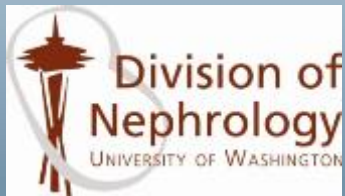




WESTERN  
CANADA

PD  
DAYS

February 7<sup>th</sup>-9<sup>th</sup>, 2013

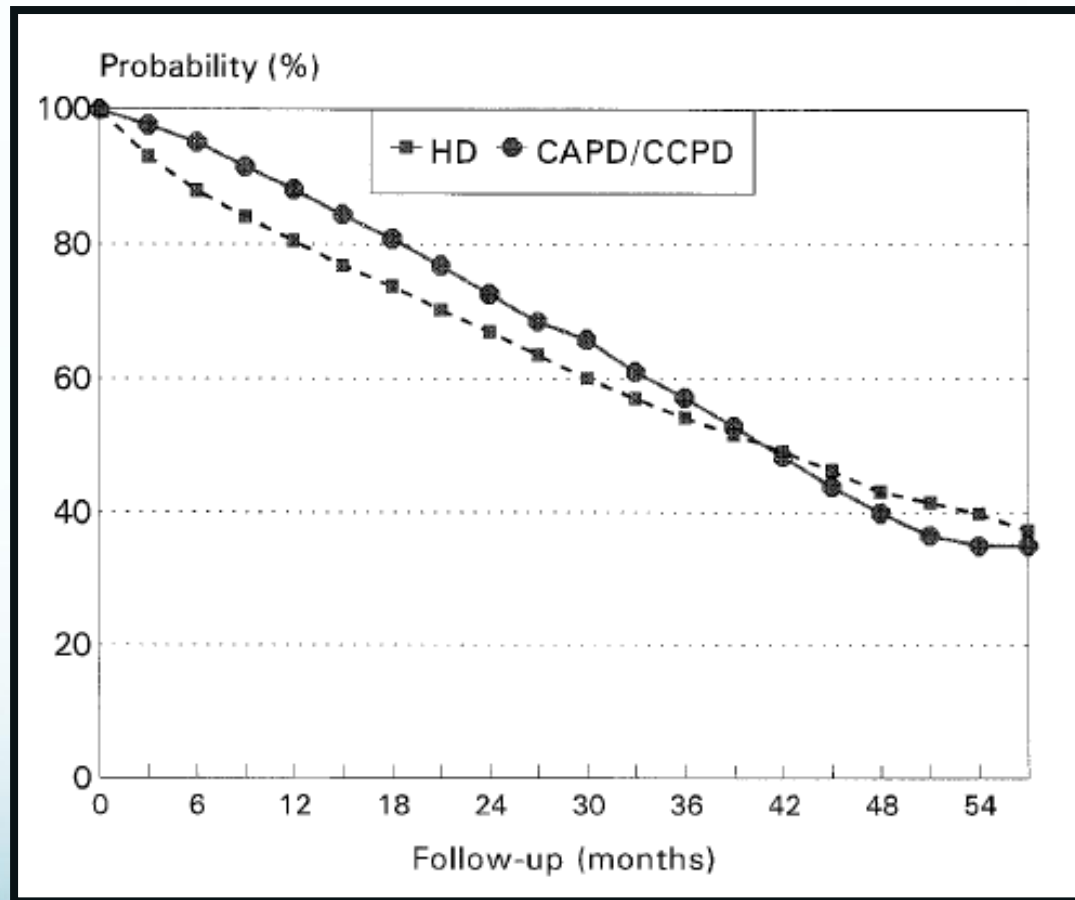


# PD Outcomes: Do Patient Socio-Demographics Matter?

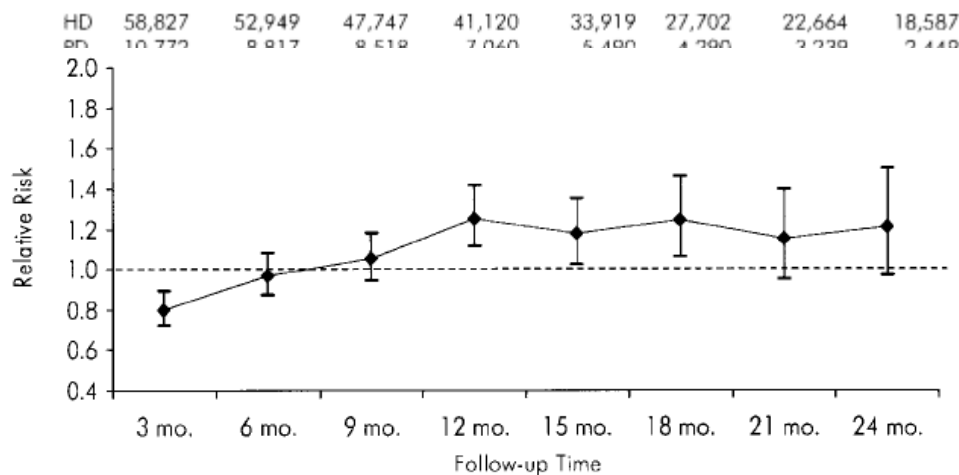
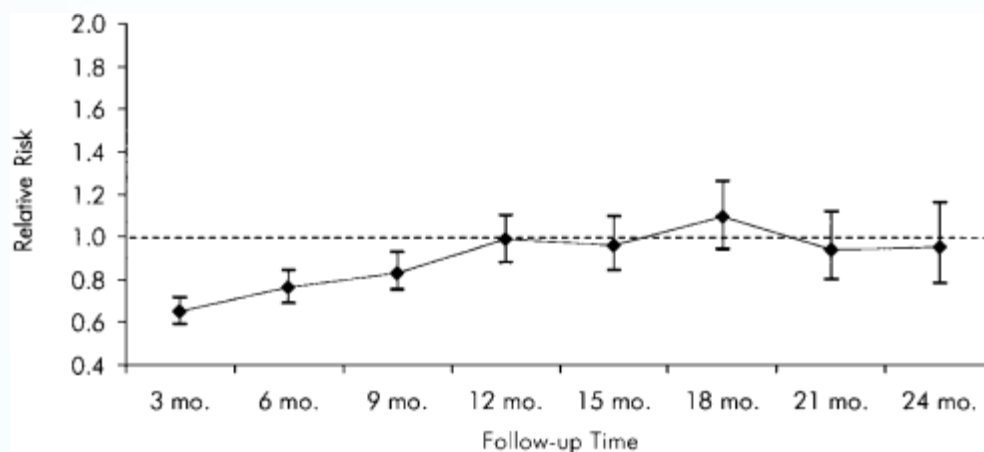
# Outline of Presentation

- Does the relative risk for death with PD, compared to that seen with HD, change over time?
  - Is PD better treatment early in the course of ESRD but an inferior long-term therapy?
- PD outcomes in selected sub-groups:
  - Regional variation
  - Racial/ethnic minorities
  - Poverty/Educational attainment
  - Rural communities or with greater distance from dialysis facilities?

# PD vs. HD Death Risk: Change over Time?



# PD vs. HD Death Risk: Change over Time?



	3 mo.	6 mo.	9 mo.	12 mo.	15 mo.	18 mo.	21 mo.	24 mo.
HD	58,827	52,949	47,747	41,120	33,919	27,702	22,664	18,587
PD	10,772	9,917	9,519	7,040	6,400	4,700	3,730	3,440

	3 mo.	6 mo.	9 mo.	12 mo.	15 mo.	18 mo.	21 mo.	24 mo.
HD	40,221	36,634	33,148	28,304	23,024	18,606	14,867	12,026
PD	7,338	6,657	5,619	4,512	3,342	2,474	1,756	1,291

# Conventional Wisdom

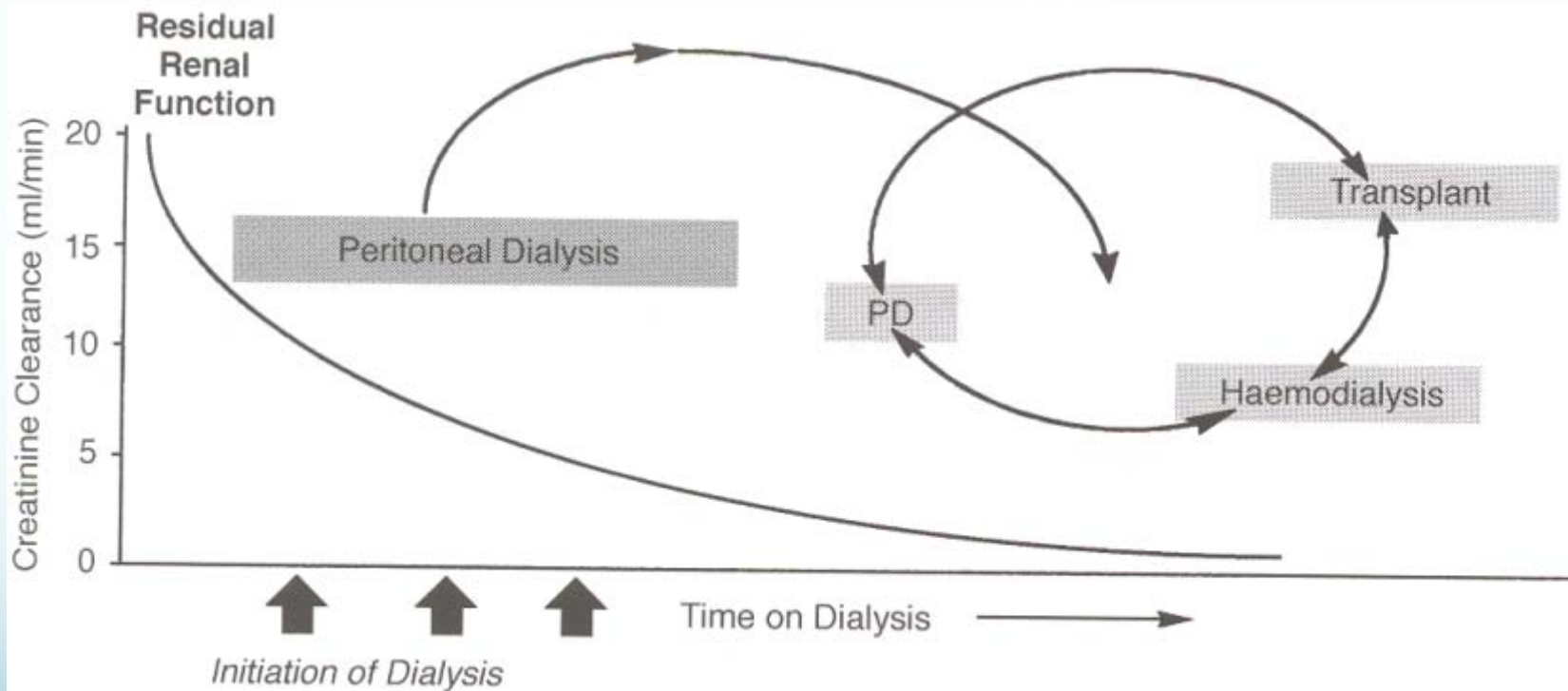
- Patients treated with PD have an early “survival advantage”:
  - Residual renal function is preserved better with PD
  - So, this early survival advantage is a direct benefit of being treated with PD
- However, over time the death risk of PD patients goes up:
  - This happens because patients lose residual renal function
  - Without residual renal function, PD alone is inadequate for removing enough urea or fluid
  - Moreover, glucose in PD fluids is really bad, damages the peritoneum, and makes volume control quite challenging

# PD Needs Residual Renal Function

Variable	RR	95% CI
Age	1.02	1.01-1.041
CVD	2.42	1.50-3.90
Diabetes mellitus	1.25	0.77-2.04
Serum Albumin	0.96	0.91-1.00
LA Transport	1.66	0.38-7.22
HA Transport	2.33	0.55-9.80
High Transport	2.01	0.43-9.36
SGA	0.74	0.65-0.84
Ccr (perit 5 L/wk/1.73 m <sup>2</sup> ↑)	1.00	0.90-1.11
GFR (5 L/wk/1.73 m <sup>2</sup> ↑)	0.88	0.83-0.94

# Conventional Wisdom

Van Biesen and Lameire



**Start more patients with PD but make sure you transition them to HD in a timely manner, particularly if they lose residual renal function**

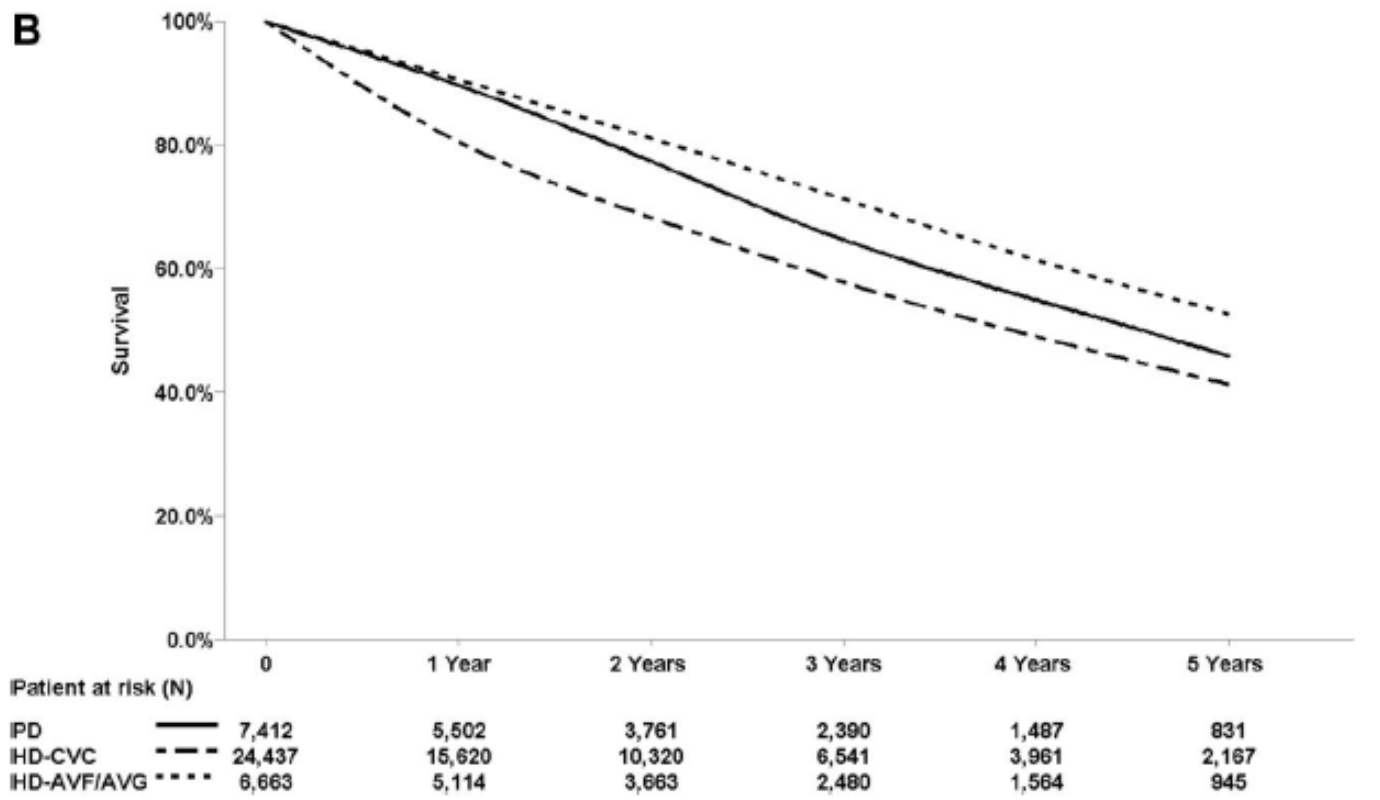
**Is the early lower death  
risk of patients who start  
PD an effect of PD?**



# Early “Survival Advantage” with PD?

- Better preservation of residual renal function with PD?
- Many patients start dialysis sub-optimally (hospitalized, without a permanent access for the dialysis therapy of their choice):
  - These are the patients with poorer outcomes
  - Most of them start hemodialysis with central venous catheters

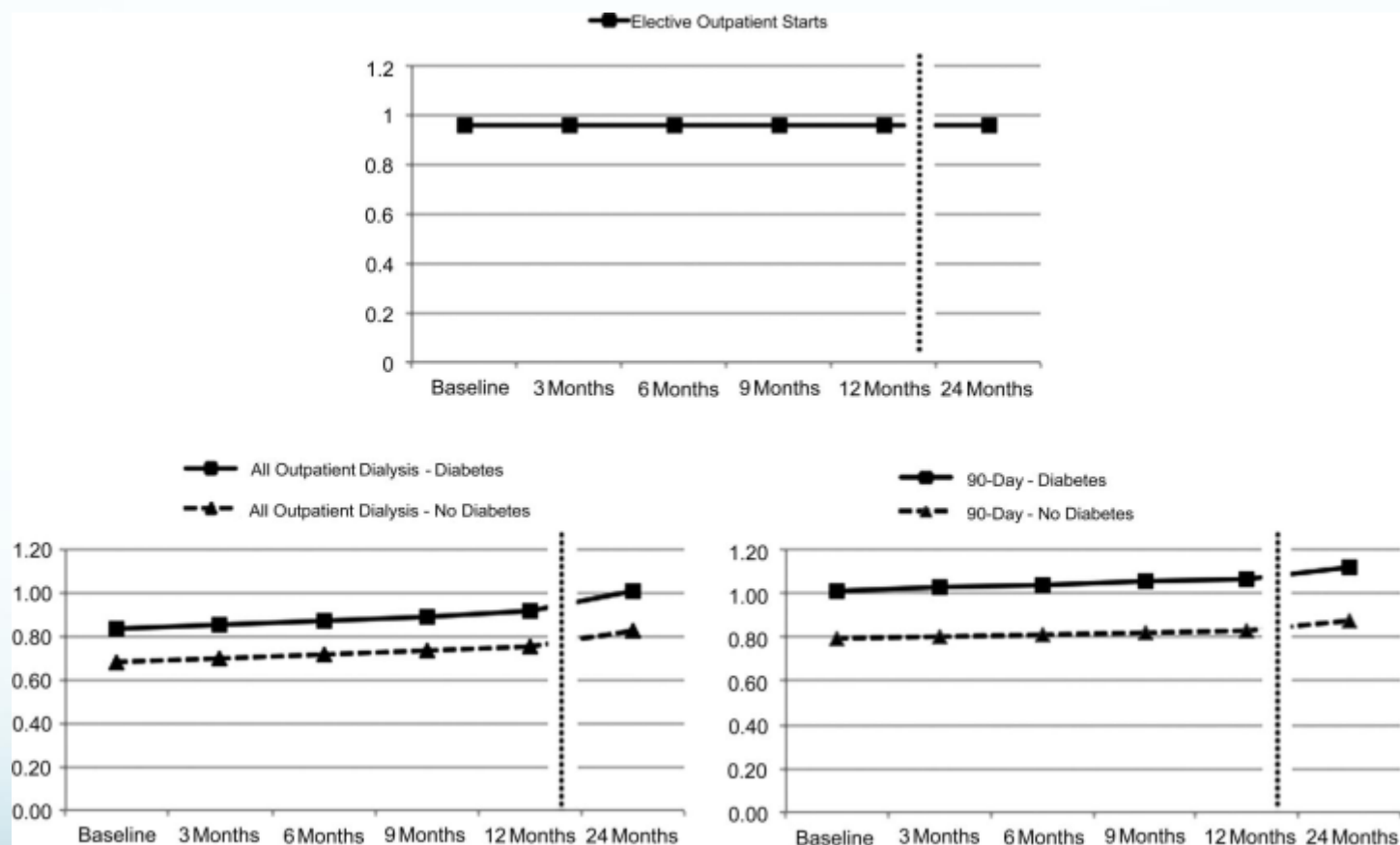
# Early Survival Advantage with PD?



- 79% of HD patients started with CVC
- PD survival better only with those who started with CVC and not AVF/AVG

**CORR Registry Data**

# Early Survival Advantage with PD?



Ontario

# An Alternative Wisdom?

- Early survival of PD patients looks better only because patients that start HD do so much worse:
  - Most patients with no pre-dialysis nephrology care are treated with HD
  - Virtually all these patients are treated with central venous catheters that increases their death risk
  - It is not HD that is bad, but how patients are treated when they start with the therapy
- Death risk of PD patients does not really go up over time:
  - It just seems that way as sicker patients who start with HD earlier
- The “change in relative risk over time” is not the direct effect of dialysis therapies but a result of differences in patients who are treated with these therapies
- Where does residual renal function fit into this wisdom?

**Is residual renal function  
more important for PD?**

# RRF is Important for PD

## But it is also important for HD

*Table 4.* Multivariate Cox regression models with residual renal  $Kt/V_{\text{urea}}$ , delivered  $Kt/V_{\text{urea}}$ , and the net fluid balance as independent predictors of survival<sup>a</sup>

	Adjusted RR		
	RR	95% CI	P Value
$rKt/V_{\text{urea}}$ (/wk)			<0.0001
0	17.66	4.98 to 62.61	
>0 to 0.84	1.67	1.06 to 2.64	
>0.84	1.0 ref		
$sp\text{-}dKt/V_{\text{urea}}$ (/wk)			
if $rKt/V_{\text{urea}} = 0$	0.54	0.40 to 0.72	<0.0001
if $rKt/V_{\text{urea}} > 0$	0.90	0.72 to 1.12	0.3395
Net fluid balance (ml/wk) <sup>b</sup>			0.0021
$\leq -300$	2.17	1.46 to 3.22	
$> -300$ to $\leq -50$	1.24	0.82 to 1.86	
$> -50$ to $\leq 67$	1.00 ref		
$> 67$ to $\leq 300$	1.31	0.85 to 2.00	
$> 300$	1.35	0.88 to 2.07	

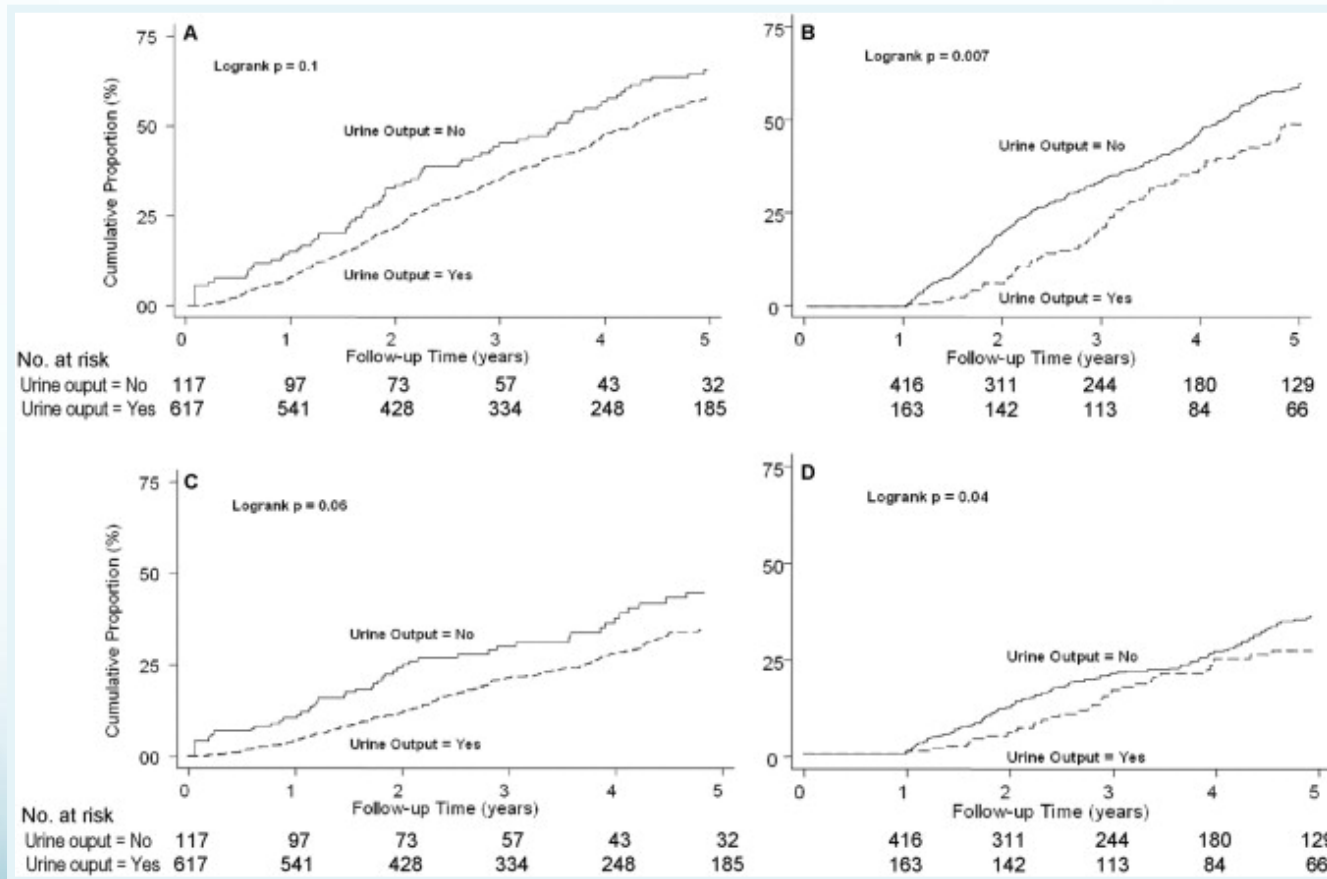
<sup>a</sup> The shown RR are adjusted for age, Davies' comorbidity score, primary kidney disease, SGA, and BMI. The  $rKt/V_{\text{urea}}$ , the  $dKt/V_{\text{urea}}$ , and the net fluid balance were entered as time-dependent variables.

# RRF Is Important for HD

Baseline U.O. > 250 ml

U.O. at 1-year > 250 ml

All-Cause



All-Cause

CV-mortality

CV-mortality

# Residual Renal Function in Dialysis Patients

- Is important for both PD and HD patients
- Loss of residual renal function makes it challenging to manage both HD and PD patients and increases the death risk of both:
  - Don't overestimate the value of ultrafiltration of large volumes of fluid with each HD session
- It is questionable that the apparent “change in relative risk over time” is related to differential importance of residual renal function



# PD can be successfully done even in anuric patients

Region	Author	N	Mean Age	% diabetics	CAPD/APD	Two-year Survival
Hong Kong	Szeto, '01	140	53 y	26%	140/0	69%
	Lo, '05	150	58 y	28%	149/1	89%
				27%	289/1	79%
Europe	Brown, '03	177	54 y	42%	0/177	78%
	Jansen, '05	130	53 Y	12%	102/28	67%
				29%	102/205	73%
United States	Fried, '08	1428	54 y	42%	?	60%

Only somewhat worse than PD patients with residual renal function

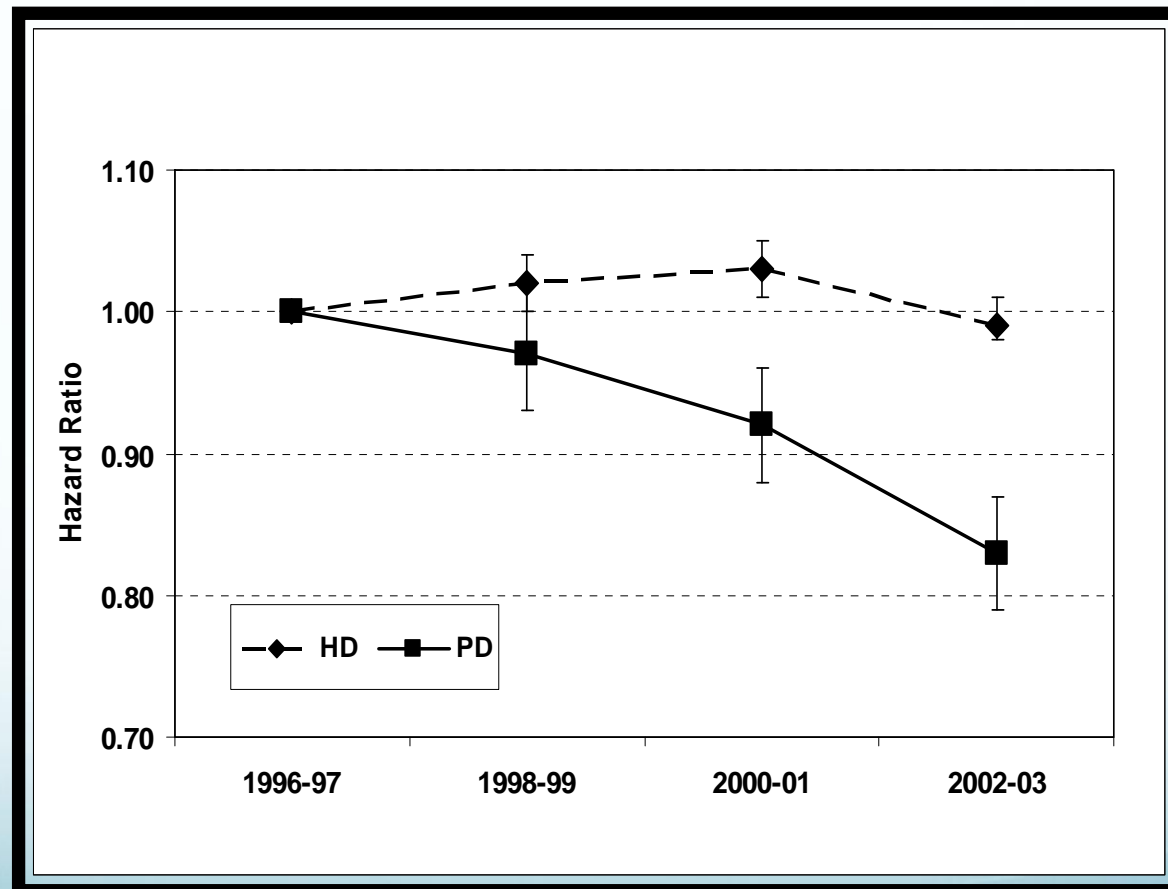
**Is the long-term survival of  
PD patients as good as  
that with HD?**

# Greater Improvements in Survival of PD Patients

		1996-'97	1998-'99	1999-2000	2000-'01
Death –	HD	22.3%	23.0%	23.5%	22.8%
	PD	17.2%	16.6%	15.2%	14.0%
Transfer –	HD	1.8%	1.5%	1.5%	1.4%
	PD	12.7%	12.4%	12.5%	12.6%
Transplant –	HD	2.8%	2.8%	2.8%	2.5%
	PD	7.3%	7.5%	7.6%	7.2%

**Outcomes in First 12 months**

# Greater Improvement in PD Outcomes

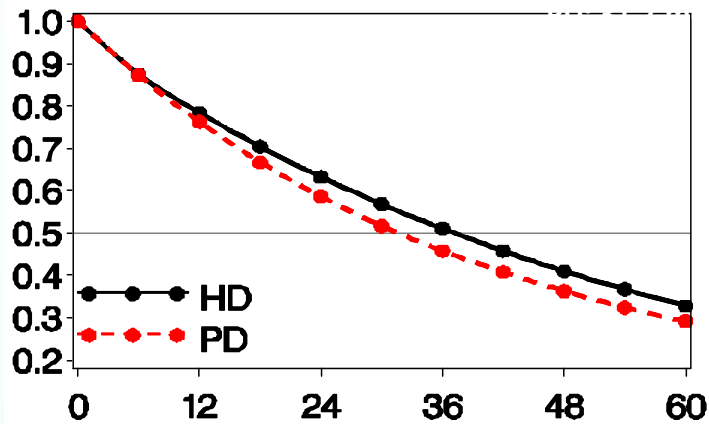


*Mehrotra et al, J Am Soc Nephrol 2007; 18: 2781-8*

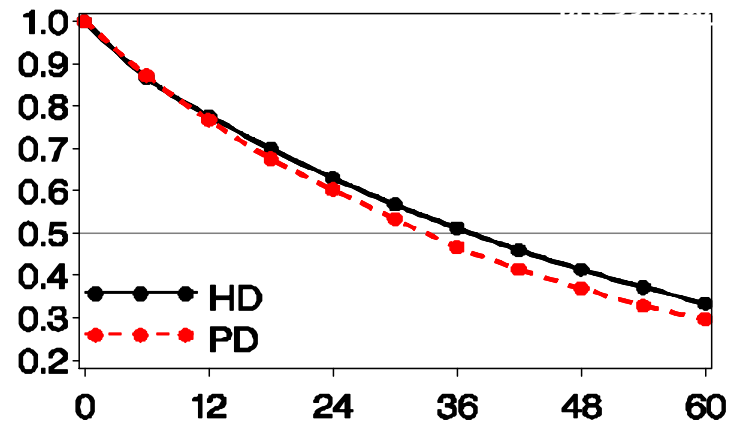
# Equal Five-Year Survival with HD and PD

Adjusted Median Life Expectancy

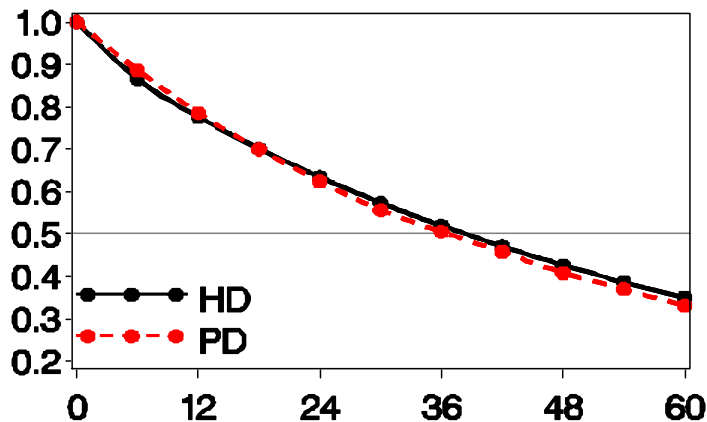
Cohort = 1996 – 1998



Cohort = 1999 – 2001



Cohort = 2002 – 2004

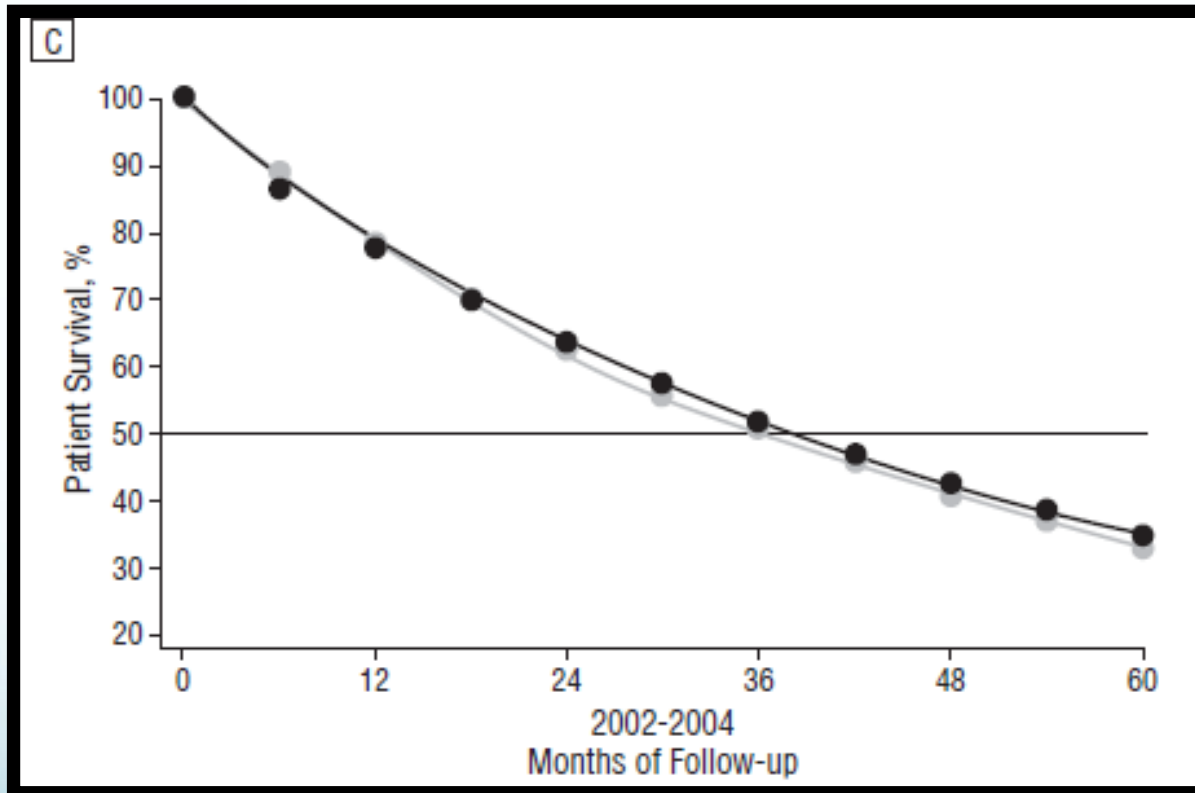


Adjusted Median Life Expectancy:

HD: 38.4 months

PD: 36.6 months

# And In the Longer Term



10-year survival  
(1999 incident pts)

HD, 12.4%  
PD, 12.4%

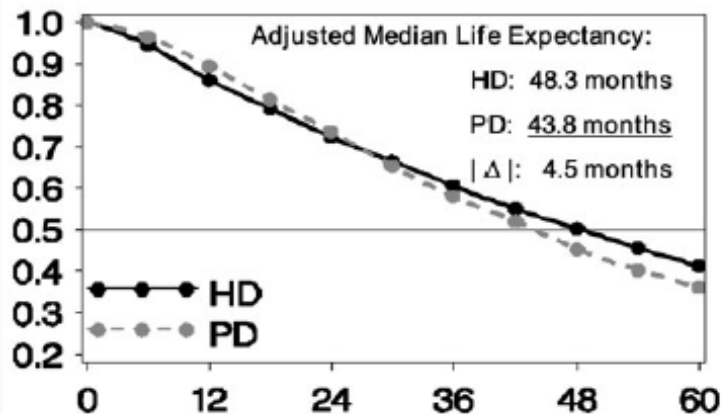
**USRDS 2011 ADR**

Adjusted Median Life Expectancy: HD: 38.4 months, PD: 36.6 months

**Survival with HD and PD is  
equivalent even when a lot  
more patients use PD**

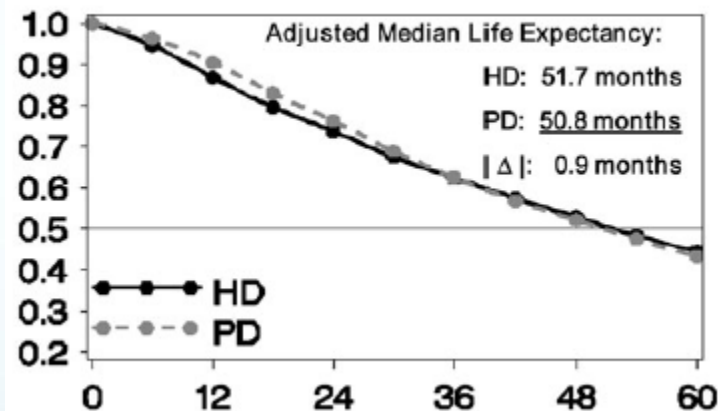
# Similar Survival Canada

Cohort Period = 1991 – 1995

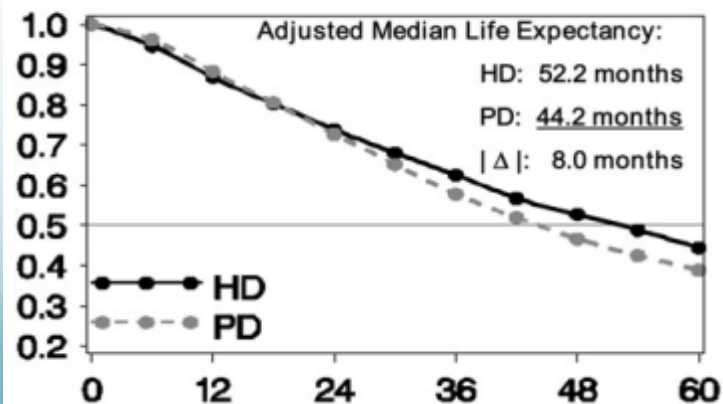


PD use, 18%

Cohort Period = 2001 – 2004

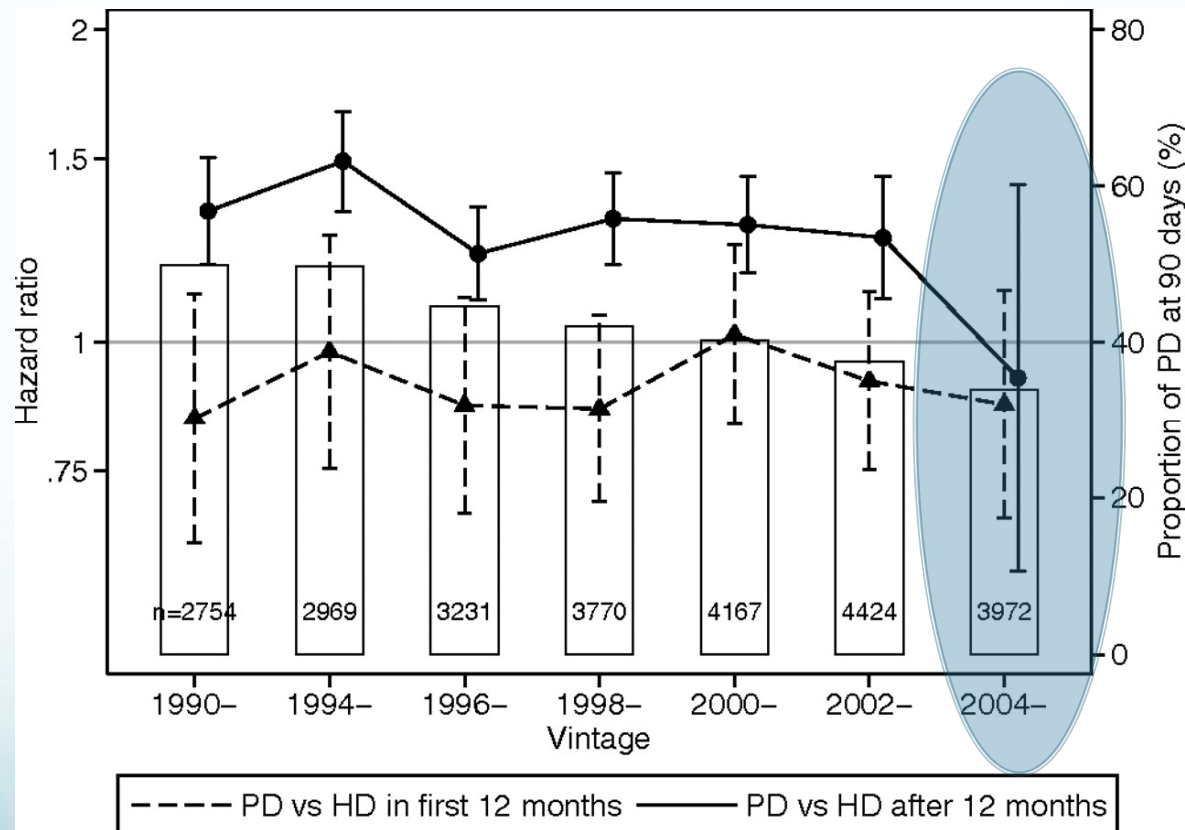


Cohort Period = 1996 – 2000





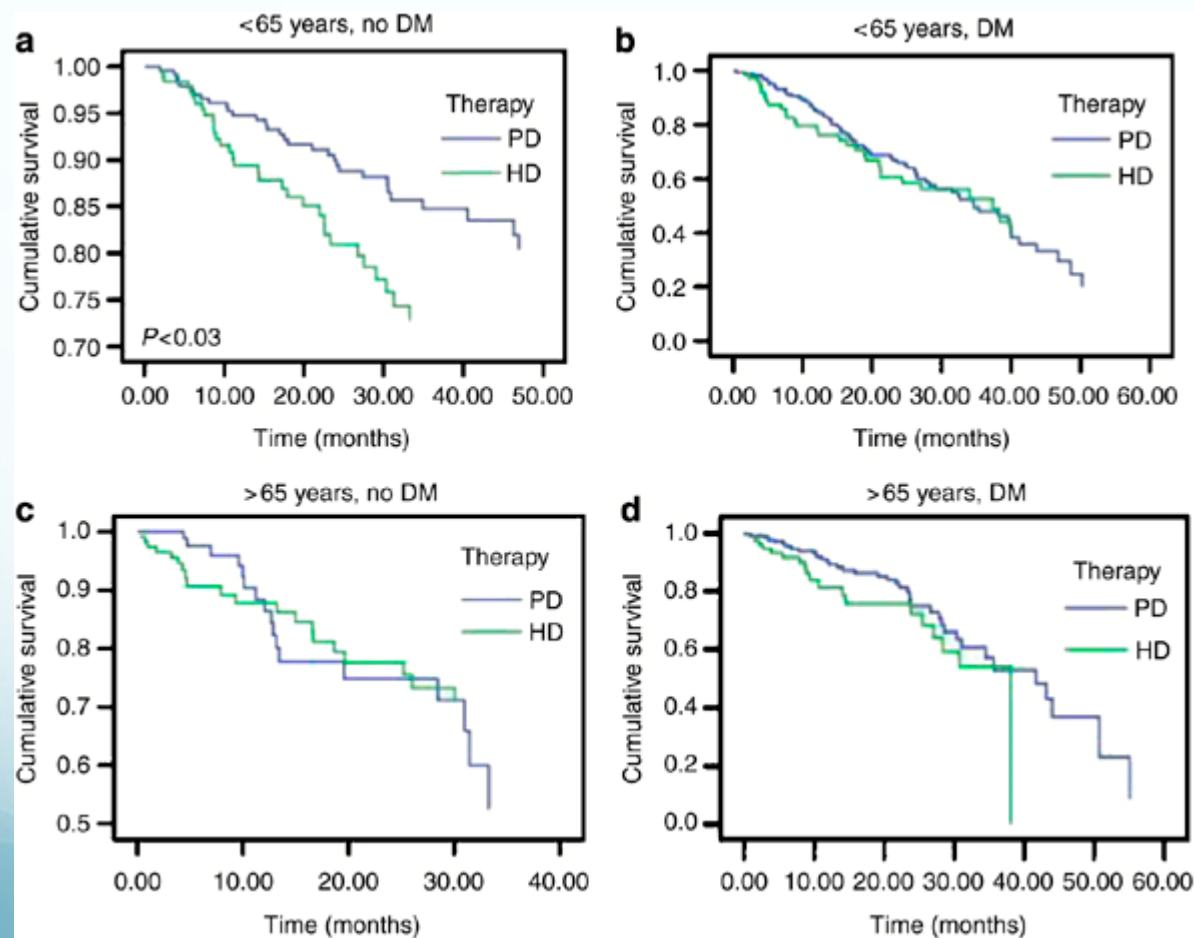
# Similar Survival Australia-New Zealand



n=25,287

**Overall PD Use – 25%**

# Similar Survival Colombia



n=923

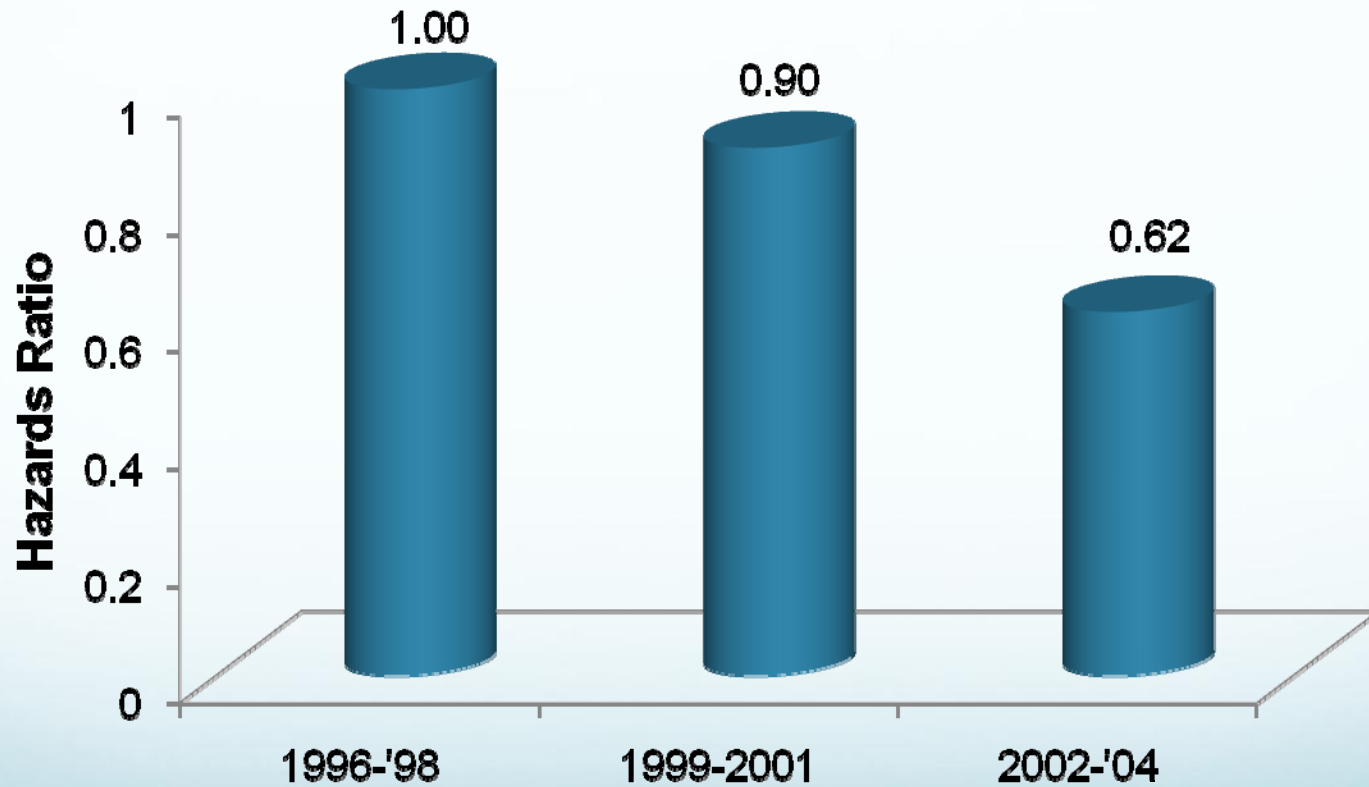
**Overall PD Use – 53%**

# What Have I Said So Far?

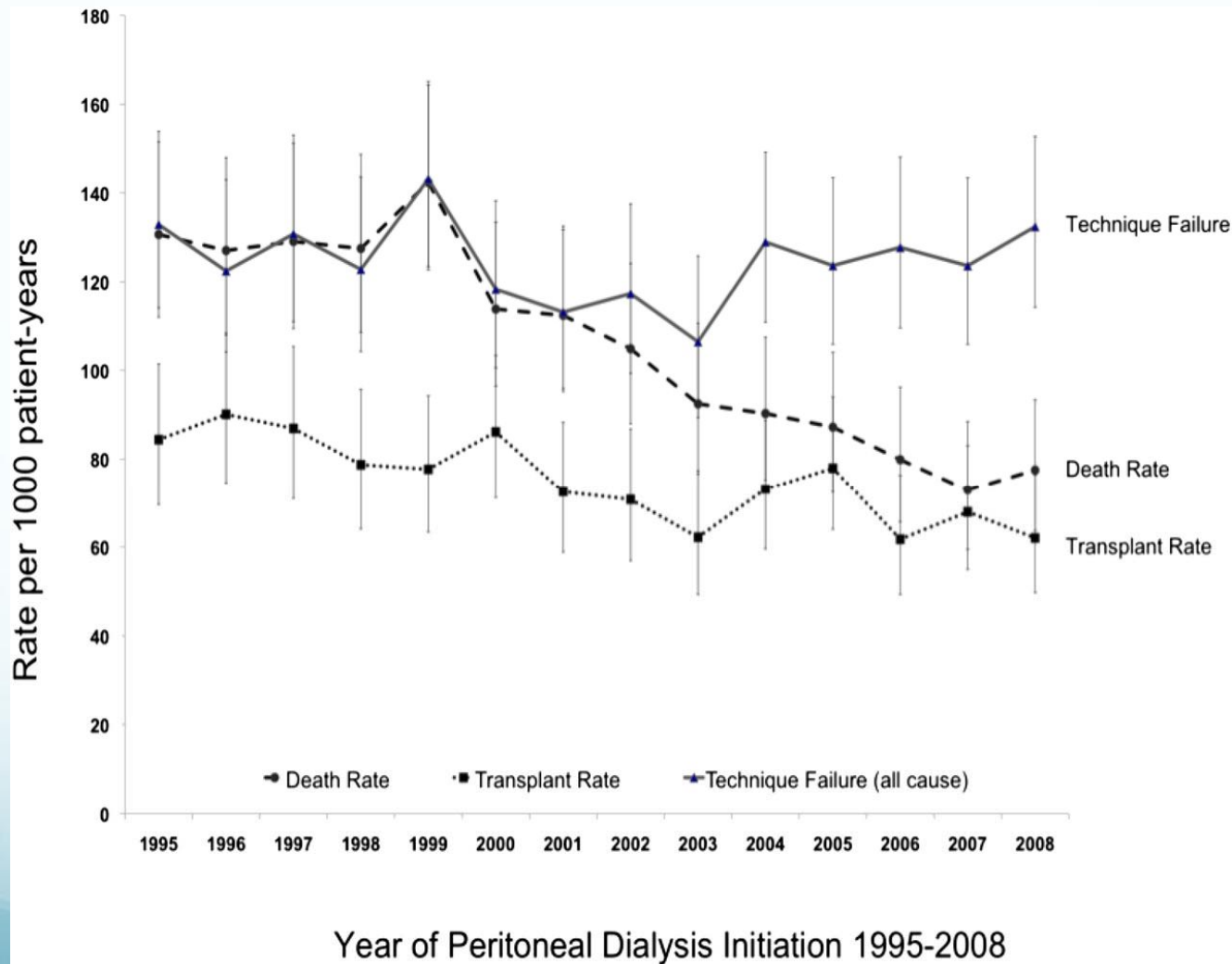
- The dialysis therapy that the patient is treated with does not specifically determine how a patient does:
  - Neither early in the course or over the long-term
  - Patients do equally well in the short-term or long-term with PD or HD
- Residual kidney function is important for both hemodialysis and peritoneal dialysis:
  - That it matters only for PD or PD cannot be done well without it is misleading

# **What About Trends In Technique Survival?**

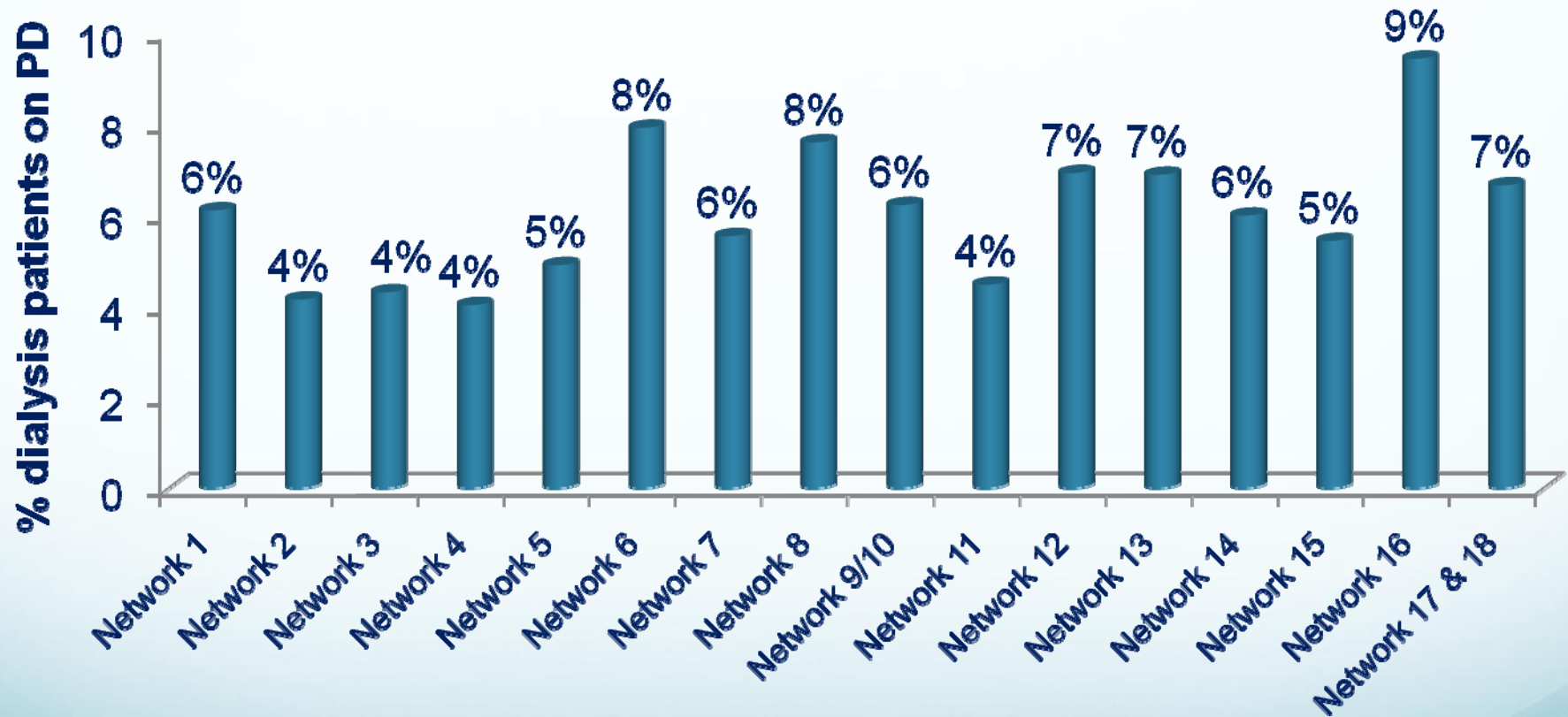
# Less Patients Need to Transfer in United States



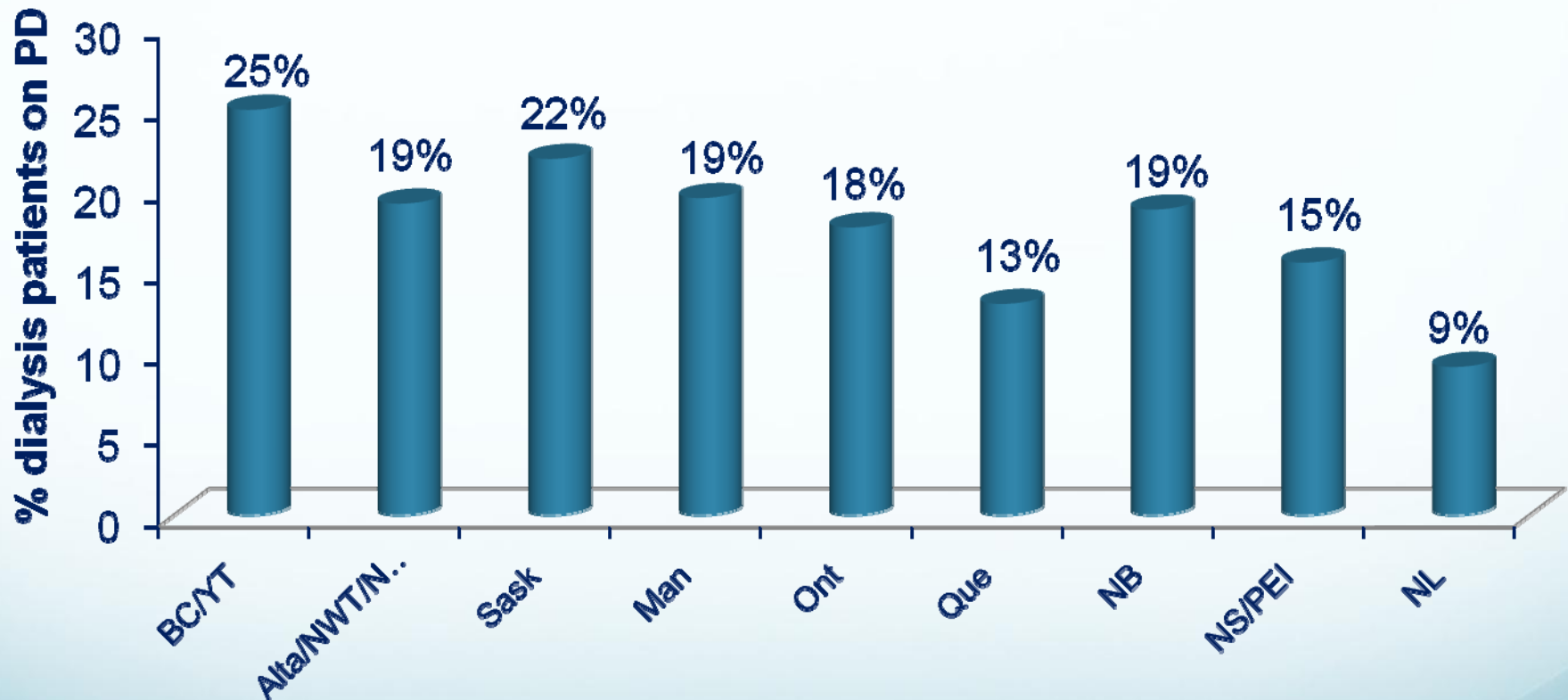
# Technique Survival Trends in Canada



# Geographic Variability in PD Use

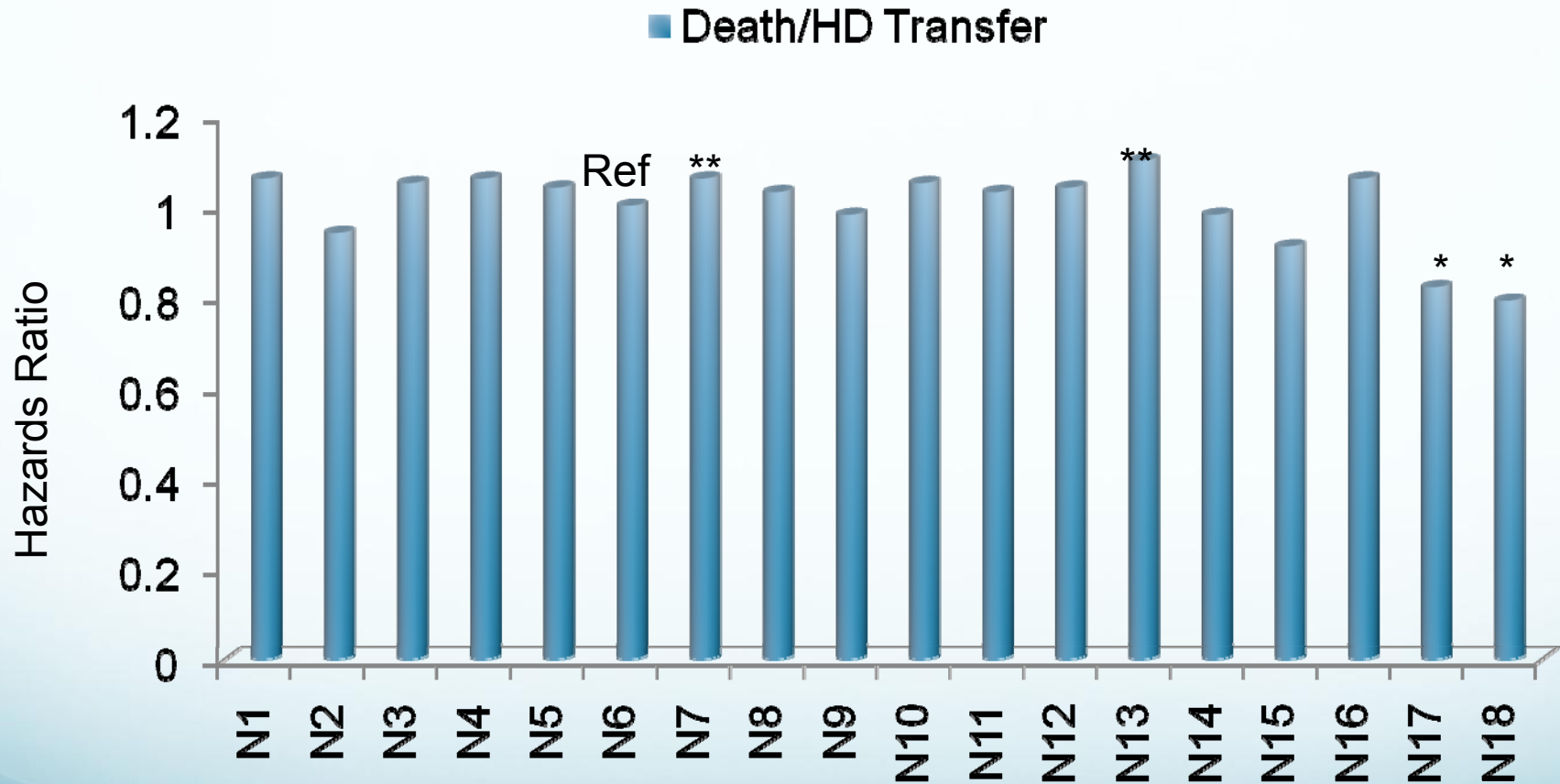


# Geographic Variability in PD Use



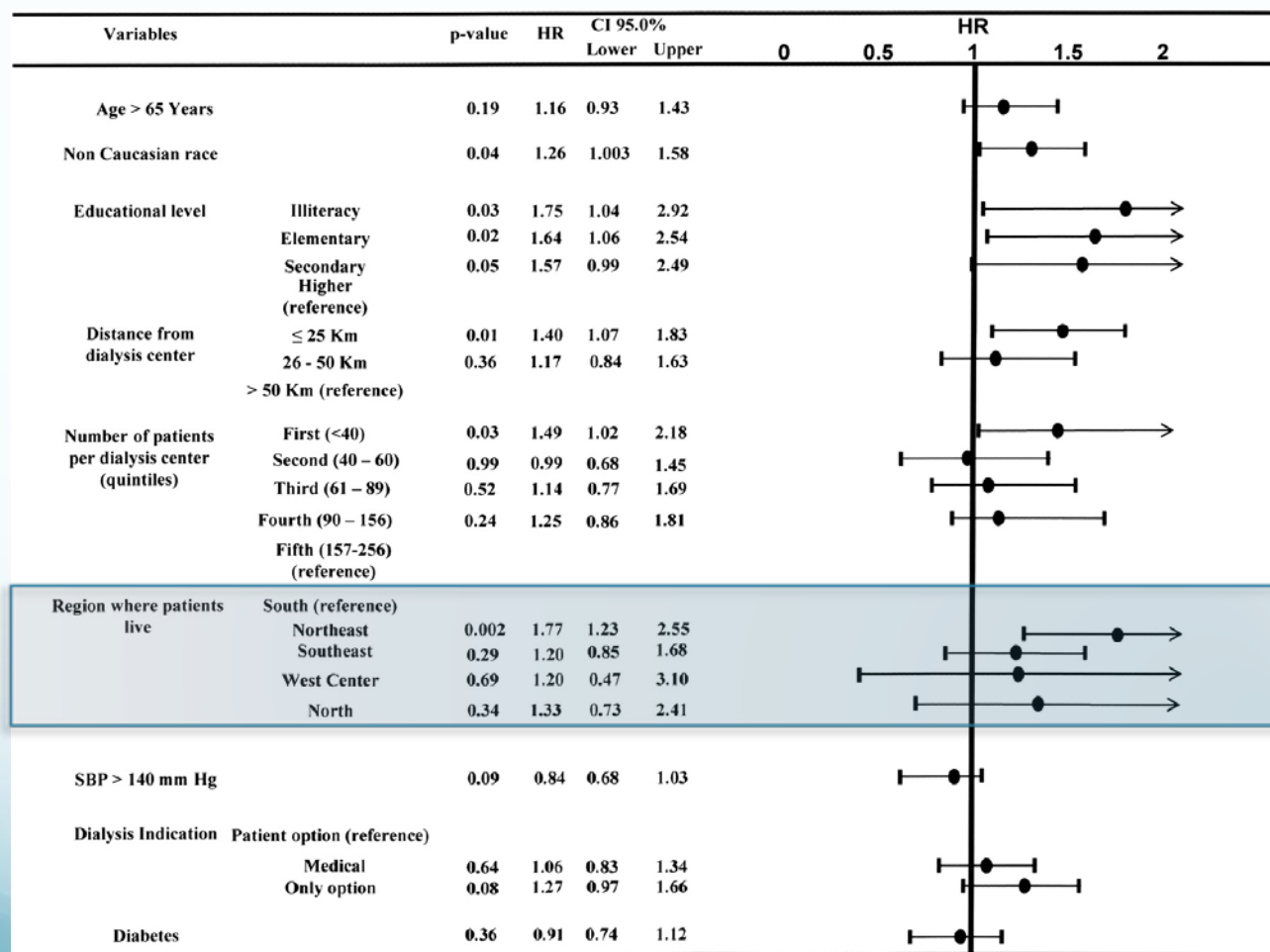


# Geographic Variability in PD Outcomes



58,700 US PD patients, 2004-2009

# Geographic Variability in PD Outcomes



Time to Peritonitis

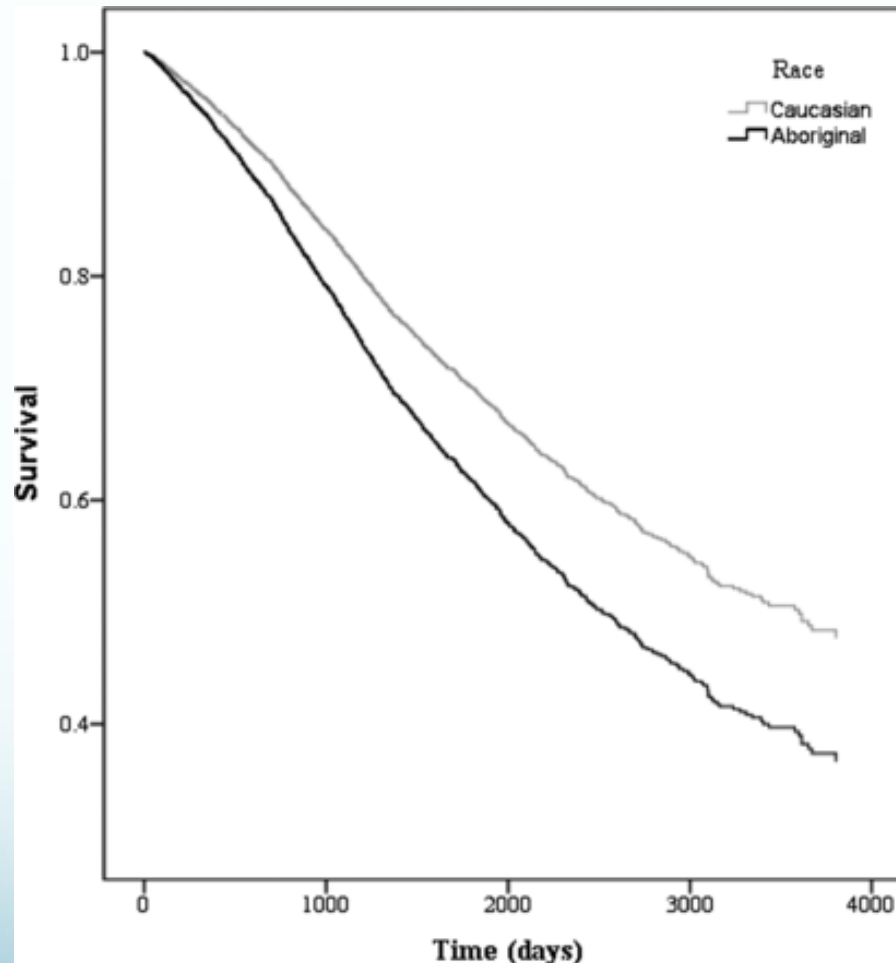
# Geographic Variability

- How well patients do on PD depends on where they live:
  - It is unlikely to be the weather or the health of patients but
  - Either:
    - How PD is practiced and/or
    - Unmeasured differences in access to care
- Need to see what good units do well and what can be improved in units that don't do so well:
  - Need to constantly measure and review outcomes

# Race and PD Outcomes United States

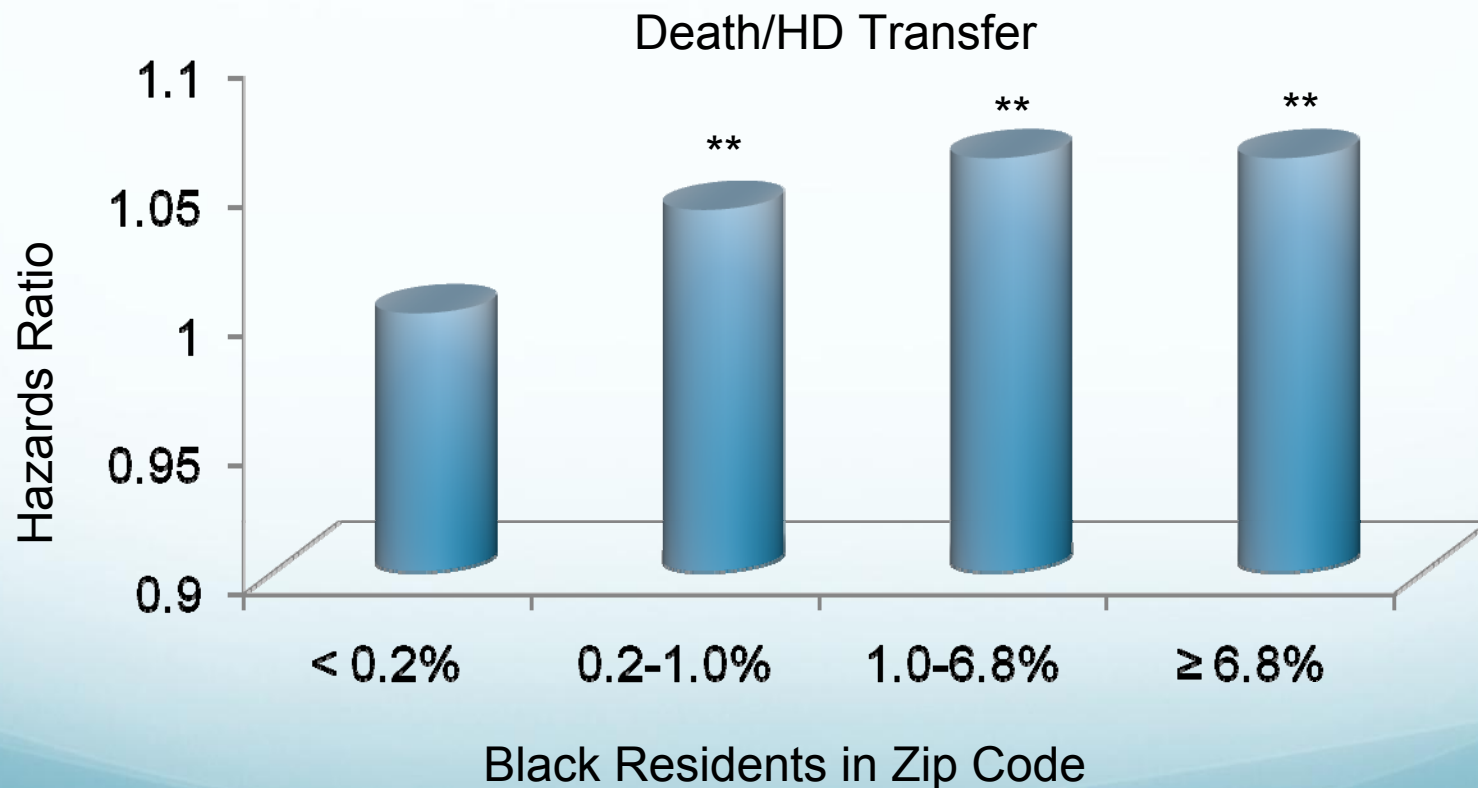
- Use of PD, relative to Whites:
  - Significantly lower in Blacks
  - No different in Hispanics
- Blacks and Hispanics:
  - Significantly lower risk for death BUT
  - Higher risk of transfer to hemodialysis (technique failure)

# Race and PD Outcomes Canada

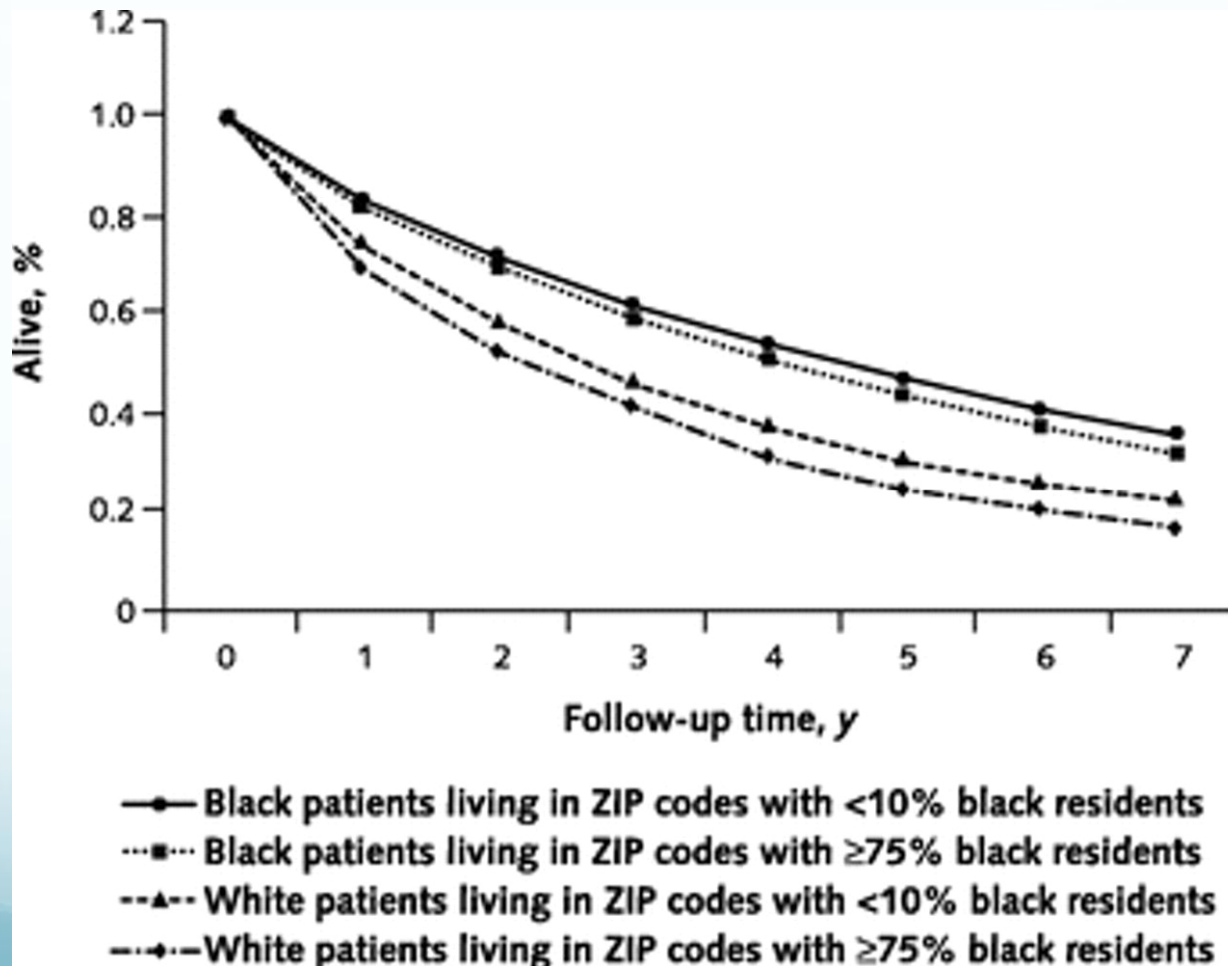


31,576 Canadian PD  
patients, 2000-'09

# Minorities in Neighborhood



# Neighborhood Segregation and HD Outcomes

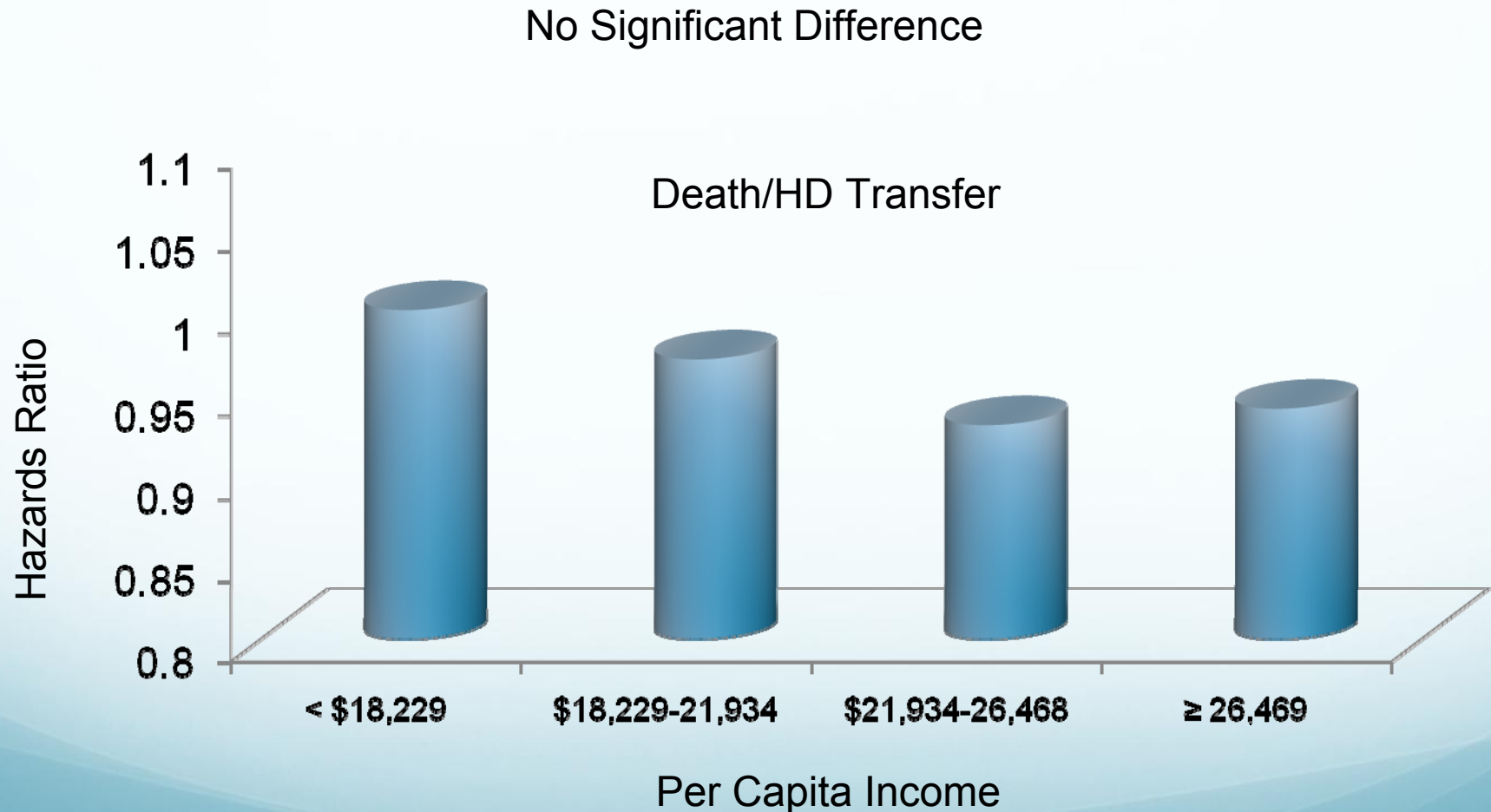


# Race and Neighborhood Segregation

- Opportunities exist to improve outcomes of racial/ethnic minorities with PD in US/Canada:
  - Blacks in US: higher technique failure
  - Aboriginals in Canada: higher mortality
- In US, dialysis patients in black-segregated communities don't do so well, either with HD or PD
- Need a different skill set, a different way to engage and educate patients from different racial/cultural backgrounds

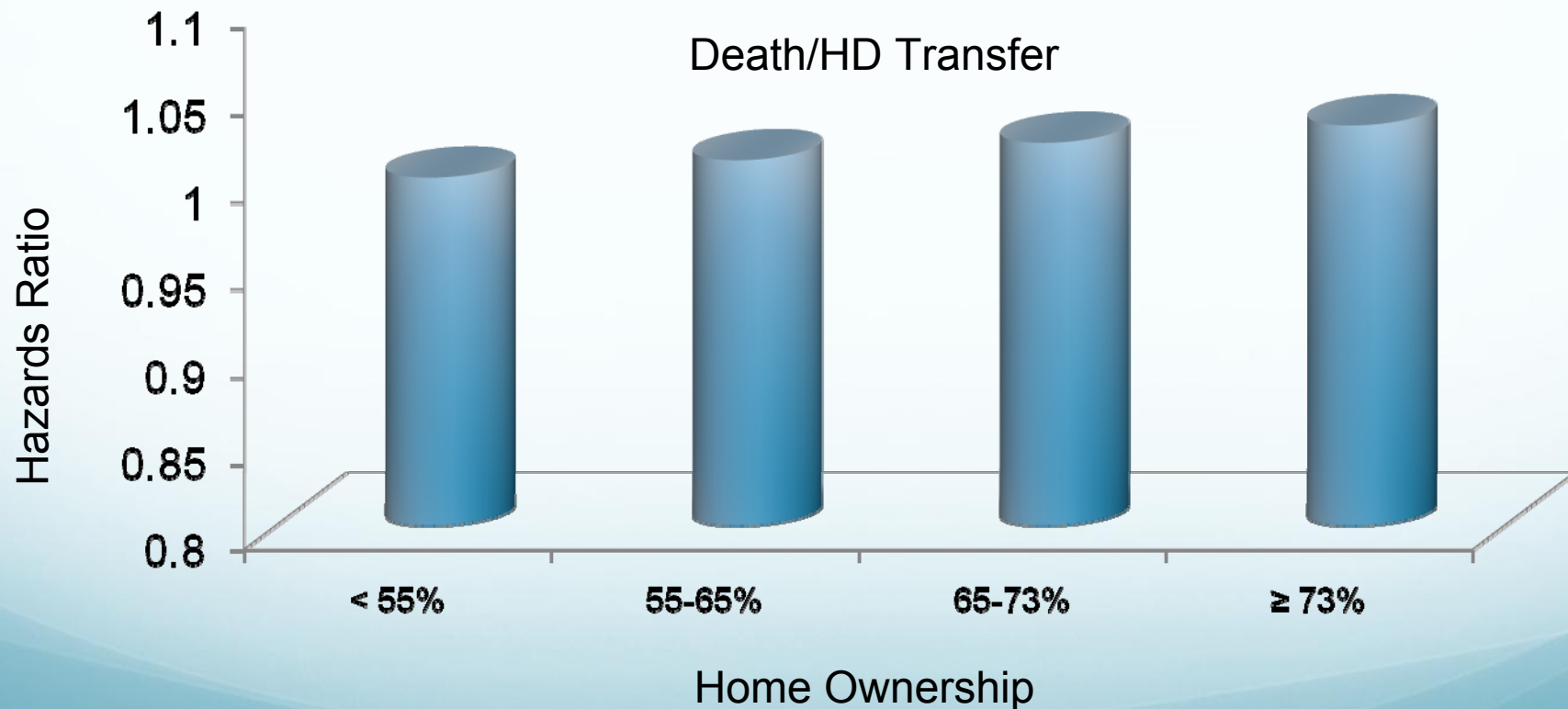


# Neighborhood Affluence

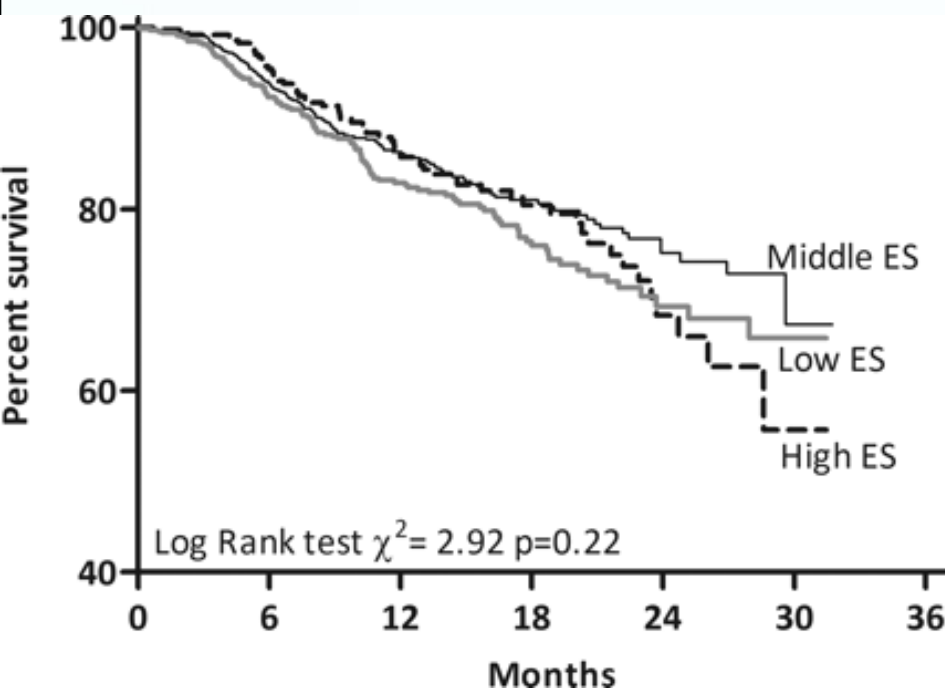


# Neighborhood Affluence

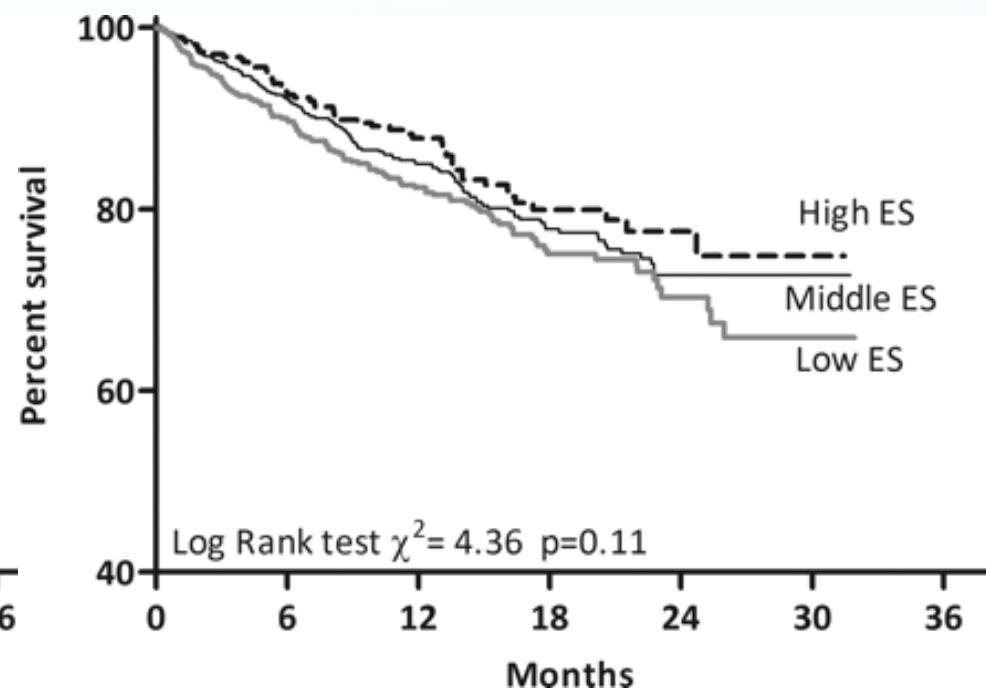
No Significant Difference



# Family Income and PD Outcomes



Patient Survival

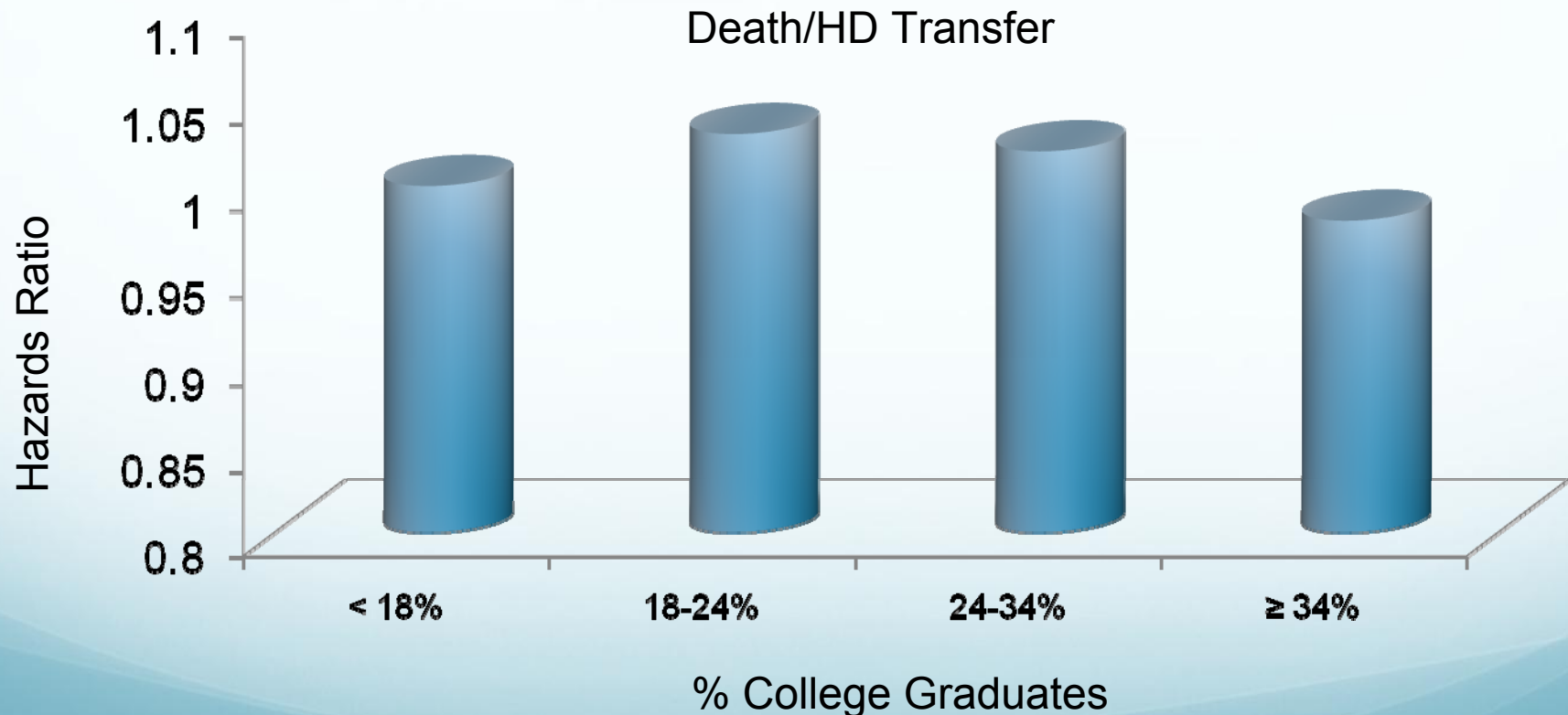


Technique Survival

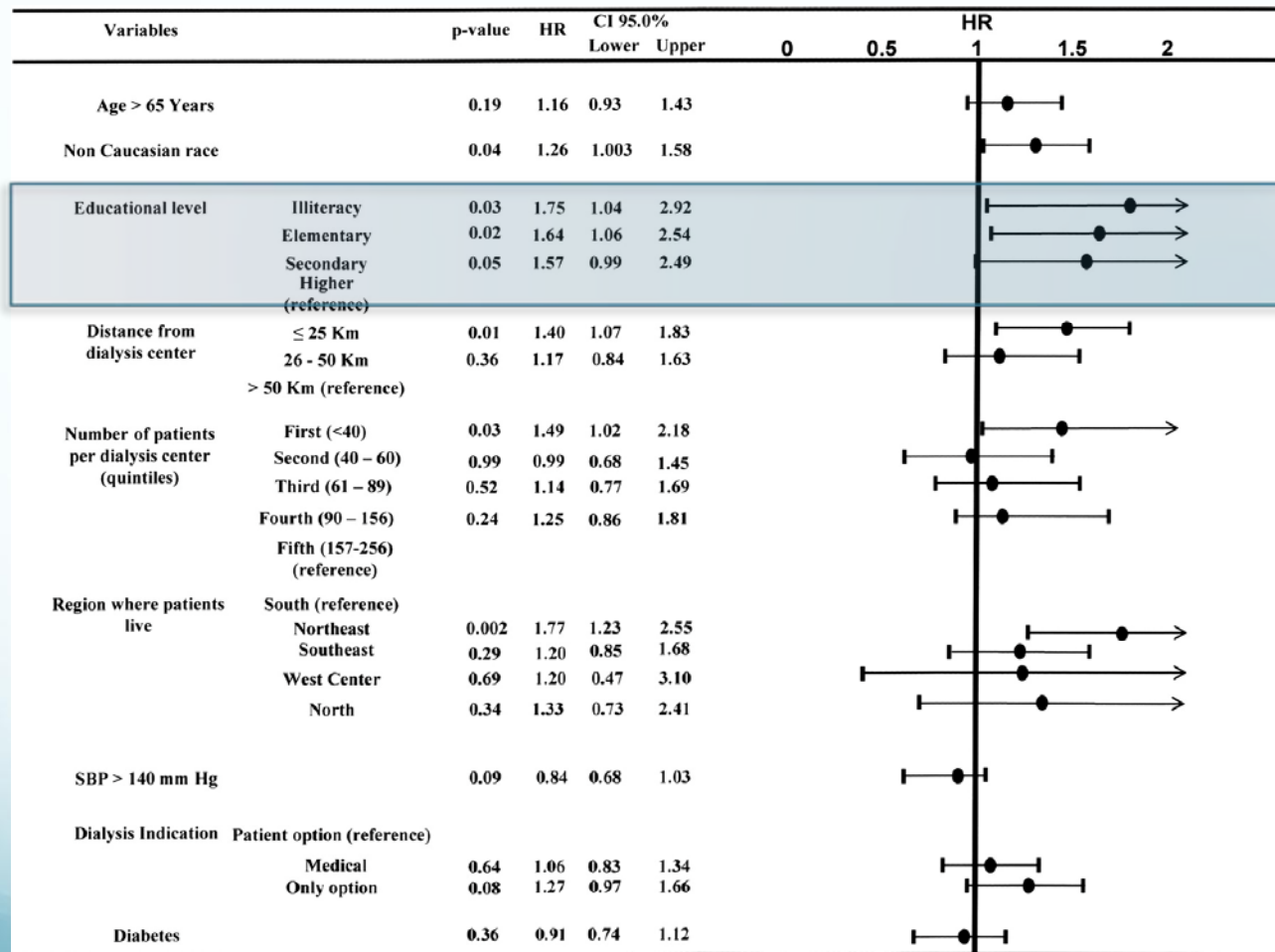
1952 Brazilian PD Patients

# Neighborhood Educational Attainment

No Significant Difference



# Educational Attainment and Peritonitis

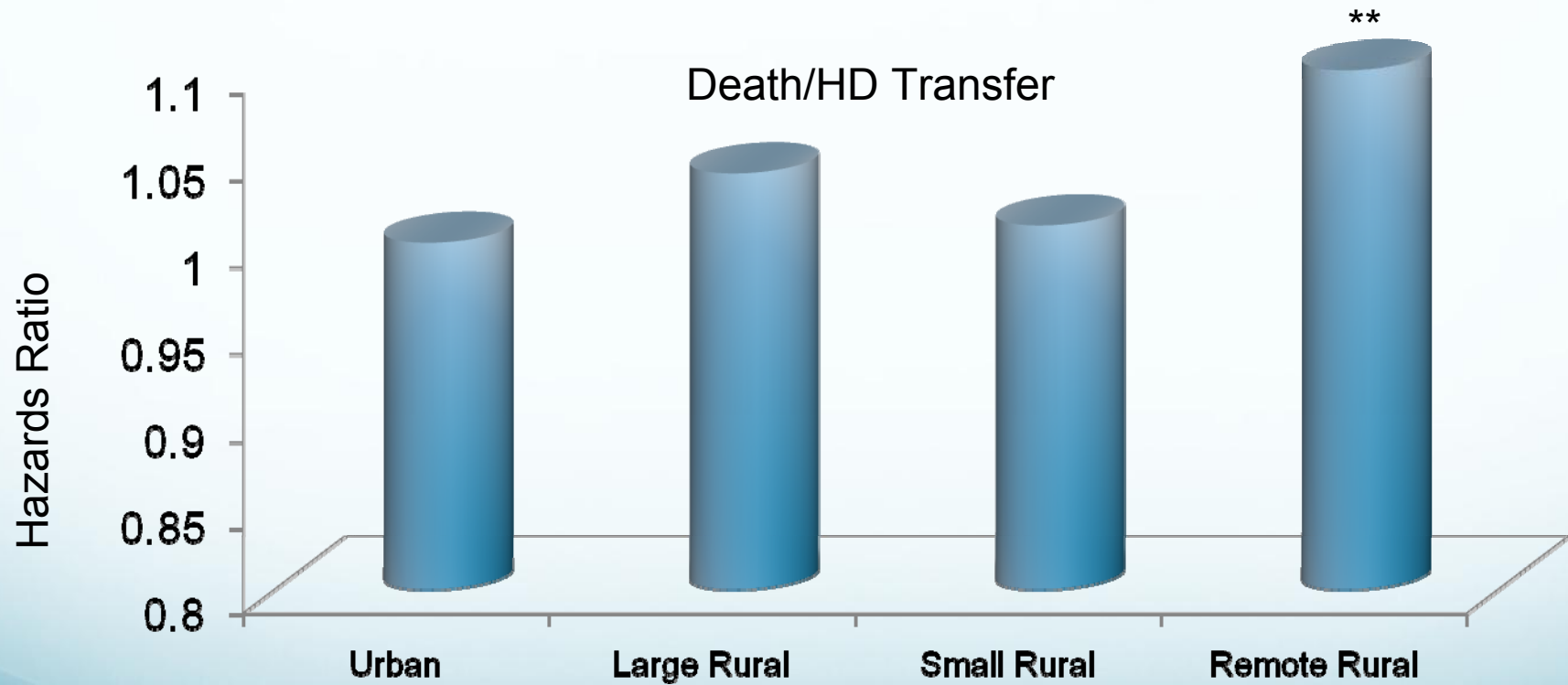


Time to Peritonitis

# Economic Status and PD Outcomes

- This seems to be the least important of the socio-demographic factors
- It is possible to achieve good outcomes with PD in individuals that are poor and/or less educated:
  - The major limitation seems to be living conditions

# Facility Neighborhood “Rurality”



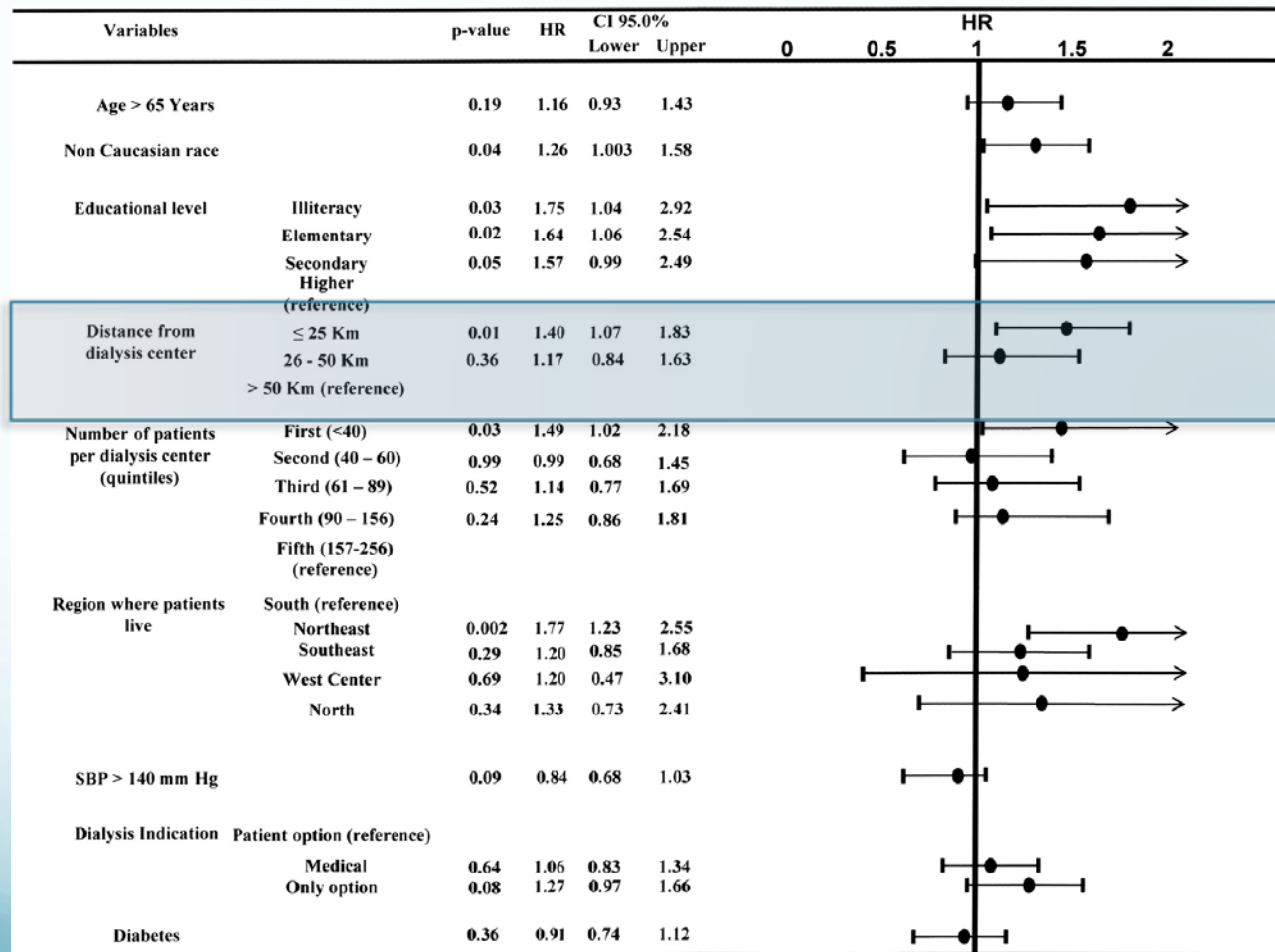
# Rurality/Distance from Facility Canada

	Death	Technique Failure
Rural Residence	1.17 (0.98-1.39)	0.91 (0.74-1.13)
Distance from dialysis unit (every 1 km increase)	1.00 (0.99-1.00)	0.99 (0.99-1.01)

5162 PD patients from Ontario, 1995-2005

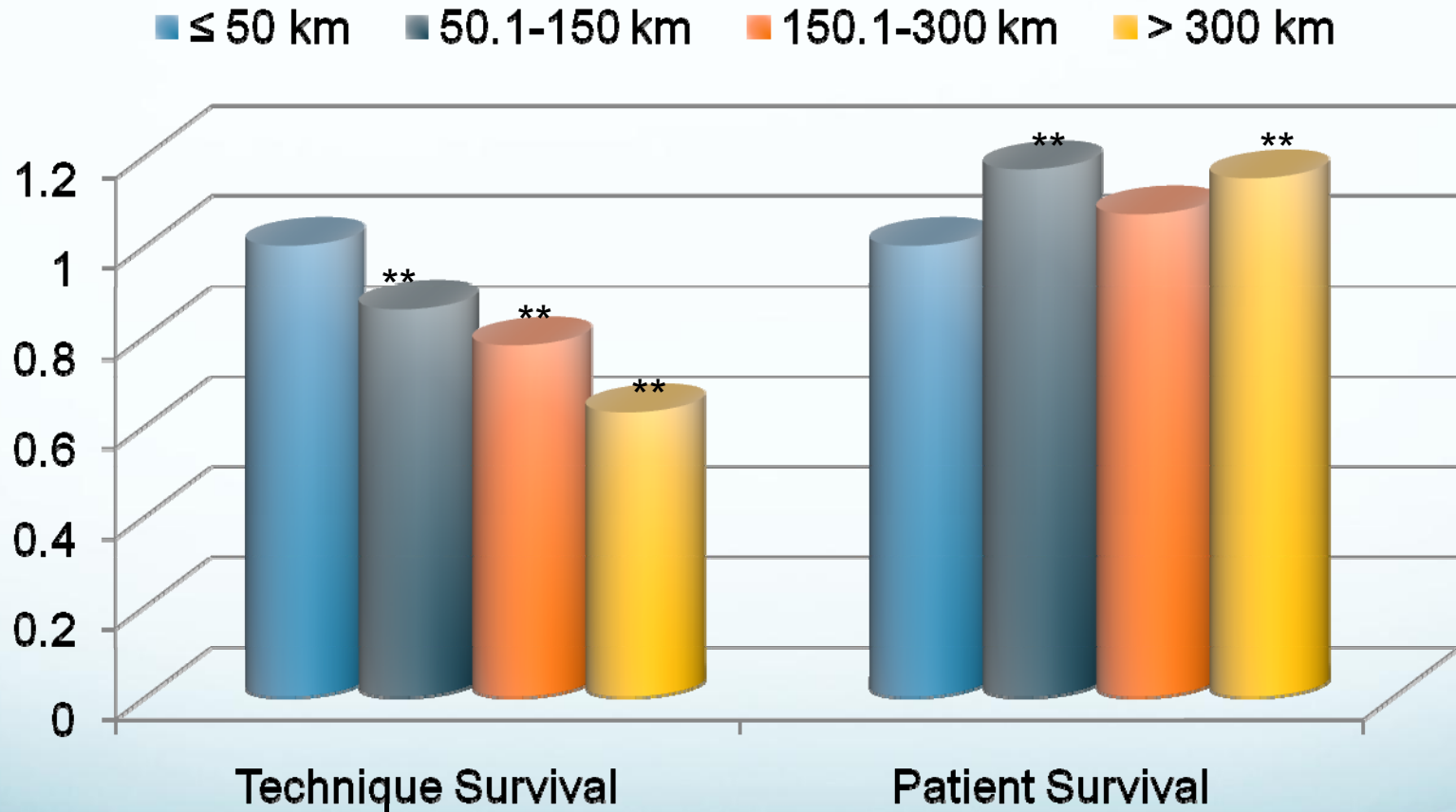


# Distance from Dialysis Facility and Peritonitis Risk



Time to Peritonitis

# Distance from Unit Canada



26,775 Canadian patients, 1990-2000

# Rurality and Distance from Facility

- Dialysis units in remote rural areas (0.1% of all facilities) seem to face unique challenges that need to be understood
- We need to test interventions, like telemedicine, to improve the outcome of patients that live particularly far away from dialysis facilities

# Conclusions

- The dialysis therapy itself does not determine how well patients do, either early or late
- People likely practice PD differently in different parts of the country/world; it is important to identify proven “best demonstrated practices”
- Training and management in PD should be culturally appropriate to overcome unique problems seen in minorities or segregated neighborhoods
- Patient’s affluence or educational attainment do not determine how well people do on PD
- Finally, there is a compelling need to identify practices that will allow programs to better support patients who live in remote locations, far from dialysis facilities