

## The Myths and Realities of Independent Dialysis

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THE  
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BRITISH  
COLUMBIA



**BC Renal Agency**  
An agency of the Provincial Health Services Authority

# Objectives

- Establish the context
- The myth of high infection rates
- The myth of being only for people near hospitals
- The myth of needing a helper
- The myth of mortality



# The BC picture

As of June 2010 the % of dialysis patients on independent therapy across was BC was

- a) 18%
- b) 25%
- c) 30%
- d) 41%



# Is that good?

- In New Zealand percentage of HHD patients = 25%
- In Hong Kong percentage of PD patients = 80%
- In Canada 2008 prevalent pts on HHD = 2% and on PD = 17% (CORR data)
- So maybe – or maybe not



# What do Patients want?

In a 2008 provincial survey of all CKD pts with  $GFR < 15$  what percentage said they were interested in additional information regarding home based therapy?

- a)32%
- b)46%
- c)55%
- d)61%



# What do Patients Say

In a 2008 survey of all Home hemodialysis patients what % of the respondents said they would recommend HHD to other CKD patients?

- a) 55%
- b) 68%
- c) 84%
- d) 97%



# CKD Pts Concerns about Pursuing Independent Dialysis

- In the 2008 provincial survey of CKD patients (GFR <15) when asked to identify the reasons, medical or otherwise, that would stop them from going onto independent dialysis what was the biggest concern?

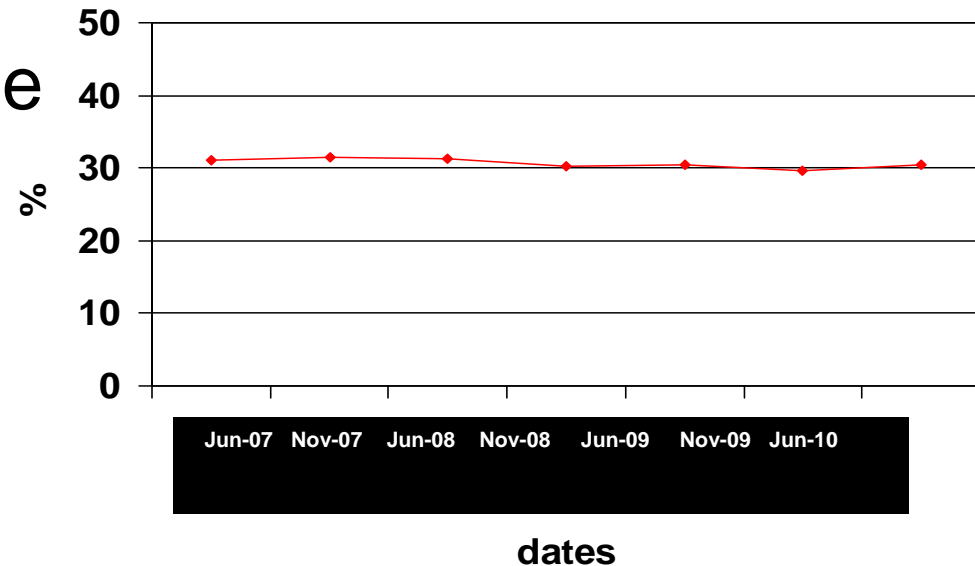
- a) I don't have anyone to help me.
- b) It is hard for me to learn new things
- c) I am concerned about infections.
- d) Nothing



# Key Indicator reported to the Ministry

- Since 2006 has been a reportable indicator to the MOH through PHSA

- Target is 30%





# Summarizing

- Although strong enrollment within the Canadian context various jurisdictions do much better
- Patients are interested in independent options
- Patients LIKE independent therapies
- Are obligated to inform the MOH where we are at, and why



# **Would you suggest home based dialysis to this patient?**

- ESRD since 1990 due to IgA Nephropathy
- Unstable angina – CABG
- Renal hypertension
- Failed transplant
- Amputated R hand/wrist
- Burnaby



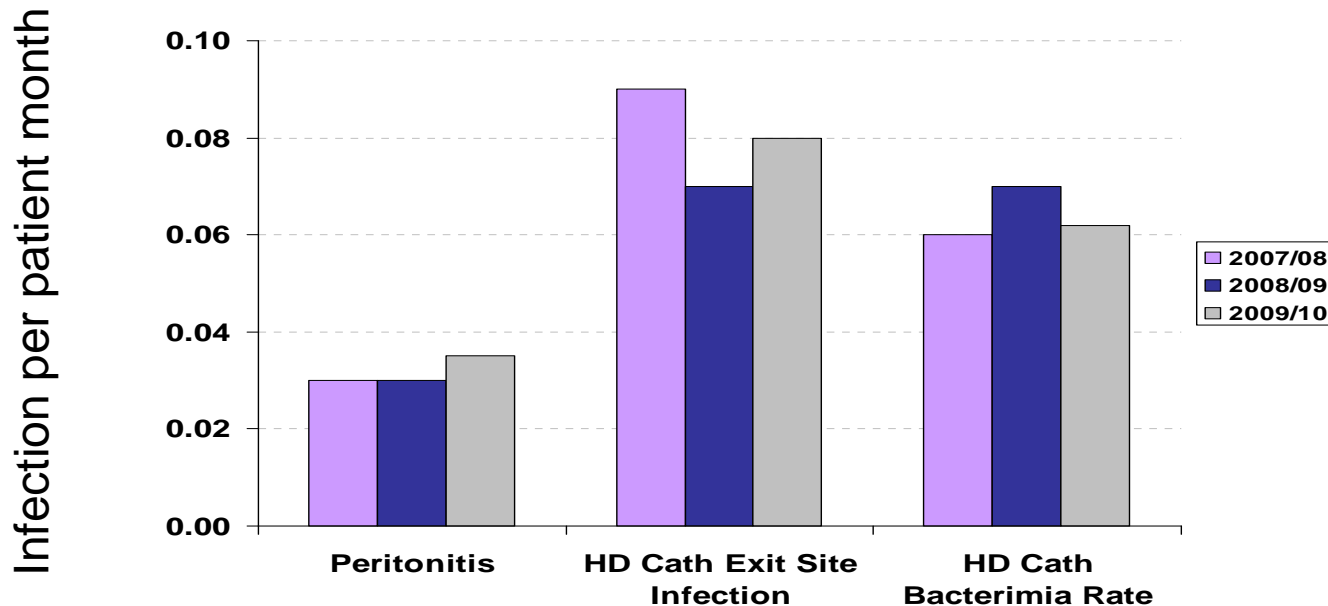


# Infections



# Rate of Catheter-Related Infections per Patient Month (HD & PD)

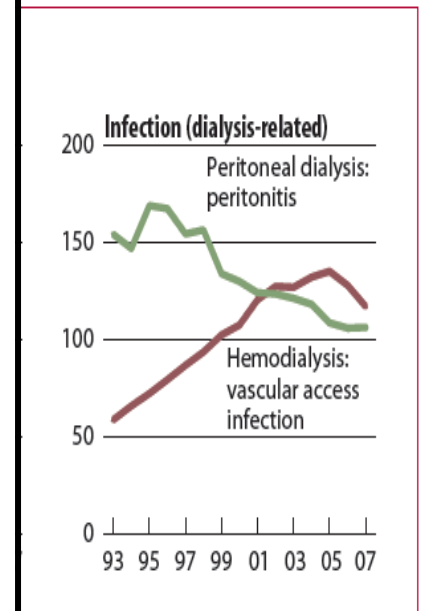
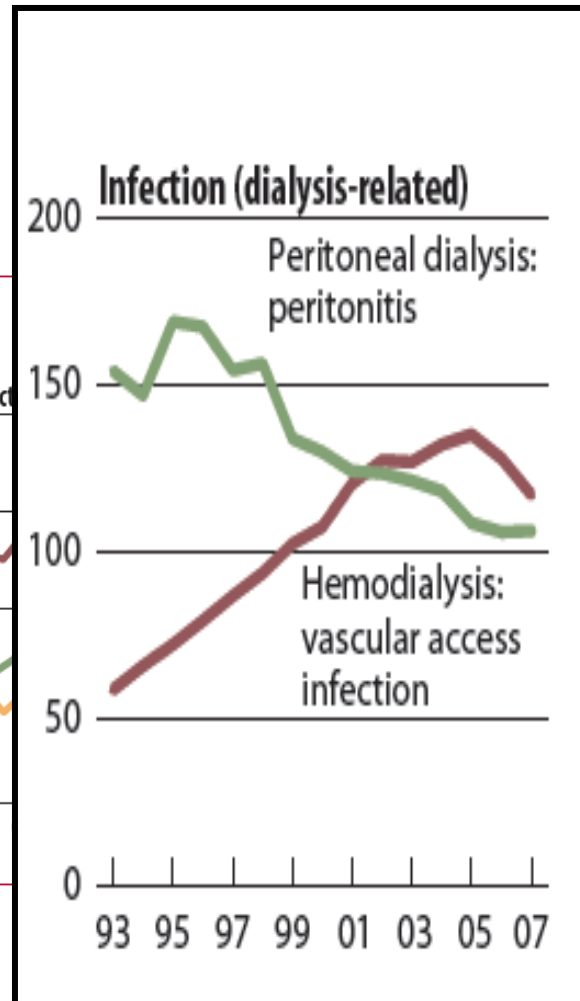
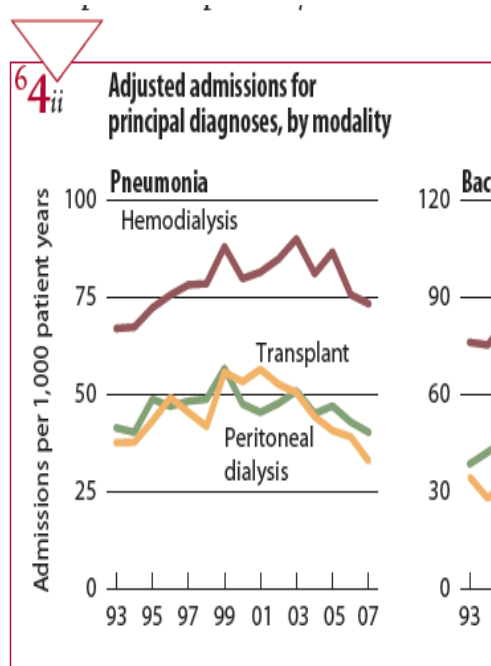
The myth of high infection rates



Source: BCPRA Health Informatics and Methodology & Analytics



# Admissions by modality



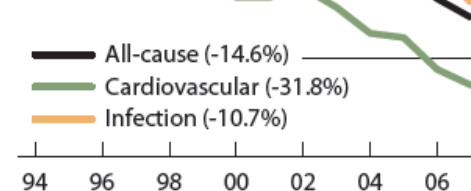
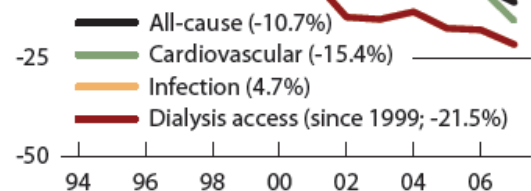
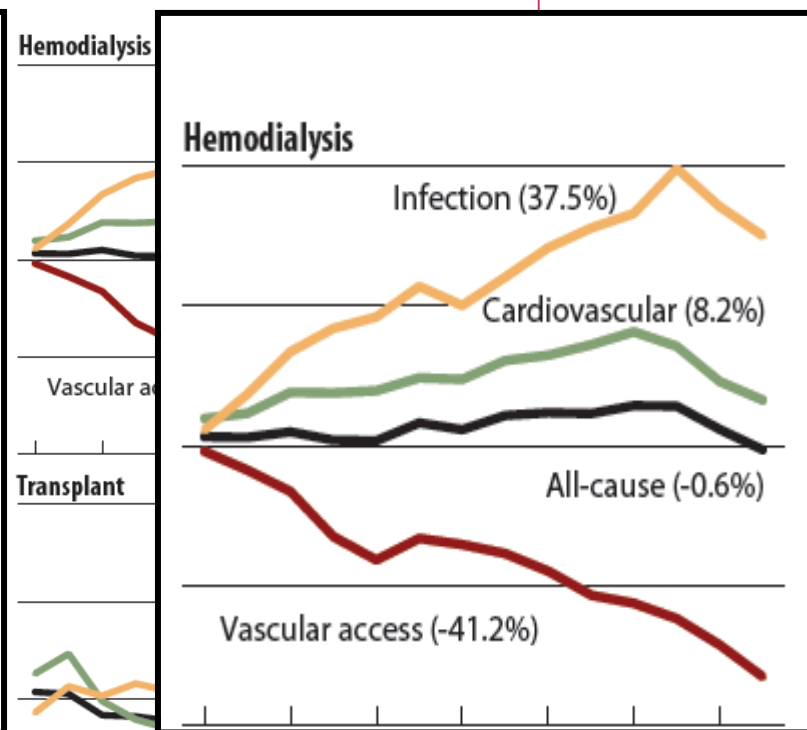
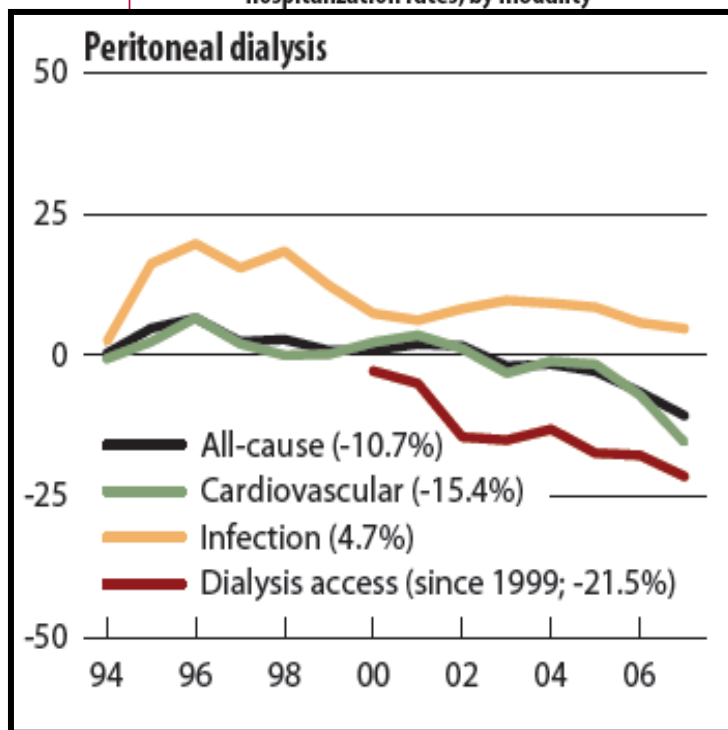
Source: USRDS  
2009 Report



# Hospitalization (by Modality)

62<sup>ii</sup>

Change in adjusted all-cause & cause-specific hospitalization rates, by modality



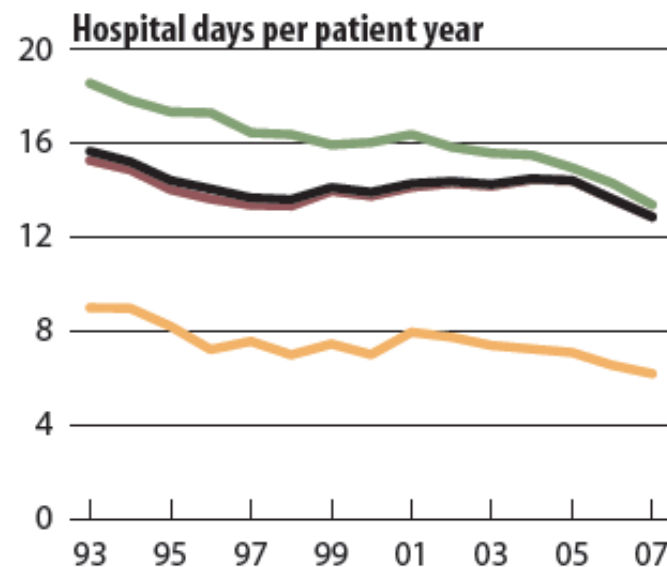
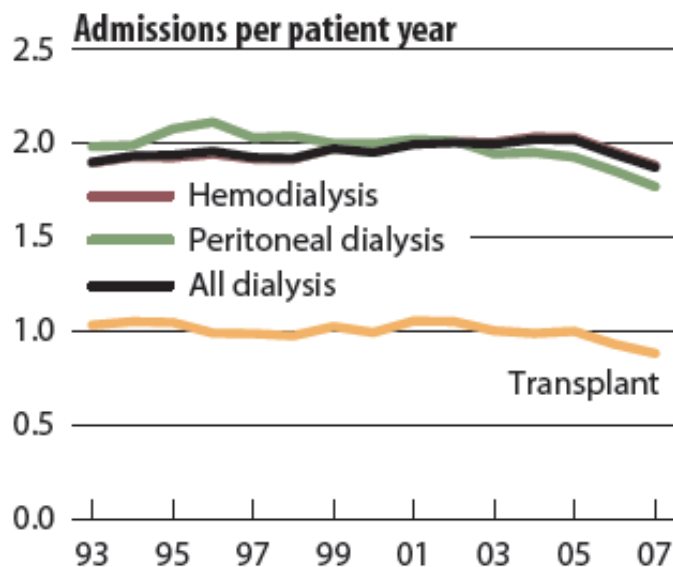
Source: USRDS 2009 Report



# Hospitalization by modality

63<sup>ii</sup>

Adjusted hospital admission rates & days, by modality



Source: *USRDS 2009 Report*



## Independent HD

Infections



# Comparison of Infections in Home Hemodialysis and Peritoneal Dialysis

Schachter M, Wu K, Li G, Sondrup B, Thomas S, Cabezon E, Greanya E, Erb N, Djurdjev O, Levin A, Singh RS, Copland M

Peritonitis is the major infectious complication of PD.

- In prevalent pts, the International Society for Peritoneal Dialysis (ISPD) has recommended a benchmark rate for peritonitis of <1 infection per 18 months (0.67 episodes/yr).
- Peritonitis rates in incident pts have not been reported.

No benchmark for infectious complications exist for HHD, to our knowledge.



Presented at the World  
Congress, Milan Italy, 2009

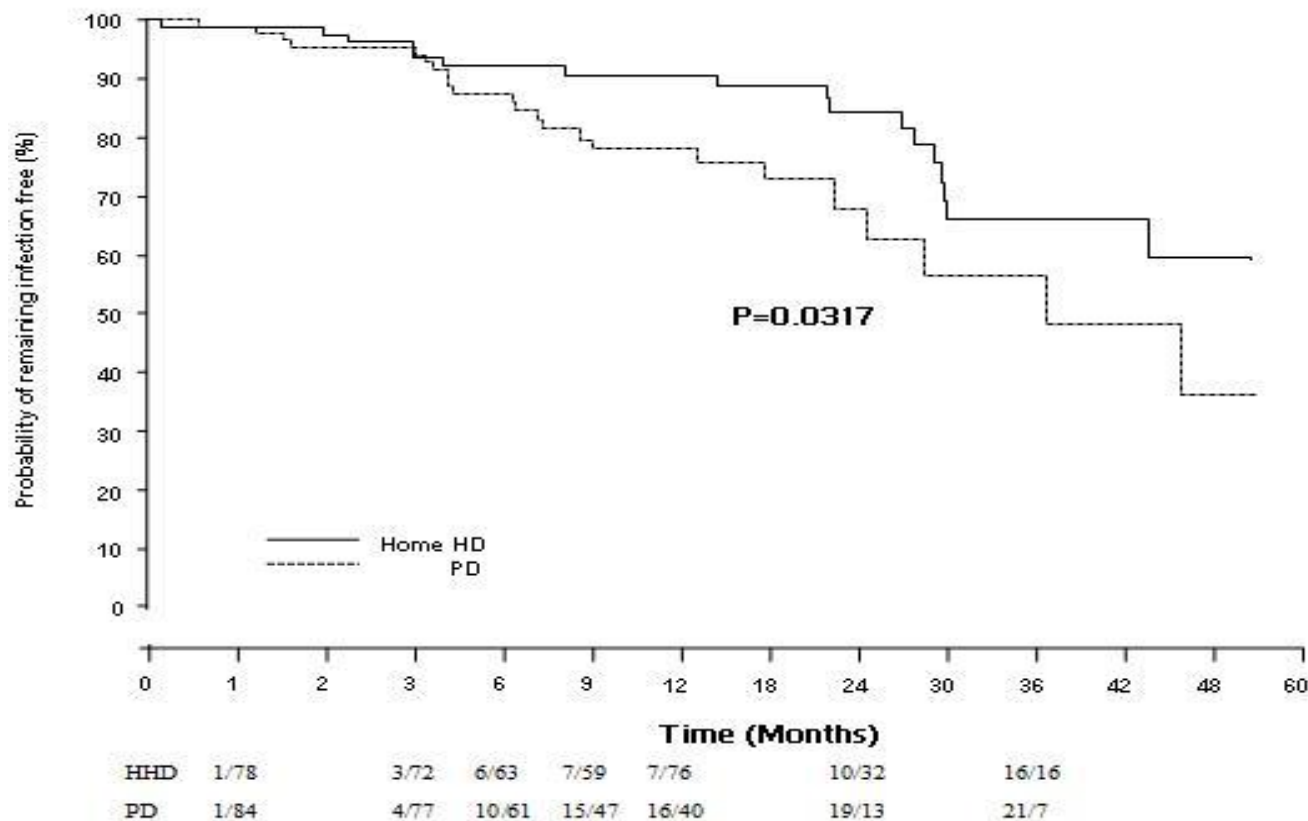
## Comparison of Infections in Home Hemodialysis and Peritoneal Dialysis

Characteristics	HHD (N=79)	PD (N=86)	P-value*
Age (years: mean $\pm$ sd.)	51.7 $\pm$ 14.4	57.5 $\pm$ 15.9	0.0228
Gender (male)	55 (69.6%)	51 (59.3%)	0.1947
Etiology of Renal Disease			0.4903
DM	15 (19.0%)	17 (20.5%)	
Exposure to Renal Replacement Therapy (months)	43.5 $\pm$ 54.4	0.6 $\pm$ 2	<0.0001
Length of follow up (months: mean $\pm$ sd. )	22.3 $\pm$ 15.3	13.9 $\pm$ 12.2	0.0002
Access Type			
Fistula	61 (77.2%)		
Graft	2 (2.5%)		
Perm catheter	15 (20.3%)		
Time to 1 <sup>st</sup> Infection (months: mean $\pm$ sd.)	19.2 $\pm$ 12.5	11.8 $\pm$ 12.6	0.0776
Infection rate per person year	11.56%	23.07%	

Presented at the World Congress, Milan Italy, 2009



# Comparison of Infections in Home Hemodialysis and Peritoneal Dialysis



**Figure 1.** Cumulative probability of being infection free following initiation of HHD or PD.

Presented at the World Congress, Milan Italy, 2009

# Comparison of Infections in Home Hemodialysis and Peritoneal Dialysis

- Our results indicate:

- the overall peritonitis rate in **prevalent** PD patients are lower at our center than ISPD targets;
- the infection rate in **incident** HHD pts (0.12 events/pt-yr) is less than half that in our **incident** PD population (0.23 events/pt-yr).
- in the first year the risk of bacteremia was 9% for HHD versus a 22% risk of peritonitis.

- Although infections are less frequent in incident HHD patients as compared with incident PD patients, it requires **careful emphasis that the types of infection (bacteremia vs peritonitis) are of a more serious nature in HHD.**



- In a 3 year study rates are the same, but the types of infection differ\*

- HD related infections are often more severe and lead to higher mortality risks\*\*

Septicaemia incidence 22%, mortality rate 20%

- Pneumonia 17%

- Exit site 37%

- PD related infections have a lower mortality rate

- Peritonitis incidence 24%, mortality rate 2.3%

- Pneumonia 3%

- Exit site 53%

\*Krishnan et al, PDI, 1998

\*\* Wang, Piraino, Bernardini et al, JASN 2022



## Peritoneal Dialysis

Infections



# Reporting of Peritonitis Events

- Months of PD at risk, divided by numbers of episodes, expressed as months between episodes

- Number of infections by organism for a time period, divided by dialysis-years time at risk, expressed as episodes per year

- ✓ Target PD-Associated peritonitis rates

- ✓ Monitor annually

- ✓ Max acceptable

  - 1 episode every 18 months (0.67/year at risk)

- ✓ Best Practice

  - 1 episode every 41-52 months (0.29-0.23/year at risk)





# Clinical Presentation and Management of Peritonitis

- Cloudy effluent – presume peritonitis
- Initiate empiric Rx treatment ASAP
- Can be painless initially
- Consider other causes of pain
- Always check exit site and tunnel



# EMPIRIC ANTIBIOTIC SELECTION

- “Empiric antibiotics must cover both gram-positive and gram-negative organisms. The Committee recommends centre-specific selection of empiric therapy, dependant on the local history of sensitivities of organisms causing peritonitis (Opinion)”
- Gram-positive organisms may be covered by vancomycin or a cephalosporin, and gram-negative organisms by a third-generation cephalosporin or aminoglycoside (Evidence)”



# Education for Patients

- Good technique is major emphasis in training for both HHD and PD
- Taught to identify potential infections early and to act quickly
- Patients take this very seriously – and are good advocates and proactive
- If an infection occurs close monitoring post
- Follow-up and retraining if needed



# Myth #1



## Proximity



# Association between proximity to the attending nephrologist and mortality among patients receiving hemodialysis

Marcello Tonelli MD SM, Braden Manns MD MSc, Bruce Culleton MD MSc, Scott Klarenbach MD MSc, Brenda Hemmelgarn MD PhD, Natasha Wiebe MMath PStat, John S. Gill MD MSc, for the Alberta Kidney Disease Network

CMAJ • OCTOBER 23, 2007 • 177(9)

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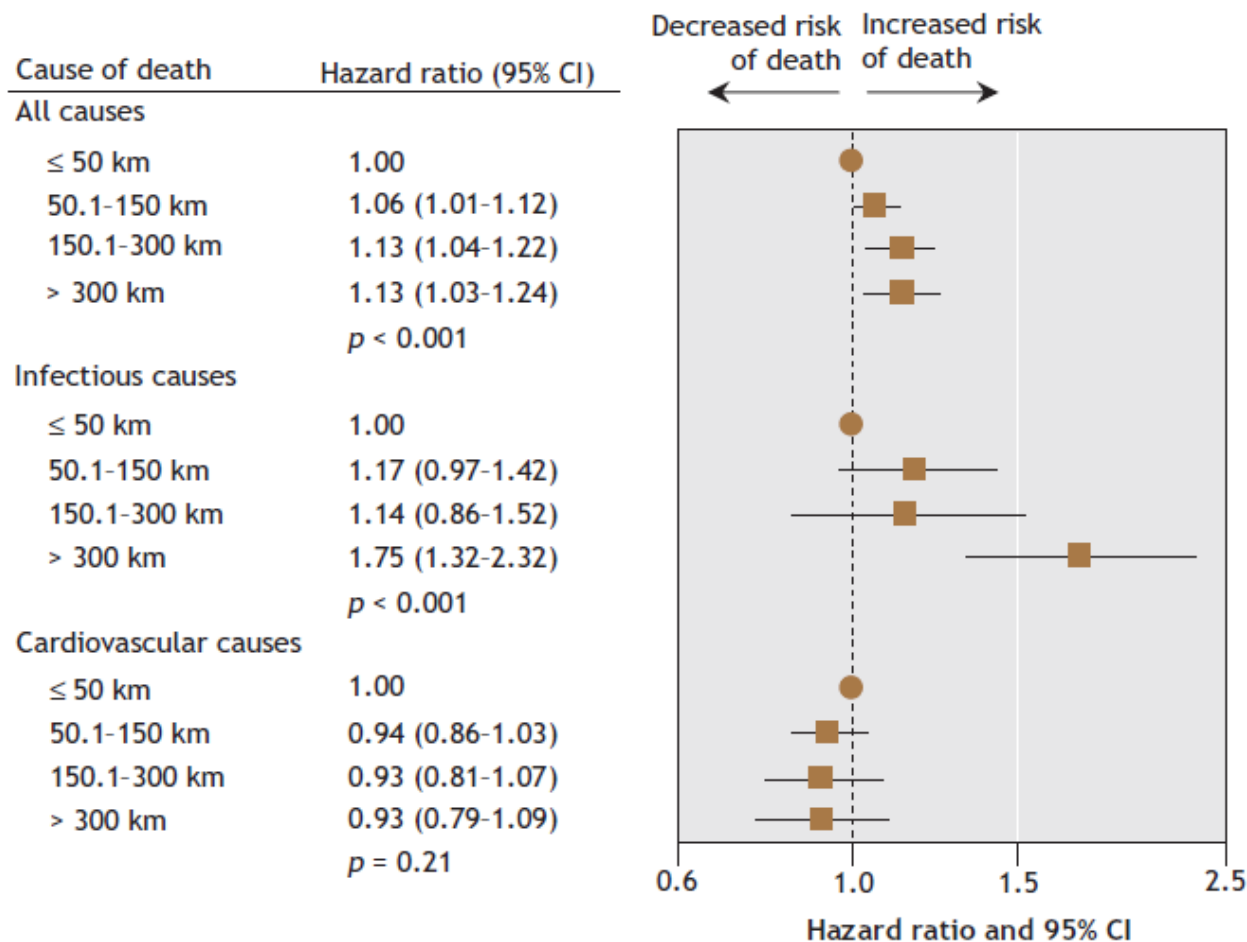


Figure 1: Forest plot showing the risk of mortality among patients receiving hemodialysis, by distance to the attending nephrologist. CI = confidence interval.



# The flip-side...

... “independent treatments are only for people who live near a dialysis centre.”



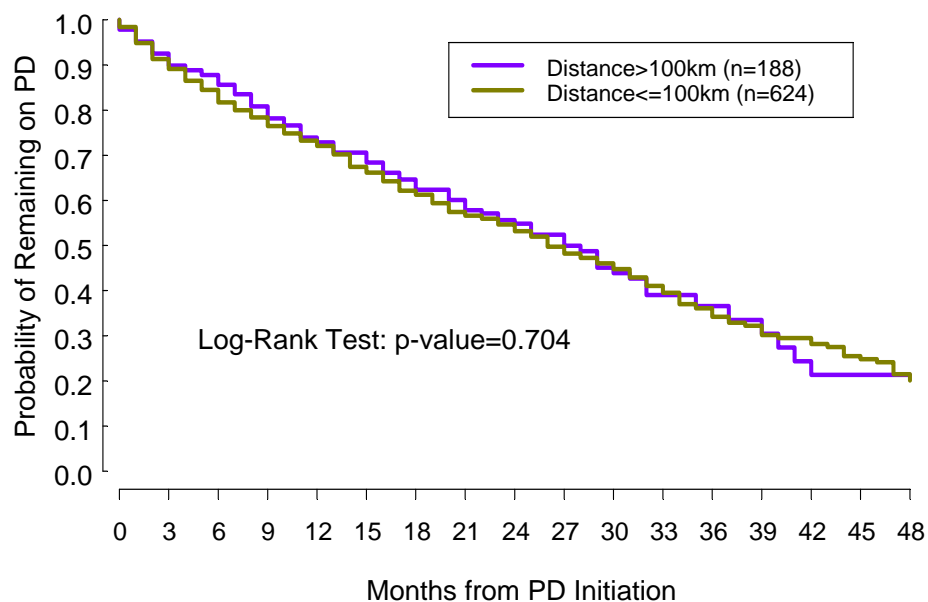


# Confused?



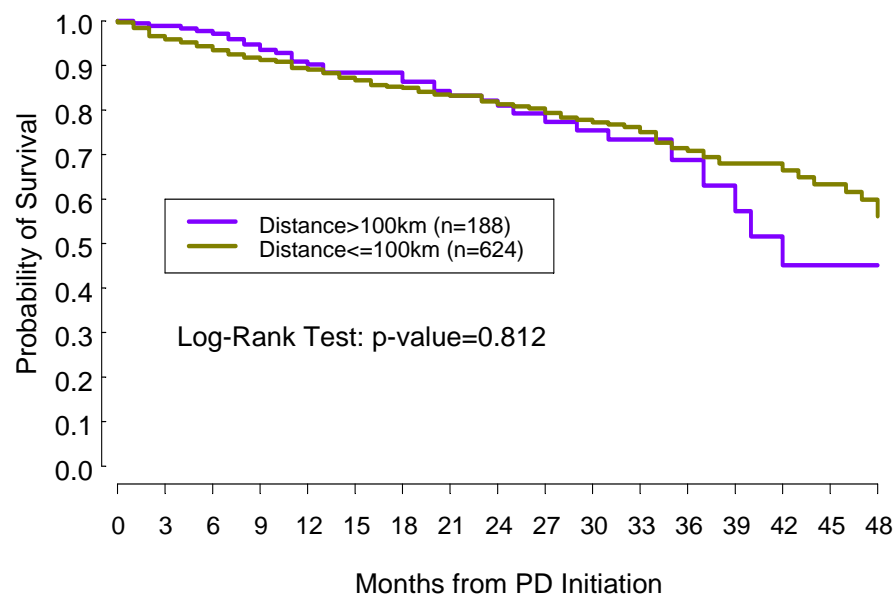
# Peritoneal Dialysis outcomes by distance from training centre

PD Technique Survival for Incident PD Cohort 2004-2008



\*Distance was based on home address and the centre where PD was initiated

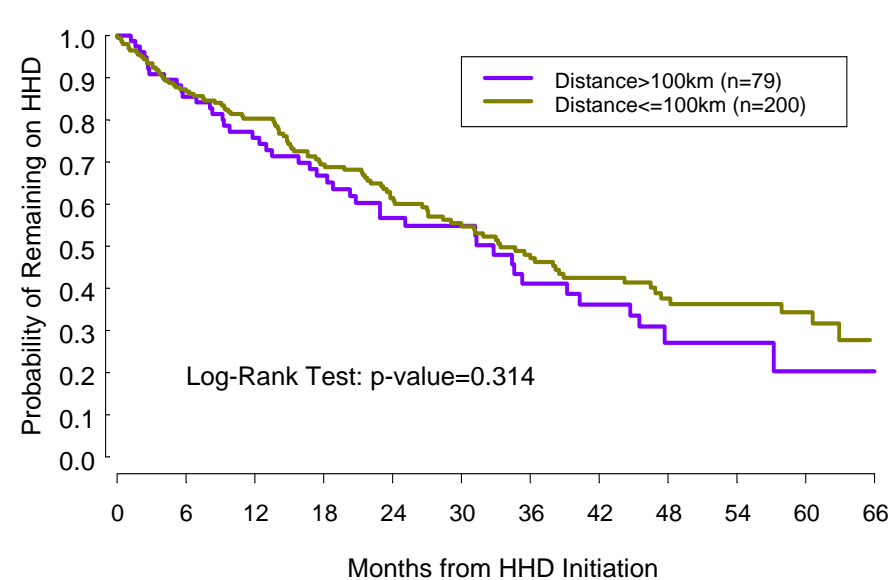
Patient Survival for Incident PD Cohort 2004-2008



\*Distance was based on home address and the centre where PD was initiated

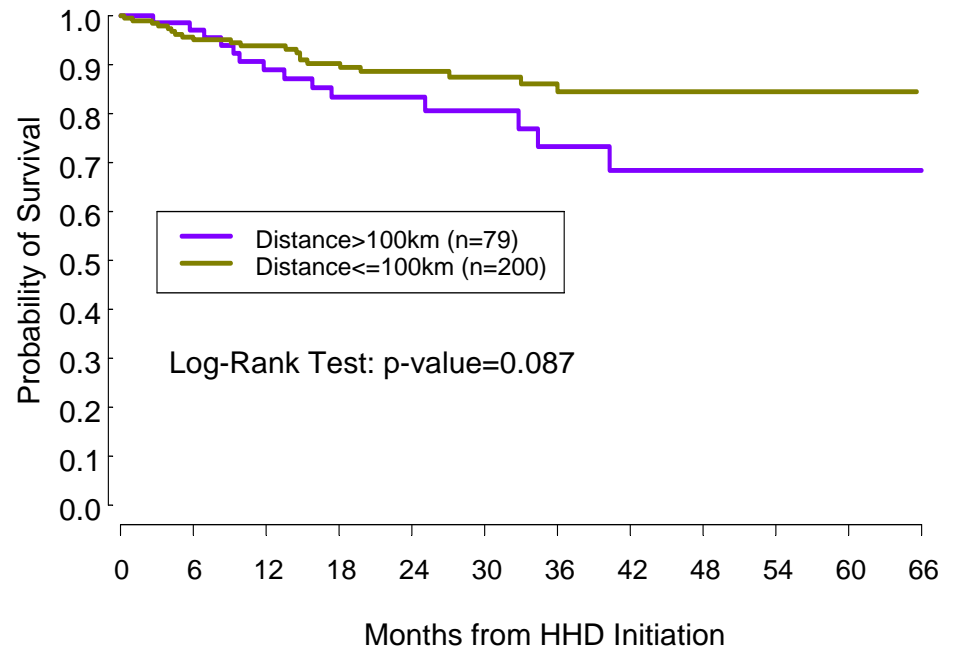
# Home Hemodialysis outcomes by distance from training centre

HHD Technique Survival for Incident HHD Cohort 2004-2009



\*Distance was based on home address and the centre where HHD was trained

Patient Survival for Incident HHD Cohort 2004-2009



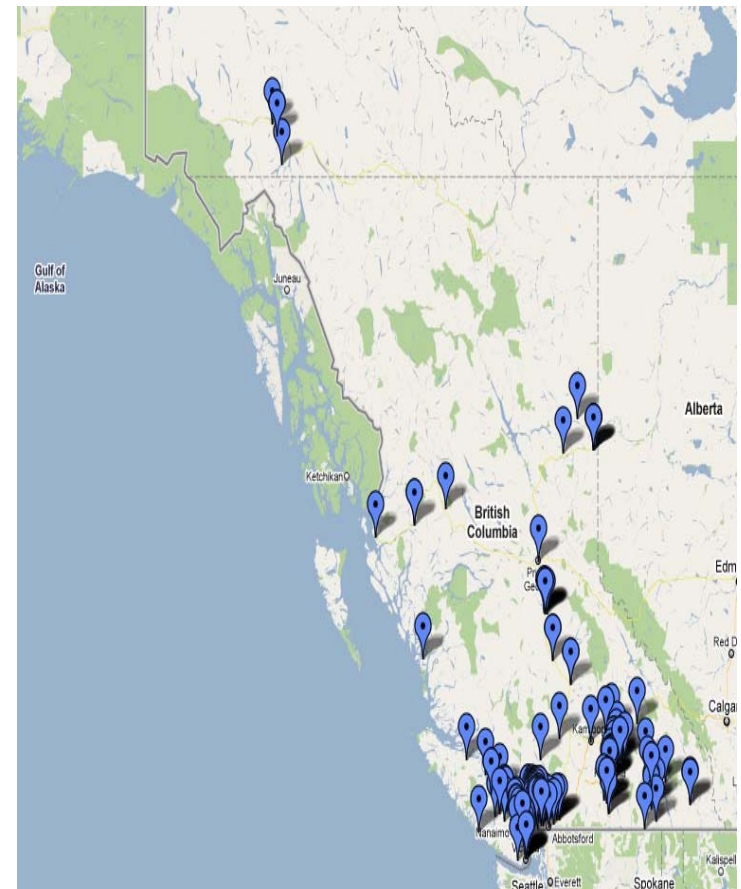
\*Distance was based on home address and the centre where HHD was trained

# Location of patients in BC

## Peritoneal Dialysis



## Independent HD



# Does this look familiar?



# Transportation

- Bane of dialysis - issue in many jurisdictions
- But if our rates of independent pts go up, the utilization of Handidart goes down, the in-center units and Handidart aren't both swamped, and everyone just might be more patient – more flexible





# Product Delivery and Technical Support for home patients

## PD

- Technical support for cyclers 24 hours/day
- Excellent vendor support
- Ability to deliver anywhere in BC and Yukon, can modify quantities

## HHD

- Tech support from 0700-2300 – 365d/yr
- Strict guidelines for response times – monitored by BCPRA
- Excellent Vendor support
- Ability to deliver anywhere in BC and Yukon, can modify quantities

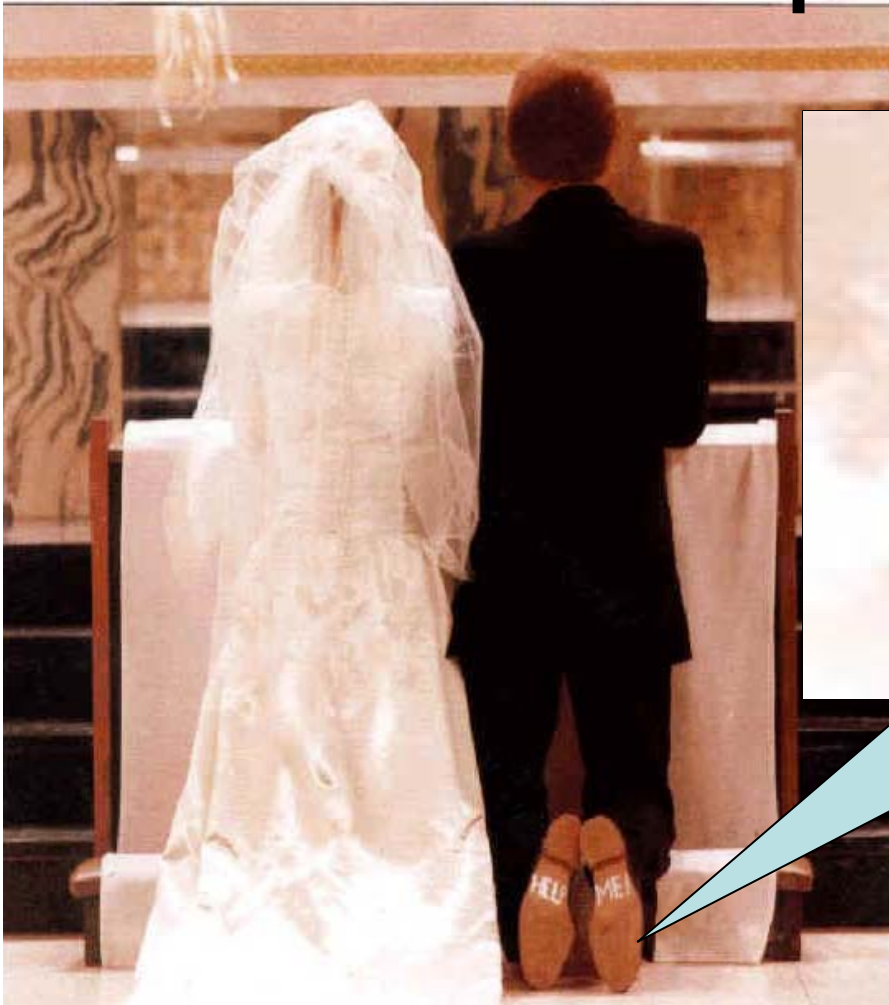


## Myth #2





## Helpers



# Helpers?



Renal Resource	Home HD	Helper required?
Kidney Foundation of Canada	-	no comment
National Kidney Foundation (USA)	+	usually
Canadian Society of Nephrology	-	no comment
K-DOQI Guidelines	+	recommended
K-DIGO	-	no comment
European Best Practice Guidelines	-	no comment
NICE (NHS Institute for Health and Clinical Excellence, UK)	+	Recommended but not mandatory
Australian/New Zealand Society of Nephrology	-	no comment



## Home Treatments Compared: Pluses

	CAPD	CCPD	Conventional HHD	Daily HHD	Nocturnal HHD	In-center HD
Less restrictive diet and fluids	*	*	*	*	*	
More dialysis to feel better	*	*	*	*	*	
Work treatment						
Puts you in control						
You're not in people's way						
Fewer hospitalizations						
Portable – take it with you	*	*				
Flexible – suits your schedule	*		*	*	*	
Available in every state	*	*				*
Needle-free treatments	*	*			*±	
Have your days free		*			*	
Learn it in a week or two	*	*				*
Fistula likely to last longer			*	*	*	

## Home Treatments Compared: Minuses

	CAPD	CCPD	Conventional HHD	Daily HHD	Nocturnal HHD	In-center HD
Need to visit clinic 3 times a week						*
Supply storage space	*	*	*	*S	*	
Lack of privacy						
A partner is needed		*	*	*		
Takes several weeks of training						
bathing					±	±
Lack of privacy						*
A partner is needed			*	*	*	
Takes several weeks of training			*	*	*	
Plumbing/wiring may be needed			*	*	*	
Limited availability			*	*	*	
Clinics lose money on it				*	*	

Lack of privacy

A partner is needed

Takes several weeks



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

Strongly Encourage Home HD (HHD)	Encourage HHD After Assessing & Eliminating Barriers	May Not Be Able to Do HHD (Helper Must Do More)
<input type="checkbox"/> Any patient who <i>wants</i> to do HHD and has no barriers to it	<div>Encourage HHD After Assessing &amp; Eliminating Barriers</div> <input type="checkbox"/> Has pet(s)/houseplants (carry bacteria) – bar from	<input type="checkbox"/> Home is health hazard, will not correct
<input type="checkbox"/> Employed full- or part-time		<input type="checkbox"/> Home is health hazard, will not correct
<input type="checkbox"/> Drives a car – skill set is very similar to learning HD		<input type="checkbox"/> Home is health hazard, will not correct
<input type="checkbox"/> Caregiver for someone with chronic illness	<input type="checkbox"/> No helper & clinic requires one – reconsider policy, monitor remotely, use LifeLine device to call for help	<input type="checkbox"/> Home is health hazard, will not correct
<input type="checkbox"/> Lives far from home with unreliable transportation	<input type="checkbox"/> Hearing impaired – use light/vibration for alarms	<input type="checkbox"/> Uncontrolled psychosis or anxiety*
<input type="checkbox"/> Student – grade school to grad school	<input type="checkbox"/> Depressed, angry, or disruptive – increased control with HHD may help	<input type="checkbox"/> Blind or severely visually impaired – consider PD*
<input type="checkbox"/> Needs/wants to travel for work or enjoyment	<input type="checkbox"/> No helper & clinic requires one – reconsider policy, monitor remotely, use LifeLine device to call for help	<input type="checkbox"/> Uncontrolled seizure disorder*
<input type="checkbox"/> Wants a flexible schedule for any reason	<input type="checkbox"/> Rents – check with landlord if home changes needed	<input type="checkbox"/> No remaining HD access sites – consider PD
<input type="checkbox"/> Has rejected a transplant	<input type="checkbox"/> Can't/won't self-cannulate – use patient mentor; practice arm, local anesthetic cream, desensitization*	<input type="checkbox"/> Reduced awareness/ability to report bodily symptoms
<input type="checkbox"/> Has neuropathy, amyloidosis, LVH, uncontrollable BP†‡	<input type="checkbox"/> No running water, poor water quality, low water pressure – assess machine & water treatment options	<input type="checkbox"/> Has living donor; transplant is imminent – consider PD
<input type="checkbox"/> Obese/large; conventional HD or PD are not adequate †‡	<input type="checkbox"/> Limited space for supplies – visit home, 2x/mo delivery, consider machine with fewer supply needs	
<input type="checkbox"/> Can't/won't follow in-center HD diet & fluid limits†‡	<input type="checkbox"/> Drug or alcohol abuse – consider HHD after rehab	
<input type="checkbox"/> Is pregnant or wants to be †‡	<input type="checkbox"/> Bedridden and/or has tracheostomy/ventilator – assess self-care and helper ability*	
<input type="checkbox"/> Frail/elderly with involved, caring helper who wants HHD*	<input type="checkbox"/> Rx drugs impair function – consider drug change	
<input type="checkbox"/> Wants control; unhappy in-center		
<input type="checkbox"/> No longer able to do PD		

Check all the boxes that apply.  
Keep a copy of the MATCH-D in patient record.



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

# BC Provincial Philosophy

- Neither IAMHD or the PD program has not and does not mandate a helper for patients at home:

- Conventional HD patients
- Short Daily HD patients
- Nocturnal HD patients
- CAPD Patients
- CCPD patients

- Both programs *support* and *encourage* helpers if available – but individual assessment

- IAMHD or PD programs *DO NOT* endorse paying a 3rd party (non-emotionally invested individual) to be a helper





# 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.



## Comparisons of illness intrusiveness score between NHD and PD

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

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





# Myth #3





## MORTALITY

You might as well start rolling up a new character.  
Right now.

### Modality Survival and Mortality

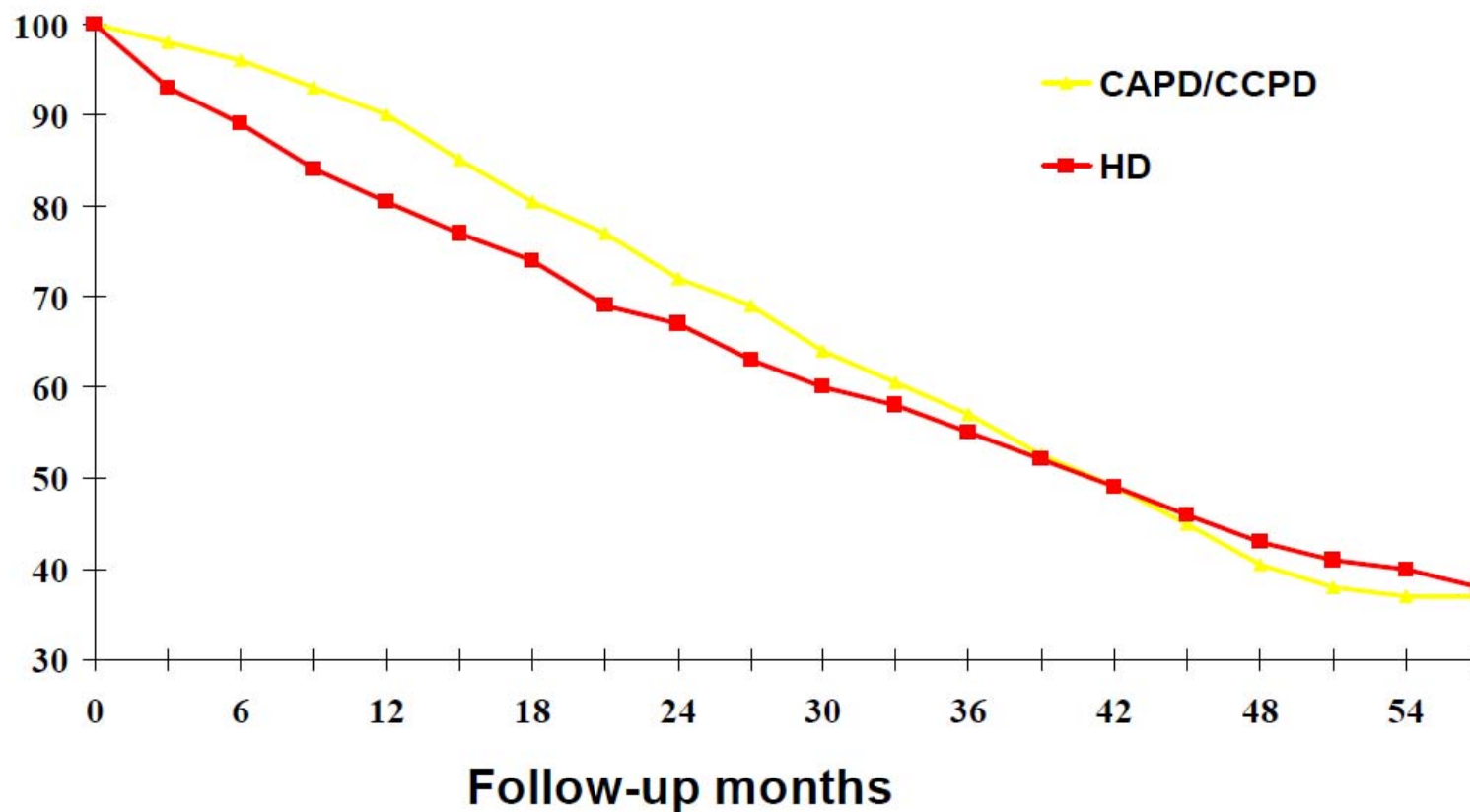
PD vs Hemodialysis

Intensive HD vs Transplant



# Survival Probability for Patients Initiating Dialysis with CAPD/CCPD Compared to HD (1990-94)

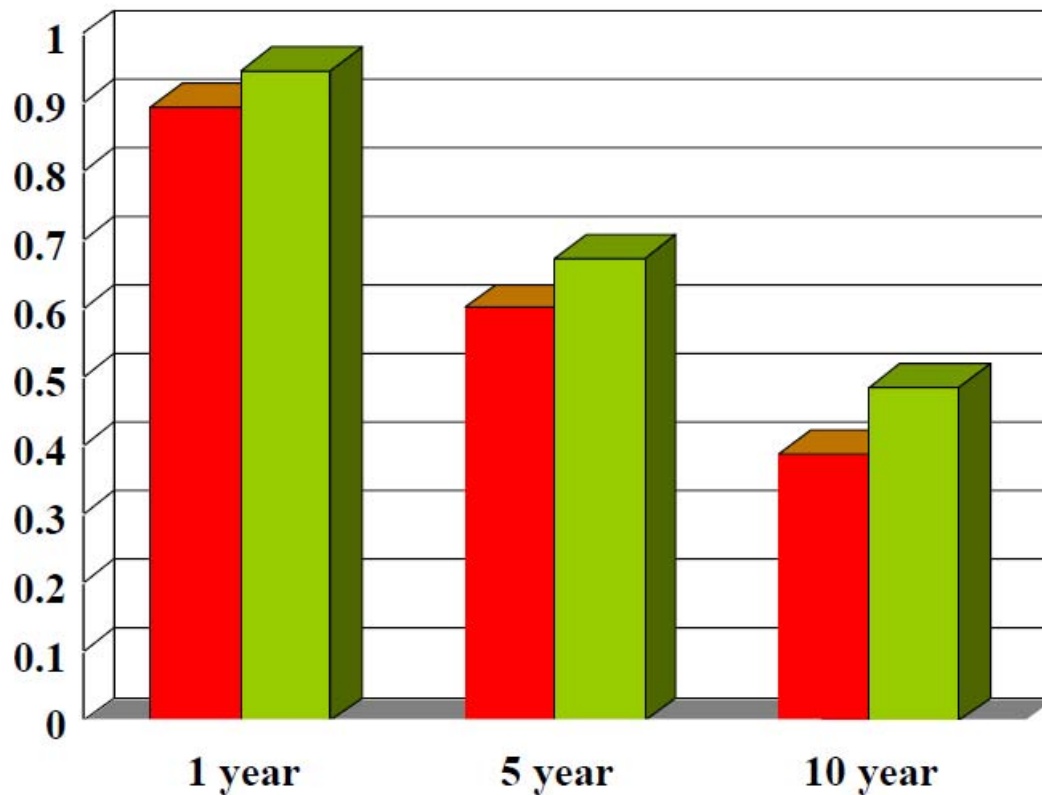
Probability (%)



Fenton SA, et al, *Am J Kidney Dis*, 1997; 30:334-34

## Cumulative survival rates by modality: patients starting RRT in Japan during or after 1983

Survival rate\*



■ Patients on hemodialysis  
■ Patients on peritoneal dialysis

\* As computed by the Cutler-Ederer (life-table) method

# Mortality: USRDS

- Adjusted five year survival, by modality & primary diagnosis

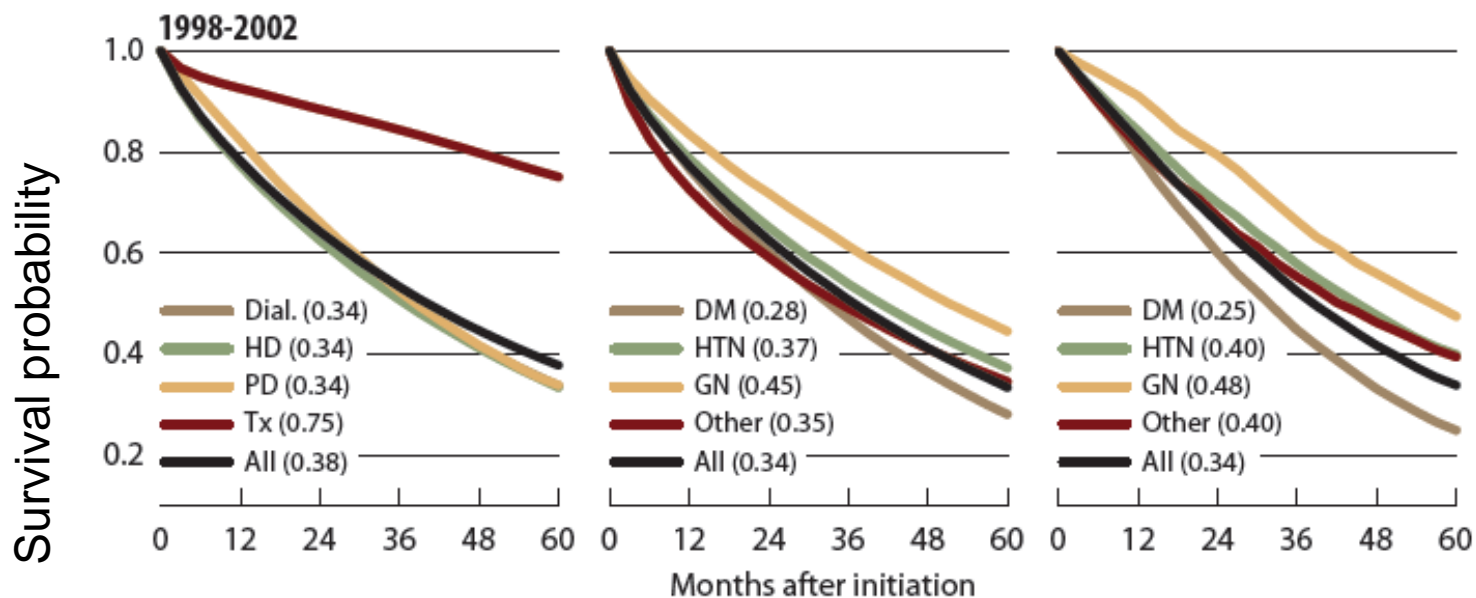
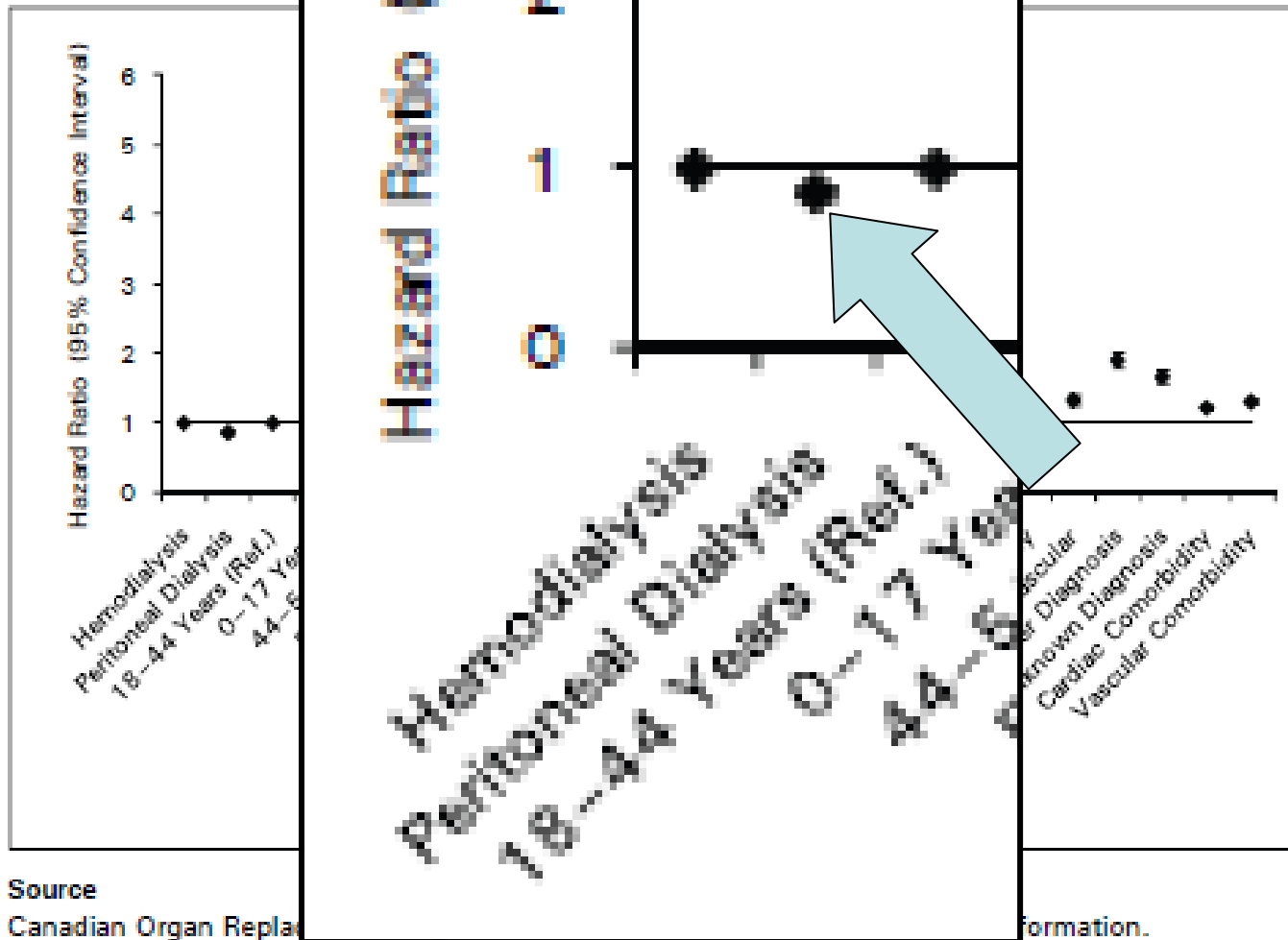


Figure 4 Cox Proportional Hazard Model for Patients Who Initiated RRT Within 90 Days of Hospital Discharge



*Original Article*

## **Survival among nocturnal home haemodialysis patients compared to kidney transplant recipients**

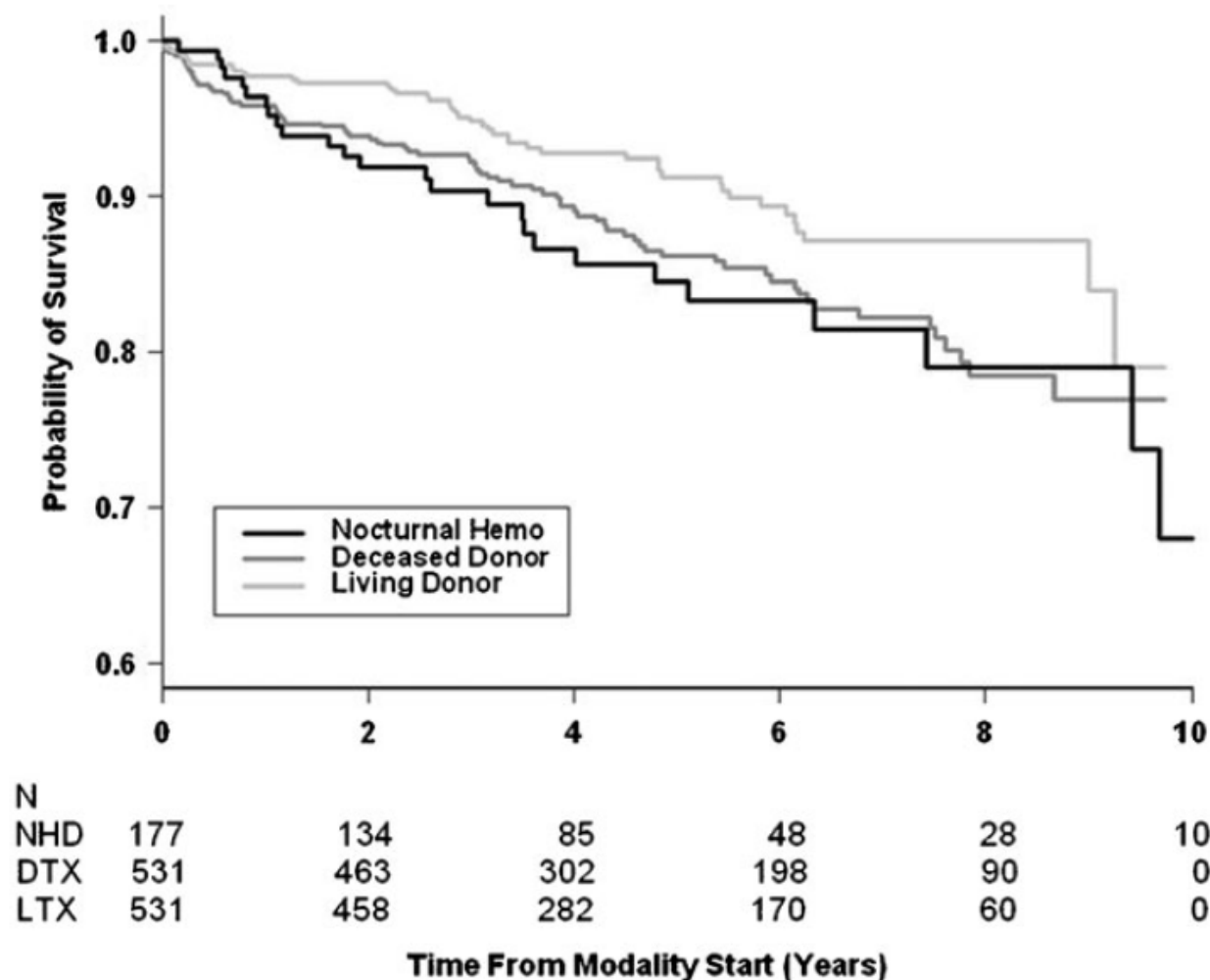
Robert P. Pauly<sup>1</sup>, John S. Gill<sup>2</sup>, Caren L. Rose<sup>2</sup>, Reem A. Asad<sup>3</sup>, Anne Chery<sup>4</sup>, Andreas Pierratos<sup>5</sup> and Christopher T. Chan<sup>3</sup>

<sup>1</sup>Division of Nephrology, Department of Medicine, University of Alberta Hospital, University of Alberta, Edmonton, AB, <sup>2</sup>Division of Nephrology, Department of Medicine, St. Paul's Hospital, University of British Columbia, Vancouver, BC, <sup>3</sup>Division of Nephrology, Department of Medicine, Toronto General Hospital, University of Toronto, <sup>4</sup>Toronto Region Dialysis Registry, University Health Network and <sup>5</sup>Department 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,  $P = 0.03$ ).





# **Would you suggest home based dialysis to this patient?**

- ESRD since 1990 due to IgA Nephropathy
- Unstable angina – CABG
- Renal hypertension
- Failed transplant
- Amputated R hand/wrist
- Burnaby



- He was a successful PD patients for over 7 year
- Had a transplant
- In-Center and CDU pt for awhile but then requested he be considered for HHD
- Successfully trained and began HHD in 2008



