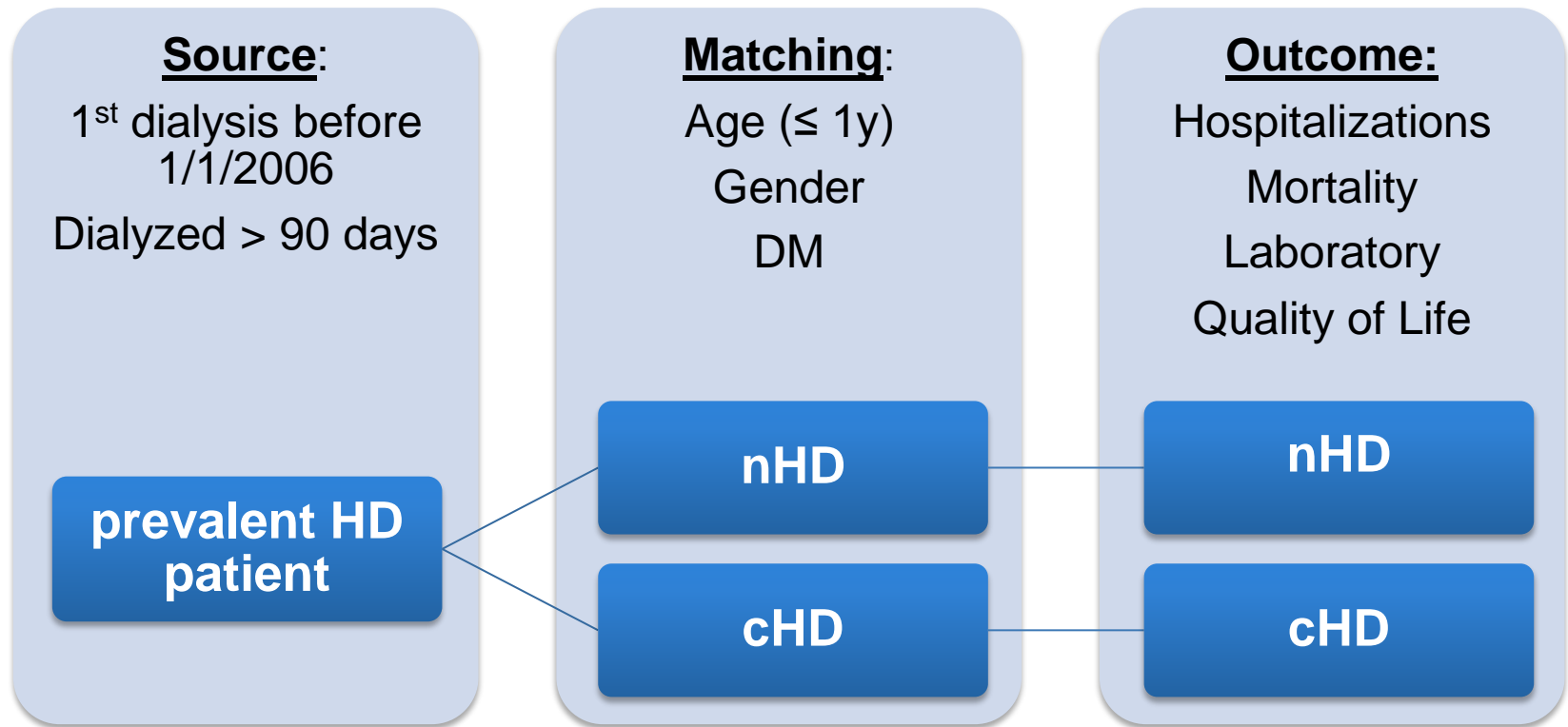
- Longer treatment times are associated with better survival
- Thrice-weekly nocturnal hemodialysis (n-HD) has been shown to have excellent outcomes in small series
- NHD requires logistical efforts and high patient motivation
- Patients on NHD are usually a select group of patients and difficult to compare with conventional hemodialysis (c-HD)
- We compared patients on NHD with matched controls on c-HD for mortality, hospitalization and treatment-related parameters.

Methods I

The QiN-database

- Developed from a voluntary quality-improvement cycle – now established as KfH-wide QI- system
- Patients provide informed consent
- Automated data collection from individual patients' electronic medical record
 - Routine documentation of patient care
 - Data quality checked electronically (plausibility) and by site visits
 - Yearly re-evaluation of comorbidities, Karnofsky Scale

Methods II



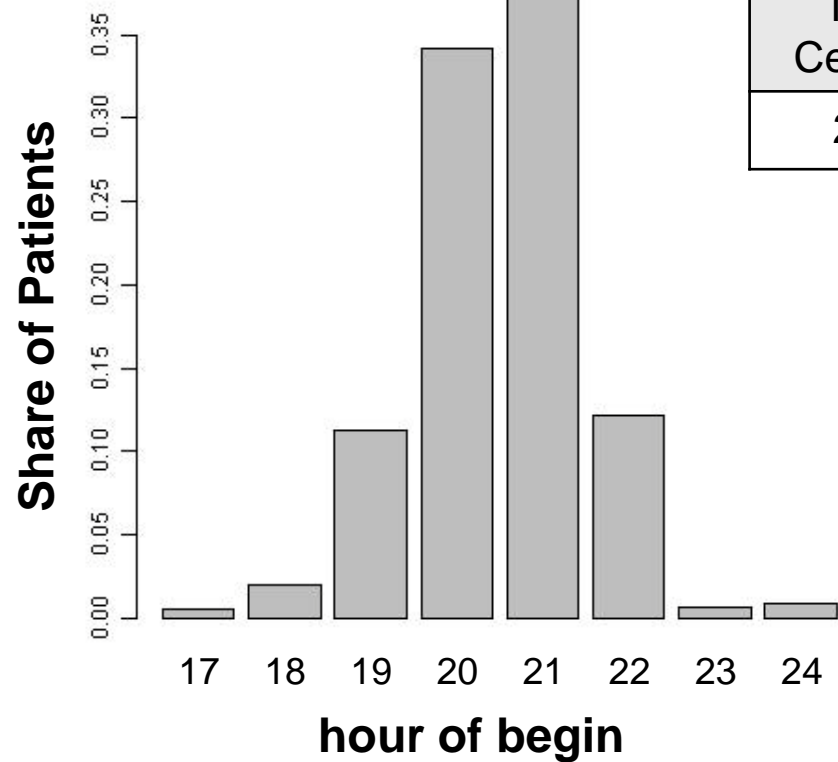
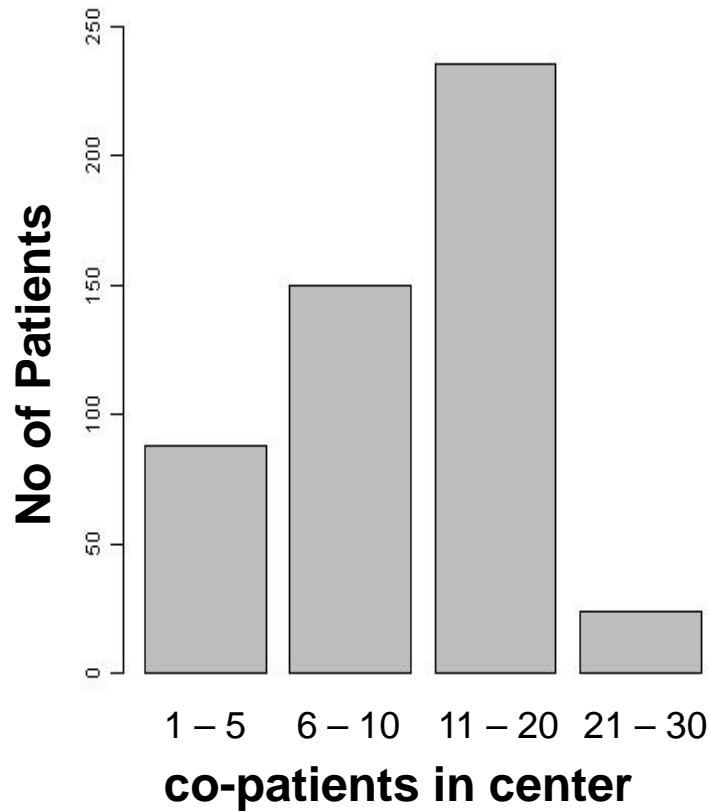
Definition nHD: Treatment time $\geq 7h$, HD-Start after 5 pm

Methods III

- **Statistics**

- Basic Descriptive Statistics, Two-tailed $p < 0,05$ is significant
- Event rates for hospitalization and mortality
- Kaplan-Meier survival analysis
- Cox Proportional Hazards Model
- Trend analysis of laboratory parameters

Size of n-HD Centers and Distribution of Treatment Start Times



n-HD Centers
71
Total Centers
204

Significant Differences After Matching

	n-HD	SD n-HD	c-HD	SD c-HD	p
N Patients	497		498		NA
Age [y]	49,8	13,7	49,8	13,7	n.s.
Female [%]	25,2		25,1		n.s.
Dialysis Burden [y]	8,3	6,7	6,0	6,6	< 0,001
Weight [kg]	76,9	18,1	73,1	16,1	< 0,001
Diabetes mellitus [%]	15,29		15,26		n.s.
CAD (CABG, PCI, MI) [%]	27,2		32,1		n.s.
Heart Failure [%]	20,5		22,5		< 0,05
Valvular Disease [%]	25,2		27,5		n.s.
Cerebrovascular Disease [%]	10,3		17,5		< 0,05
Peripheral Vascular Disease [%]	22,3		22,1		n.s.
Pulmonary Disease [%]	10,5		14,3		< 0,05
Depression [%]	9,7		14,5		< 0,05
Cirrhosis [%]	2,8		5,2		n.s.
Chronic Infection [%]	12,7		17,5		< 0,05
Neoplasm [%]	13,5		12,5		n.s.

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Higher Nutritional Parameters in n-HD at Start

Mean 3-mo values

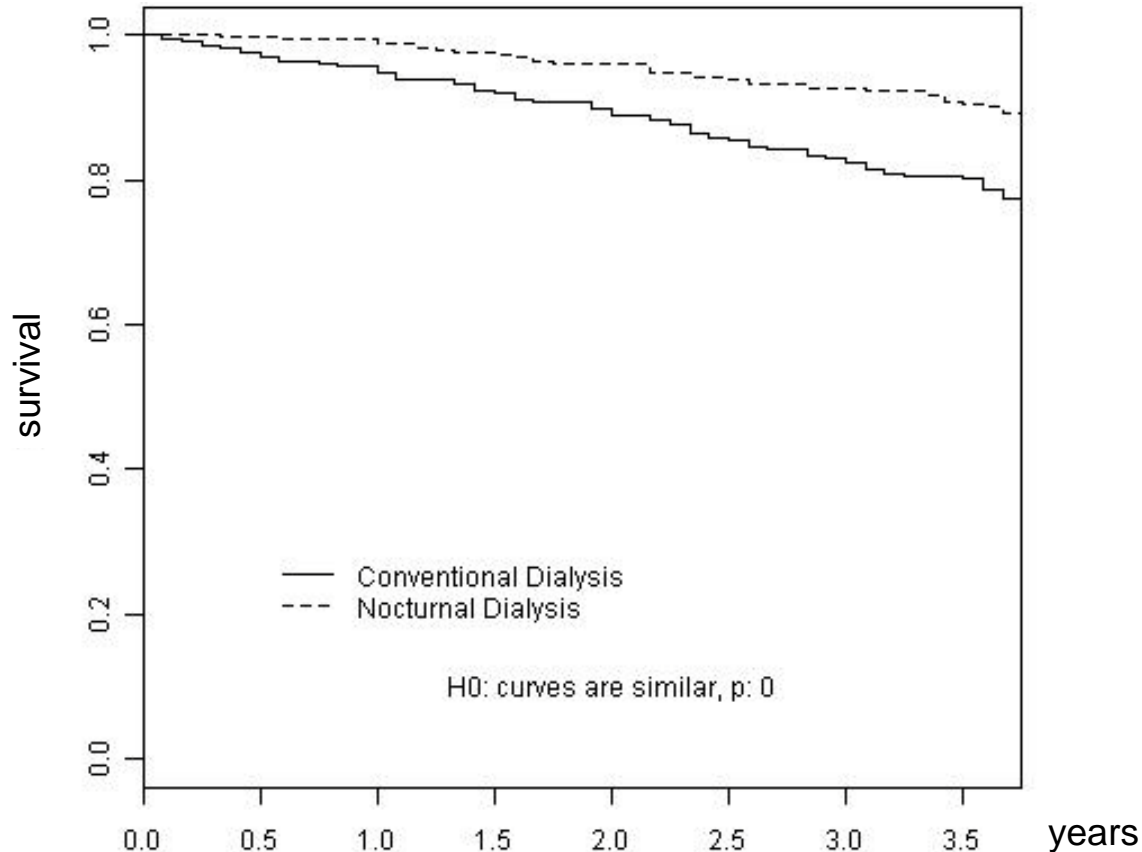
	n-HD	SD	c-HD	SD	p
BP [mmHg]	134,1/76,8	15,6/9,0	134,5/77,4	16,0/9,6	0,48/0,27
Hb [mg/dL]	12,0	1,2	12,0	1,3	0,65
Ferritin [μ g/L]	578,7	373,9	618,6	385,2	0,28
Transferrin [g/L]	1,8	0,4	1,7	0,4	0,06
TSAT [%]	25,3	11,4	28,4	13,5	< 0,001
CRP [mg/L]	10,7	13,7	12,6	17,8	0,78
Phos [mmol/L]	1,86	0,51	1,87	0,47	0,39
PTH [ng/L]	590	391	684	398	0,07
Calcium [mmol/L]	2,25	0,23	2,27	0,23	0,17
AP [U/L]	100,1	70,5	106,7	120,2	0,71
TProt [g/L]	68,7	4,4	67,4	9,4	0,20
Albumin [g/L]	42,3	4,2	40,5	4,8	< 0,001
Choles [mg/dL]	178,4	46,2	175,0	42,0	0,59
Creatinine [mg/dL]	10,8	2,6	10,2	2,8	< 0,05
HCO ₃ [mmol/L]	21,9	3,0	22,2	2,8	0,49
spKt/V	1,86	0,59	1,49	0,35	< 0,001
e Kt/V	1,69	0,57	1,32	0,31	< 0,001

Decreased Incidence of Death in n-HD

Mortality/ Hospitalizations	n-HD	SD n-HD	c-HD	SD c-HD	p
Deaths / 1000 LY	30,9		52,11		< 0,05
No of hospitaliz./pt.	3,16		3,15		n.s.
Hosp. days / patient years [d/py]	9,9	14,1	12,9	19,5	n.s.
Days to 1st Hosp. [d]	417,5	341,6	448,1	372,4	n.s.

- Death rate in n-HD was a lower by approx. 21/1000 LY
- Hospitalizations were not different

Decreased Mortality in n-HD: Kaplan-Meier Survival Analysis of 3,5 year follow-up



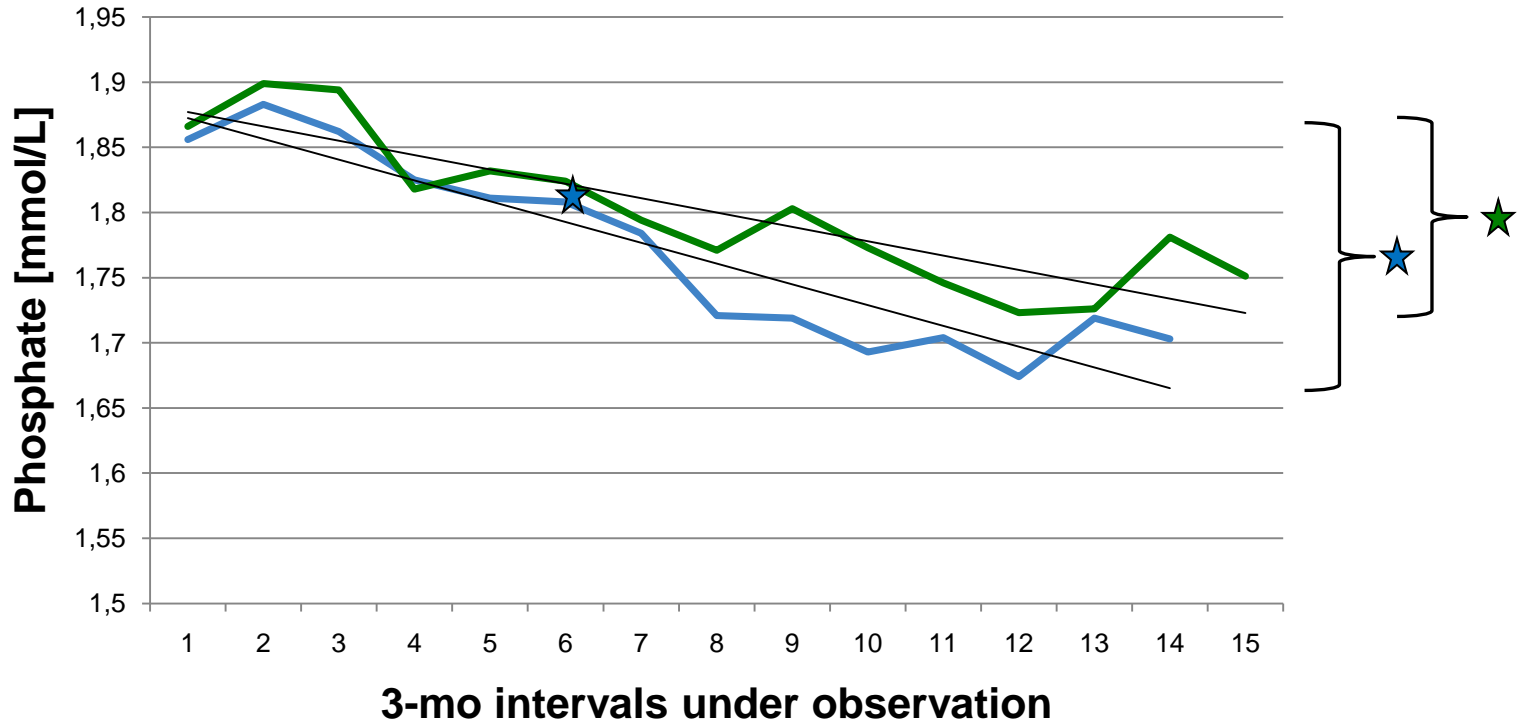
N	0 y	1 y	2 y	3 y
c-HD	497	445	391	328
n-HD	495	477	419	365

Multivariate Adjustment for Mortality: Cox-Proportional Hazards Model

	estimator	95% CI	p
✓ Nocturnal Dialysis	0.54	0.38 – 0.75	< 0,001
Dialysis Burden	1.00	0.98 – 1.03	n.s.
Cerebrovascular Disease	1.37	0.93 – 2.03	n.s.
Depression	0.72	0.45 – 1.16	n.s.
⬆ Heart Failure	2.15	1.51 – 3.05	< 0,001
Pulmonary Disease	1.29	0.86 – 1.94	n.s.
⬆ Chronic Infection	1.61	1.11 – 2.36	< 0,05

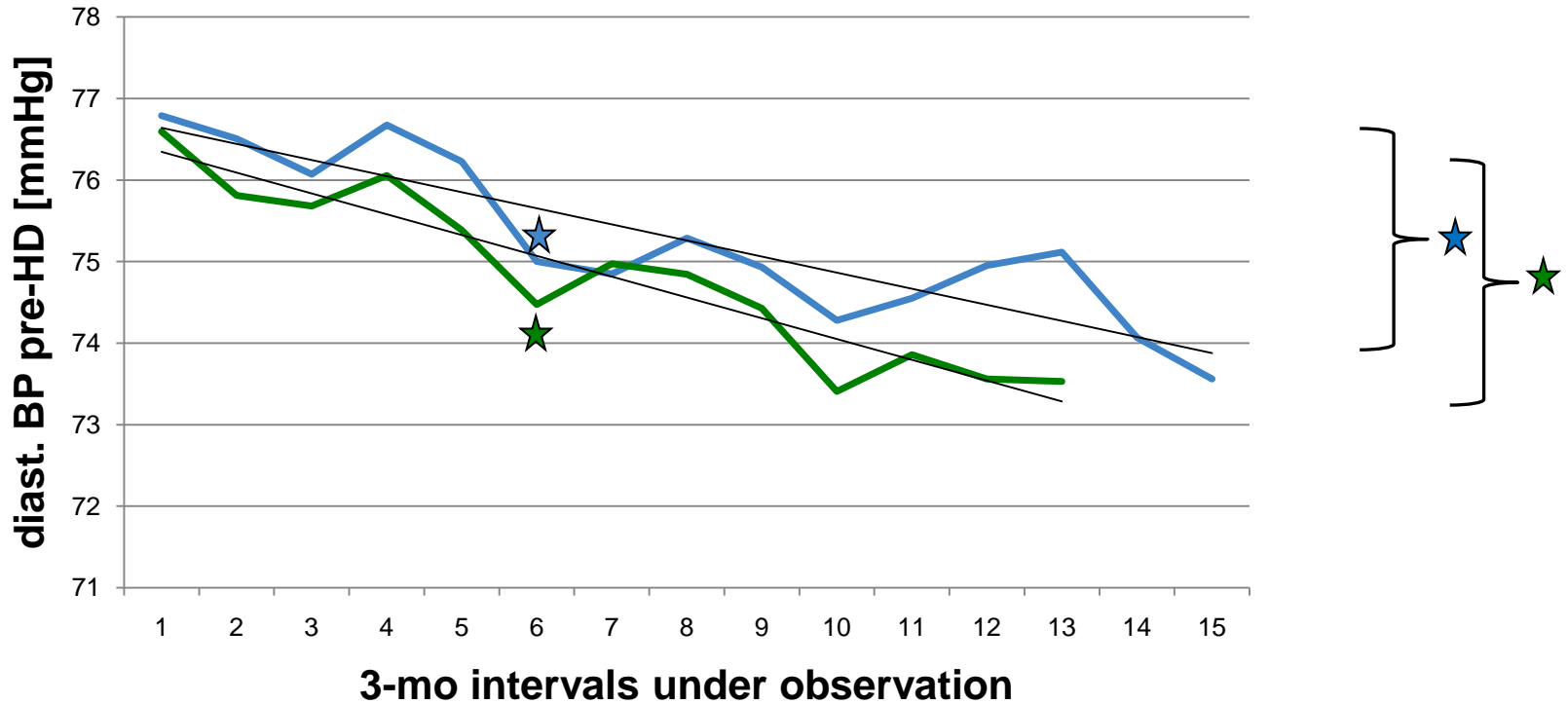
- In the adjusted model n-HD reduced the risk of death by half
- Dialysis burden was not a significant predictor of mortality in this young group of patients
- Heart failure and chronic infections were significant risk factors for higher mortality
- Other comorbidities did not have a significant influence on survival

Decrease in Phosphate Over 45 Months Observation



— Phosphate n-HD — Phosphate c-HD ★ $p < 0,001$
— Linear (Phosphate n-HD) — Linear (Phosphate c-HD) ★ $p < 0,05$

Decrease in Diastolic Blood Pressure Over 45 Months Observation



— diast. BP n-HD — diast. BP c-HD ★ $p < 0,05$
— Linear (diast. BP n-HD) — Linear (diast. BP c-HD) ★ $p < 0,05$

Summary & Conclusions

- There is a survival benefit for patients on nocturnal hemodialysis in comparison to patients on conventional hemodialysis
- Phosphate and Blood pressure decreased significantly in patients on n-HD, but also on c-HD
- No association could be found between n-HD and hospitalizations

Thank you very much for your attention!