

Independent Hemodialysis: Home is where the treatment is...

British Columbia Nephrology Days
November 6, 2009

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Hemodialysis Program
(British Columbia)*



Objectives

1. To review the growth to date of the BC Provincial IAMHD Program.
2. To provide an update on emerging outcome data for intensive hemodialysis provision.
3. To look at the impact of independent therapies on the healthcare system.
4. To review common patient barriers to independent (home) therapies and strategies to increase uptake of these therapies.





The BC IAMHD Program: 2004 - 2009

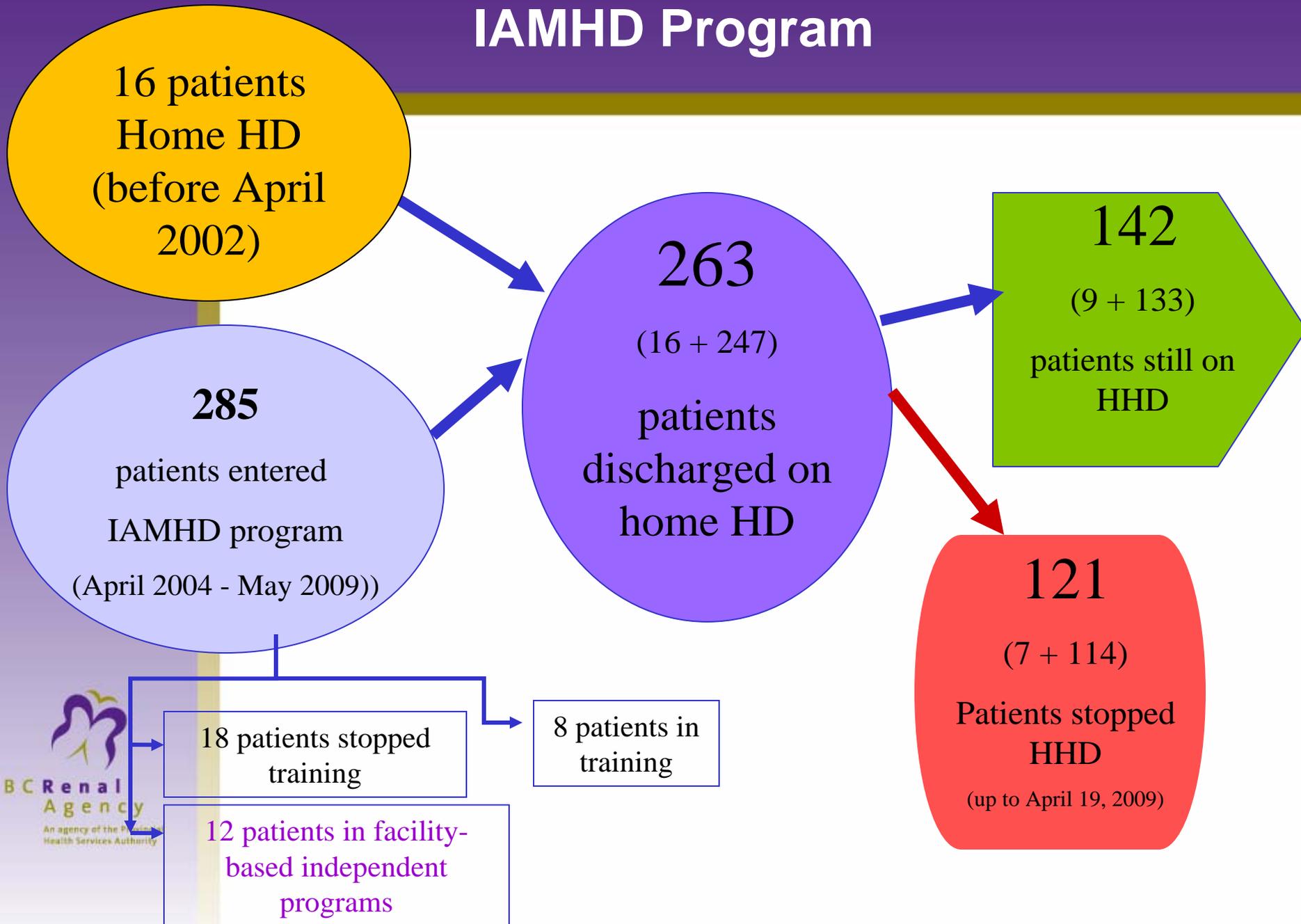


Human Development, age 4 – 5: How can it be applied to our program?

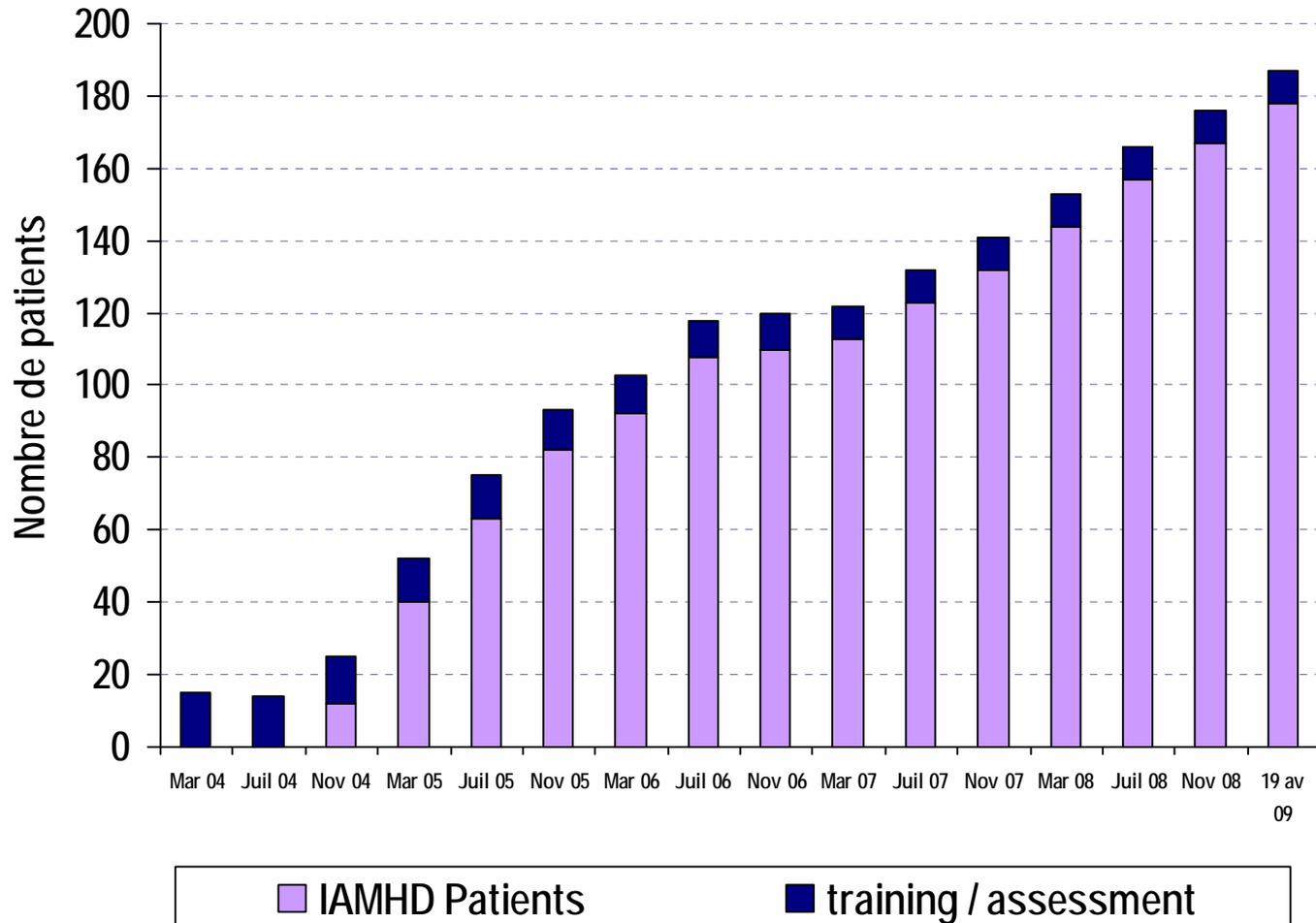
- Motor ability: mature motor control...
- Language: talks clearly, uses adult speech sounds, has mastered basic grammar, relates a story, knows over 2,000 words ...
- Feels pride in accomplishment...
- Prefers to play with other children...



IAMHD Program



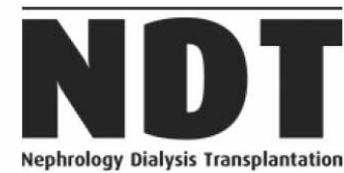
Growth of Home Hemodialysis



Nephrol Dial Transplant (2008) 23: 2647–2652

doi: 10.1093/ndt/gfn065

Advance Access publication 10 March 2008



Original Article

Outcomes of a provincial home haemodialysis programme—a two-year experience: establishing benchmarks for programme evaluation

Paul Komenda^{1,2,3}, Michael Copland^{1,2}, Lee Er², Ognjenka Djurdjev² and Adeera Levin^{1,2}

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IAMHD Technique Survival

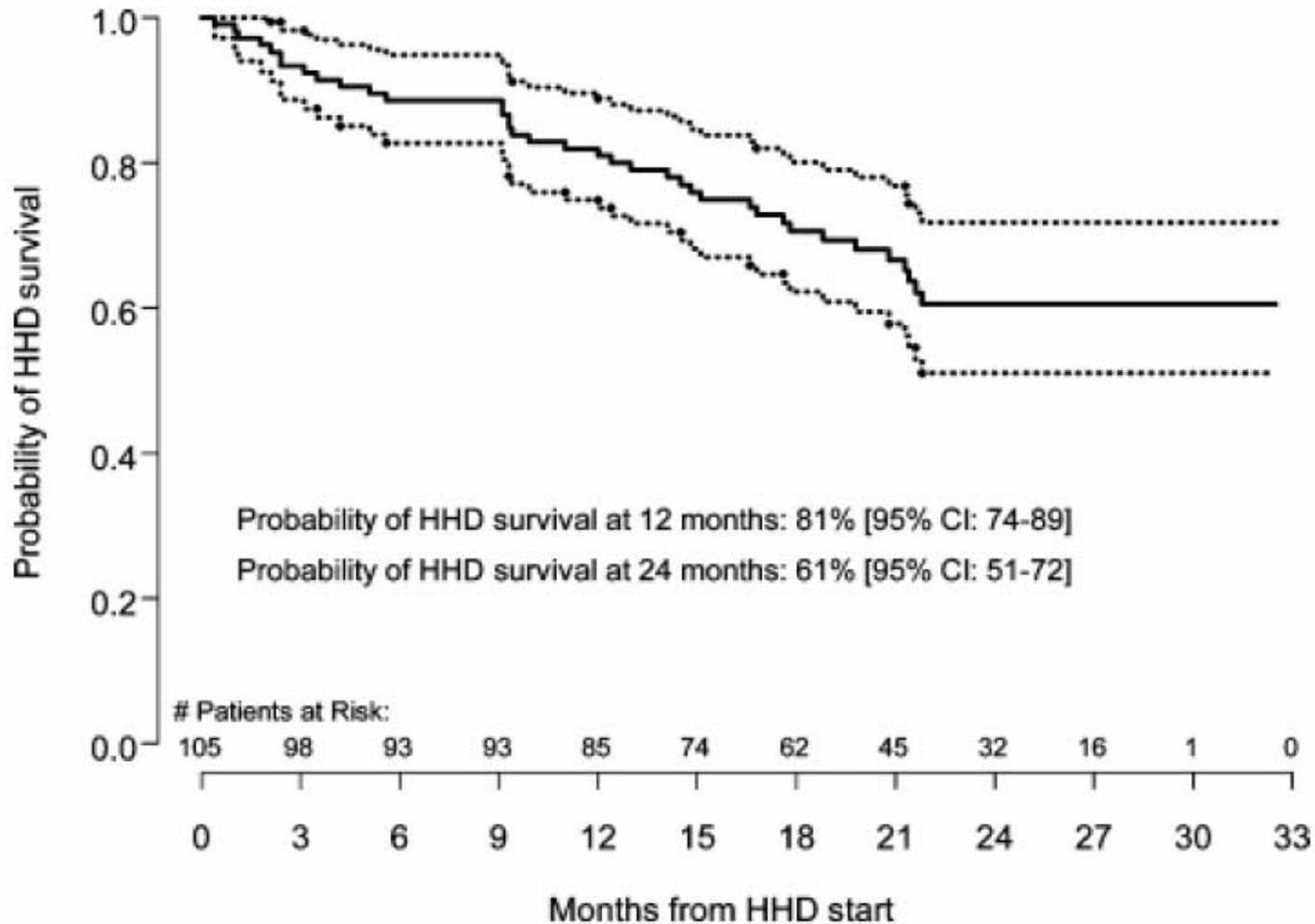


Fig. 2. Home haemodialysis technique survival (all reasons).



IAMHD Technique Survival (censored for transplant)

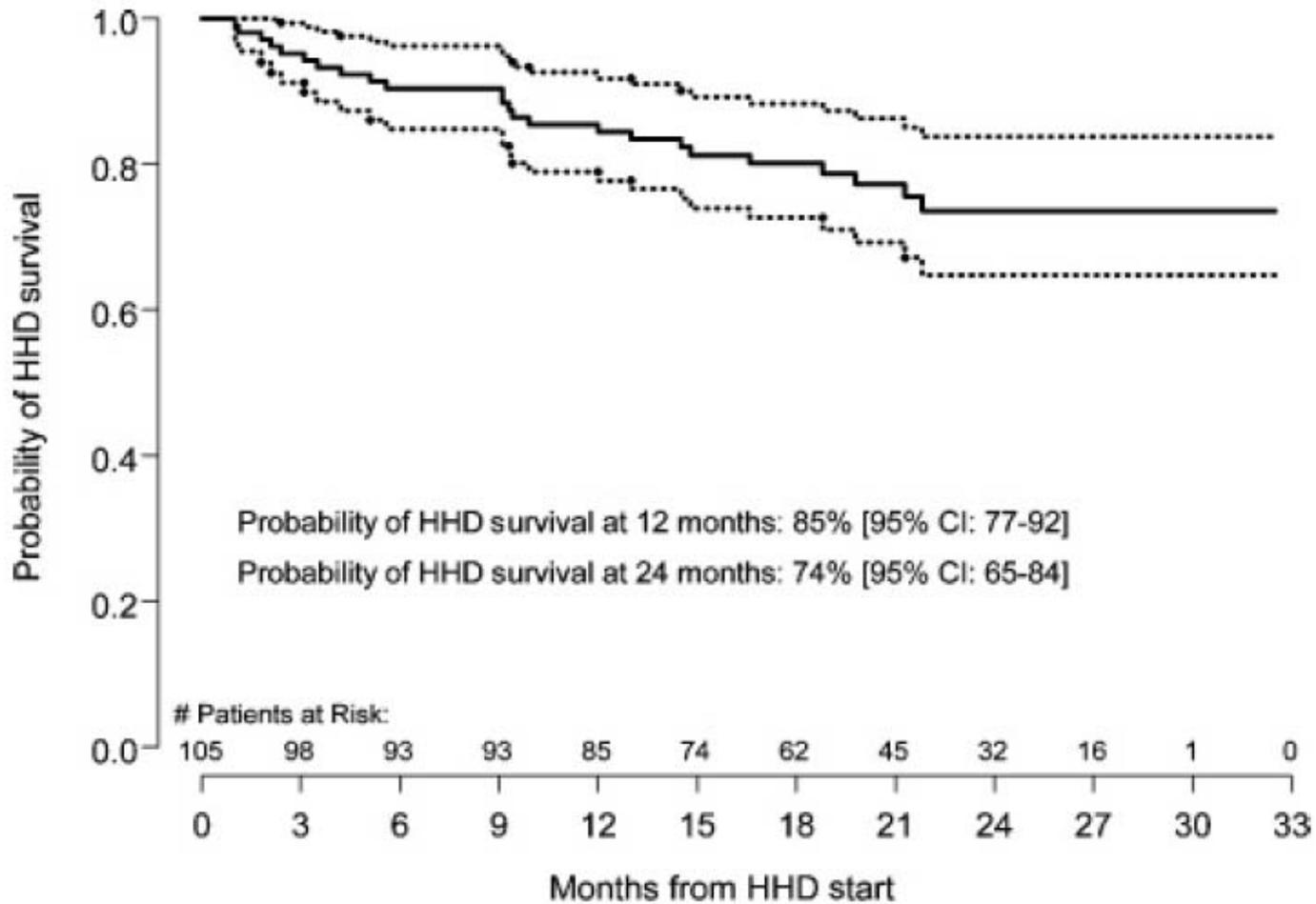


Fig. 3. Home haemodialysis technique survival (censored on transplant).



IAMHD Technique Survival (censored for death and transplant)

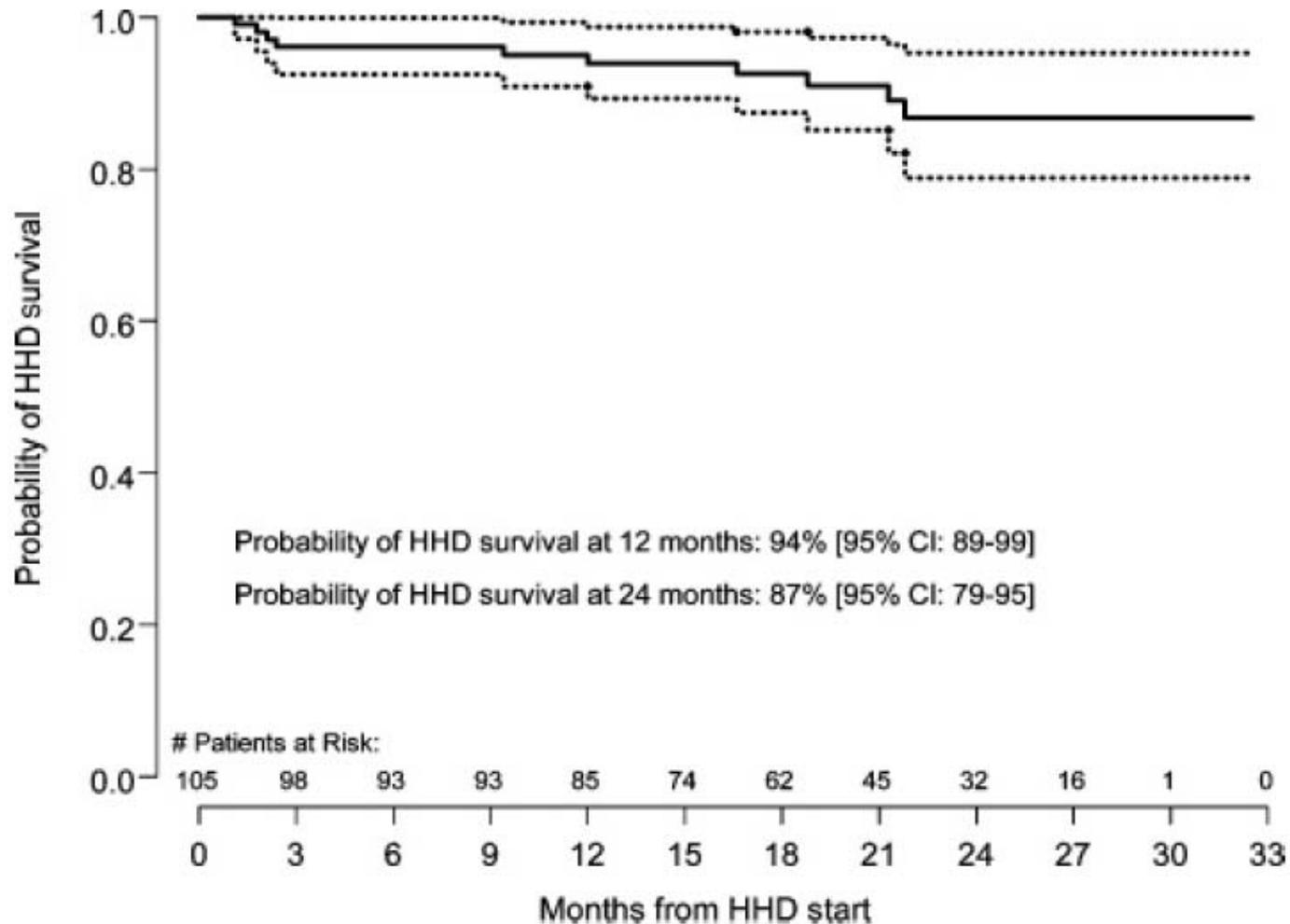


Fig. 4. Home haemodialysis technique survival (censored on transplant and death).



Benefits and unknowns about home hemodialysis

Clinical Outcomes
Quality of Life
Mortality



**BC Renal
Agency**

An agency of the Provincial
Health Services Authority

November 9, 2009

NHD and Clinical outcomes

Clinical Observations

Normalization of BP

LVH regression

- Chan et al, KI 2002

LV EF improvement

- Chan et al, NDT 2002

PVD improvement

- Chan et al, AJKD 2003

Sleep apnea correction

- Hanly et al, NEJM 2001

Improvement in anemia management

- Schwartz et al (Clin Nephro)

Mechanistic analysis

Restoration of TPR

Selective decrease in PNE

Time course in restoration of vascular responsiveness depends on Pi control

- Chan et al (ADC 2004)

Impact of NHD on EPC biology

- Chan et al (ASN 2004)

Restoration of nocturnal cardiac sympathetic outflow

- Chan et al (KI 2004)



NHD → marked impact on vascular and cardiac functions

Effect of Frequent Nocturnal Hemodialysis vs Conventional Hemodialysis on Left Ventricular Mass and Quality of Life A Randomized Controlled Trial

Bruce F. Culleton, MD, MSc

Michael Walsh, MD

Scott W. Klarenbach, MD, MSc

Garth Mortis, MD

Narine Scott-Douglas, MD, PhD

Robert R. Quinn, MD

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JAMA[®]

JAMA. 2007;298(11):1291-1299 (doi:10.1001/jama.298.11.1291)



Table 2. Outcomes for LV Mass, Blood Pressure, Anemia, and Mineral Metabolism^a

Characteristic	Nocturnal Hemodialysis ^b (n = 26)	Conventional Hemodialysis ^b (n = 25)	Between-Group Comparison (95% CI) ^c
LV mass, mean (SD), g			
Baseline	177.4 (51.1)	181.5 (52.3)	-4.1 (-40.5 to 41.3)
Exit	169.6 (45.2)	183.0 (54.2)	-13.4 (-60.5 to 21.7)
Change	-13.8 (23.0)	1.5 (24.0)	-15.3 (-20.6 to -1.0) ^d
LV mass, mean (SD), g/m²			
Baseline	92.4 (25.8)	101.8 (50.6)	-9.4 (-34.0 to 15.2)
Exit	85.3 (23.2)	102.8 (46.1)	-17.5 (-30.8 to 4.6)
Change	-7.1 (12.4)	1.0 (14.1)	-8.1 (-16.2 to -0.1) ^d
Blood pressure, mean (SD), mm Hg			
Systolic			
Baseline	129 (23)	135 (19)	-6 (-17 to 5)
Exit	122 (23)	130 (20)	-17 (-28 to -4)
Change	-7 (20)	4 (17)	-11 (-24 to 2)
Diastolic			
Baseline	75 (14)	77 (15)	-2 (-10 to 7)
Exit	68 (15)	75 (12)	-7 (-15 to 1)
Change	-7 (15)	-2 (12)	-5 (-13 to 2)
Anemia, mean (SD)			
Hemoglobin, mean (SD), g/dL			
Baseline	11.9 (1.2)	11.7 (1.3)	0.2 (-0.4 to 0.8)
Exit	11.6 (1.2)	11.8 (1.1)	-0.2 (-0.8 to 0.5)
Change	-0.3 (1.3)	0.1 (1.4)	-0.4 (-1.2 to 0.3)
Carboplatin-hematocrit ratio, mean (SD)			
Baseline	556 (116 to 1116)	320 (173 to 892)	P = .60
Exit	524 (54 to 1174)	333 (151 to 804)	P = .60
Change	0 (-115 to 302)	0 (-121 to 107)	P = .78
Mineral metabolism			
Serum calcium, mean (SD), mg/dL			
Baseline	9.5 (0.6)	9.1 (1.2)	0.4 (-0.1 to 0.9)
Exit	9.4 (0.7)	8.9 (0.8)	0.5 (0.0 to 0.8)
Change	-0.1 (0.8)	-0.2 (0.5)	0.1 (-0.3 to 0.4)
Serum phosphate, mean (SD), mg/dL			
Baseline	5.5 (1.5)	4.9 (1.3)	0.6 (-0.2 to 1.4)
Exit	4.4 (1.7)	5.3 (1.9)	-0.9 (-1.9 to 0.1)
Change	-1.1 (1.8)	0.4 (1.8)	-1.5 (-2.5 to -0.5) ^e
Calcium-phosphate product, median (IQR), mg²/dL²			
Baseline	51.8 (13.6)	44.0 (13.8)	6.9 (-0.8 to 14.7)
Exit	40.6 (16.3)	47.3 (16.9)	-6.7 (-16.7 to 3.3)
Change	-11.2 (16.2)	2.4 (16.8)	-13.6 (-22.3 to -4.3) ^e
Elemental calcium use, mg/d			
Baseline	900 (0 to 1800)	900 (300 to 1800)	P = .78
Exit	0 (0 to 0)	900 (600 to 1800)	P < .001
Change	-750 (-1800 to 0)	0 (0 to 0)	P < .001
Parathyroid hormone, median (IQR), pg/mL			
Baseline	249 (140 to 388)	140 (88 to 383)	P = .12
Exit	202 (75 to 282)	184 (83 to 401)	P = .85
Change	-84 (-155 to 125)	15 (-6 to 122)	P = .05



Table 2. Outcomes for LV Mass, Blood Pressure, Anemia, and Mineral Metabolism^a

Characteristic	Nocturnal Hemodialysis ^b (n = 26)	Conventional Hemodialysis ^b (n = 25)	Between-Group Comparison (95% CI) ^c
LV mass, mean (SD), g			
Baseline	177.4 (51.1)	181.5 (52.3)	-4.1 (-40.5 to 41.3)
Exit	163.6 (45.2)	183.0 (54.2)	-19.4 (-60.5 to 21.7)
Change	-13.8 (23.0)	1.5 (24.0)	-15.3 (-20.6 to -1.0) ^d
LV mass, mean (SD), g/m ²			
Baseline	92.4 (25.8)	101.8 (50.6)	-9.4 (-34.0 to 15.2)
Exit	85.3 (23.2)	102.8 (46.1)	-17.5 (-30.8 to 4.6)
Change	-7.1 (12.4)	1.0 (14.1)	-8.1 (-16.2 to -0.1) ^d
Blood pressure, mean (SD), mm Hg			
Systolic			

LV Mass	NHD (n=26)	CHD (n=25)	Between Group Comparison (95% CI)
Baseline	177.4	181.5	-4.1 (-40.4 to 41.3)
Exit	163.6	183.0	-10.4 (-60.5 to 21.7)
Change	-13.8	1.5	-15.3 (-20.6 to -1.0)

Exit	4.4 (1.7)	5.3 (1.9)	-0.9 (-1.9 to 0.1)
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Calcium-phosphate product, median (IQR), mg ² /dL ²			
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Elemental calcium use, mg/d			
Baseline	900 (0 to 1800)	900 (300 to 1800)	P = .78
Exit	0 (0 to 0)	900 (500 to 1850)	P < .001
Change	-750 (-1800 to 0)	0 (0 to 0)	P < .001
Parathyroid hormone, median (IQR), pg/mL			
Baseline	249 (140 to 388)	140 (58 to 383)	P = .12
Exit	202 (75 to 282)	184 (83 to 401)	P = .85
Change	-84 (-155 to 125)	15 (-6 to 122)	P = .06





Cross-Sectional Comparison of Quality of Life and Illness Intrusiveness in Patients Who Are Treated with Nocturnal Home Hemodialysis *versus* Peritoneal Dialysis

Edwin Fong, Joanne M. Bargman, and Christopher T. Chan

Toronto General Hospital–University Health Network, Toronto, Ontario, Canada

Clin J Am Soc Nephrol 2: 1195–1200, 2007.



Baseline Characteristics, Nocturnal vs Peritoneal Dialysis

Table 1. Baseline patient characteristics^a

Variable	NHD	PD	P
Age (yr; mean \pm SD)	49 \pm 12	61 \pm 13	<0.01
Male (%)	67	55	0.28
Race (%)			0.16
white	73	52	
black	6	16	
Asian	9	28	
other	12	4	
Highest education level (%)			0.051
elementary school	0	14	
high school	28	30	
college/undergraduate	53	43	
postgraduate	19	13	
Previous kidney transplant (%)	31	14	0.08
Living alone (%)	25	18	0.41
Charlson Index (mean \pm SD)	1.14 \pm 0.25	1.82 \pm 0.33	0.14
Years of renal replacement (yr; mean \pm SD)	10.8 \pm 1.7	7.6 \pm 1.0	0.10

^aNHD, nocturnal home hemodialysis; PD, peritoneal dialysis.



Quality of Life:

Comparison of KDQOL values between NHD and PD

Variable	NHD	PD	P-value
Symptom problem list	76.3 ± 2.5	71.9 ± 2.6	0.22
Effect of kidney disease	61.5 ± 3.7	60.7 ± 2.7	0.85
Burden of kidney disease	37.0 ± 4.4	47.0 ± 3.8	0.092
Work status	48.6 ± 7.6	36.0 ± 5.4	0.17
Cognitive function	75.6 ± 4.8	81.4 ± 2.2	0.27
Quality of social interaction	73.5 ± 3.0	75.8 ± 2.3	0.55
Sexual function	81.7 ± 5.4	61.8 ± 9.0	0.07
Sleep	52.8 ± 3.9	54.1 ± 2.7	0.79
Social support	65.7 ± 5.3	79.2 ± 2.8	0.027
Dialysis staff encouragement	89.2 ± 2.6	85.7 ± 2.8	0.37
Patient satisfaction	75.5 ± 4.3	79.2 ± 2.7	0.46

Clin J Am Soc Nephrol 2: 1195–1200, 2007.



Quality of Life:

Comparisons of illness intrusiveness score between NHD and PD

Variable	NHD	PD	P-value
Physical well-being and diet	3.81 ± 0.3	3.98 ± 0.20	0.65
Work and finance	3.77 ± 0.35	3.30 ± 1.64	0.27
Marital, sexual and family relations	3.32 ± 0.31	2.78 ± 0.22	0.16
Recreation and social interactions	3.23 ± 0.28	3.11 ± 0.18	0.72
Other aspects of life	2.46 ± 0.25	2.47 ± 0.20	0.96

Clin J Am Soc Nephrol 2: 1195–1200, 2007.



Original Article

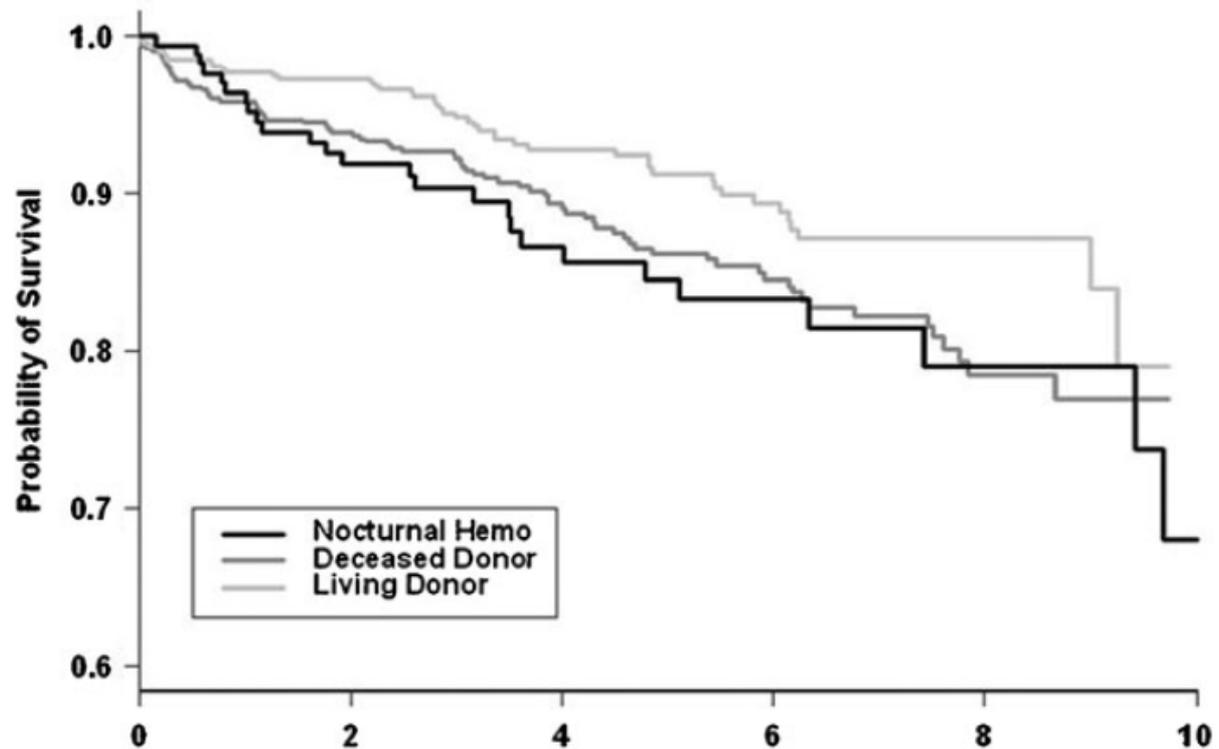
Survival among nocturnal home haemodialysis patients compared to kidney transplant recipients

Robert P. Pauly¹, John S. Gill², Caren L. Rose², Reem A. Asad³, Anne Chery⁴, Andreas Pierratos⁵ and Christopher T. Chan³

¹Division of Nephrology, Department of Medicine, University of Alberta Hospital, University of Alberta, Edmonton, AB, ²Division of Nephrology, Department of Medicine, St. Paul's Hospital, University of British Columbia, Vancouver, BC, ³Division of Nephrology, Department of Medicine, Toronto General Hospital, University of Toronto, ⁴Toronto Region Dialysis Registry, University Health Network and ⁵Department of Nephrology, Humber River Regional Hospital, University of Toronto, Toronto, ON, Canada



Fig. 1. Time to death in patients treated with nocturnal haemodialysis, deceased and living donor kidney transplantation (log-rank test, $P = 0.03$).



N	0	2	4	6	8	10
NHD	177	134	85	48	28	10
DTX	531	463	302	198	90	0
LTX	531	458	282	170	60	0

Time From Modality Start (Years)



Nephrol Dial Transplant (2008) 1 of 7
doi: 10.1093/ndt/gfn210

Original Article

NDT
Nephrology Dialysis Transplantation

Short daily haemodialysis: survival in 415 patients treated for 1006 patient-years

Carl M. Kjellstrand¹, Umberto Buoncristiani², George Ting³, Jules Traeger⁴, Giordina B. Piccoli⁵, Roula Sibai-Galland⁶, Bessie Ann Young⁷ and Christopher R. Blagg⁷



Short Daily Hemodialysis Survival:

Kjellstrand et al

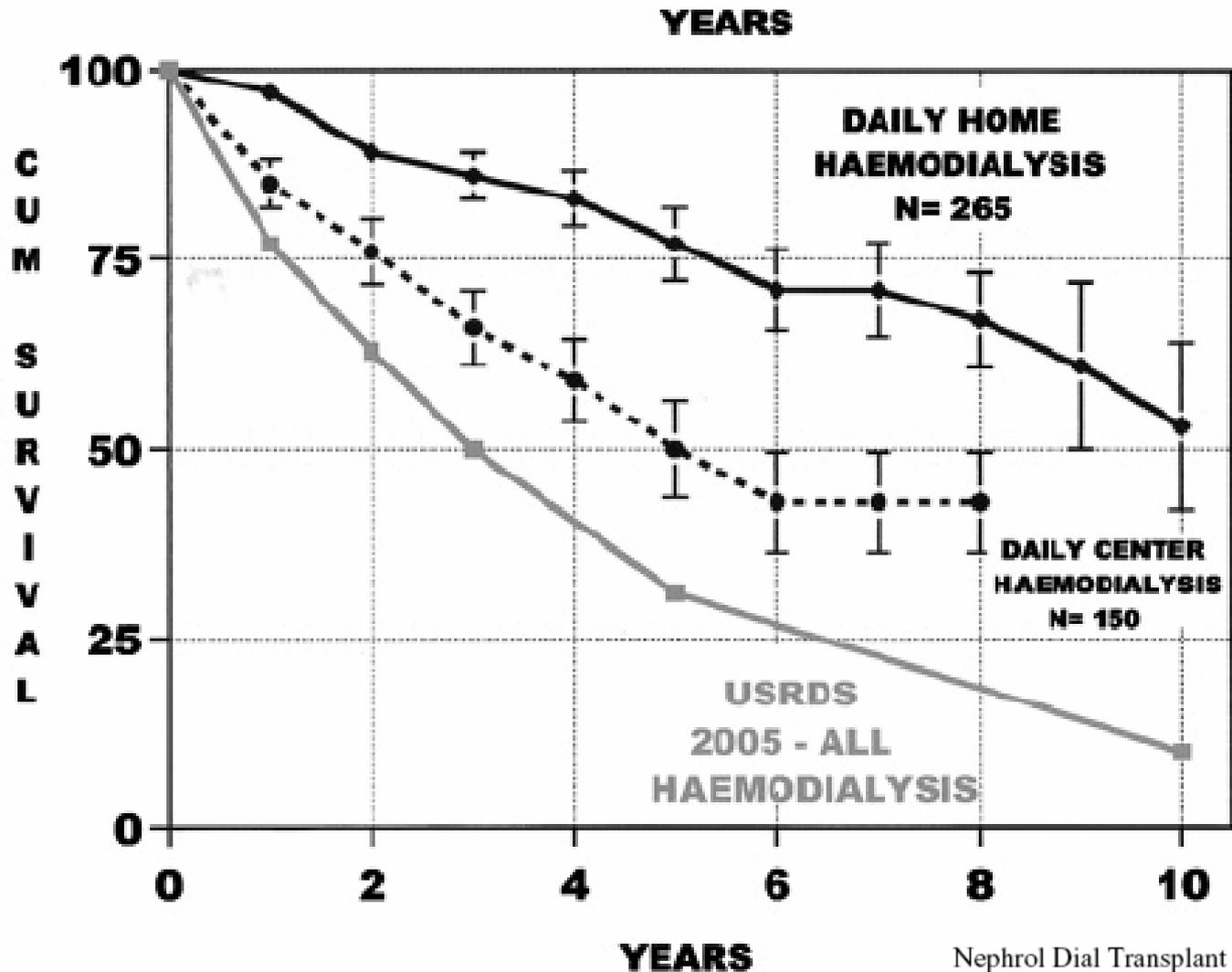
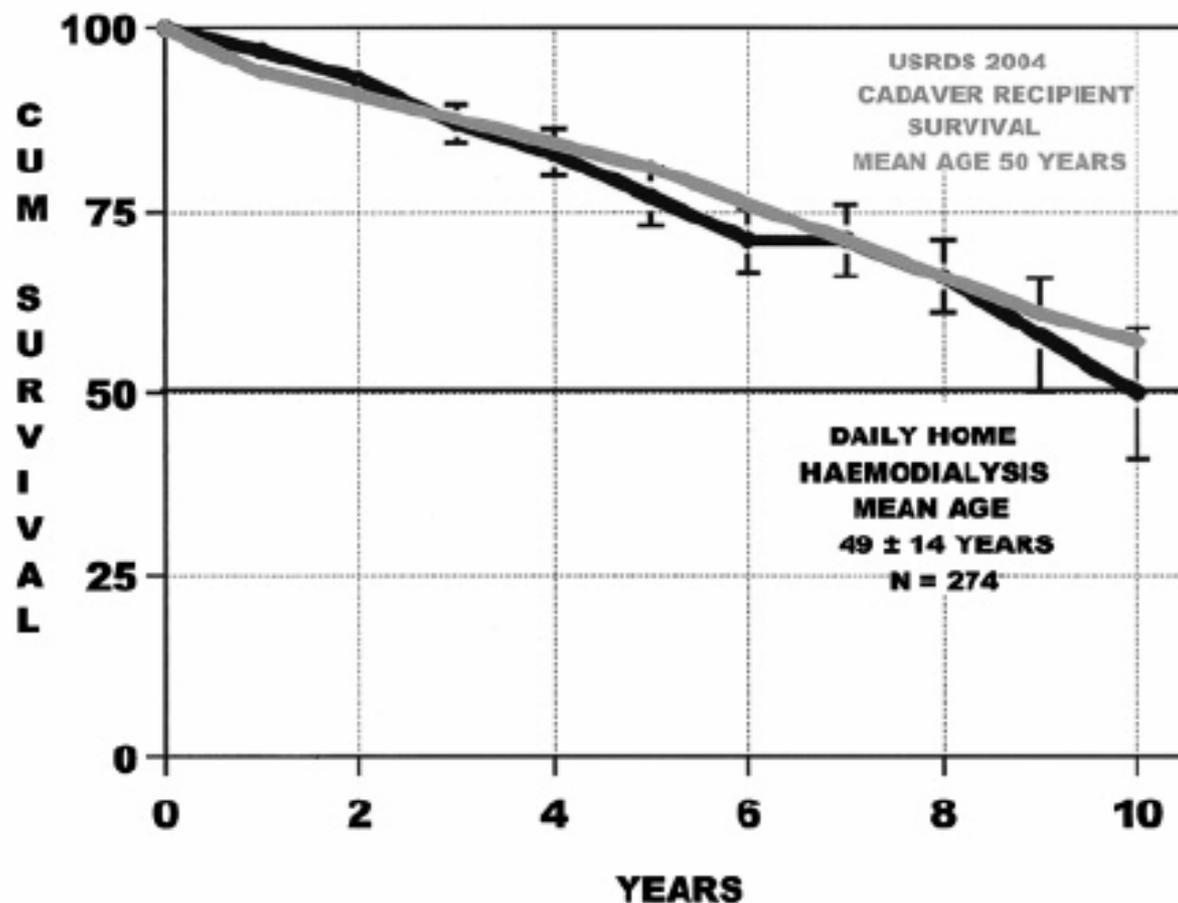
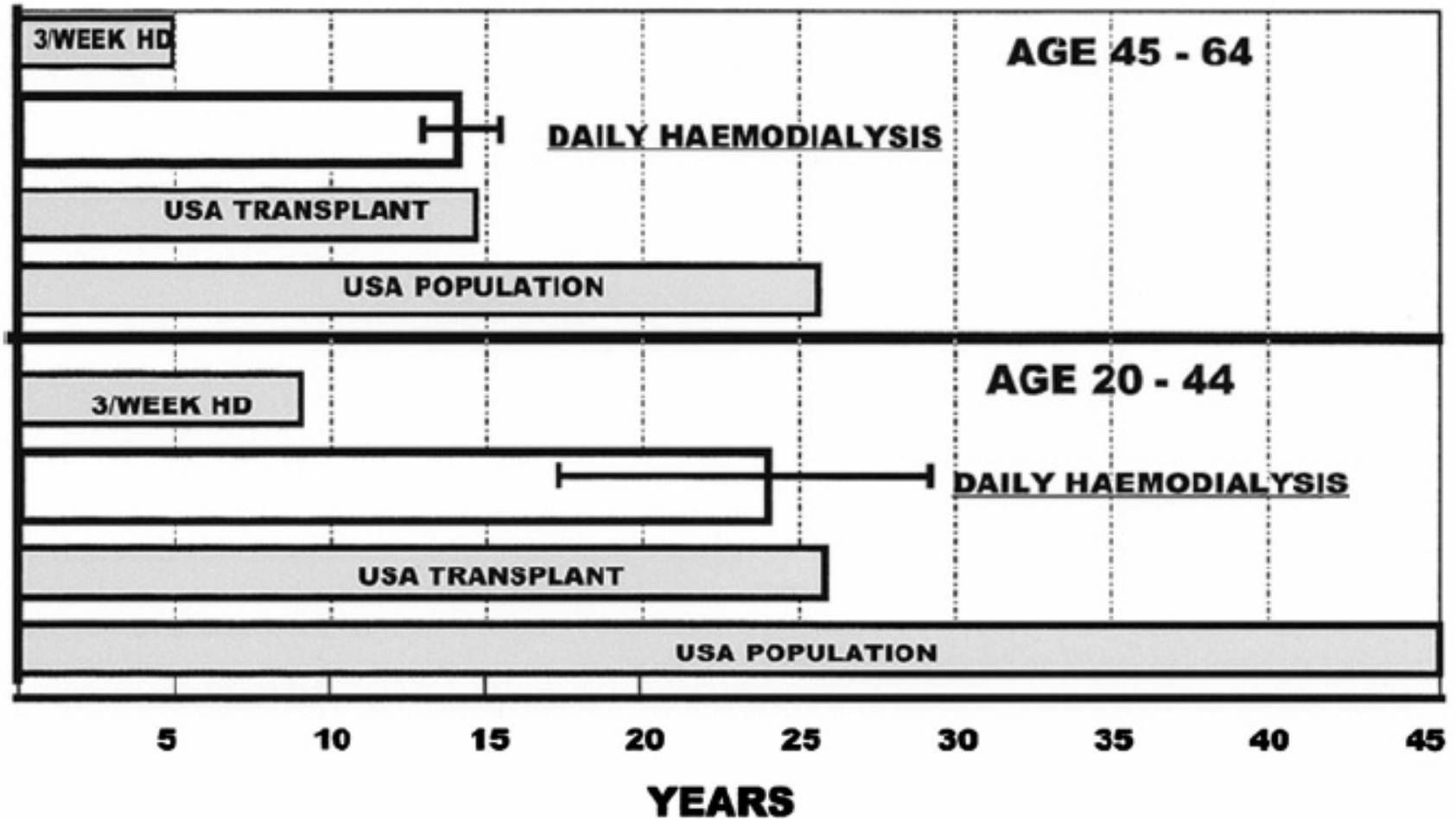


Fig. 4. Comparison of daily home haemodialysis patients to survival of recipients of deceased donor renal transplant is the USRDS. The survival is virtually identical and the age of the patients the same.



LIFE EXPECTANCY



Weekends are bad for Chronic Hemodialysis patients!



Sudden and cardiac death rates in hemodialysis patients

Bleyer AJ et al, Kidney Int. 1999;55:1553-1559

For Monday, Wednesday, Friday patients, **20.8%** of sudden deaths occur on Monday compared to **14.3%** expected ($P = 0.002$) - a **45% increase in mortality**

For Tuesday, Thursday, Saturday patients, **20.2%** of cardiac deaths occur on Tuesday compared to **14.3% expected** ($P = 0.0005$).

There is an even distribution of sudden and cardiac deaths throughout the week in peritoneal dialysis patients



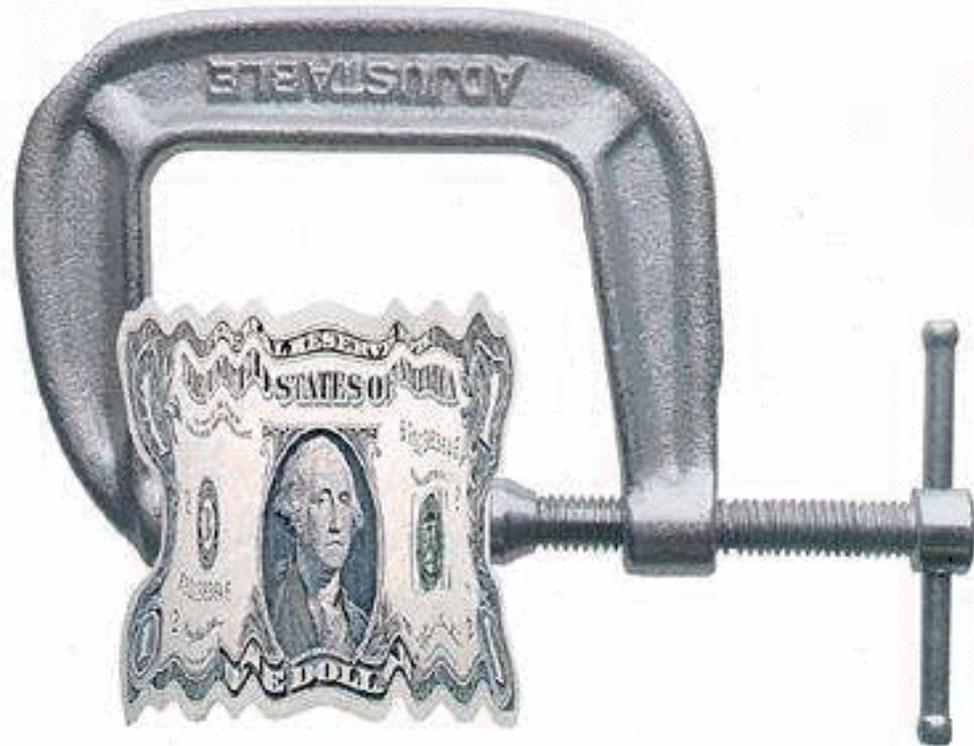
Impact of Independent hemodialysis on the healthcare system:

Costs

Effect on other independent modalities (ie, PD)



Cost effectiveness



The Costs of Starting a Provincial Home Hemodialysis Program: When do we break even?

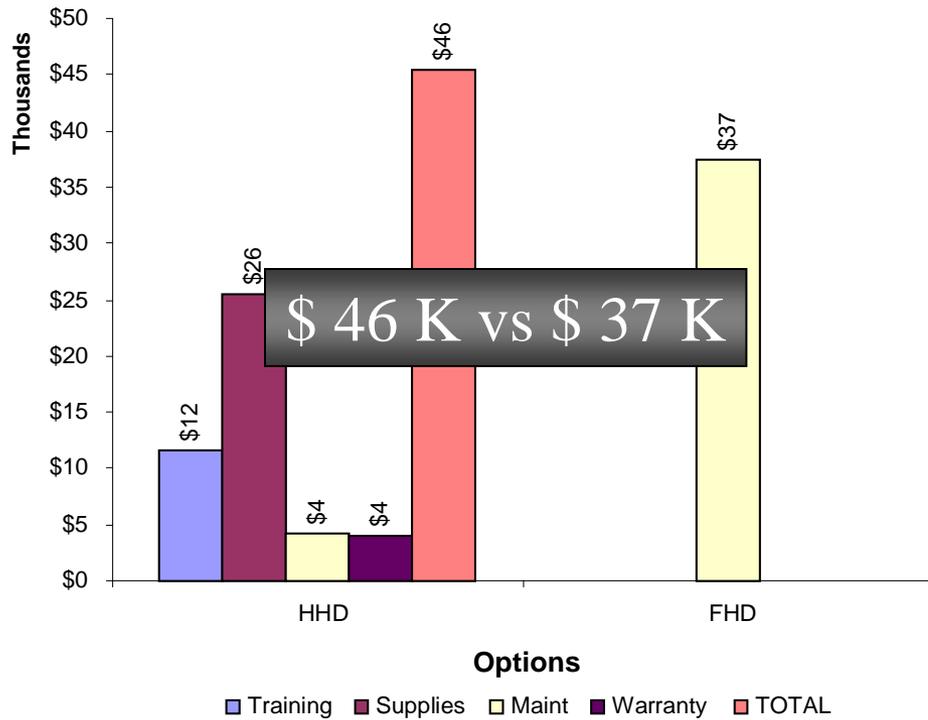
Komenda P*, Levin A*†, Djurdev O†, Makwana J†, Copland M*†.

*University of British Columbia Division of Nephrology,

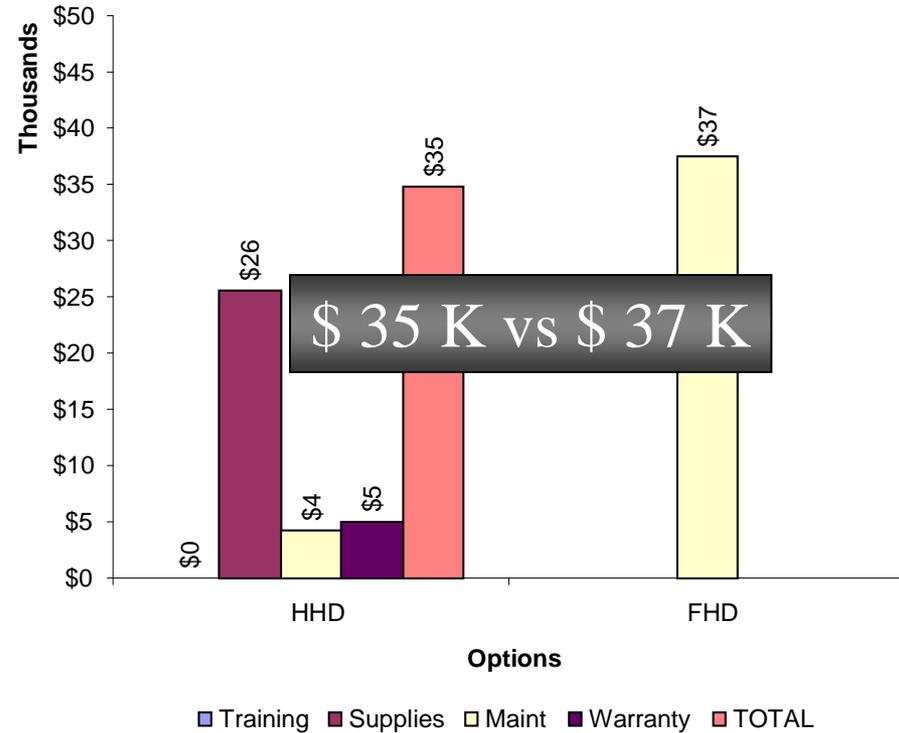
†BC Provincial Renal Agency, Vancouver, British Columbia, Canada.

Cost per Patient

Year 1



Year 2 and beyond



Cost Comparison, Home HD vs Blended Facility Based Care (Provincial Program)

	2004 - 2005		2005 - 2006		2006 - 2007 Projected		2007- 2008 Projected		2008- 2009		2009- 2010	
	PY	\$\$	PY	\$\$	PY	\$\$	PY	\$\$	PY	\$\$	PY	\$\$
Home HD Program												
Entry Training	N=53		N=69	804,865	N=50	583,236	N=60	699,883	Assume NO New Patients (N = 232)		Assume NO New Patients (N = 232)	
Exits			9.00	2,942	10.00	3,269	12.00	3,923	-	0	-	0
Maintenance HHD	12.36	513,769	65.58	1,948,816	130.67	3,882,859	203.19	6,037,791	203.19	6,037,791	203.19	6,037,791
P yrs Facility HD	9.51	368,656	17.52	655,661	27.44	1,026,737	42.67	1,596,561	42.67	1,596,561	42.67	1,596,561
Start up costs		788,000		20,000		0		0		0		0
Home Renovation		110,000		107,500		50,000		100,000		100,000		100,000
Equip. Warranty		36,000		443,000		700,000		750,000		750,000		750,000
TOTAL HHD	21.86	\$1,816,425	83.11	\$3,982,784	158.11	\$6,246,101	245.86	\$9,188,158	245.86	\$8,484,352	245.86	\$8,484,352

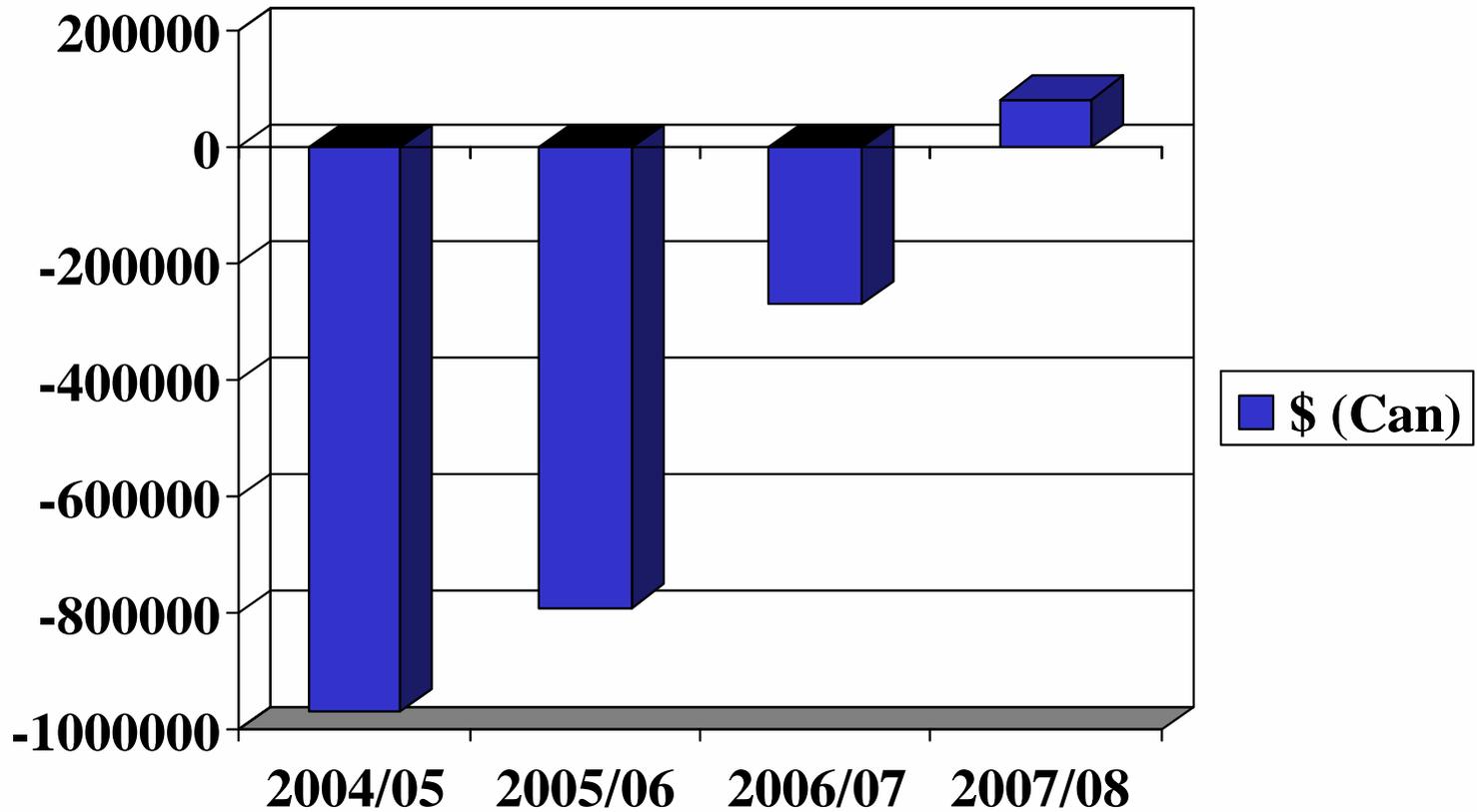
Without Home HD Program - Facility Based HD												
Home HD at unit	12.36	479,234	65.58	2,536,397	130.67	4,949,682	203.19	7,675,224	203.19	7,602,673	203.19	7,602,673
Facility HD	9.51	368,656	17.52	655,661	27.44	1,026,737	42.67	1,596,561	42.67	1,596,561	42.67	1,596,561
IN Facility Costs	21.86	\$847,890	83.11	\$3,192,058	158.11	\$5,976,419	245.86	\$9,271,785	245.86	\$9,199,234	245.86	\$9,199,234
SAVINGS		(968,535)		(790,726)		(269,682)		83,627		714,882		714,882

Summary of Costs and Savings over 6 years (Assume NO New patients after Year 4)

	2004 - 2005		2005 - 2006		2006 - 2007 Projected		2007- 2008 Projected		2008- 2009		2009- 2010	
	PY	\$\$	PY	\$\$	PY	\$\$	PY	\$\$	PY	\$\$	PY	\$\$
HOME HD Pgm		\$1,816,425		\$3,982,784		\$6,246,101		\$9,188,158		\$8,484,352		\$8,484,352
Facility HD Pgm		\$847,890		\$3,192,058		\$5,976,419		\$9,271,785		\$9,199,234		\$9,199,234
Surplus/(Deficit)	21.86	(\$968,535)	83.11	(\$790,726)	158.11	(\$269,682)	245.86	\$83,627	245.86	\$714,882	245.86	\$714,882
Cummulative		(\$968,535)		(\$1,759,262)		(\$2,028,943)		(\$1,945,316)		(\$1,230,434)		(\$515,552)

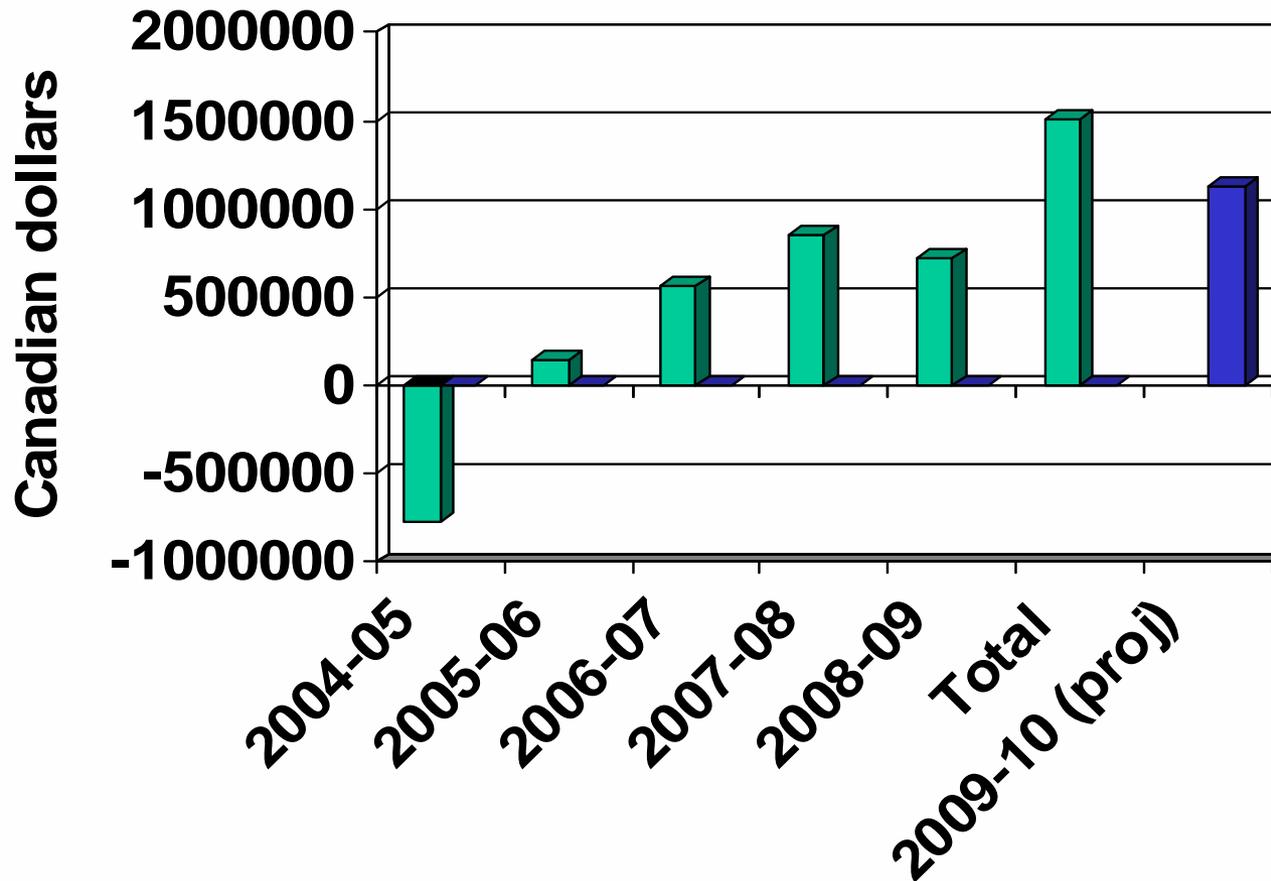


Actual Costs of Implementation of Provincial Program

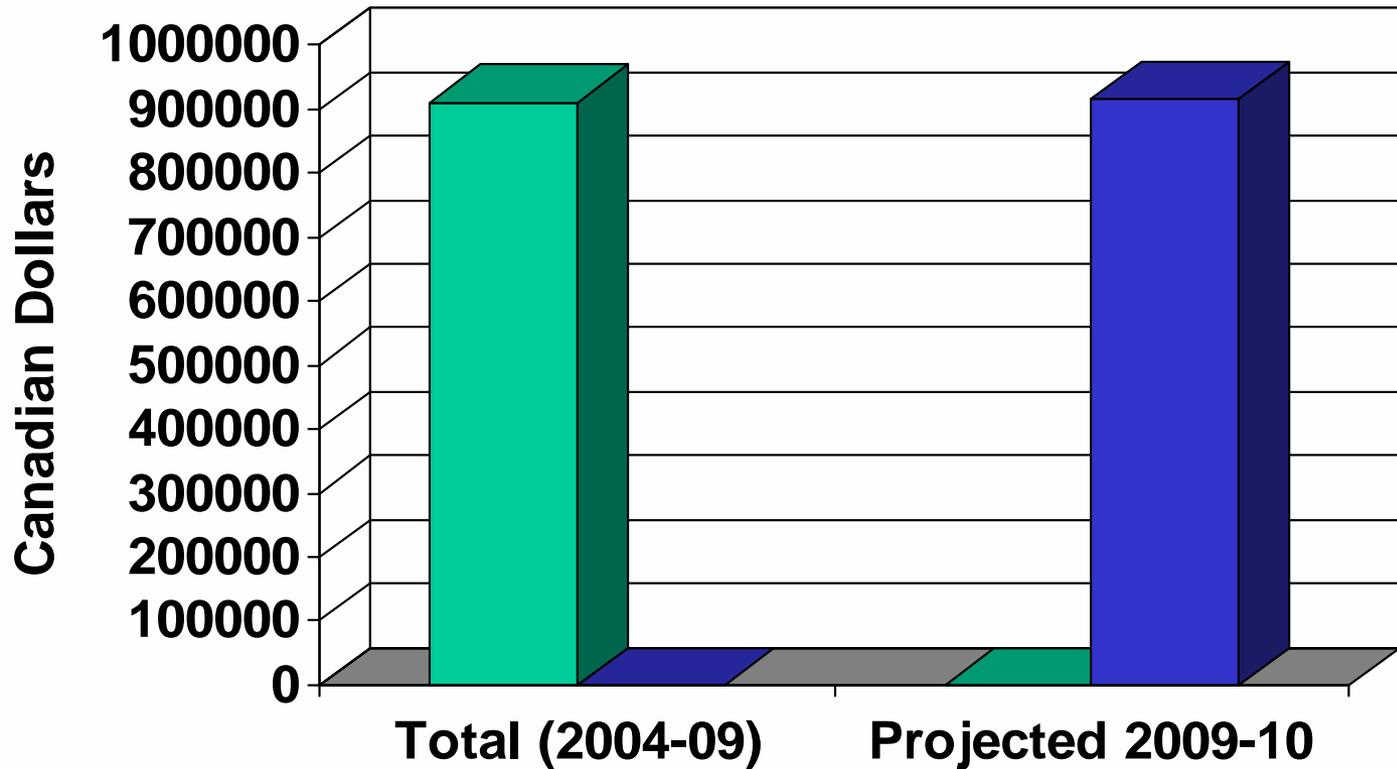


Put another way...

Cost deferrals with BC IAMHD Program



Total cost deferrals with BC IAMHD Program (adjusted for facility-based HD runs)



Does growth of Independent HD simply steal from PD??

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"Is robbing Peter to pay Paul like using your Mastercard to pay Visa?"

A skeptical view of assisted home peritoneal dialysis

DC Mendelssohn^{1,2}

Kidney International (2007) **71**, 602–604.



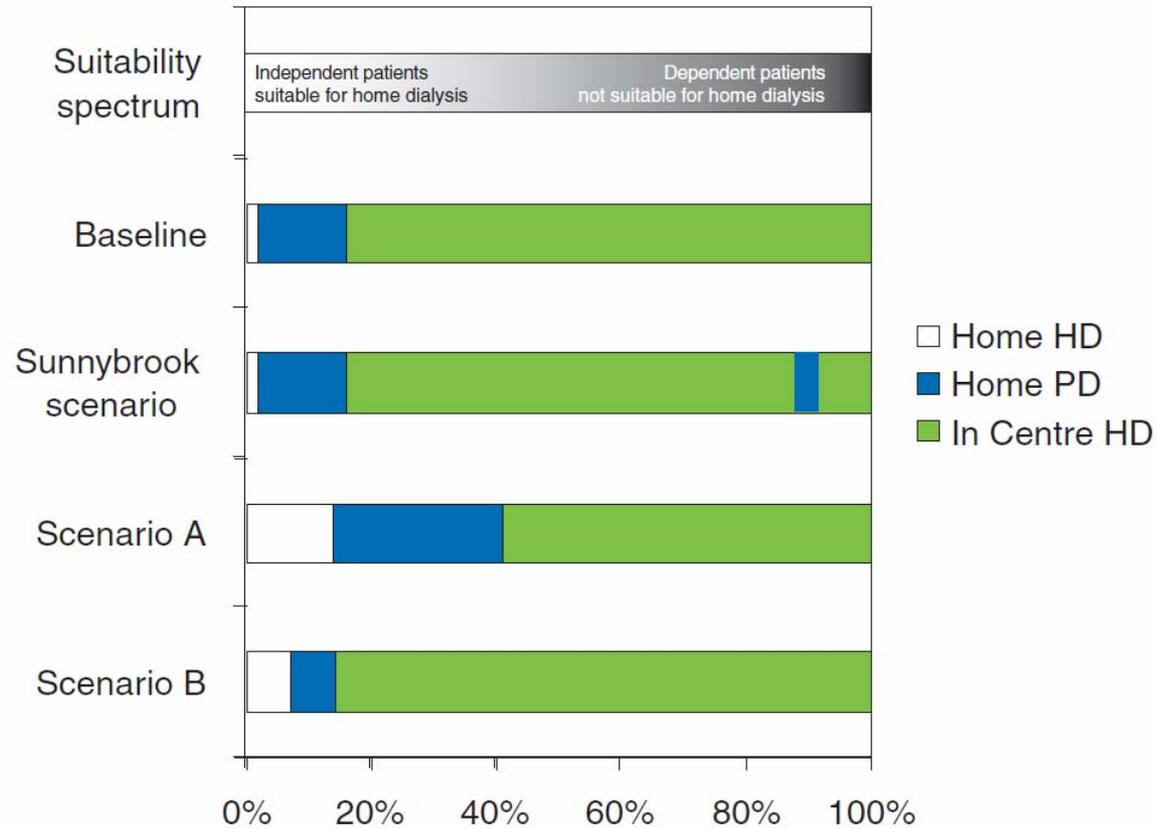


Figure 1 | A theoretical spectrum of dialysis patients classified by suitability for home dialysis. The baseline represents a hypothetical current dialysis-modality distribution. The Sunnybrook scenario shows the new region where potential dependent, assisted peritoneal dialysis (PD) patients derive from. Scenario A shows the effect of expansion of the pool of patients eligible for home dialysis (both hemodialysis (HD) and PD), with growth of both modalities. Scenario B represents the growth of home HD, through competition with PD for the existing pool of home-eligible patients. PD utilization has decreased.



A skeptical view of assisted home peritoneal dialysis

DC Mendelssohn^{1,2}

« PD enthusiasts should be re-examining the spectrum shown in Figure 1 and considering a large and novel future threat to PD utilization. It seems that home HD (and especially daily home HD) is believed by nephrologists to be underutilized. Therefore a rather fundamental question must be carefully considered: where will these new home HD patients come from?

Home HD patients are the most independent, at the far left of the spectrum. If the new generation of home HD patients comes from the PD pool instead of from the in-center HD pool, then growth of home HD will reduce the prevalence of PD (Figure 1, scenario B). This seems the likeliest scenario, because patients in the PD pool are more independent than those in center. The PD community should think about how to expand the eligible pool for both PD and home HD (scenario A), rather than focus on PD only, ***because in a direct competition for patients with home HD, PD is likely to lose market share.*** »



Nephrol Dial Transplant (2009) 1 of 5
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Nephrol Dial Transplant (2009) 1 of 5
doi: 10.1093/ndt/gfp130



Original Article

Implementing a home haemodialysis programme without adversely affecting a peritoneal dialysis programme

Michael Copland^{1,2}, Donna Murphy-Burke¹, Adeera Levin^{1,2}, Rajinder S. Singh², Paul Taylor² and Lee Er¹

¹British Columbia Renal Agency and ²Division of Nephrology, University of British Columbia, Vancouver, BC, V5Z 1M9, Canada



Table 3: Percent annual growth in each modality in BC

Modality	Fiscal year January 2000 – April 2003	Fiscal year May 2004 – August 2008
In-hospital HD	4.61	1.3
Community HD	12.28	5.87
Peritoneal Dialysis	7.84	7.34
Home Hemodialysis	19.17	124.18

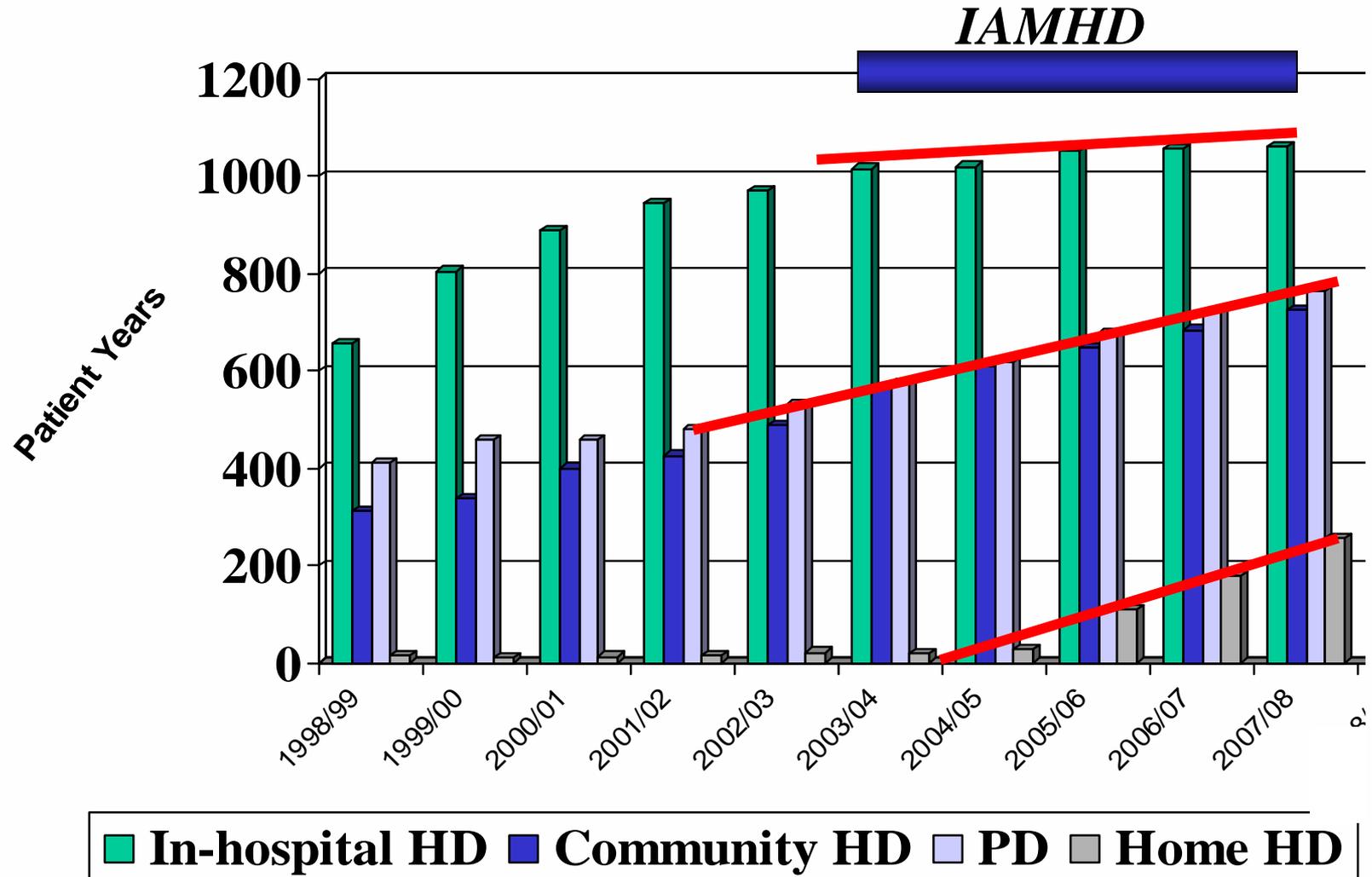


Table 5: Exposure to PD prior to initiation of HHD

Prior PD Status	Total (%)
Not on PD before HHD	71.2%
Ended PD < 6 months before HHD	6.4%
Ended PD 6 – 12 months before HHD	6.9%
Ended PD > 12 months before HHD	15.5%



Dialysis Patient Activity (in Patient Years) by Dialysis Modality



Barriers to the increase in Independent hemodialysis

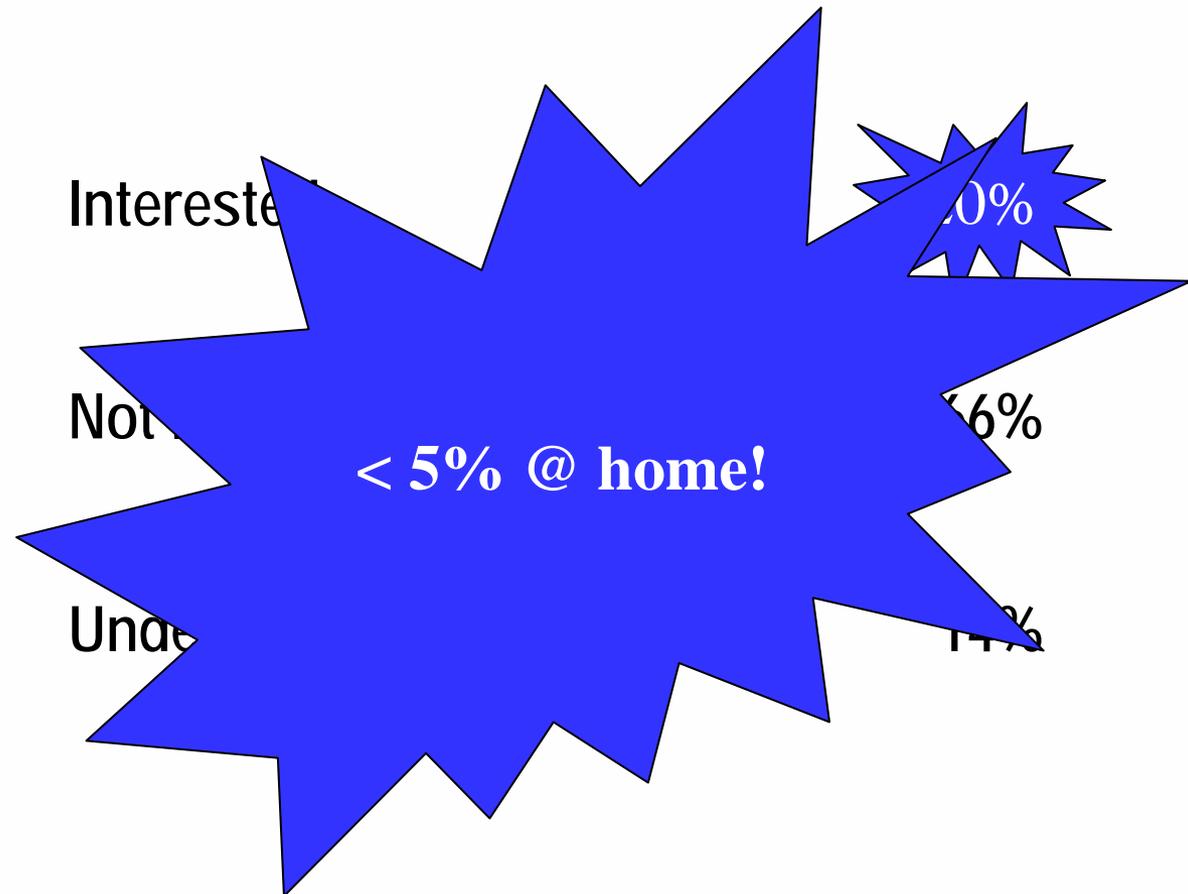


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November 9, 2009

Systematic Survey of All Hemodialysis Patients Interest in Independent Dialysis: Province Wide Implications





“Patient-Perceived Barriers to the Adoption of Nocturnal Home Hemodialysis”

Cafazzo J, Leonard K, Easty A, Rossos P, Chan C

Clin J Am Soc Nephrol 4: 784-89, 2009



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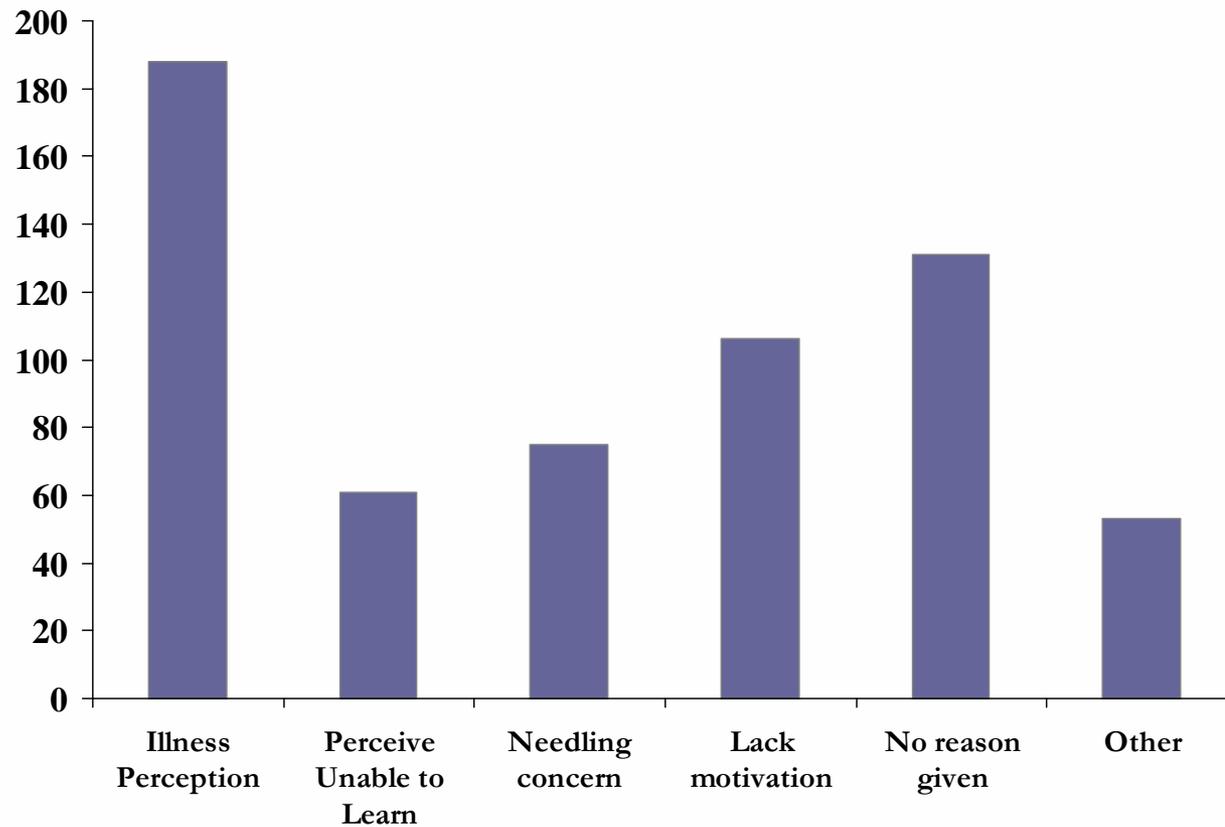
9 novembre 2009

“Patient-Perceived Barriers to the Adoption of Nocturnal Home Hemodialysis”

- 66 NHHD patients and 290 CHD patients in UHN surveyed.
- 85% response NHHD group; 77% response CHD group
- Identified barriers:
 - Perceived burden on family members
 - Fear of self-cannulation
 - Fear of a catastrophic event in the absence of nursing support
 - Lack of self-efficacy



British Columbia experience: Of those stating 'not interested' or 'undecided', reason given...



So, who should we be targeting to grow the independent programs?



Patient Selection: MATCH-D Tool

- Tool to help Nephrologists and dialysis staff identify and assess candidates for home dialysis therapies (both PD and HHD)
- Tool designed to sensitize clinicians to key issues about who can use home dialysis

Column 1 – triage criteria for home

Column 2 – Solutions to common barriers

Column 3 – contraindications to home treatments
(may be overcome with partner)



Method to Assess Treatment Choices for Home Dialysis (MATCH-D)

www.homedialysis.org/match-d

Criteria for Suitability for *Self* Home Hemodialysis: Conventional, Daily, Nocturnal

Strongly Encourage Home HD (HHD)
Any patient who <i>wants</i> to do HHD <i>or</i> has no barriers to it
Employed full- or part-time
Drives a car – skill set is very similar to learning HHD
Caregiver for a child, elder, or person with disability
Lives far from clinic and/or has unreliable transportation
Student – grade school to grad school
Needs/wants to travel for work or enjoyment
Wants a flexible schedule for any reason
Has rejected a transplant
Has neuropathy, amyloidosis, LVH, uncontrollable BP††
Obese/large; conventional HD or PD are not adequate ††
Can't/won't follow in-center HD diet & fluid limits††
Is pregnant or wants to be ††
Frail/elderly with involved, caring helper who wants HHD*
Wants control; unhappy in-center
No longer able to do PD

Encourage HHD After Assessing & Eliminating Barriers
No employer insurance – not a barrier to nocturnal 3x/week HHD, which Medicare & Medicaid cover
Unkempt – provide hygiene education; assess results
Has pet(s)/houseplants (carry bacteria) – bar from room at least while cannulating/connecting access
Frail or can't walk/stand – assess lifting ability, offer PT*
Illiterate – use pictures to train, return demonstrations to verify learning, tape recorders for patient reports
Hearing impaired – use light/vibration for alarms
Depressed, angry, or disruptive – increased control with HHD may help
No helper & clinic requires one – reconsider policy, monitor remotely, use LifeLine device to call for help
Rents – check with landlord if home changes needed
Can't/won't self-cannulate – use patient mentor, practice arm, local anesthetic cream, desensitization*
No running water, poor water quality, low water pressure – assess machine & water treatment options
Limited space for supplies – visit home, 2x/mo delivery, consider machine with fewer supply needs
Drug or alcohol abuse – consider HHD after rehab
Bedridden and/or has tracheostomy/ventilator – assess self-care and helper ability*
Rx drugs impair function – consider drug change

May Not Be Able to Do HHD (or Helper Must Do More)
Homeless; consider PD if storage is available
Can't maintain personal hygiene
Home is health hazard, will not correct
No or unreliable electricity
Brain damage, dementia, or poor short-term memory*
No use of either hand*
Uncontrolled psychosis or anxiety*
Blind or severely visually impaired – consider PD*
Uncontrolled seizure disorder*
No remaining HD access sites – consider PD
Reduced awareness/ability to report bodily symptoms
Has living donor; transplant is imminent – consider PD

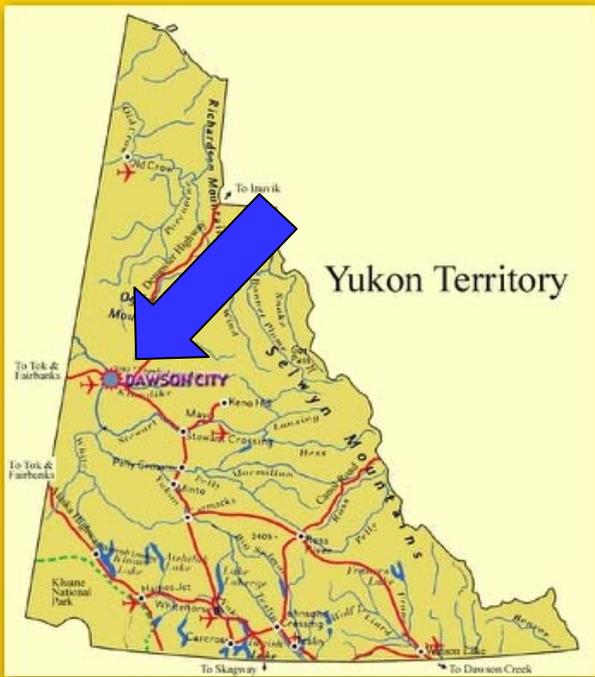


* May be able to do with a helper
 † Consider nocturnal HHD
 ‡ Consider daily HHD

Patient Inclusion Criteria



Isolated Patient



Isolated Patient



**What about those people who want
independence, but can't do it at
home?**



In-centre Nocturnal Hemodialysis Context

Has been done elsewhere (Tassin, France,
Toronto, Australia)

However, has been done with fully dependent
patients:

– Queensland, Australia

- 1257 patients invited to participate
- 224 patients agreed to participate



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8hr vs 4hr thrice weekly HDx

Methods

- 1 year prospective matched control study
- 1257 invited to participate
 - Temporary catheter excluded
 - Life limiting comorbidity excluded
- 224 agreed to undertake 8hrx3 NICH
- 224 controls (matched for age, sex, diabetes, HDx vintage) underwent 4hrx3 dialysis
- Primary endpoints mortality and morbidity

Baseline characteristics

- Age 45 +/- 12
- Female 32%
- Diabetes 40%
- Smokers 18%
- BMI 24 +/- 5
- Weight 65 +/- 15kg
- AVF 92%

NICH dialysis was Na 138, K 2, Ca 1.5, Fx60



Queensland, Australia Results

- No BP change but reduction from 24% to 8% on anti-hypertensives
- Reduced intra-dialytic hypotension (60% to 12%)
- 72% reduction in phosphate binder use
- Reduced phosphate and $\text{Ca} \times \text{PO}_4$
- Reduced hospitalisations
- Improved cognitive function
- No change in QOL/depression scores
- Reduced LVMI



Queensland, Australia Results

	Nocturnal In-centre HD	Conventional Hemodialysis
Discontinuation of treatment due to symptoms	17%	30%
Death	3 / 224	14 / 224



“In-center Nocturnal Hemodialysis: Another option in the management of Chronic Kidney Disease”

Bugeja A, Dacouris N, Thomas A, Marticorena R,
McFarlane P, Donnelly S, Goldstein M

Clin J Am Soc Nephrol 4: 778-783, 2009



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In-center Nocturnal Hemodialysis: Another option in the management of CKD

- Patient population: Patients not optimally treated with conventional hemodialysis, who were unable to perform home
- Total population = 39



In-center Nocturnal Hemodialysis: Another option in the management of CKD

- Patient population: Patients not optimally treated with conventional hemodialysis, who were unable to perform home HD

Variable	n
Hyperphosphatemia	23
Employment / Lifestyle	8
Quality of Life	3
Congestive heart failure	1
Other	4

- Reasons for home 'insuitability' not given



In-center Nocturnal Hemodialysis: Another option in the management of CKD

- Patient departures from program = 17

Reason for departure	n
Renal transplantation	5
Spousal concerns	3
Lifestyle concerns	2
Sleeping difficulties	1
Transfer to another hospital	1
Transfer to PD	1
Discontinuation of dialysis	1

- Total of 3 deaths



Comparison of laboratory data from baseline to 12-months following conversion to INHD

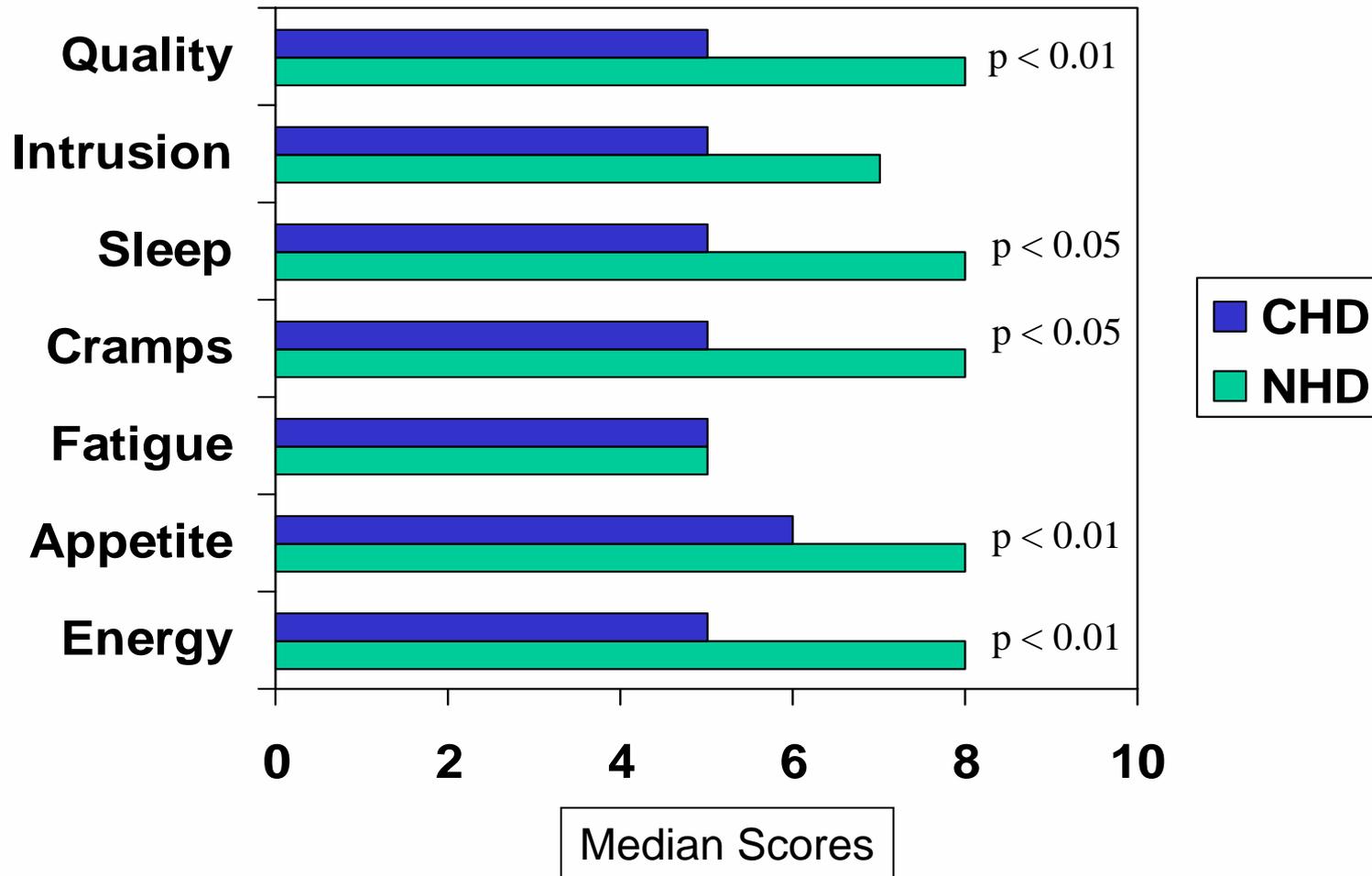
Parameter	Baseline at conversion to INHD	6 months after INHD	12 months after INHD
n	39	28	25
PRU (%)	76 (71 – 82)	89 (87 – 90)	89 (79 – 93)
Phosphorus (mmol/L)	1.74 (1.16 – 2.23)	1.52 (1.36 – 1.91)	1.20 (1.07 – 1.62)
Hemoglobin (g/L)*	115 (102 – 127)	117 (105 – 129)	126 (114 – 128)

* HgB trends seen with a net ESA dose reduction (baseline vs 12-month – 2089 U/week reduction)



St. Michael's Hospital Results

Quality of Life Questionnaire (n=23)



British Columbia's Independent Incentre NHD Program

...an extension of the home...



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IAMHD Program Guiding Principles

To provide the highest quality dialysis possible in the most appropriate setting, promoting independent care to the degree that is appropriate for the individual patient.

Independence includes:

- home-based treatments ('Phase 1')
- ***independent treatments within existing facilities ('Phase 2' – 2008)***

Equitable access to care, with preservation of regional autonomy.

Centrally negotiated equipment and service contract, with standardized teaching materials and safety protocols ('Turn-key Operation')



VCH / PHC Recruitment Experience

October 2004 – October 2007

Parameter	Number
Patients assessed	134
Patients trained	85
Patients excluded	49
<i>Patients excluded due to home/social reasons</i>	14



In-Centre NHD – Operational Plan

First questions were:

Will patients continue to attend program?

Will there be clinical benefits as seen in home-based nocturnal hemodialysis?

Now up to 7 (+1) patients, dialyzing from 21.30 – 06.00 on M, W, F.;

Supervised by RN (1) and PCA (1)

- Not participating in dialysis care
- Present for assistance with emergency

- Patients trained fully for independent hemodialysis (all aspects)

- Certification of competence at end of 6 week training period

- Self-management of all aspects of dialysis treatment

- Set-up/clean up
- Self-cannulation
- Management of alarm situations

Clinical follow up in IAMHD clinic by IAMHD team



Dialysis Teaching Unit by Day



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Dialysis Teaching Unit by Night



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Future projections

By end of November, will be up to 8 patients, and planning to add 2nd shift (TThSat)

100% positive feedback from patients – all wish to remain with program

??Movement from stable, fully independent patients to patients in whom more aggressive dialysis would be of benefit*

- Sicker outpatient HD patient
- Admitted Chronic HS patients
- Overnight call centre for home patients





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