Emodialisi domiciliare

- C Brunati
- ASST GOM Niguarda
- Milano

Emodialisi domiciliare nel 2024

- Schemi di dialisi diversi
- Tecnologie diverse

Schemi di dialisi nella emodialisi domiciliare

KDIGO 2015

Table 1
Typical treatment schedules for the various forms of home hemodialysis.

Modality
Conventional home hemodialysis [1]
Short daily home hemodialysis [1]
Long schedule or quasi-intensive home hemodialysis [21]
Standard daily hemodialysis [1]
Long frequent or long daily home hemodialysis [1]
Nocturnal home hemodialysis [47]

Frequency and hours represent typical schedules and variations are common

Adequacy of hemodialysis,KDIGO 2015

Le tecnologie "tradizionali" nella emodialisi domiciliare

Le “nuove” tecnologie nella emodialisi domiciliare

Nuove tecnologie

Nuove tecnologie.....

Strutturali

Dimensioni
Semplificazione

Nuove tecnologie…..

Funzionali

Fornisce una bicarbonato dialisi con sedute che utilizzano basse dosi di dialisato (15-30 litri) somministrato tramite sacche e con un flusso basso (< 200 ml/min).

Es : per un paziente che utilizzi 20 litri di dialisato a 180/ml/min durata di seduta sara' di circa 111 minuti

Nuove tecnologie.....

Il dialisato fornito in sacche preformate in quantitatitivi ridotti evita tutte le opere di infrastrutture domiciliari che sono necessarie per fornire 120 litri di dialisato che utilizziamo in una dialisi standard (SEMPLIFICAZIONE)

La dose in litri da fornire al paziente dipendera' principalmente dal BMI del paziente (PERSONOFICAZIONE)

Somministrare un dialisato con un flusso basso permette di «sfruttare» il dialisato molto meglio che durante una bicarbonato dialisi standard (OTTIMIZZAZIONE)

HDB

Qb > 300 ml/min Qd ≥ 500 ml/min Durata 240 min

	D/P_{inst}	D/P_{bal}		Kt_{inst}	Kt_{bal}		Q_{inst}	Q_{bal}	
	mg/mg	mg/mg	p	l/4hrs	l/4hrs	p	g/session	g/session	p
Urea	0.42±0.02	0.37±0.04	0.01	53.5±5.0	46.7±4.3	0.01	26.3±12.7	27.2±9.8	0.66
Creatinine	0.25±0.03	0.21±0.02	0.01	31.8±5.7	26.6±3.4	0.01	1.300±0.522	1.355±0.512	0.01
Phosphorus	0.26±0.03	0.20±0.02	0.01	32.9±5.8	25.7±3.6	0.01	0.822±0.205	0.831±0.228	0.67
b_2M	0.07±0.05	0.05±0.03	0.04	9.3±7.1	6.7±4.0	0.05	0.143±0.083	0.154±0.093	0.03

NxT

Multifrequenza

	D/P_{inst}	D/P_{bal}		Kt_{inst}	Kt_{bal}		Q_{inst}	Q_{bal}	
	mg/mg	mg/mg	p	l/session	l/session	p	g/session	g/session	p
Urea	0.90±0.06	0.79±0.06	0.01	22.3±3.8	19.4±3.6	0.01	23.0±7.0	20.7±5.0	0.13
Creatinine	0.83±0.07	0.70±0.06	0.01	20.6±3.1	17.3±3.0	0.01	1.363±0.172	1.223±0.117	0.04
Phosphorus	0.77±0.06	0.61±0.04	0.01	19.1±2.7	15.1±2.9	0.01	0.859±0.357	0.746±0.305	0.03
b_2M	0.24±0.05	0.19±0.02	0.04	6.1±1.6	4.7±0.9	0.03	0.122±0.033	0.111±0.031	0.60

OSPEDALE NIGUARDA
CA' GRANDA

https://doi.org/10.1371/journal.pone.0233331.t004,2020

UNRESOLVED ISSUES IN
THE CARE OF DIALYSIS PATIENTS
Guest Editor: Steven Fishbane

WILEY Seminars in Dialysis

When is more frequent hemodialysis beneficial?

Rita S. Suri[1] | Alan S. Kliger[2]

1) Dializzare 5/6 volte alla settimana rispetto a quando dializzi 3 vv alla settimana significa dializzare di piu' la' dove abbiamo la parte piu' ripida della curva di rimozione dell'urea

2) Dializzare piu' frequentemente implica ridurre la quota di UF oraria : alti livellli di UF oraria sono Stati associati ad una maggiore mortalita' (tutte la cause e cardiovascolare)

3) Le ipotensioni intradialitiche sono state associate allo stunning miocardico e cerebrale

4) Le ampie fluttuazioni di volumi, elettroliti, fosoforo nel «periodo lungo» sono state definite come la «unphysiology» della dialisi intermittente

Seminars in Dialysis. 2018;1–11.

Nuove tecnologie : la depurazione

La quota di rimozione di fosforo in NSO vs HBD

	NSO	BHD	*p* values
Number[a]	40	18	
Plasma P, start, mg/dL	5.1±1.4	4.5±2.8	ns
Plasma P, end, mg/dL	2.7±0.8*	2.2±0.5**	<0.02
Net decrease, mg/dL	2.4±1.0	2.6±3.0	ns
Percentage of decrease	46.3±10.9	45.5±21.8	ns
Net P removal, mg/session	581.4±196.8	878.1±292.6	<0.0006
Estimated weekly P removal, mg	3,488±1,181	2,634±878	<0.0037

[a] Number of balance studies.
* $p < 0.0001$ vs. start.
** $p < 0.006$ vs. start. ns, not significantly different.

Blood Purif 2018;45(4):334-342

Single Session and Weekly Beta 2-Microglobulin [illegible]:

Weekly β2M removal efficiency proved equal and highest in HDF and NSO (at 6/week prescription), slightly lesser in BHD

Hemodiafiltration, Short Frequent Hemodialysis with NxStage Technology and Automated Peritoneal Dialysis

Blood Purif 2019;48(1):86-96

Nuove tecnologie : la gestione della volemia

Home Dialysis Network in Europe (129 pts)

	Month 3	Month 6
Ultrafiltration rate (mL/hour/kg)		
Patients (*n*)	32	32
Mean (SD)	6.54 (4.85)	6.82 (5.61)
Median (IQR)	6.21 (6.35)	6.46 (5.11)
10th–90th percentile interval	1.51–13.95	0.76–11.88

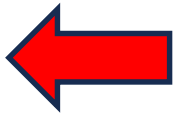
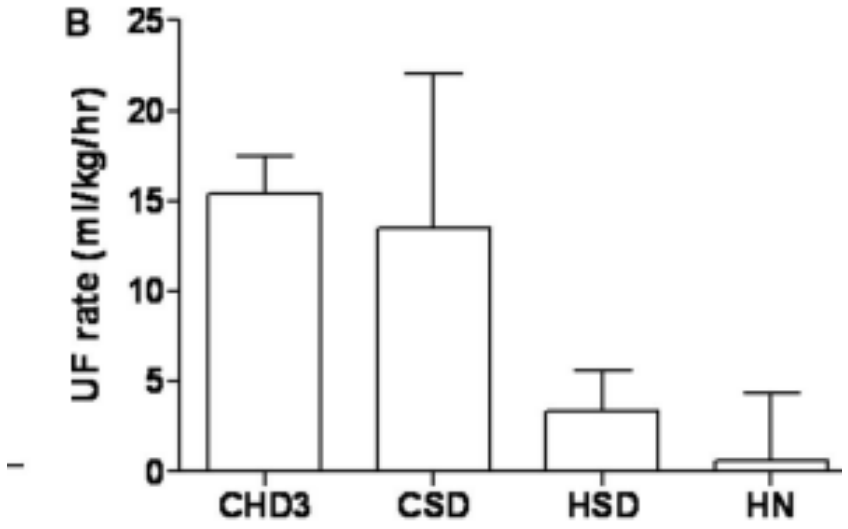


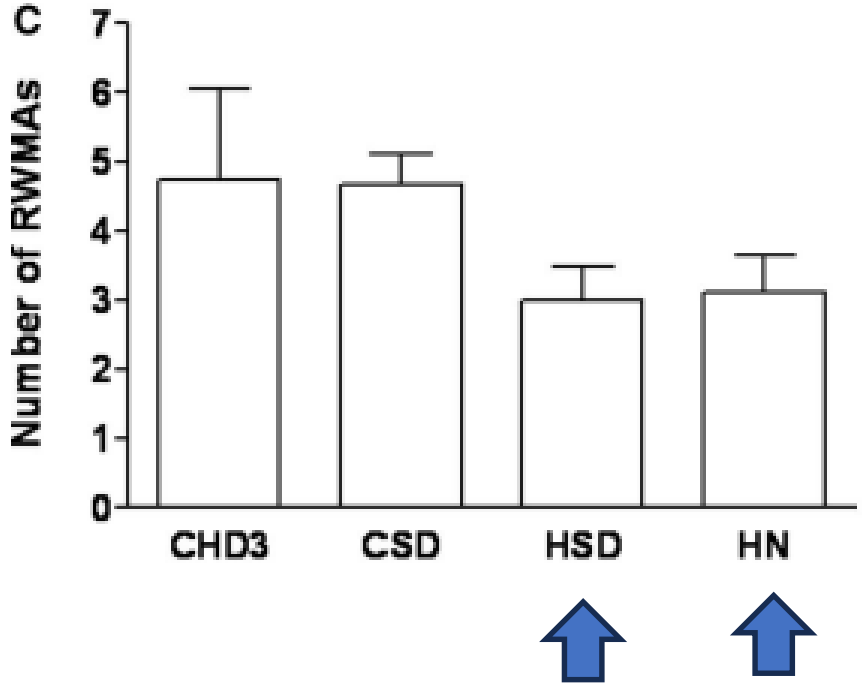
Table 5 Medication use in home hemodialysis patients

	Baseline	Month 3	Month 6	*P* [a]
Antihypertensive medication use (agents/day)				
Mean (SD)	1.46 (1.49)	1.10 (1.29)	1.01 (1.11)	< 0.001
Median (IQR)	1 (2)	1 (1)	1 (1)	
10th–90th percentile interval	0–4	0–3	0–3	

Cherukuri et al. BMC Nephrology (2018) 19:262

Frequent Hemodialysis Schedules Are Associated with Reduced Levels of Dialysis-induced Cardiac Injury (Myocardial Stunning)

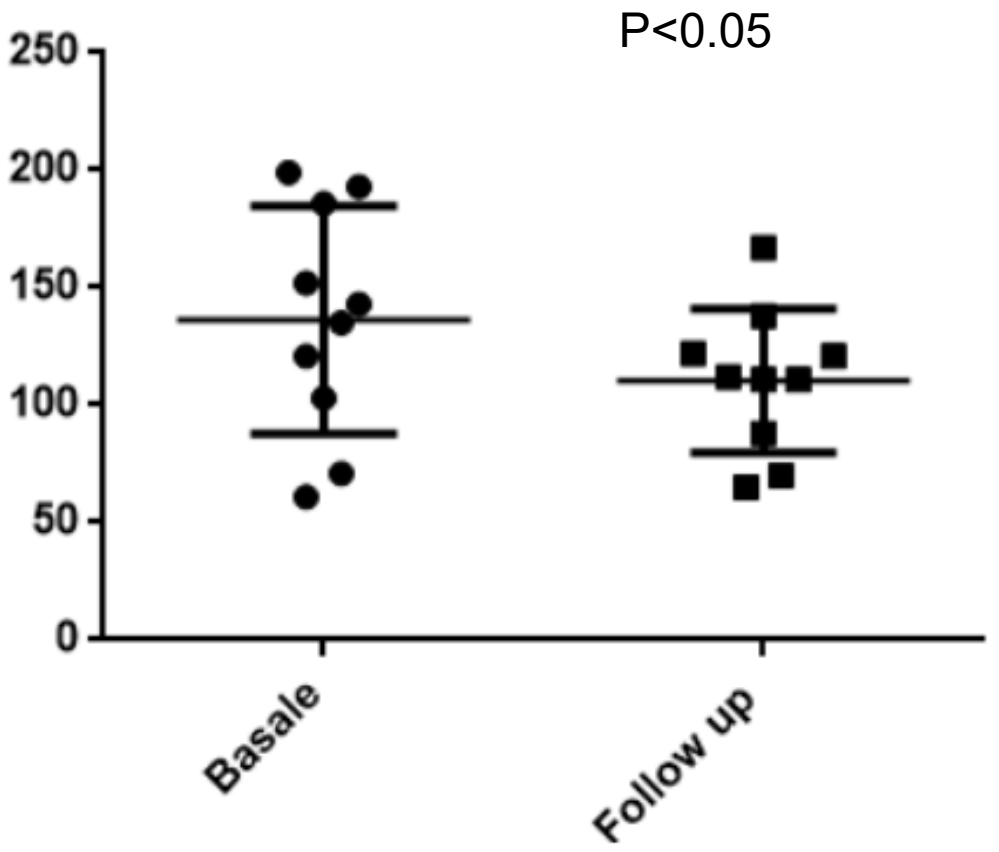




Clin J Am Soc Nephrol 6: 1326 –1332, 2011

OSPEDALE NIGUARDA
CA' GRANDA

Massa cardiaca indicizzata (gr/m2) in 10 pz (1 anno di follow up)



G Ital nefrol2017 Sep 28;34(5):119-133.

Nuove tecnologie :lo stato di benessere

Nxstage : l stato di benessere fisico

At-home short daily hemodialysis improves the long-term health-related quality of life

Fredric O. Finkelstein[1], Brigitte Schiller[2], Rachid Daoui[3], Todd W. Gehr[4], Michael A. Kraus[5], Janice Lea[6], Yoojin Lee[7], Brent W. Miller[8], Marvin Sinsakul[9] and Bertrand L. Jaber[10], on behalf of the FREEDOM Study Group

The FREEDOM =Following Rehabilitation, Economics and Everyday Dialysis Outcome Measurements

Prospective cohort study measuring the potential benefits of at-home short daily (6 times per week) hemodialysis with *Short Form Health Survey 36* (SF-36)

154 pts valutati bas,4, 12 months

Kidney International (2012) 82, 561–569

Il recupero dopo dialisi in Nxstage e' immediato e completo

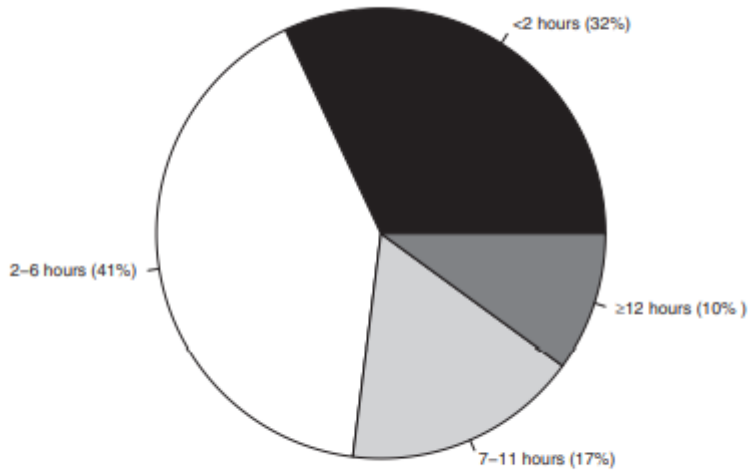
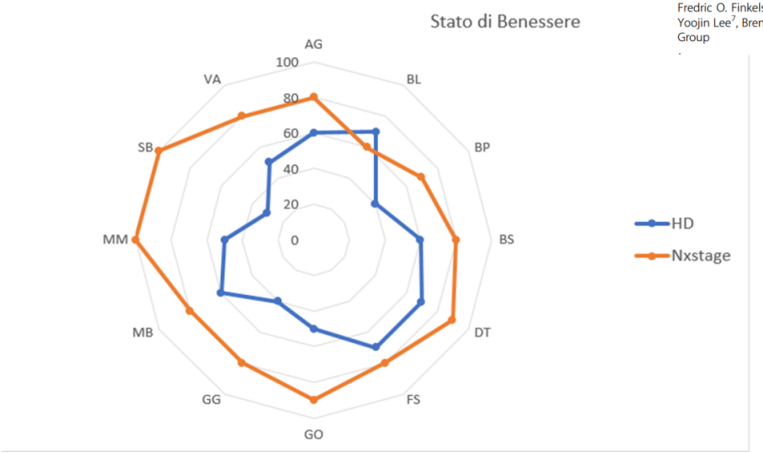


Figure 3. Distribution of postdialysis recovery time in the DOPPS (Dialysis Outcomes and Practice Patterns Study).[3]

Am J Kidney Dis. 68(5)(suppl 1):S15-S23

Il benessere



At-home short daily hemodialysis improves the long-term health-related quality of life

Fredric O. Finkelstein[1], Brigitte Schiller[2], Rachid Daoui[3], Todd W. Gehr[4], Michael A. Kraus[5], Janice Lea[6], Yoojin Lee[7], Brent W. Miller[8], Marvin Sinsakul[9] and Bertrand L. Jaber[10], on behalf of the FREEDOM Study Group

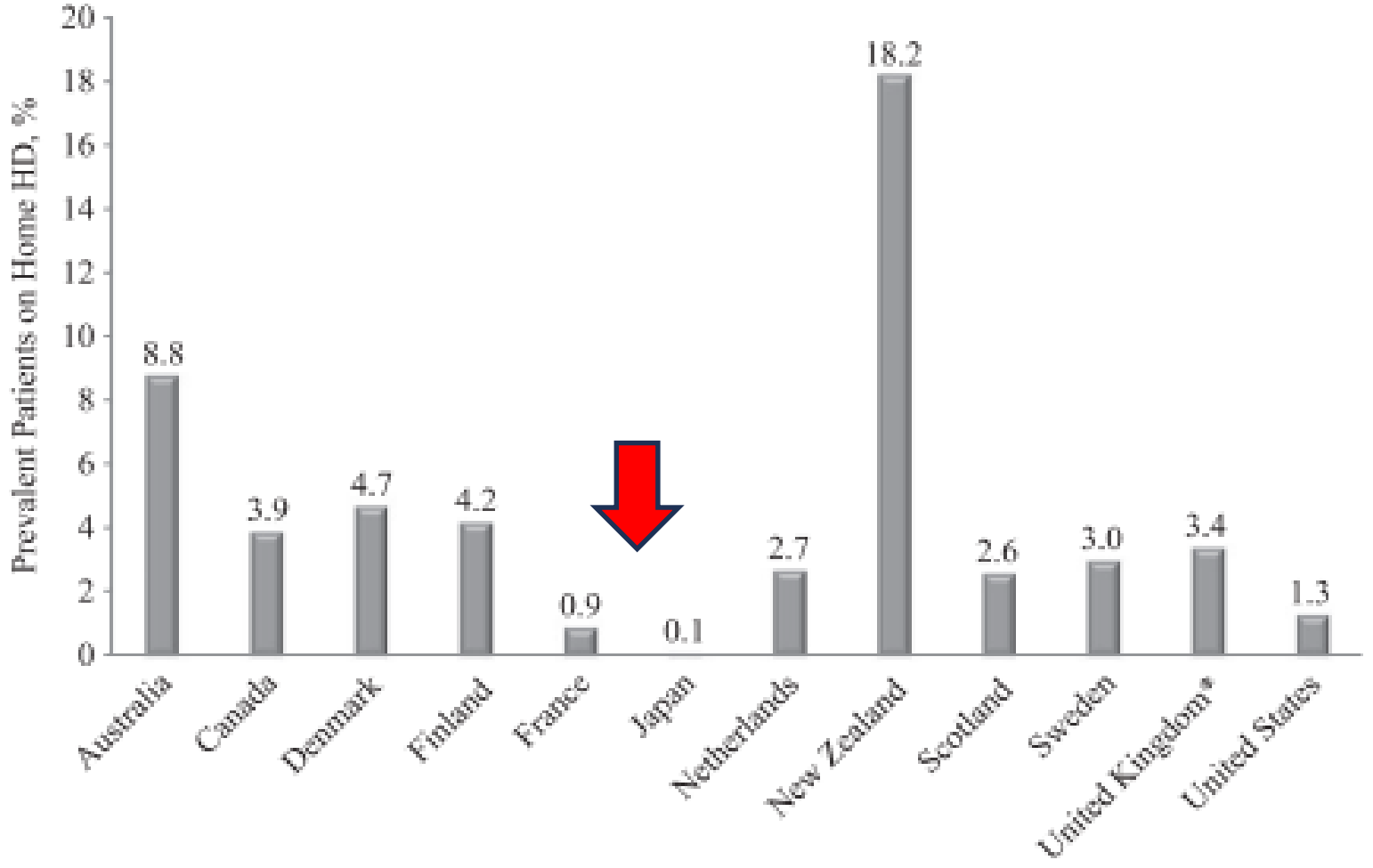
2012

1) Flessibilita'/trasportabilita'
2) Sindrome di Lazzaro : alzati e cammina

Prevalenza della HHD in Italia?

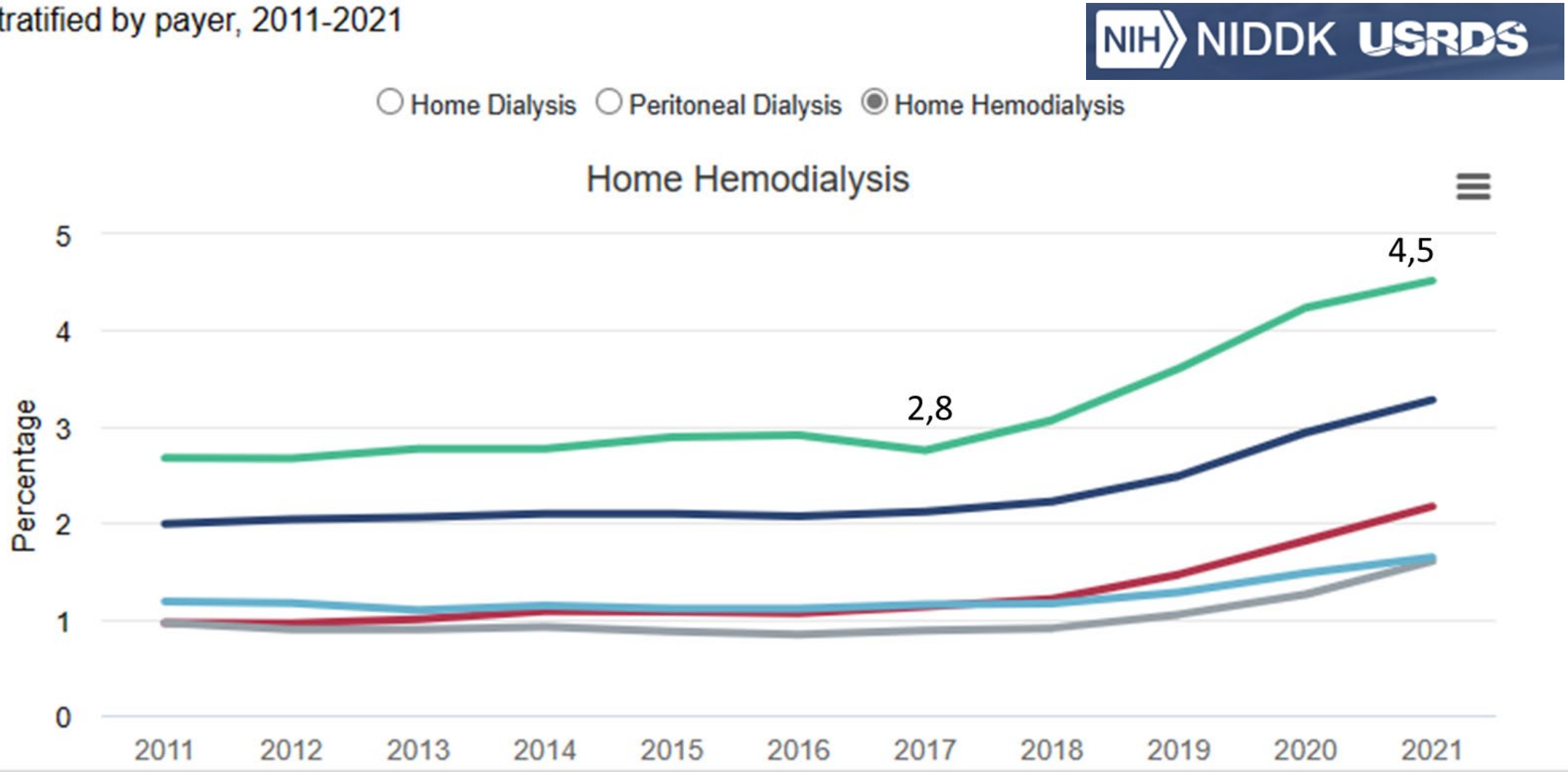
0,3%

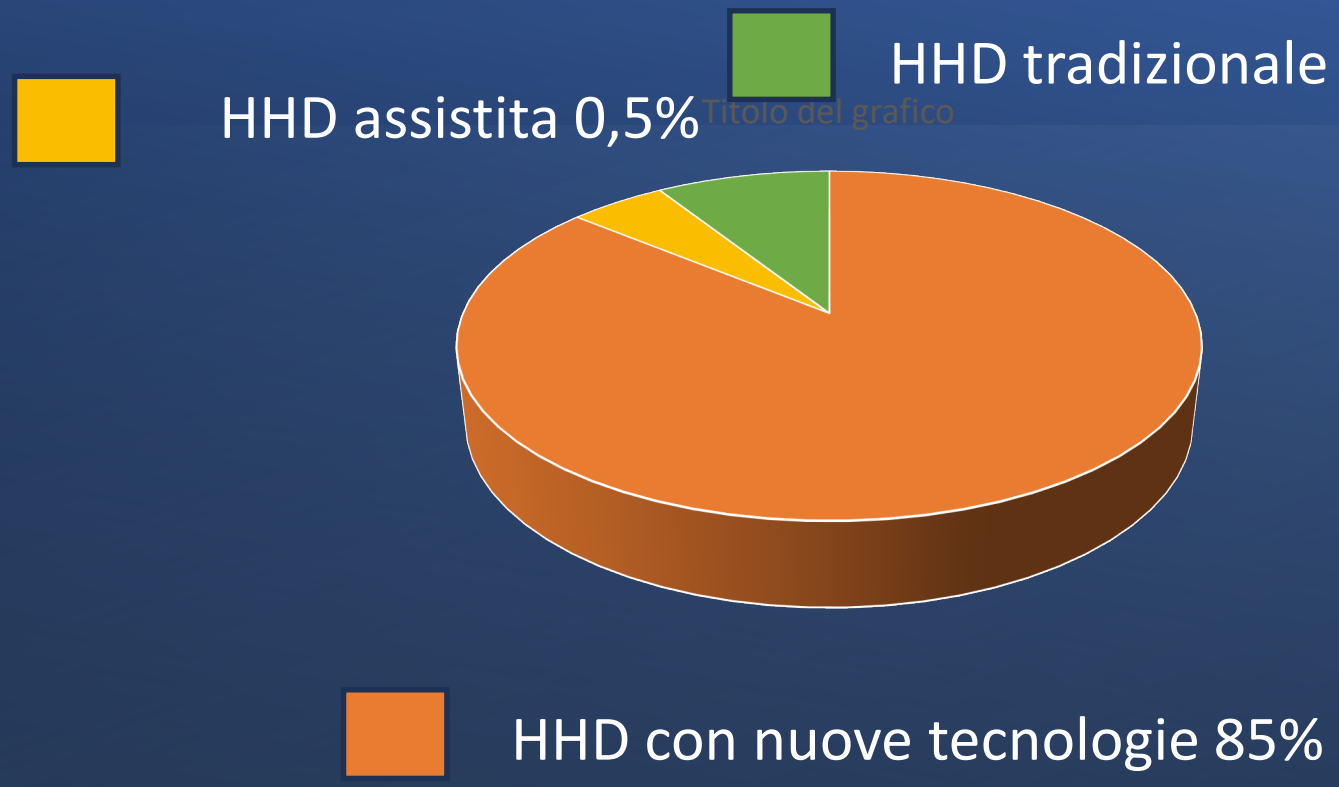
Dati ufficiosi all’ottobre 2023



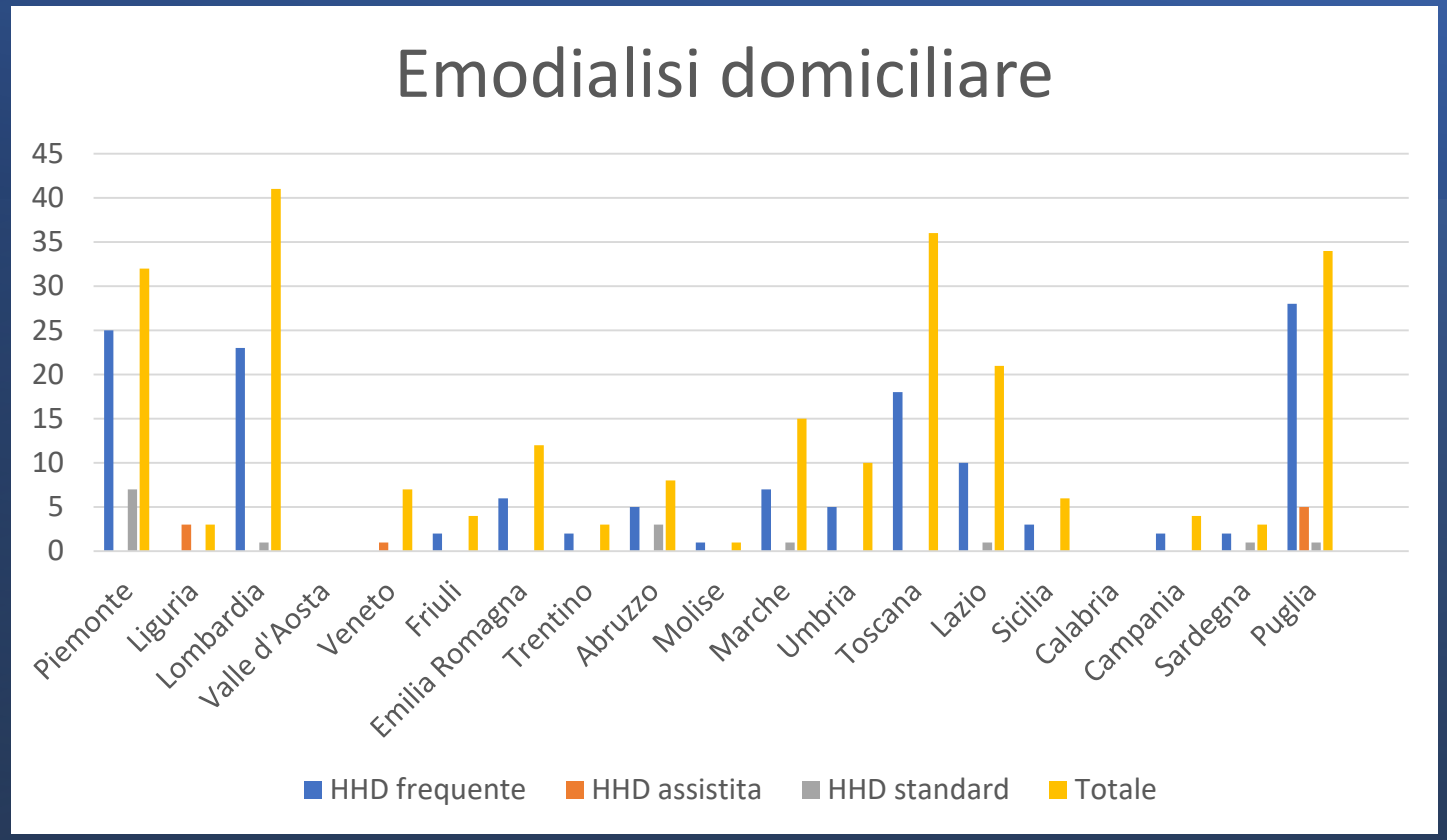
Lockridge Hemodialysis International 2015; 19:S112–S127

Figure 2.1b Utilization of home dialysis in adult prevalent dialysis patients, overall and by modality, stratified by payer, 2011-2021





Dati «ufficiosi» ad ottobre 2023



Lombardia
Piemonte
Toscana
Puglia

Perche’ cosi poca HHD?

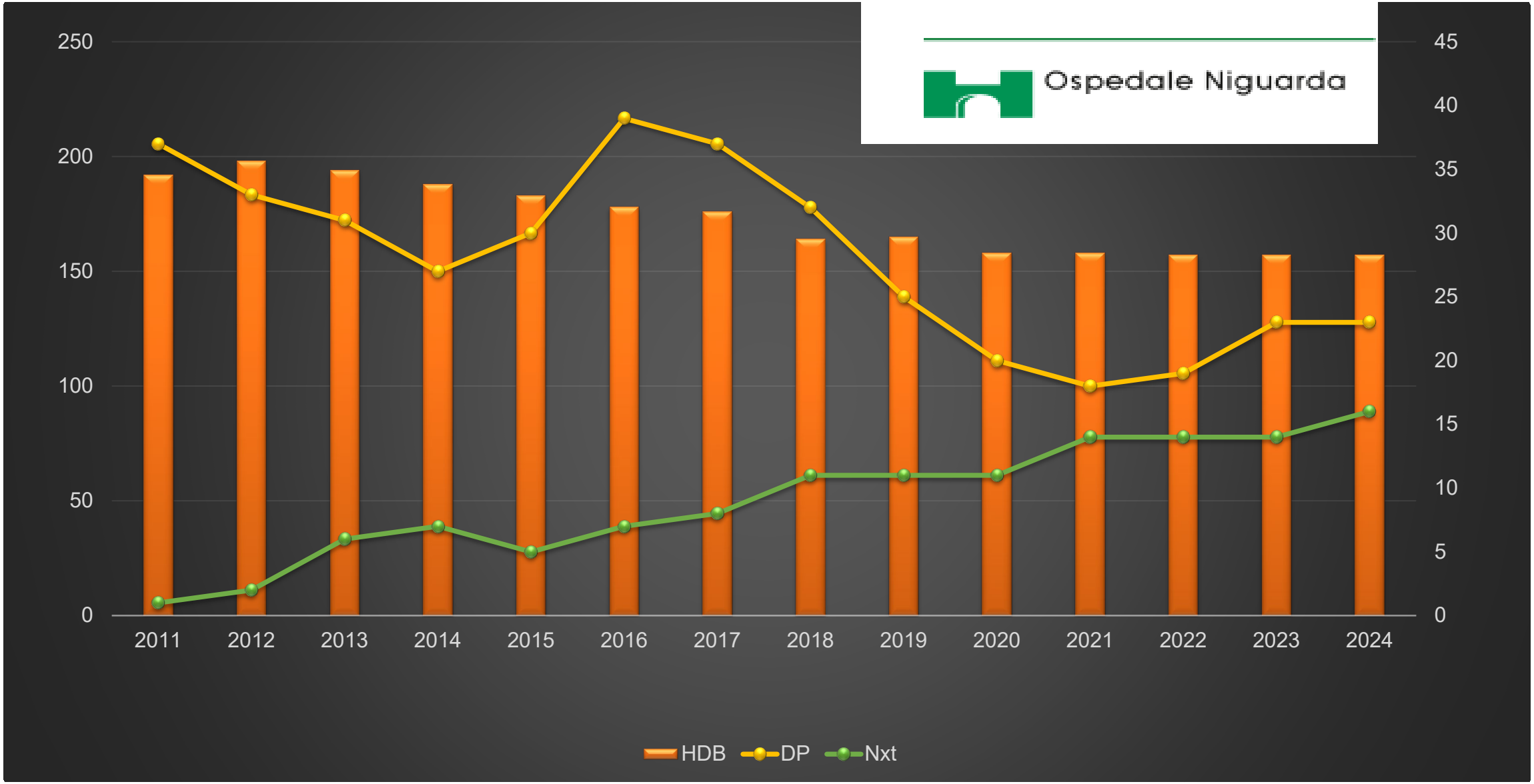
- Il problema della carenza infermieristica

Perche’ in Italia si fa poca HHD?

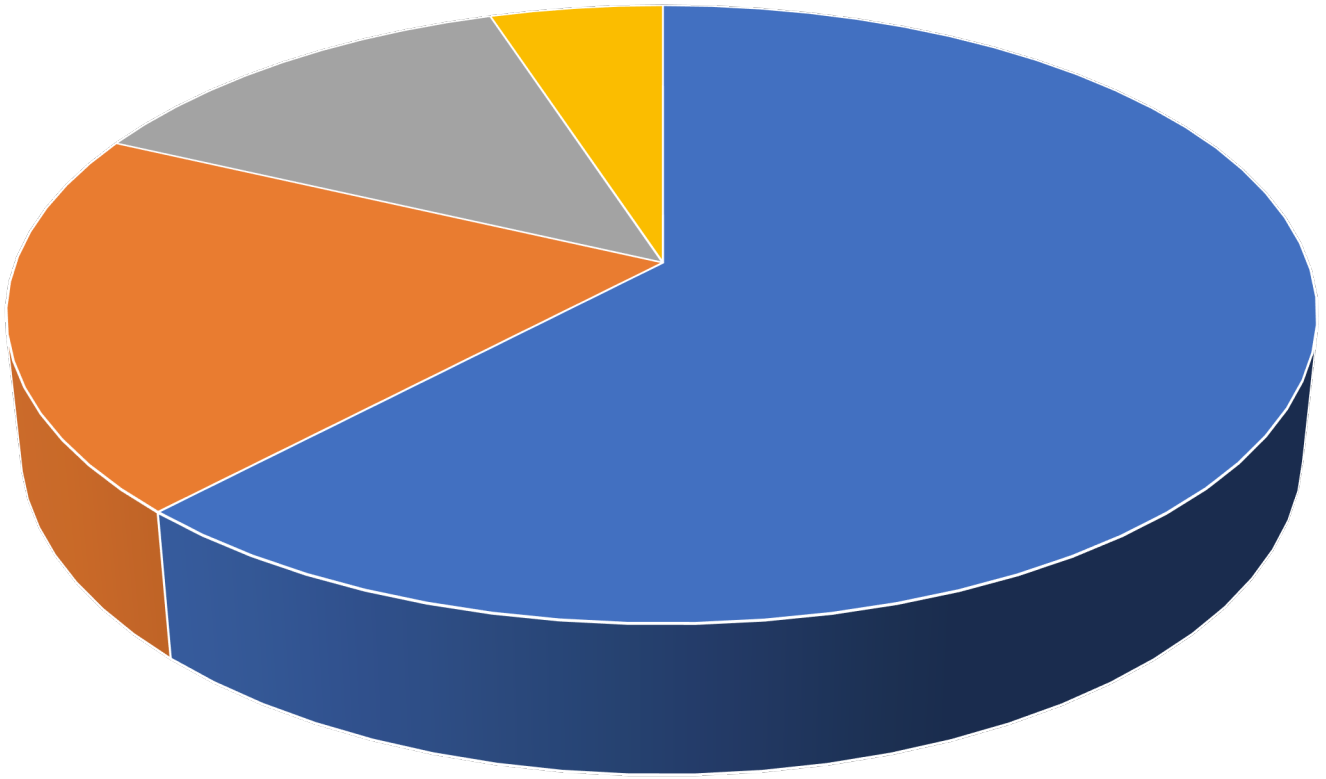
1) I problemi organizzativi

I tanti vincoli burocratici

Pz che possono fare una emodomiciliare sono 4 gatti


Ospedale Niguarda
250
200
150
100
50
0
45
40
35
30
25
20
15
10
5
0
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
HDB
DP
Nxt

Afferenza alla emodialisi domiciliare
(38 pazienti,Eta’44±13aa, follow up 22ms (3-156ms)



- Tx renale (62%)
- IHD (20%)
- Amb Marea (13%)
- Dialisi peritoneale (2%)

Ospedale Niguarda

L’emodialisi domiciliare dall’Ambulatorio Marea

13%

Ospedale Niguarda

2011-2024

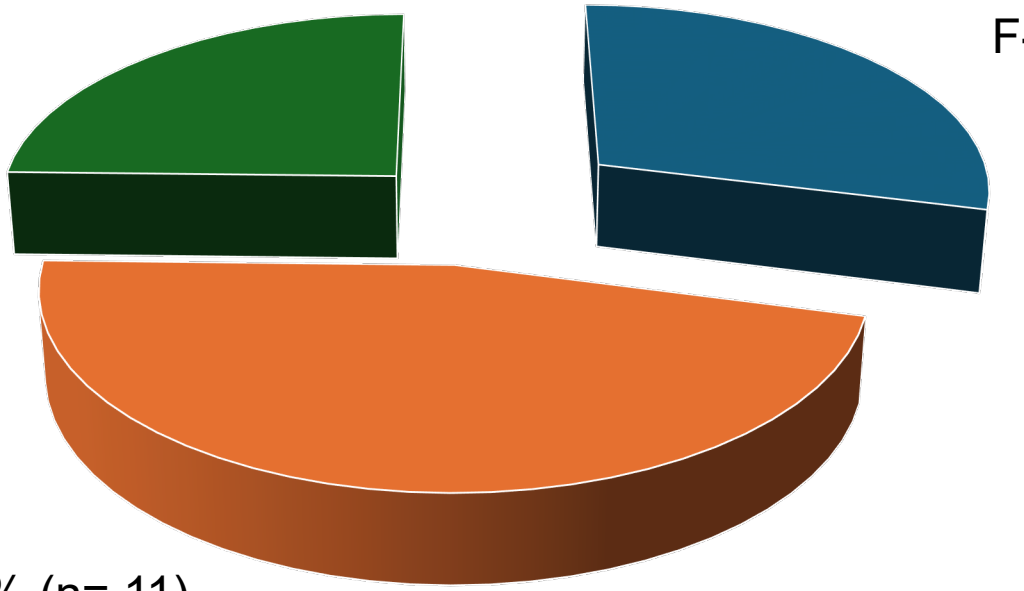
Perche' la « PD first »?

- Minor impatto psicologico → trattamento piu' facile
- Costi complessivi sono minori
- Il caregiver e' una figura meno fondamentale
- C'e' un minore impegno infermieristico (addestramento)

Roma, settembre 2021

Drop out nella emodialisi domiciliare (24/38 pts)

Technical failure 21% (n=6)
F-U 6 ms (2-34)



Exitus 21 % (n=7)
F-U 24 ms (9-75)

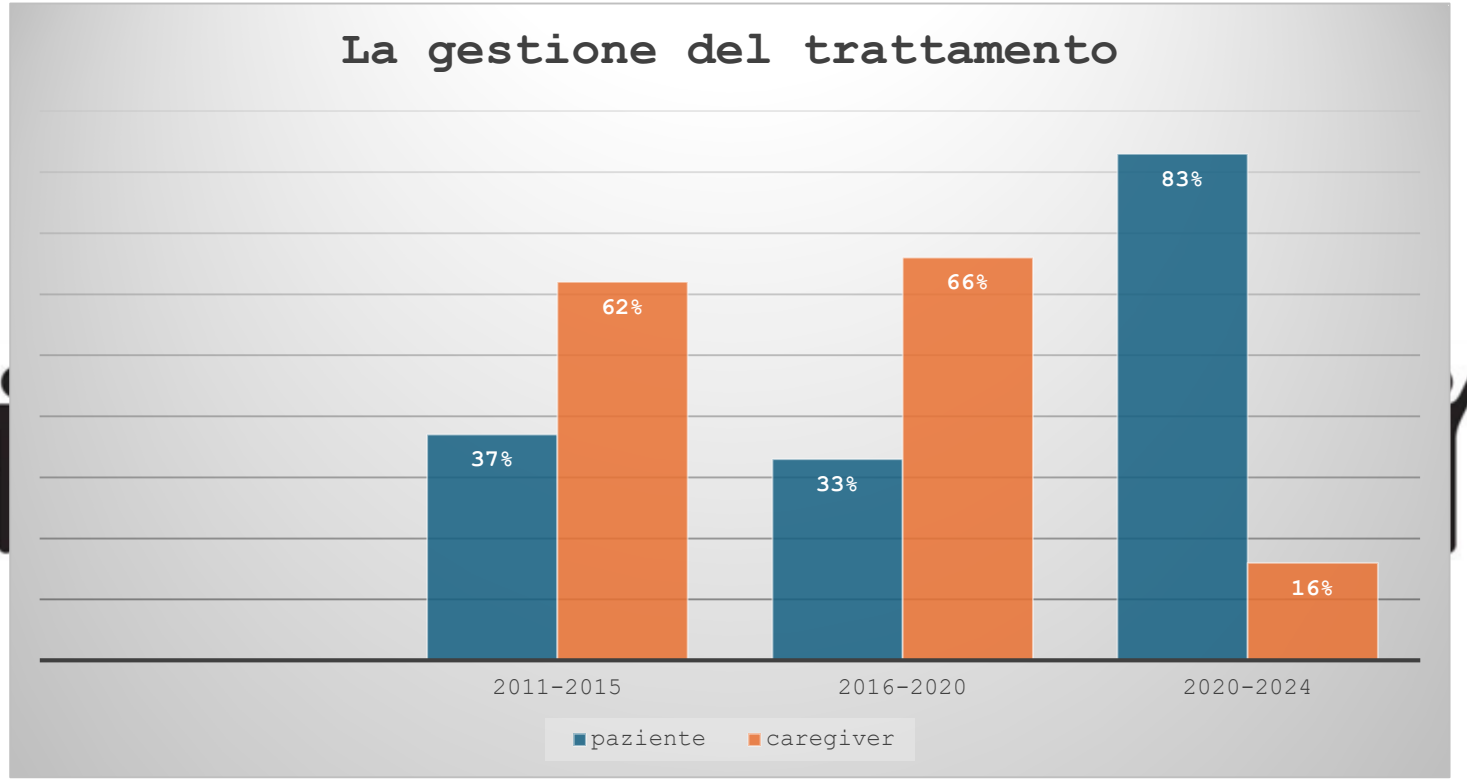
Trapianto 32 % (n= 11)
F-U 25 ms(5-69)

Exitus	
Polmonite (correlata?)	1
Morte improvvisa	1
Cirrosi epatica	1
Oncologiche	2
Infezioni NON correlata	1

Causa technical failure	
accesso vascolare/tecnico	1
caregiver	5

OSPEDALE NIGUARDA
CA' GRANDA

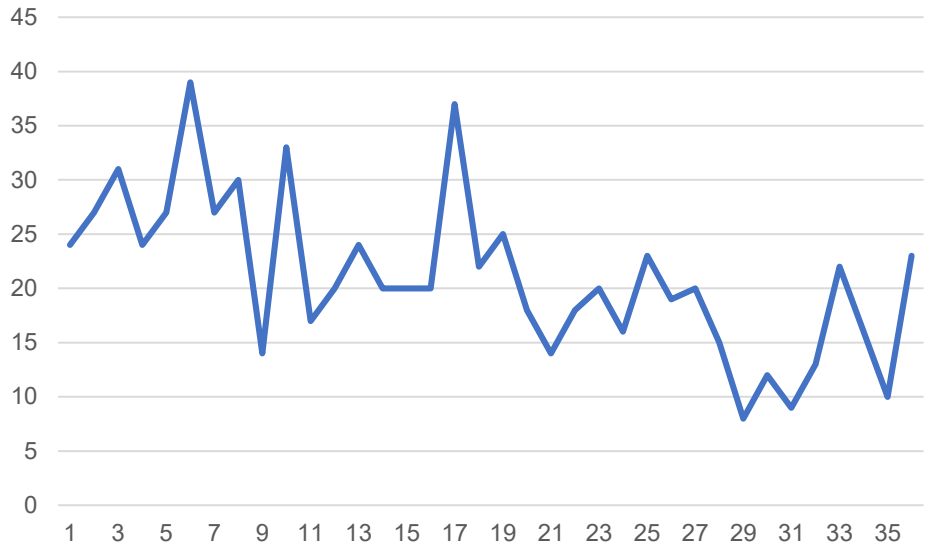
Il caregiver e' una figura fondamendale …. Non sempre
L'AUTOGESTIONE DA PARTE DEL PAZIENTE



2011 2015 2020 2024

8pz 19 pz 12 pz

Durata addestramenti : 20 sedute ± 8



28±5 sedute (primo quadriennio)

21±6 (secondo quadriennio)

16±5 Terzo quadriennio)

OSPEDALE NIGUARDA
CA' GRANDA

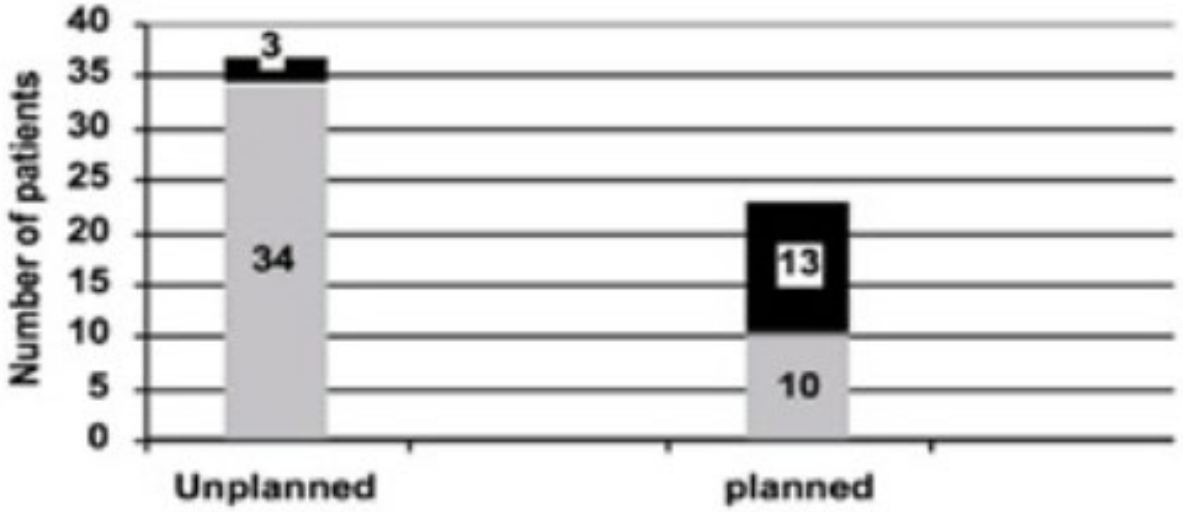
La emodialisi domiciliare dalla dialisi peritoneale

2%

Ospedale Niguarda

2011-2024

Rate of the unplanned hemodialysis initiation



Peritoneal Dialysis International, inPress
doi: 10.3747/pdi.2011.00134

IS TRANSITION BETWEEN PERITONEAL DIALYSIS AND HEMODIALYSIS REALLY A GRADUAL PROCESS?

Lucie Boissinot,[1] Isabelle Landru,[2] Eric Cardineau,[3] Elie Zagdoun,[4] Jean-Philippe Ryckelycnk,[1] and Thierry Lobbedez[1]
Nephrology Department,[1] CHU Clemenceau, Caen; Nephrology Department,[2] CH Bisson, Lisieux; Nephrology Department,[3] CH Intercommunal, Alençon; and Nephrology Department,[4] CH Memorial, Saint Lo, France

La transizione da PD a HD e' talvolta un processo poco «pianificato» e molto «rimandato»

L’emodialisi domiciliare dalla emodialisi ospedaliera

20%

Ospedale Niguarda

2011-2024

La emodialisi domiciliare dal trapianto renale

62%

Ospedale Niguarda

2011-2024

Alta incidenza di depressione nei primi tre mesi

Il paziente dopo fallimento di tx renale

Table 2. QOL score and depression symptoms

	TN patients ($n = 2806$)	TF patients ($n = 1856$)	P-value[a]	TF patients			P-value[b]
				<3 months ($n = 313$)	3–12 months ($n = 299$)	>12 months ($n = 1244$)	
Physical component summary	39.6	37.1	<0.0001	36.4	36.5	37.4	0.81
Physical functioning	54.2	47.3	<0.0001	46.2	47.7	47.4	0.22
Role physical	42.3	34.7	0.0007	25.9	30.8	37.5	0.03
General health	46.9	42.4	0.0005	41.0	40.4	43.1	0.88
Bodily pain	66.3	60.8	0.0001	59.1	59.4	61.4	0.93
Mental component summary	46.5	44.8	0.51	43.5	43.9	45.3	0.34
Mental health	65.1	61.5	0.36	59.2	61.5	62.0	0.38
Role emotional	59.6	55.8	0.74	49.5	54.2	57.6	0.49
Social functioning	65.8	60.6	0.02	60.6	56.1	61.6	0.50
Vitality	45.5	38.8	0.0002	33.7	38.5	40.0	0.20
Burden	40.4	38.2	0.68	40.4	35.9	38.3	0.0022
Effects	61.5	57.3	0.06	60.0	55.8	57.1	0.0004
Symptoms	75.3	72.3	0.02	71.0	70.8	72.9	0.77
CES-D ≥ 10 (%)	36.7	41.7	0.11	38.5	49.5	40.6	0.80
Depression (%)	9.1	14.0	0.0027	13.1	15.5	13.9	0.12

Models adjusted for age, sex, race, BMI, 13 comorbidities, albumin, country and study phase and accounted for facility level clustering.
[a]Test for difference between TF and TN patients in adjusted models.
[b]Test for trend across TF patient subgroups in adjusted models.
QOL, quality of life; TN, transplant naïve; TF, transplant failure; CES-D, Centers for Epidemiologic Studies Depression scale.

Nephrol Dial Transplant (2012) 27: 4464–4472
doi: 10.1093/ndt/gfs386
Advance Access publication 30 September 2012

Reduced survival and quality of life following return to dialysis after transplant failure: the Dialysis Outcomes and Practice Patterns Study

Jeffrey Perl[1], Jinyao Zhang[2], Brenda Gillespie[3], Bjorn Wikström[4], Joan Fort[5], Takeshi Hasegawa[6], Douglas S. Fuller[2], Ronald L. Pisoni[2], Bruce M. Robinson[2,3] and Francesca Tentori[2,7]

La scelta della dialisi domiciliare nel post trapianto....

gestione della malattia

gestione del proprio tempo libero

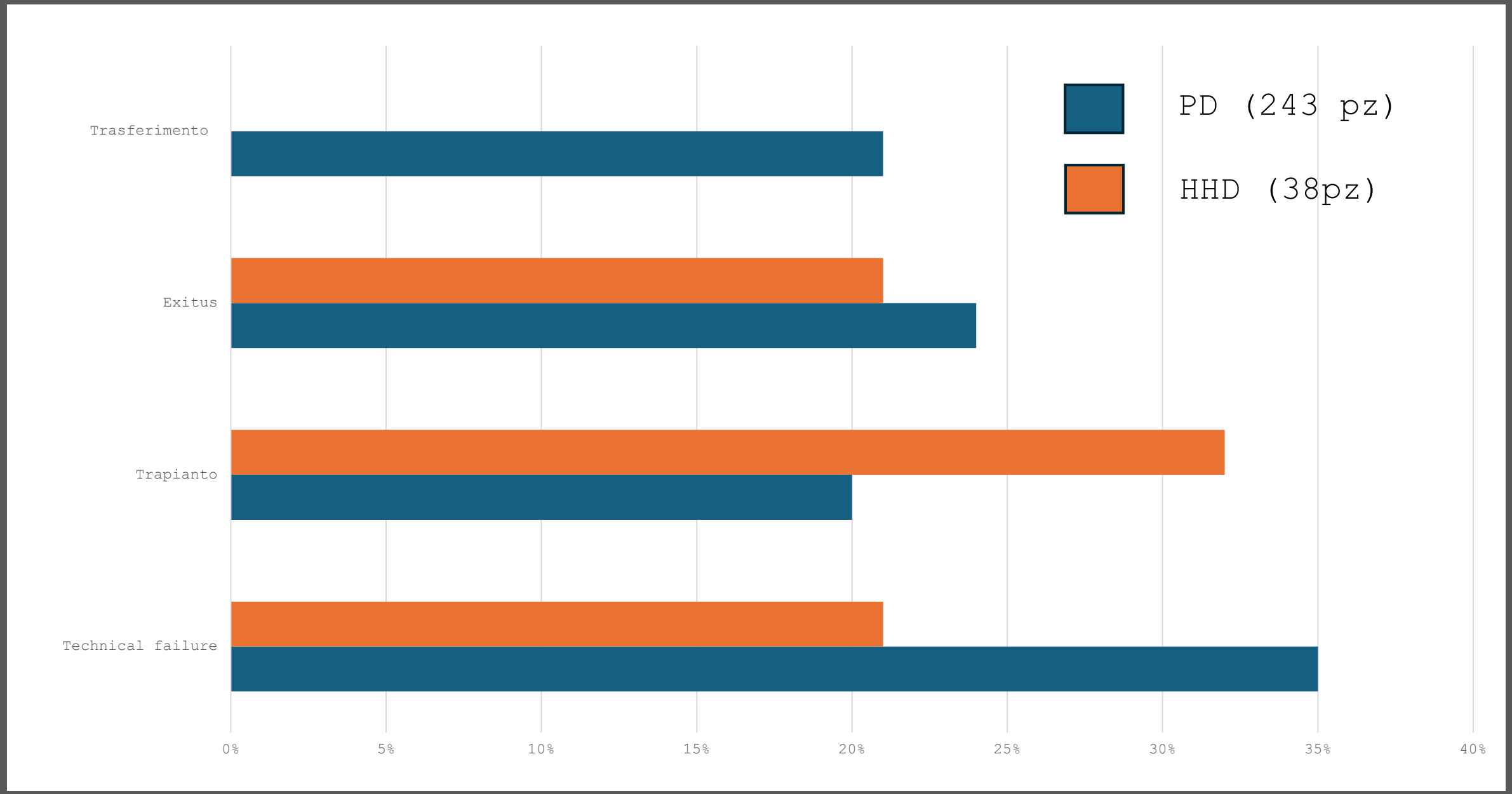
liberta' di spostamento

At-home short daily hemodialysis improves the long-term health-related quality of life

Fredric O. Finkelstein[1], Brigitte Schiller[2], Rachid Daoui[3], Todd W. Gehr[4], Michael A. Kraus[5], Janice Lea[6], Yoojin Lee[7], Brent W. Miller[8], Marvin Sinsakul[9] and Bertrand L. Jaber[10], on behalf of the FREEDOM Study Group

Perche’ non un in rientro in dialisi peritoneale?

Cause di drop out peritoneale vs emodiialisi domiciliare (2011-2023)



Nephrol Dial Transplant (2019) 34: 858–863
doi: 10.1093/ndt/gfy290
Advance Access publication 24 October 2018

Peritoneal dialysis after kidney transplant failure: a nationwide matched cohort study from the French Language Peritoneal Dialysis Registry (RDPLF)

Myriam Benomar[1], Clement Vachey[1], Thierry Lobbedez[2], Julie Henriques[3], Didier Ducloux[1], Dewi Vernerey[3] and Cécile Courivaud[1]

[1]Department of Nephrology, Dialysis and Renal Transplantation, University of Franche-Comté, Besançon, France, [2]Department of Nephrology, Dialysis and Renal Transplantation, University Hospital, Caen, France and [3]Methodology and Quality of Life Unit in Oncology, INSERM UMR1098, University Hospital of Besançon, Besançon, France

Table 2. Outcomes at the end of the study

	Tx group ($n = 328$)	Control group ($n = 656$)	P-value
PD duration (months), median (range)	17 (14–20)	21 (19–23)	0.004
Final outcomes, *n* (%)			
Ongoing PD	43 (13)	81 (12.4)	0.8
Death	33 (10.1)	82 (12.5)	0.3
Transfer to HD	145 (44.2)	198 (30.2)	<0.0001
Transplantation	96 (29.2)	260 (39.6)	0.002
Others[a]	11 (3.5)	35 (5.3)	0.2
Episode of peritonitis, *n* (%)			
Patients with at least 1 episode of peritonitis	143 (43.6)	263 (40.1)	0.3
1 episode of peritonitis	89 (27.2)	144 (22.1)	0.2
2 episodes of peritonitis	32 (9.7)	66 (10)	0.6
≥3 episodes of peritonitis	22 (6.7)	53 (8)	0.3

[a]Renal recovery and lost of follow-up.

- A retrospective study about 328 patients registered in the French Language Peritoneal Dialysis Registry (RDPLF) who started PD after kidney transplant failure (Tx group) between January 2002 and December 2012 who were compared with 656 matched never-transplanted patients having started PD during the same period (control group).

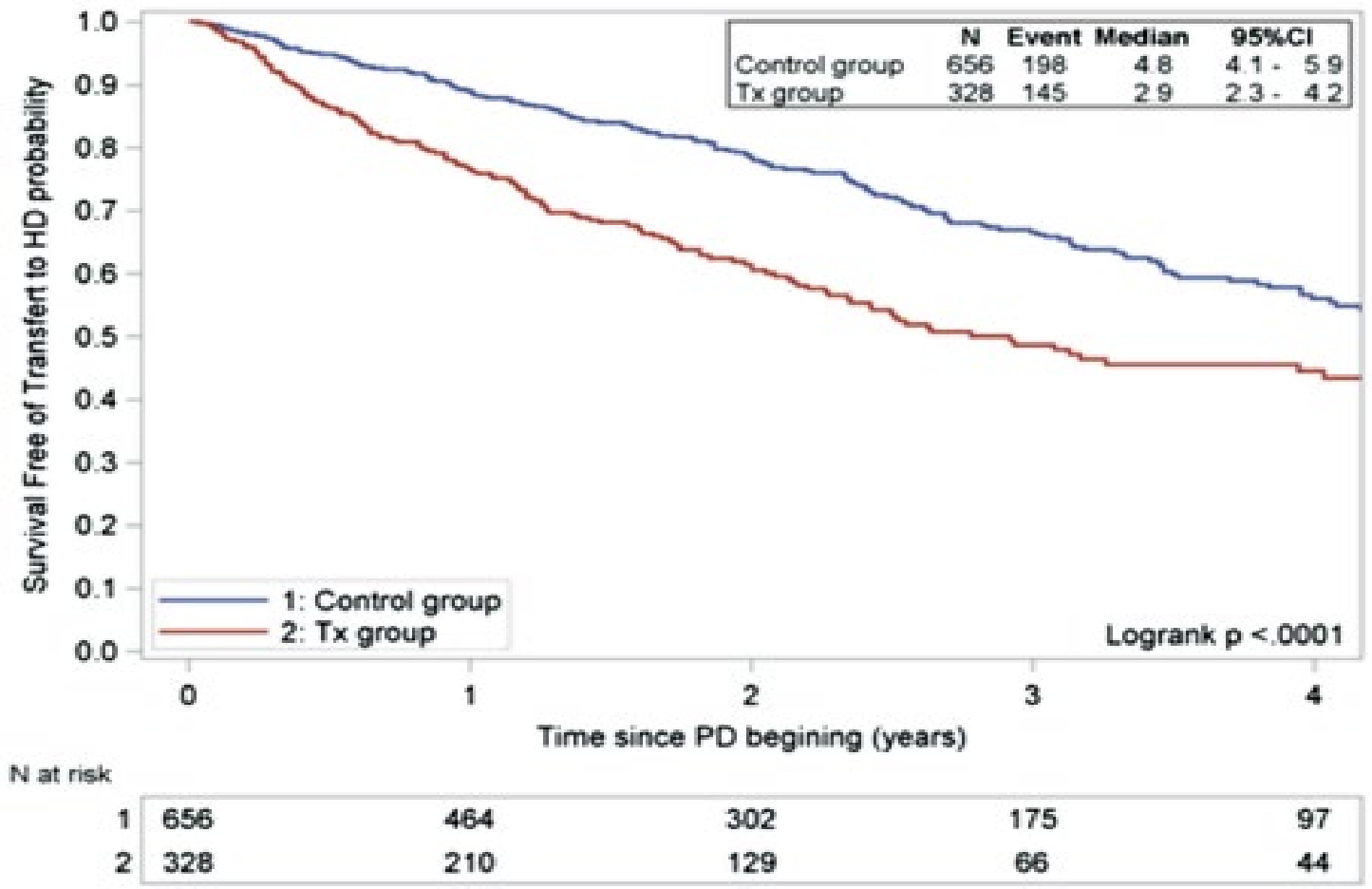


FIGURE 1: Survival free of transfer to HD in Tx and control groups (Kaplan–Meier curve from the Cox model).

Home dialysis modality	CAPD	APD	Home HD	P-value	
				CAPD vs Home HD	APD vs Home HD
Number of patients	162	229	145		
Male Gender (%)	70	66	68	0.691	0.703
Median FU-time (years)	2.0 (0.97–3.4)	1.6 (0.86–2.5)	1.4 (0.73–2.7)	0.013	0.499
Number of Patient-years	365	426	264		
Number of Infection episodes	197	158	52		
Hospitalization needed (n)	178	142	38		
Infection episode IR	540	371	197		
At least one episode (%)	62	35	21		
Number of deaths in 5 years*	66	26	12	<0.001	0.330
Number of infection deaths*	18	12	5	0.011	0.418
Median age (years)	65 (52–74)	50 (40–61)	50 (42–60)	<0.001	0.832
Number of comorbidities (%)				0.001	0.305
0	1.2	2.2	0.0		
1–2	32	44	48		
3–4	40	42	41		
> = 5	27	12	11		
Dialysis assistance (%)				<0.001	0.061
by professional	4.9	1.7	0.7		
by family member	18.5	4.4	4.1		
KTx-listed (%) *	39	75	74	<0.001	0.776
KTx (%) *	25	58	66	<0.001	0.116

https://doi.org/10.1371/journal.pone.0286579

Over 5 years of follow-up, hazard ratio of severe infection

	HR of first infection episode	95% CI of HR	
		Lower	Upper
HR of first infection episode incidence, unadjusted			
Home HD (reference)			
CAPD	3.2	2.1	4.8
APD	1.9	1.2	2.8
HR of first infection episode incidence, adjusted for propensity score			
CAPD (compared to Home HD)	2.8	1.6	4.8
APD (compared to Home HD)	2.2	1.4	3.5

When excluding peritonitis, the incidence rate was not higher among PD than home HD patients

PD peritonitis was 530/1000 patient-years 2011–2020

PLoS One. 2023 Jun 14;18(6):

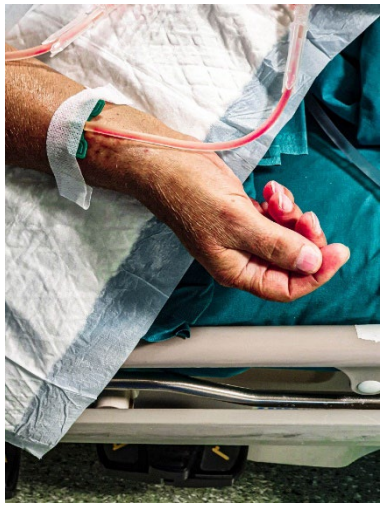
Perche’ in Italia si fa poca HHD?

2) Emodialisi multifrequenti e rischio infettivo

Infection-hospitalisation/ vascular access and Home Therapy

Le infezioni ….. Il tallone d’Achille della Home Hemodialyisis (la possibile minore igiene e professionalita’ dell’ambiente domiciliare ,il minor controllo)

La multifrequenza di per se’ amplifica il problema delle infezioni e aggiungendo «teoricamente» anche un rischio aumentato di complicanze «funzionali»

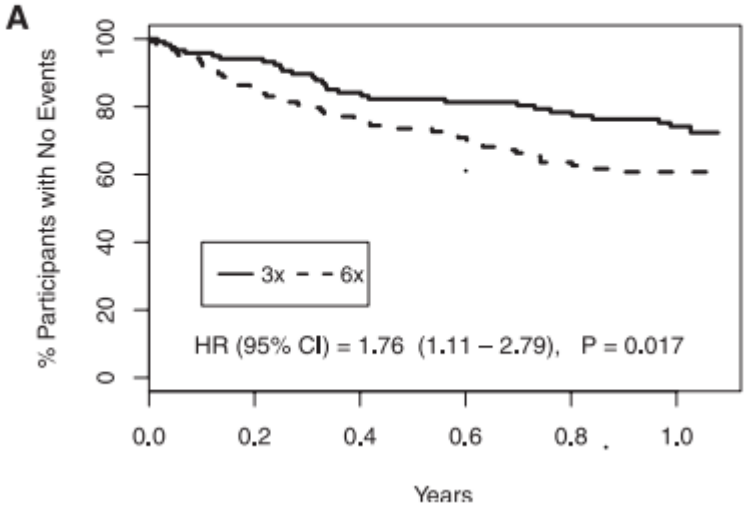


Hemodialysis International 2017; 21:155–160

FHN

Risk of Vascular Access Complications with Frequent Hemodialysis

Rita S. Suri,* Brett Larive,† Susan Sherer,† Paul Eggers,‡ Jennifer Gassman,† Sam H. James,§ Robert M. Lindsay,* Robert S. Lockridge,‖ Daniel B. Ornt,¶ Michael V. Rocco,** George O. Ting,†† Alan S. Kliger,‡‡ and the Frequent Hemodialysis Network Trial Group



40 eventi/100 pz/anni in 6x vs 23 eventi/100 pz/anni in3x

	3 TIMES PER WEEK			6 TIMES PER WEEK					
	N	Follow-up (yrs)	Event rate*	N	Follow-up (yrs)	Event rate*	HR (95% CI)	Plot of HR, 95% CI	p-value
Daily Trial									
All patients	120	127.8	23	125	121.2	40	1.76 (1.11-2.79)		0.017
AV access	94	101.3	21	104	99.5	37	1.90 (1.11-3.25)		0.020
Catheters	26	18.9	16	21	17.0	47	2.70 (0.71-10.2)		0.14

J Am Soc Nephrol 24: 498–505, 2013

Hospitalization in Daily Home Hemodialysis and Matched Thrice-Weekly In-Center Hemodialysis Patients

Eric D. Weinhandl, MS,[1] Kimberly M. Nieman, MS,[1] David T. Gilbertson, PhD,[1] and Allan J. Collins, MD[1,2]

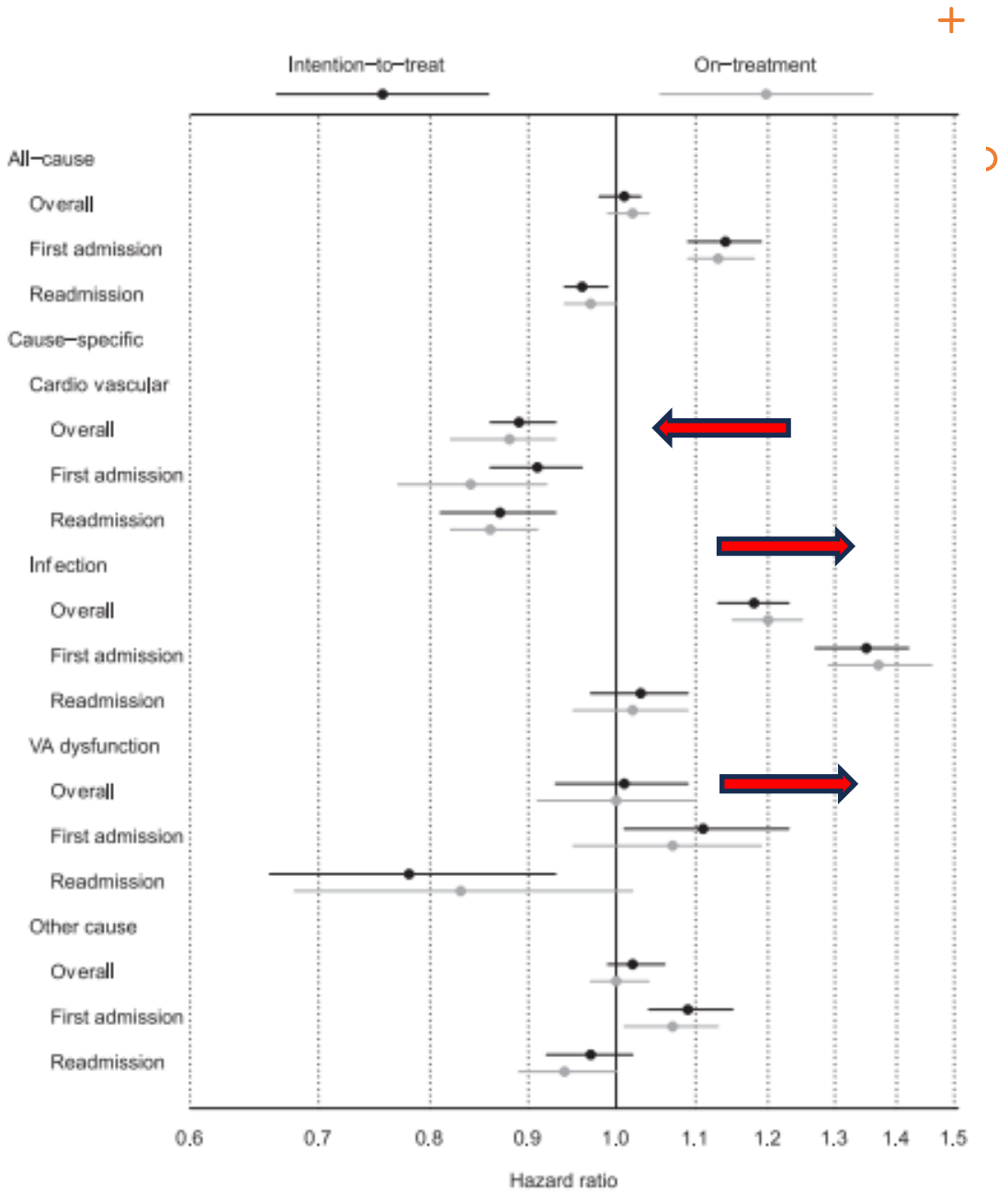
Matched observational cohort study using US Renal Data System data

3,480 pts - 5/6 sessions per week HHD patients initiating NxStage System One

17,400 - 3 sessions per week IHD patients

Am J Kidney Dis. 2015 Jan;65(1):98-108.

Pooled relative hazards of all-cause and cause-specific admission (HHD vs HD)



Cause-specific admission HRs for HHD
HR 0.89 (95%CI, 0.86-0.93) for cardiovascular disease
HR 1.18 (95%CI, 1.13-1.23) for infection
HR 1.01 (95%CI, 0.93-1.09) for vascular access dysfunction

Am J Kidney Dis. 2015 Jan;65(1):98-108.

	No of events		Unadj hazard ratio (95% CI)	P-value
	Home DHD (n=1187)	In-center CHD (n=3173)		
All hospitalization	1503	7562	0.92 (0.85–1.00)	0.053
All infection	730	2905	1.15 (1.04–1.29)	0.006
Cardiac	555	3717	0.68 (0.61–0.77)	<0.001
Access related	373	1358	1.25 (1.08–1.43)	0.002
Access non infection	150	668	1.04 (0.86–1.27)	0.669
Access infection	223	690	1.43 (1.20–1.71)	<0.001
Bleeding	89	317	1.19 (0.86–1.63)	0.292

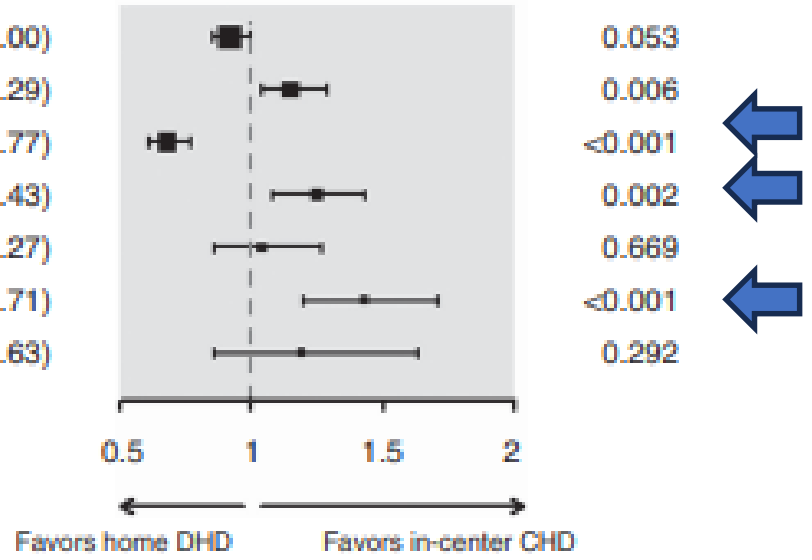


Figure 3 | Relative hazard of hospitalization associated with daily home hemodialysis (DHD) versus in-center conventional hemodialysis (CHD). CI, confidence interval; No, number.

Suri et al Kidney International (2015) 88, 360–368

Characteristics	DHHD	Matched In-Center
Sample size (*n*)	1873	9365
Age[d] (yr)		
mean (SD)	52.2 (14.8)	53.2 (14.7)
median	52.3	53.1
Race (%)		

Survival in Daily Home Hemodialysis and Matched Thrice-Weekly In-Center Hemodialysis Patients

Eric D. Weinhandl,* Jiannong Liu,* David T. Gilbertson,* Thomas J. Arneson,* and Allan J. Collins*†

*Chronic Disease Research Group, Minneapolis Medical Research Foundation, Minneapolis, Minnesota; and †Department of Medicine, University of Minnesota, Minneapolis, Minnesota

congestive heart failure	26.9	27.1
peripheral vascular disease	20.9	20.5
other cardiovascular disease	20.0	17.9
cancer	9.1	7.3
diabetes	40.6	42.1
Dual Medicare/Medicaid eligibility (%)[d]	23.2	35.4
Cumulative EPO dose (1000s IU)[f]		
mean (SD)	184.0 (237.4)	180.6 (226.6)
median	110.7	113.1
Cumulative hospital days[f]		
mean (SD)	2.3 (7.7)	2.3 (7.7)
median	0.0	0.0

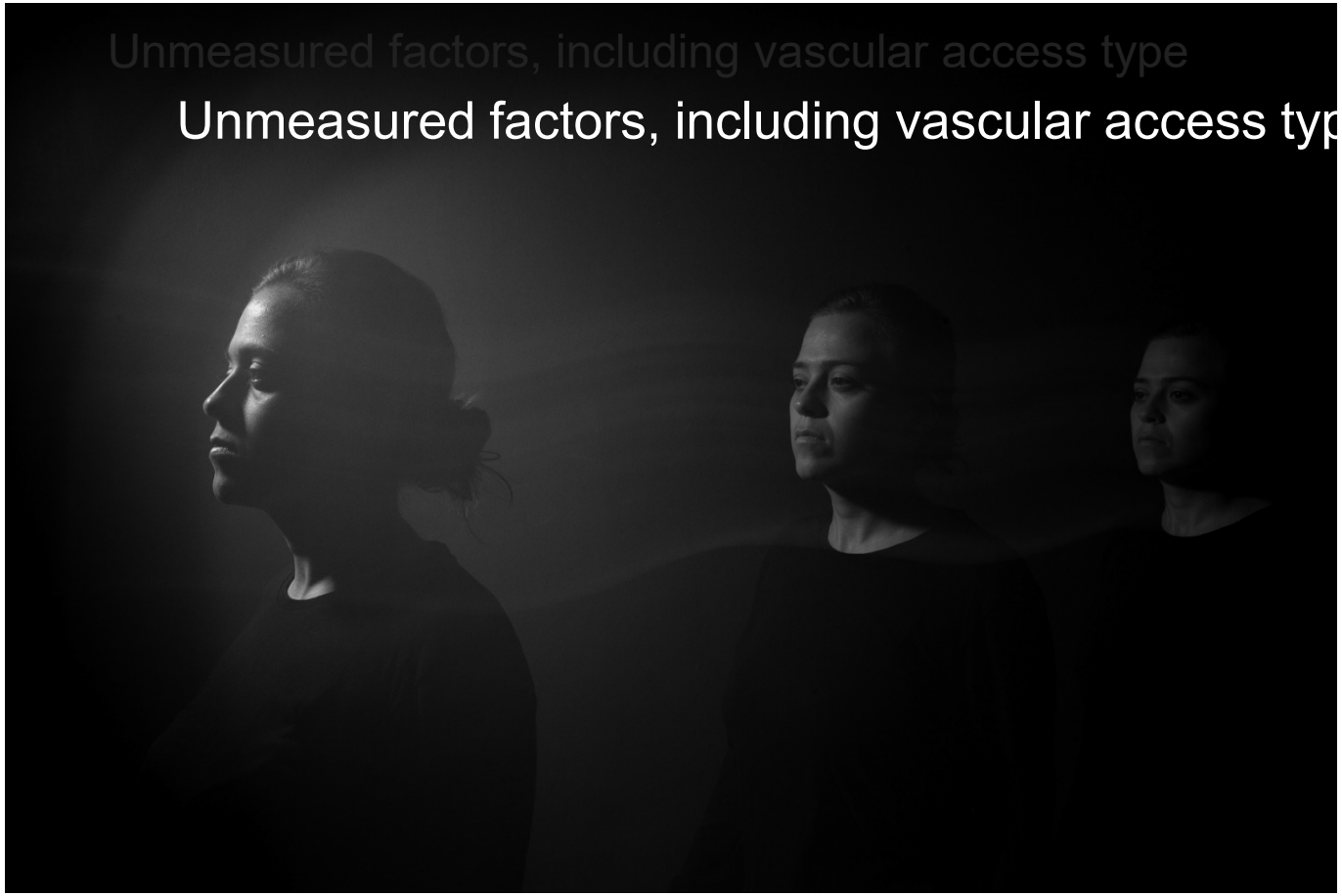
J Am Soc Nephrol 23: 895–904, 2012

Table 2. Relative hazards of death for daily home hemodialysis patients in intention-to-treat and as-treated analyses

	Intention to Treat		As Treated	
	HR (95% CI)	*P*	HR (95% CI)	*P*
All-cause mortality	0.87 (0.78–0.97)	0.01	0.82 (0.72–0.94)	<0.01
Cause-specific mortality				
cardiovascular disease	0.92 (0.78–1.09)	0.34	0.83 (0.67–1.01)	0.06
infection	1.13 (0.84–1.53)	0.41	1.17 (0.83–1.66)	0.38
cache			[1]	0.13
other			[1]	0.25
unknown cause	0.59 (0.44–0.79)	<0.01	0.41 (0.28–0.62)	<0.01
Interval-specific mortality (mo)				
1–6	0.88 (0.78–0.98)	0.02	0.77 (0.68–0.89)	<0.01
7–12	0.89 (0.78–1.02)	0.10	0.75 (0.63–0.89)	<0.01
13–18	0.92 (0.78–1.09)	0.32	0.81 (0.65–1.01)	0.06
19–24	0.95 (0.76–1.20)	0.69	0.89 (0.66–1.21)	0.45
≥25	0.92 (0.66–1.28)	0.61	0.95 (0.62–1.47)	0.82

Referent: matched thrice-weekly in-center patients.

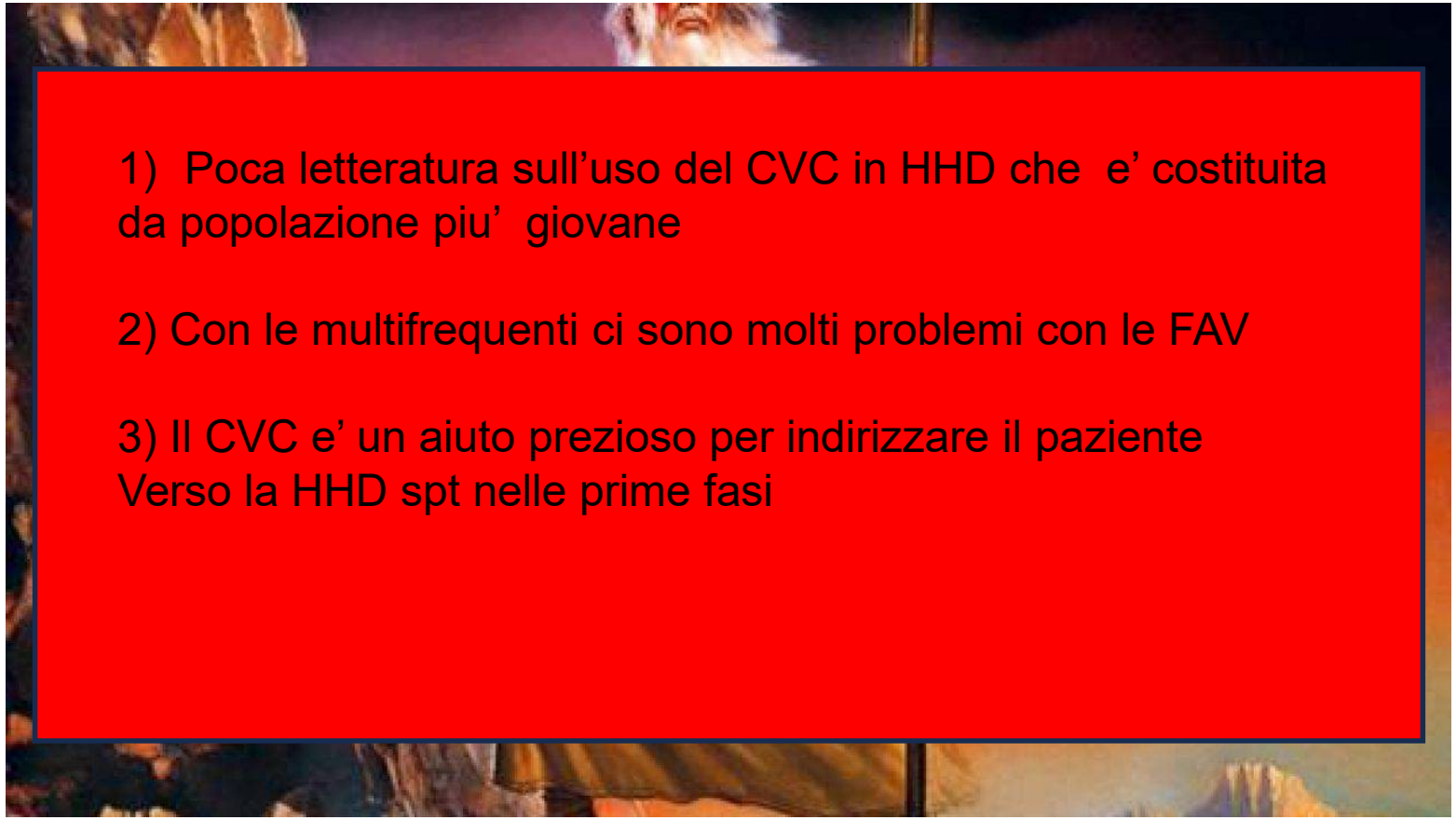
Riduzione di mortalita' del 13%



Am J Kidney Dis. 2015 Jan;65(1):98-108.

The Burden of Harm—What Is the Ideal Vascular Access for Home Hemodialysis?

Emilie Trinh and Christopher T. Chan



1) Poca letteratura sull'uso del CVC in HHD che e' costituita da popolazione piu' giovane

2) Con le multifrequenti ci sono molti problemi con le FAV

3) Il CVC e' un aiuto prezioso per indirizzare il paziente Verso la HHD spt nelle prime fasi

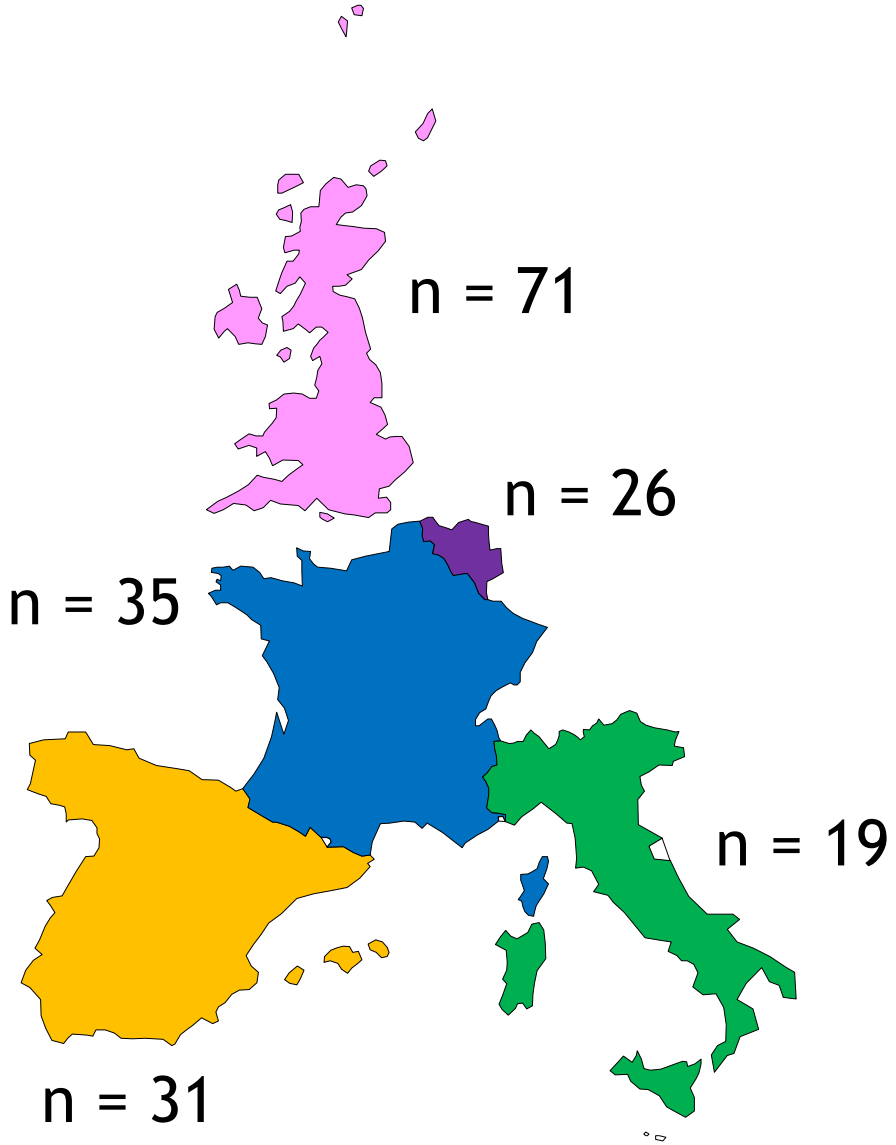
Clinical Journal of the American Society of Nephrology 11(2):p 205-206, 2016

KIHDNEy

Knowledge to Improve
Home Hemodialysis Network in Europe

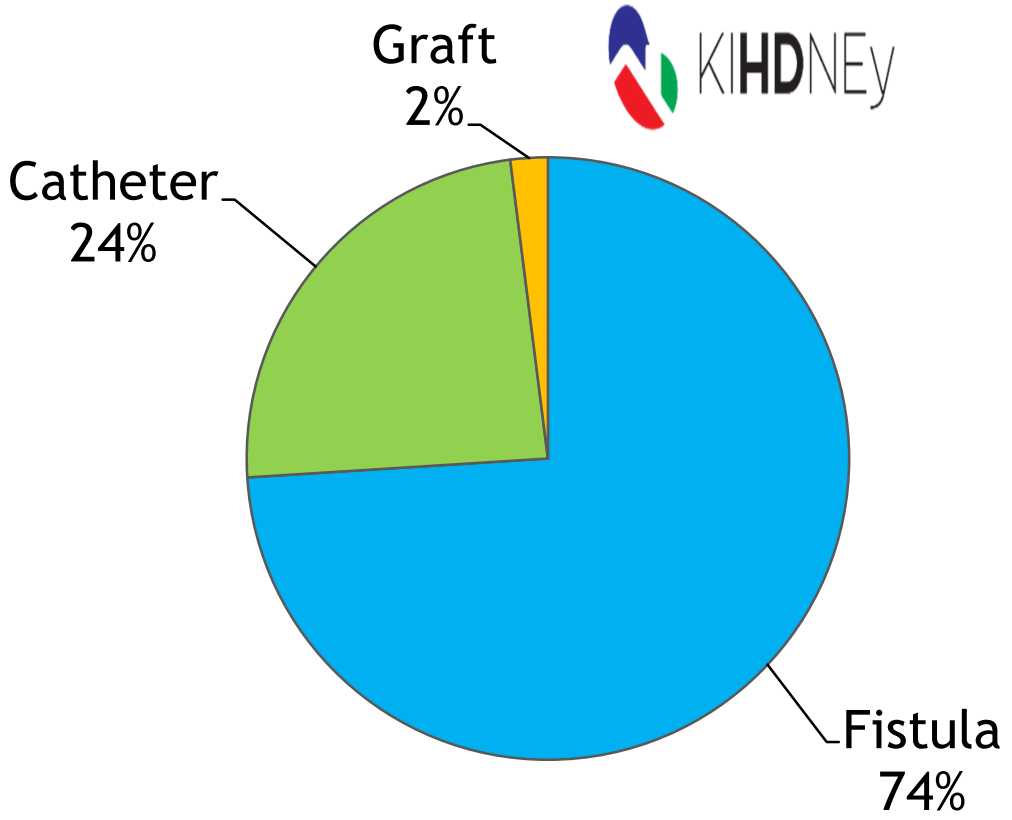
Studio retrospettivo su pazienti trattati con NxStage® System One™

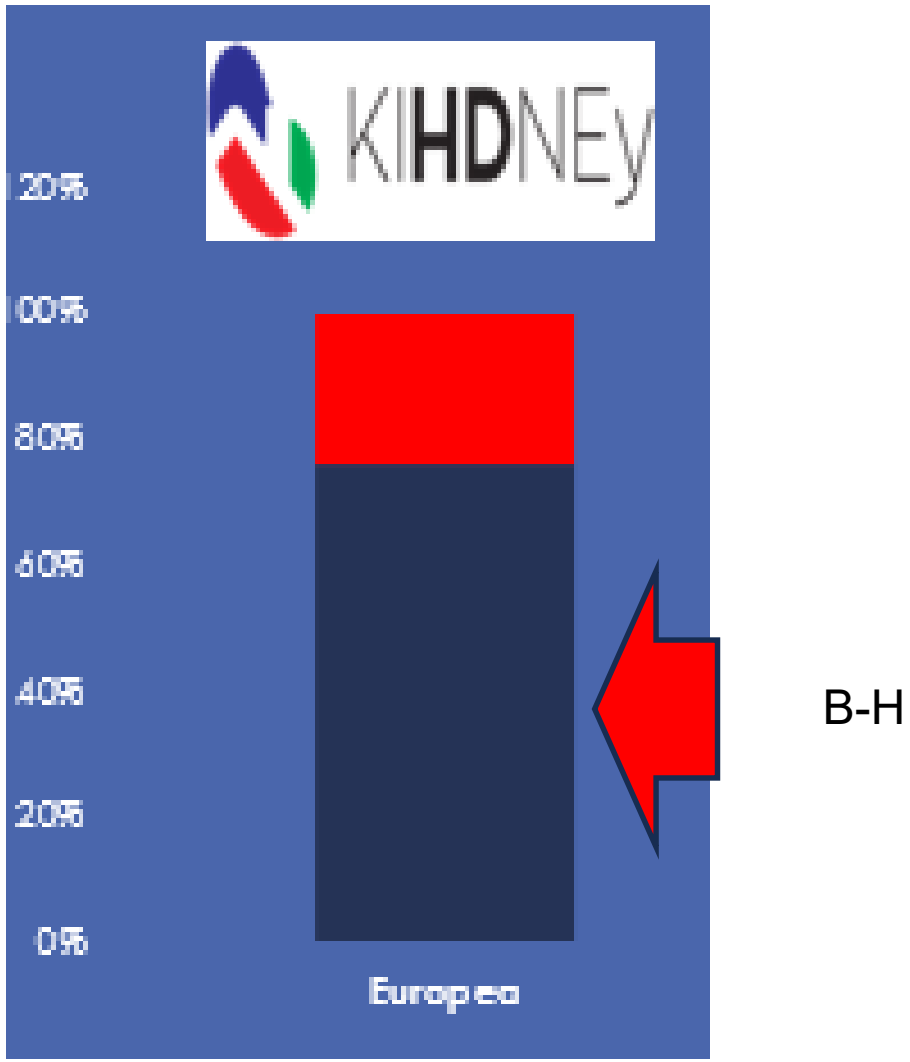
182 pazienti
5 European countries
1 year follow-up



Cherukuri et al. BMC Nephrology (2018) 19:262

L'accesso vascolare





B-H

Cherukuri et al. BMC Nephrology (2018) 19:262

Buttonhole and HHD – Muir C

90 patient retrospective cohort

Conversion of prevalent patients from rope ladder to buttonhole

Incident started on BH

Primary outcomes

AVF-attributable systemic infections

(Blood culture-positive sepsis or complicated infection [*e.g.*, endocarditis] in the absence of an identifiable non-AVF source)

– higher with BH (IRR 2.71; 95% CI 0.66 to 11.09; *P*=0.17)

Composite of arteriovenous fistula loss or requirement for surgical intervention

- not difference

- significantly higher with buttonhole

Secondary outcomes

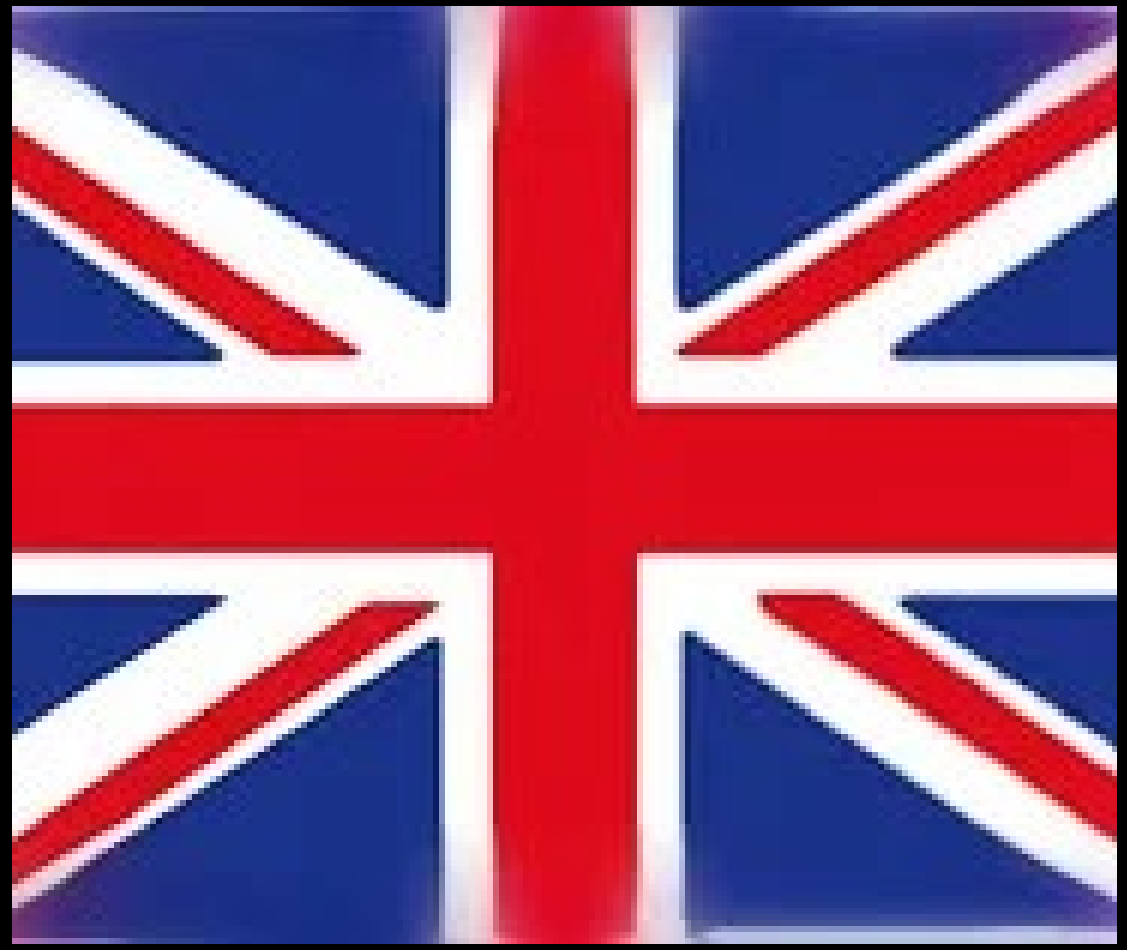
AVF-related infections
- higher rate with BH (IRR 3.85; 95% CI 1.66 to 12.77; P=0.03)

Staff time requirements
- significantly higher with BH

Clin J Am Soc Nephrol. 2014 Jan;9(1):110-9. doi: 10.2215/CJN.03930413. Epub 2013 Dec 26

Vascular access type (n, %)	
Catheter	47 (55%)
Native fistula	39 (45%)
Prosthetic fistula	0
Fistula cannulation technique (n, %)	
Rope ladder	6 (15%)
Button hole	33 (85%)
Fistula self-puncture (n, %)	9 (23%)

- Nefrologia, 2021 Aug 12:S0211-6995(21)




Birmingham
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INGHILTERRA
Oxford
Londra
Bath
Cardiff
Bruges
Portsmouth
La Manica

???

Article

Two Years' Experience of Intensive Home Hemodialysis with the Physidia S^3 System: Results from the RECAP Study

Hafedh Fessi [1], Philippe Nicoud [2,3], Tomas Serrato [4], Olivia Gilbert [5], Cécile Courivaud [6], Salima Daoud [7], Marion Morena [8], Michel Thomas [9], Bernard Canaud [10] and Jean-Paul Cristol [5,8,*]

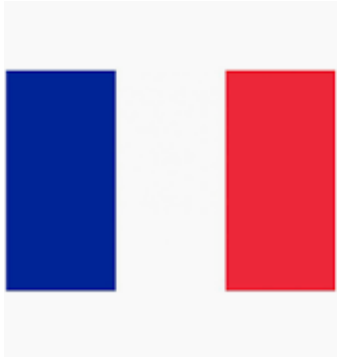


Table 2. *Cont.*

Dialysis Prescription	
Anticoagulation (n = 91)	
No anticoagulation	19 (20.9)
UFH	6 (6.6)
LMWH	66 (72.5)
Vascular Access (n = 93)	
AV fistula	92 (97.9)
Catheter	2 (2.1)
Vascular access needling	
Buttonhole	83 (89.2)
Rope-ladder rotation	10 (10.8)

Values expressed as n (%), median (IQR). Abbreviations: HHD, home hemodialysis; LMWH, low-molecular-weight heparin; UFH, unfractionated heparin.

J. Clin. Med. 2023, 12, 1357

ORIGINAL ARTICLE

Home Hemodialysis

Characteristics, practices, and outcomes in a Belgian cohort of incident home hemodialysis patients: A 6-year experience

Bernard Vô[1] | Blaise Anthonissen[1] | Christian Verger[2] | Michel Jadoul[1,3] | Johann Morelle[1,3] | Eric Goffin[1,3]

Hemodialysis International. 2022;1–13.

TABLE 1 Baseline characteristics for the HHD overall cohort and stratified by HHD regimen

Characteristics	Overall ($n = 80$)	HHD regimen					p
		Std HD ($n = 7$)	Std-fqt HD ($n = 38$)	S-fqt HD ($n = 5$)	Nocturnal HD ($n = 3$)	S-fqt LFD HD ($n = 27$)	
Age, yrs.	47 ± 14	43 ± 14	50 ± 14	43 ± 17	37 ± 2	46 ± 15	0.44
Male	51 (64)	5 (71)	29 (76)	3 (60)	2 (67)	12 (44)	0.13

- 80 pazienti incidenti in emodialisi domiciliare (Clinica Universitaria di Bruxell) dal 2013 al 2018 e seguiti fino al 2019
- (follow up median follow-up: 19 [IQR: 8–35] months)

Hemodialysis International. 2022;1–13.

Cumulative incidence of technique failure and death was 15%, 24%, and 32% at 1, 2, and 5 years, respectively.

Modality before HHD	
Incident	28 (35)
HD	30 (38)
PD	8 (10)
KT	14 (17)

Characteristics	Overall ($n = 80$)	HHD regimen: Std HD ($n = 7$)	Std-fqt HD ($n = 38$)	S-fqt HD ($n = 5$)	Nocturnal HD ($n = 3$)	S-fqt LFD HD ($n = 27$)	p
Access type							0.39
AVF	38 (47)	3 (43)	23 (60)	3 (60)	2 (67)	8 (30)	
CVC	41 (52)	4 (57)	14 (37)	2 (40)	1 (33)	19 (70)	
AVG	1 (1)	0	1 (3)	0	0	0	
HD Surveillance							0.94
None	77 (96)	7 (100)	36 (95)	5 (100)	3 (100)	25 (93)	
Family	2 (2)	0	2 (5)	0	0	1 (4)	
Nurse	1 (1)	0	0	0	0	1 (4)	

Hemodialysis International. 2022;1–13.

RESPITE

TABLE 4 Comparison of incidence rates of respite care between HHD regimens

As-treated analysis	Overall ($n = 80$)	AVF ($n = 49$)	CVC ($n = 45$)	AVG ($n = 3$)	p
Patients	47 (59)	22 (45)	31 (69)	3 (100)	0.02
Number of events, No.	181	47	121	13	
Events/patient, No.	3 [1–5]	1 [1–2]	3 [1–5]	4 [3–5]	0.02
Reason, No (%)					
Thrombosis	9 (5)	6 (13)	2 (2)	1 (8)	0.01
Infection, localized	25 (14)	7 (15)	15 (12)	3 (23)	0.55
Infection, systemic	11 (6)	2 (4)	9 (7)	0	0.47
Catheter dysfunction	84 (46)	—	84 (69)	—	—
Post-puncture hematoma	4 (2)	4 (8)	—	0	0.28
Difficult cannulation	21 (12)	13 (28)	—	8 (61)	0.02
Stenosis	10 (5)	9 (19)	—	1 (8)	0.33
Vascular steal	1 (0)	1 (2)	—	0	0.60
Symptomatic hyper-flow	1 (0)	1 (2)	—	0	0.60
Other/NR	15 (8)	4 (8)	11 (9)	0	0.53

Note: Values for categorial variables are given as crude number (percentage); values for continuous variables, as mean ± standard deviation or median [interquartile range].

Abbreviations: AVF, arteriovenous fistula; AVG, arteriovenous graft; CVC, central venous catheter; No, number; NR, not recorded.

Hemodialysis International. 2022;1–13.

- Overall incidence rate for access complications was 1.14 per access-year

Access type	No. of Events	IR per access-year	IRR (95%CI)	P value
Overall complications	181	1.14		
AVF	47	0.50	1.0	ref.
CVC	121	2.14	4.27 (3.07-6.04)	<0.01
AVG	13	1.60	3.23 (1.67-5.80)	<0.01
Access-related infections	36	0.23		
AVF	9	0.09	1.0	ref.
CVC	24	0.42	4.38 (2.10-10.05)	<0.01
AVG	3	0.37	3.99 (0.84-13.66)	0.07

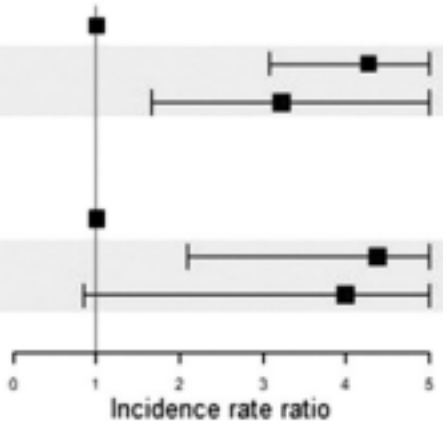
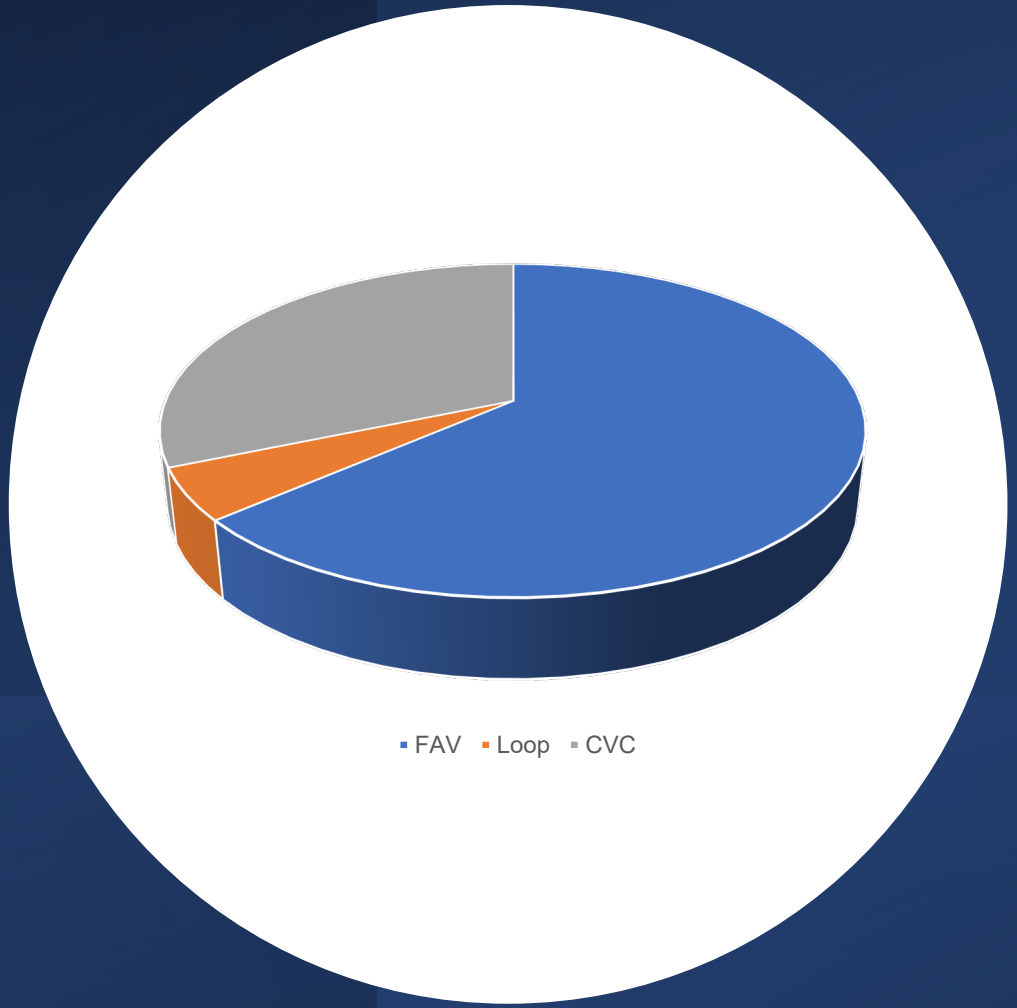


FIGURE 5 Number of events, incidence rates, and incidence rate ratios for access complications (all-cause) and access-related infections depending on type of HHD vascular access (as-treated)

Hemodialysis International. 2022;1–13.

Accessi vascolari

FAV 24/38 (63%)
Loop 2/38 (5%)
CVC 12/38 (31%)



5 perdita di accesso vascolare
(1 loop ,3 FAV, CVC)
AVF thrombosis 11%*

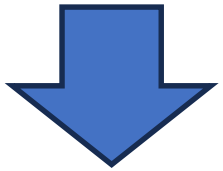
.
9,9 episodi infettivi/100 pz/anno FAV
4,8 episodi infettivi/100 pz/anno CVC p=ns

* 13% per Vo et al

Ospedalizzazione da infezione e durata del follow up

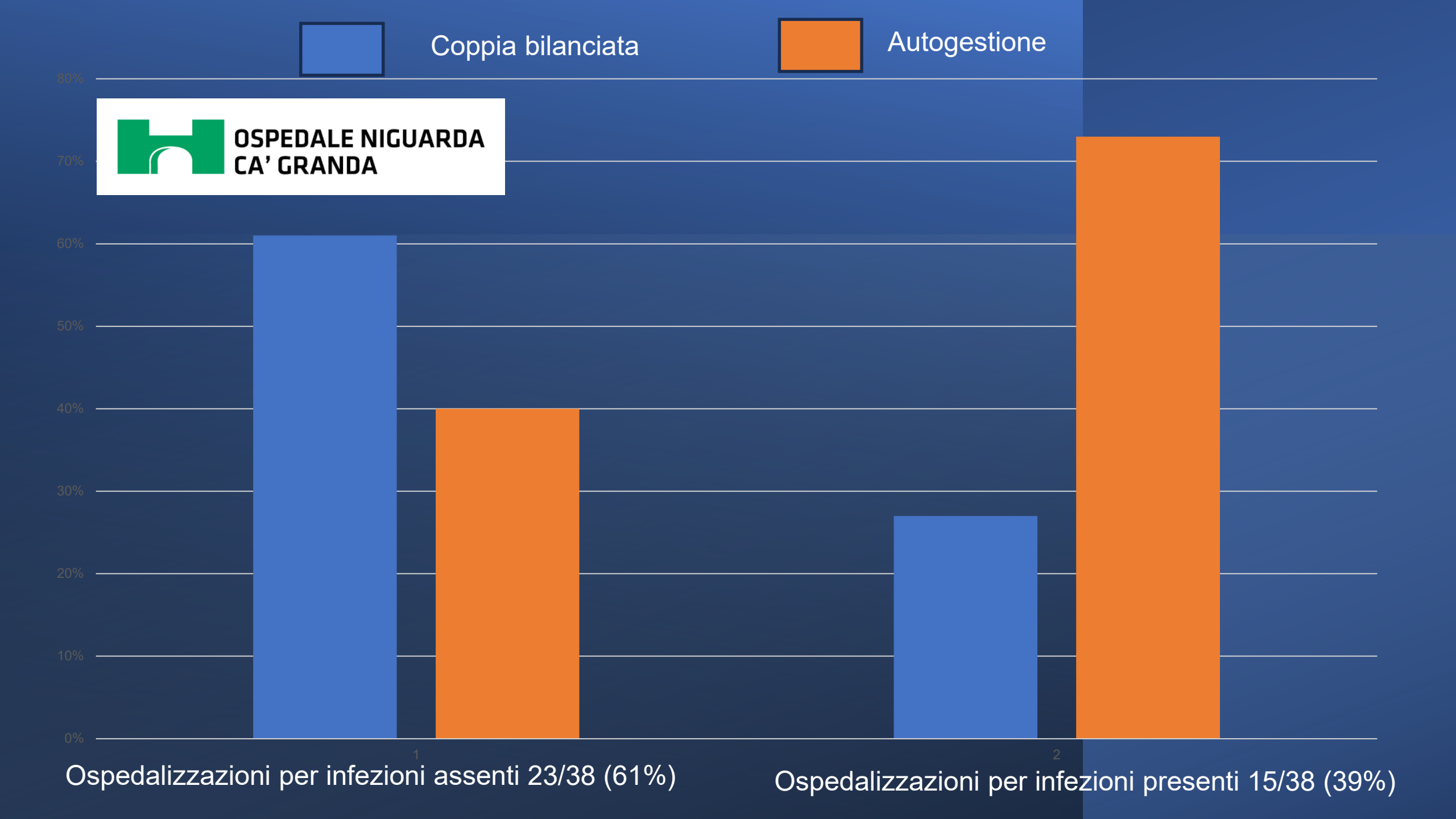
I pazienti con < 2 anni di follow up >>>> 7/100 pz/anno

I pazienti con > 2 anni di follow up >>>> 22/100 pz/anno



IRR 3,1 (1,1-7,7 ; p<0,0052)

OSPEDALE NIGUARDA
CA' GRANDA



OSPEDALE NIGUARDA
CA' GRANDA

Ospedalizzazioni per infezioni assenti 23/38 (61%)

Ospedalizzazioni per infezioni presenti 15/38 (39%)

AJKD
Narrative Review

Intensive Hemodialysis and Potential Risks With Increasing Treatment

Michael A. Kraus, MD,[1] Sheru Kansal, MD,[2] Michael Copland, MD,[3] Paul Komenda, MD,[4,5,6] Eric D. Weinhandl, PhD, MS,[7] George L. Bakris, MD,[8] Christopher T. Chan, MD,[9] Richard J. Fluck, MA (Cantab), MBBS,[10] and John M. Burkart, MD[11]

La emodialisi multintensiva anche in regime domiciliare non è una panacea per la malattia renale allo stadio terminale

Molti dei problemi associati alle dialisi multifrequenti potrebbero essere affrontati con un attento monitoraggio, in modo che gli interventi rilevanti (ad esempio, antibiotici, riqualificazione e le prestazioni di supporto) possono essere definiti (mancano dati, linee guida, ci vuole una via comune per migliorare outcome, incentivi)

Am J Kidney Dis. 2016;68(5)(suppl 1):S51-S58