Cultivating the growth of Peritoneal Dialysis:

The impact of KCC

Krishna Poinen

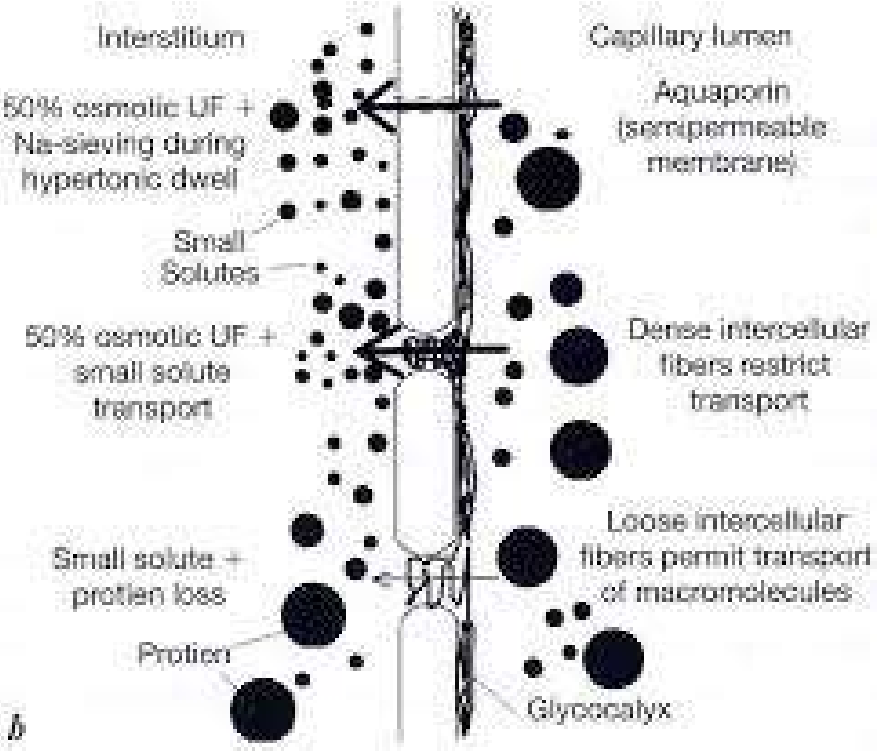
February 28th, 2019

Objectives

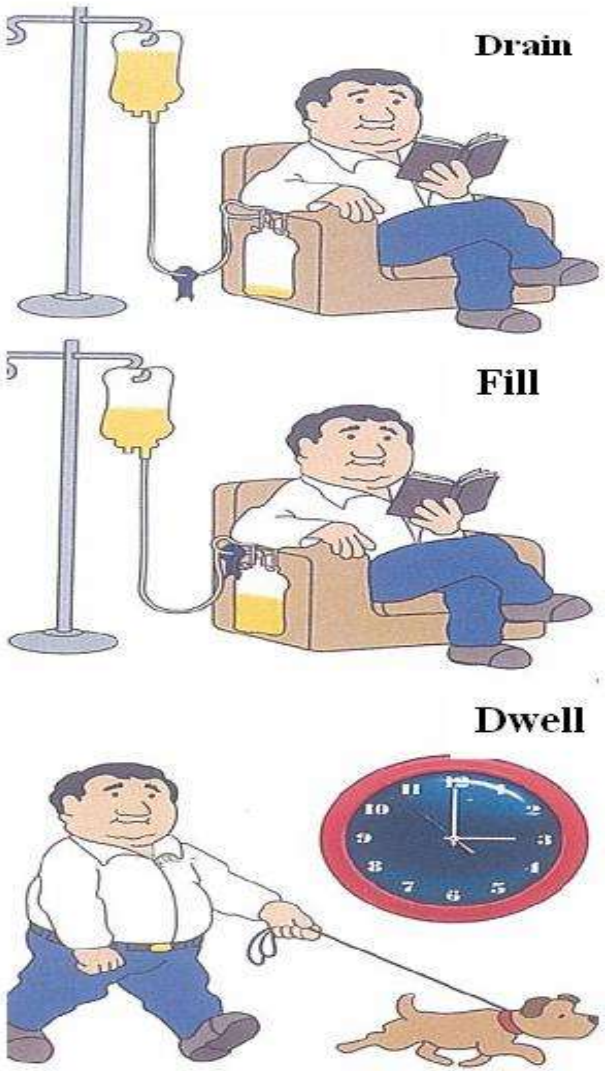
1. Why PD is important?

2. Why is PD important to you?

3. Why debunking PD myths is important for everyone?

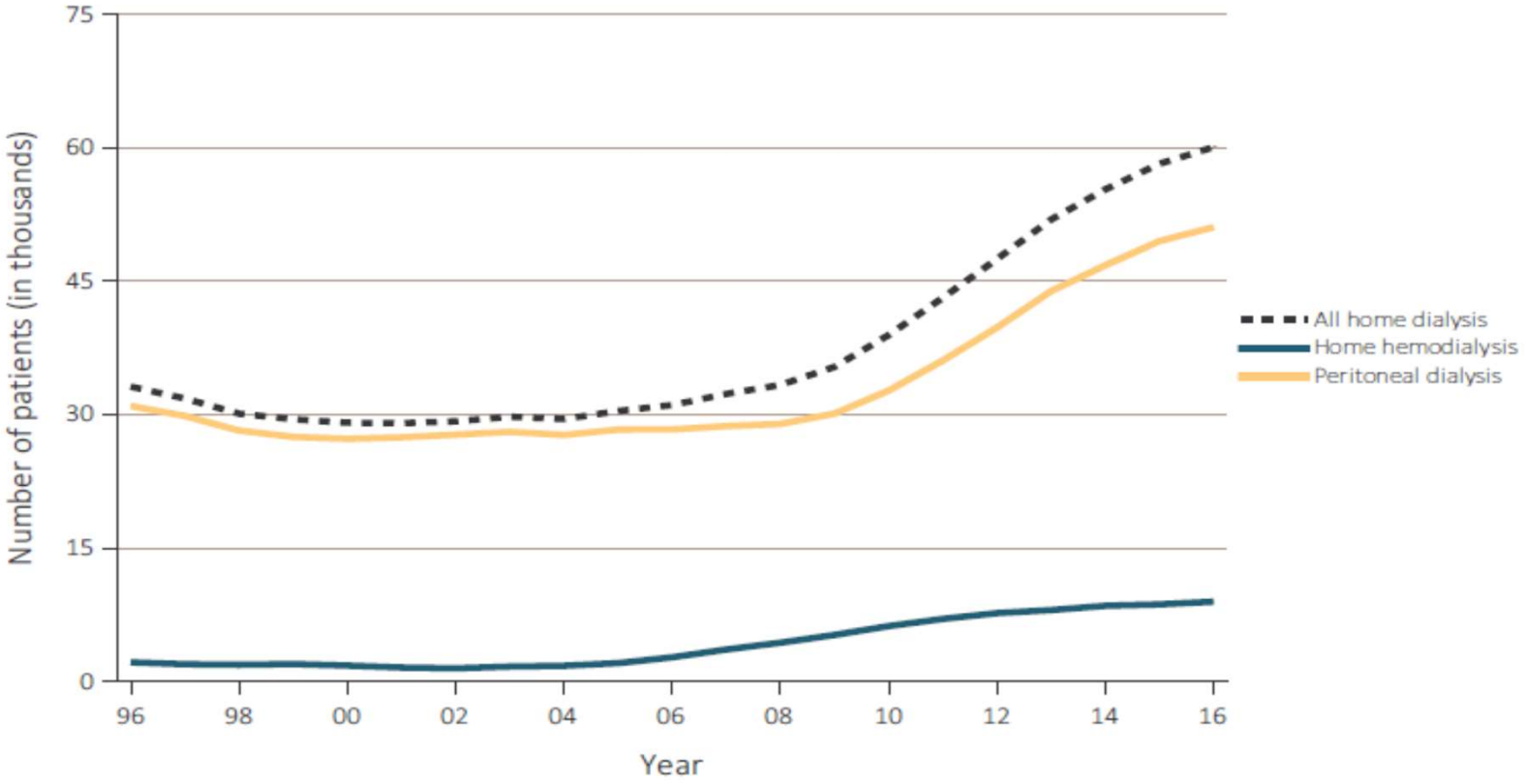

Interstitium
Capillary lumen
50% osmotic UF + Na-sieving during hypertonic dwell
Aquaporin (semipermeable membrane)
Small Solutes
50% osmotic UF + small solute transport
Dense intercellular fibers restrict transport
Loose intercellular fibers permit transport of macromolecules
Small solute + protien loss
Protien
Glycocalyx
b


Solution Bag
Peritoneum
Catheter
Drainage Bag
Peritoneal Dialysis Solution


Drain
Fill
Dwell

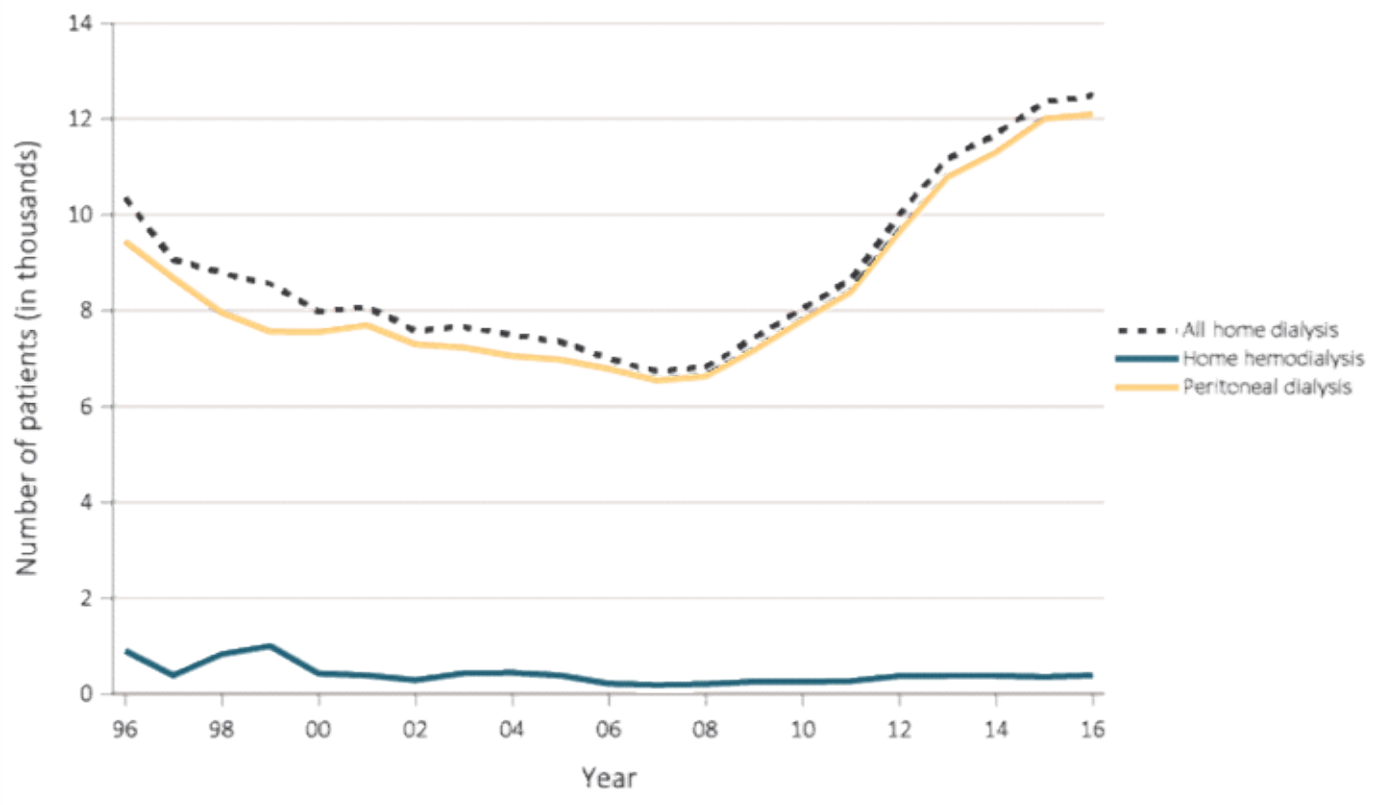

APD

Trends in number of prevalent ESRD cases using home dialysis, by type of therapy, in the United States, 1996-2016



USRDS, 2018

Trends in the number of incident ESRD cases using home dialysis, by type of therapy, in the U.S. population, 1996-2016



USRDS, 2018

vol 2 Table 5.3 Adjusted survival by treatment modality and incident cohort year (year of ESRD onset)

	3 months (%)	12 months (%)	24 months (%)	36 months (%)	60 months (%)
Hemodialysis					
2003	91.0	74.8	61.8	51.4	36.6
2005	91.2	75.4	62.7	53.0	38.6
2007	91.6	76.3	64.2	54.6	40.0
2009	91.8	77.5	65.7	56.2	41.6
2011	92.1	78.3	66.8	57.4	42.0
Peritoneal dialysis					
2003	96.3	83.9	69.0	57.7	42.9
2005	96.5	85.6	72.2	61.6	45.7
2007	96.9	87.5	74.8	64.5	48.8
2009	97.4	87.8	76.6	66.7	51.5
2011	97.7	89.7	79.0	69.5	52.1
Deceased-donor transplant					
2003	95.7	89.9	84.5	79.5	69.2
2005	95.6	89.7	84.9	80.3	71.0
2007	96.7	92.2	88.1	83.7	73.3
2009	96.7	92.0	88.2	84.0	75.1
2011	97.1	93.9	90.4	86.4	76.8
Living-donor transplant					
2003	98.1	95.3	91.3	86.9	77.9
2005	98.2	95.2	91.7	88.2	80.3
2007	99.0	97.0	94.3	91.0	83.5
2009	98.9	97.1	94.4	91.1	84.1
2011	98.9	96.3	94.3	91.2	84.1

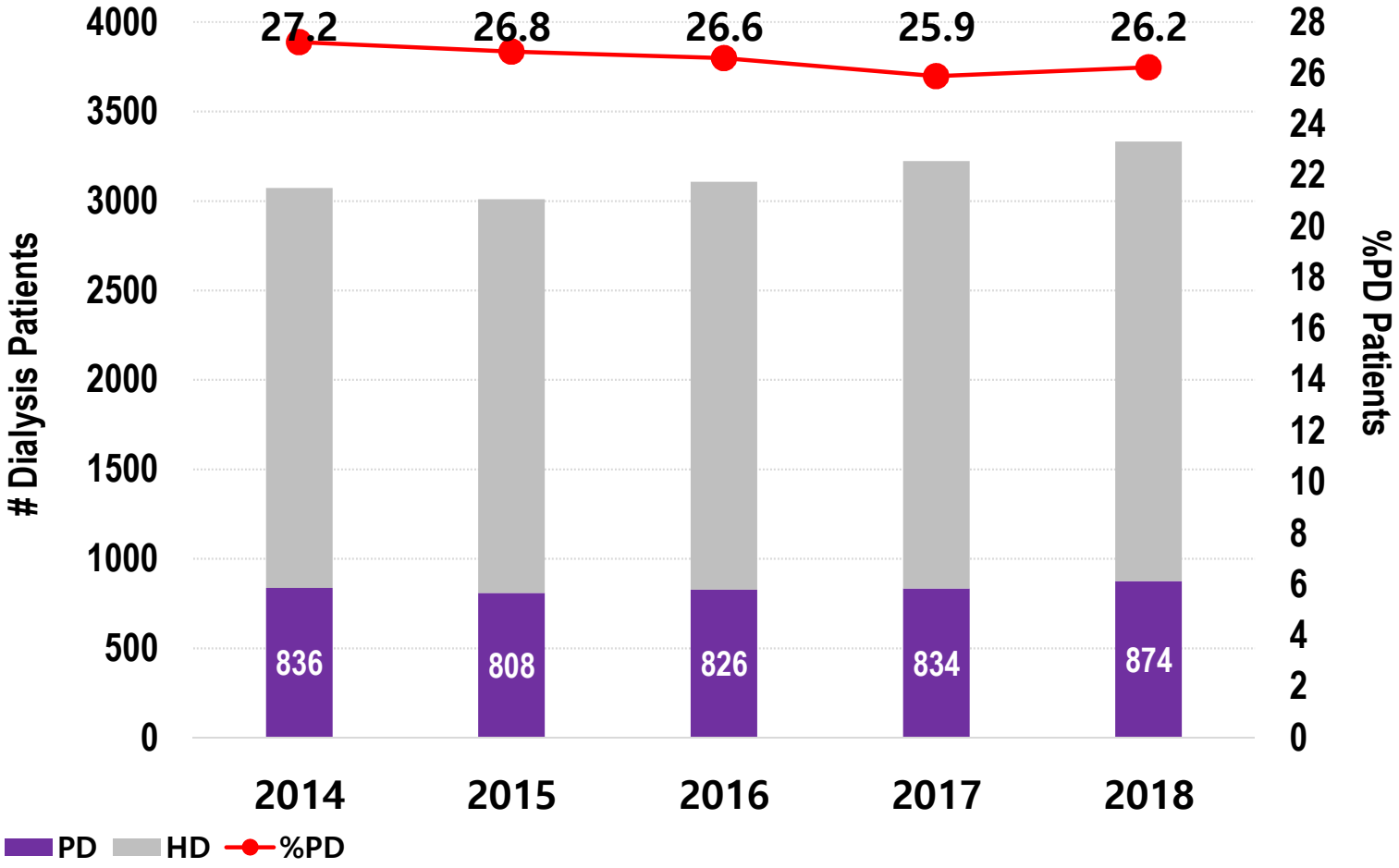
Data Source: Reference Tables I.1_adj-I.36_adj. Adjusted survival probabilities, from day one, in the ESRD population. Reference population: incident ESRD patients, 2011. Adjusted for age, sex, race, Hispanic ethnicity, and primary diagnosis. Abbreviation: ESRD, end-stage renal disease.

USRDS, 2018

BC - Prevalent PD as of March 2018

	Total	CCPD	CAPD	PD Assist	IPD	Unspecified
BC	874	598 *(68.5%)*	218 *(25%)*	53 *(6%)*	3 *(0.3%)*	2 *(0.2%)*
IHA	106	66	39	1	0	0
FHA	362	255	76	26	3	2
VCH/ PHC	226	164	52	10	0	0
VIHA	111	69	28	14	0	0
NHA	55	30	23	2	0	0
BCCH	14	14	0	0	0	0

Prevalent PD in BC Over Time



Transition: First PD Catheter Insertion → PD Training → PD Home

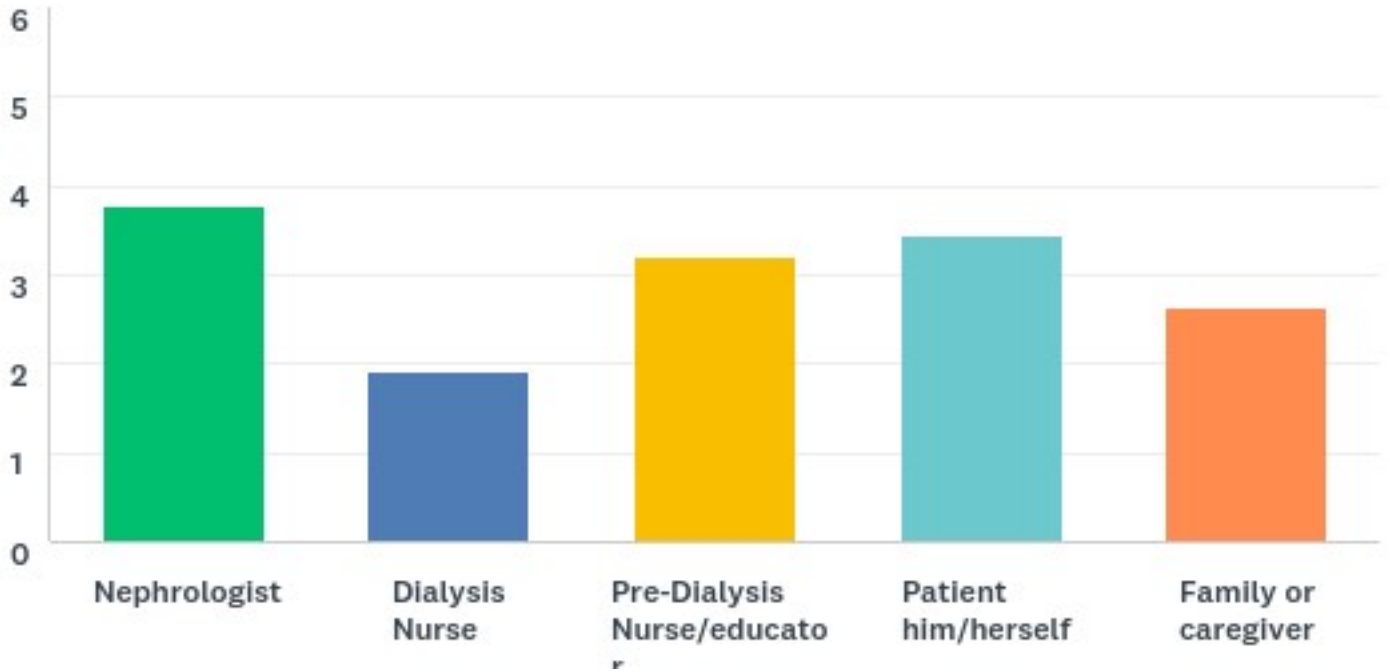
	FY12/13	FY13/14	FY14/15	FY15/16	FY16/17
# Pts with first-ever PD Catheter Inserted	390	325	303	347	384
Within first 12 months of insertion:					
Any PD Starts: IPD, Trial or Training	369 (95%)	311 (96%)	283 (93%)	322 (93%)	367 (96%)
PD training	353 (91%)	301 (93%)	274 (90%)	313 (90%)	356 (90%)
PD at Home	342 (88%)	294 (90%)	264 (87%)	302 (87%)	349 (91%)

https://www.timescolonist.com/news/from-gay-marriage-to-oil-spills-canada-party-hopes-to-solve-america-s-woes-1.36851

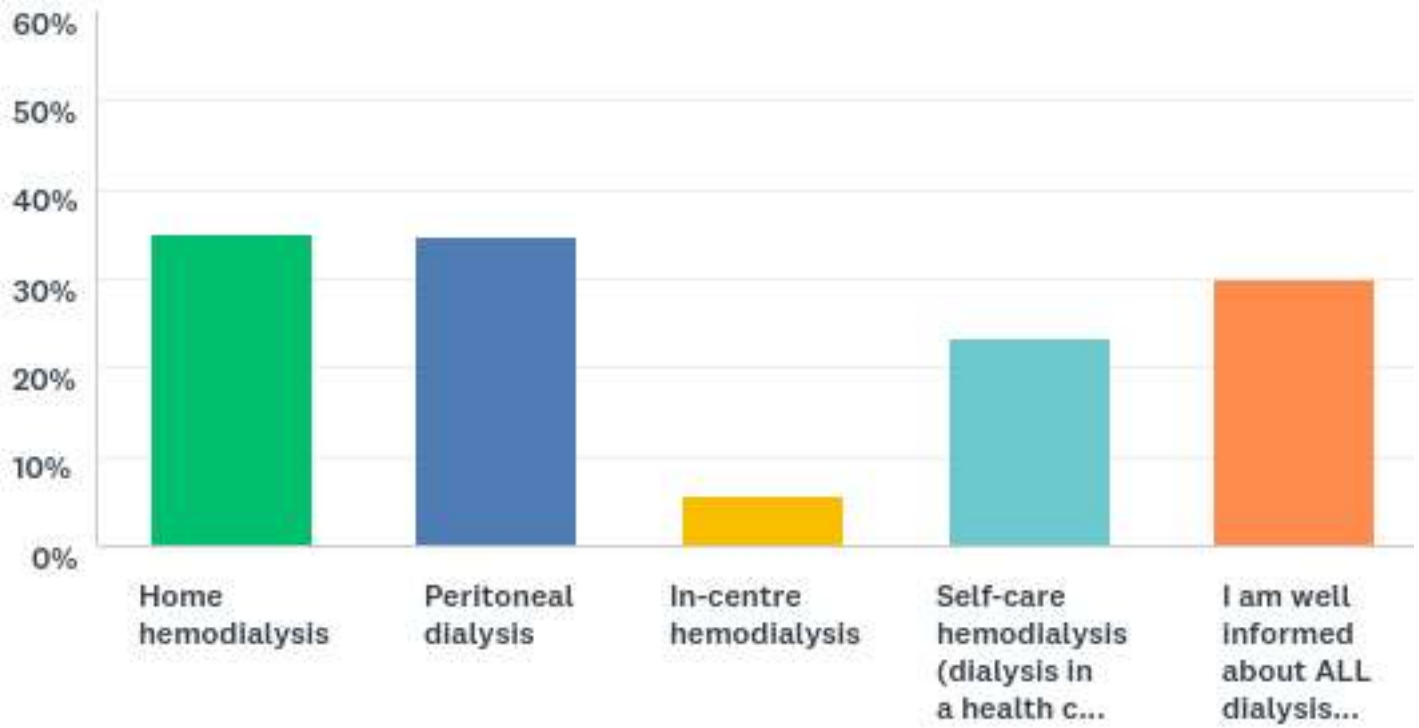
KCC patients started chronic dialysis with PD as preferred ESRD modality choice: Did they start on PD?

	FY13/14	FY14/15	FY15/16	FY16/17
# KCC Pts Starting Chronic Dialysis	636	564	657	709
% Pts chose PD as preferred dialysis modality	36% (n=230)	37% (n=210)	39% (n=259)	44% (n=309)
Of those who chose PD, dialyzed on PD*?				
No PD	19%	16%	19%	20%
On PD: Day 0-90	78%	77%	73%	76%
On PD: Day 91-365	2%	6%	7%	3%
On PD: >Day 365	1%	1%	1%	1%

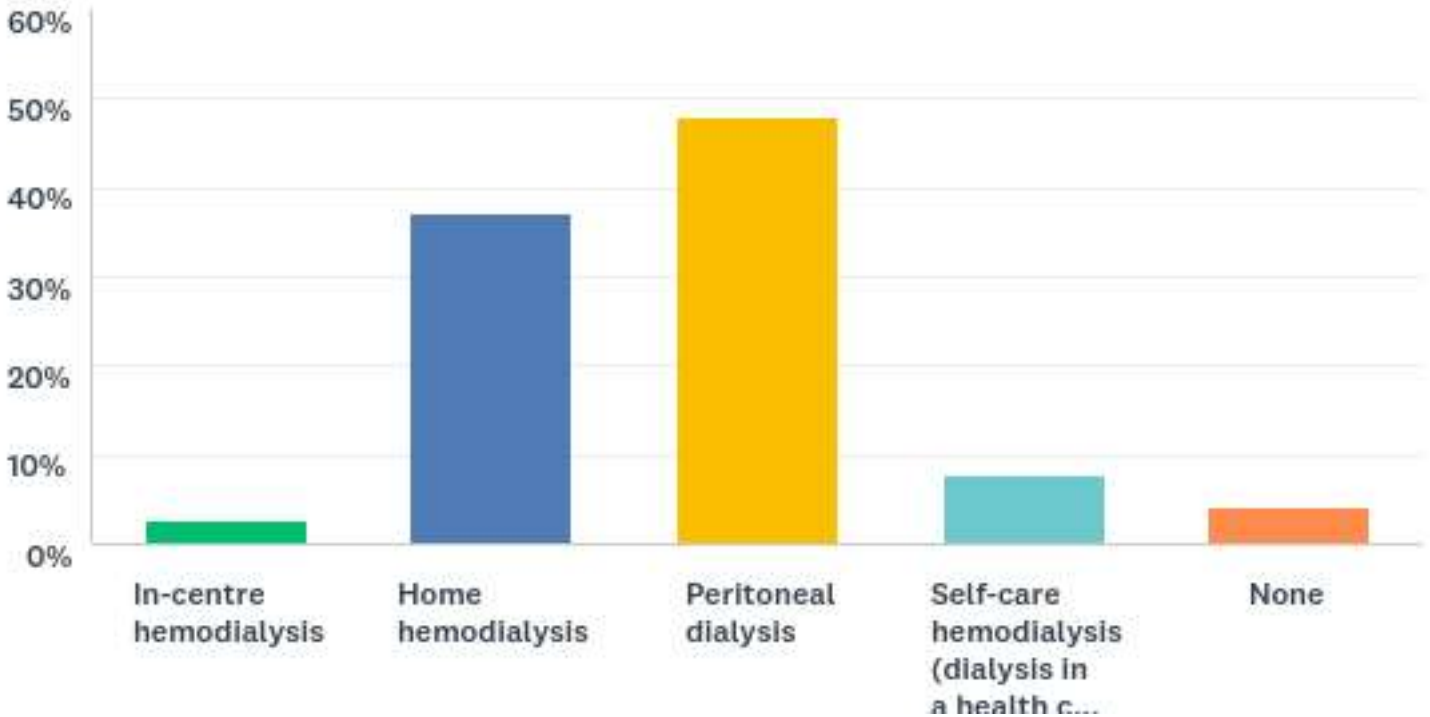
Who do you believe has the most impact on a patient's choice of dialysis modality?



Which type(s) of dialysis do you feel you know the least about?



If you required renal replacement therapy, which dialysis modality would you choose?



PD Process

Most Patients Are Eligible for PD -

>1000 ESRD Patients Starting Dialysis

	% Medically Eligible for PD
Netherlands[1]	83%
U.S.[2]	76%
U.K.[3]	76%

1. Jager K et al. Am J Kidney Dis. 2004;43:891-899.
2. Mehrotra et al. Kidney Int. 2005;68:378-390.
3. Little et al. Am J Kidney Dis. 2001:37:981-986

PD Process

Preference for a specific modality → individual circumstances

1. Patients value:
    - Treatments that are least disruptive to their lives, daily activities, and caregivers' lives
    - Information provided on all treatment options
    - Shared decision making process
    - Having the support of their family (and having them be part of the process)

2. Barriers:
    - Policy and funding (e.g., lack of policies for promoting home-based modalities and lack of funding for establishing the requirements of home-based programs)
    - Organization/health institution (e.g., lack of health administration and clinical staff support, lack of appropriate infrastructure, education and training)
    - Health care providers (e.g., preference for IHD)
    - Patients (e.g., lack of education, increased utility costs, housing issues, burden on family, lack of interest in home treatment or preference for IHD)

https://www.cadth.ca/

Quality Improvement

BC PD Process

1) Updated Definitions

All Candidates	Modality Selection	1) Preparation for RRT 2) Reason for RRT need (e.g decreased GFR)
Education	Suitability	1) Treatment Options on PROMIS 2) The types of treatments available for the patient (Nephrologist assessment) 3) PD RN abdomen assessment ?
Choice	Education	1) PROMIS: Education provided (Modality Selection Orientation, HD, PD, HHD) Delivery method (Education/Discussion, Informational Tool) Session type (Individual, Group)
Assessment	Decision	1) PROMIS: Modality Selection Education Completed or LAST dated education item 2) PROMIS: decision made by the patient on their next modality (dialysis and rtx) decisions 3) PROMIS: After a patient decision --> the Treatment Started section is enabled (whether or not a patient started the modality of choice) 4) Modality Selection History (change of mind, etc)
Catheter	Catheter	1) Insertion 2) Duration of training
Start	Start	Start PD at home

BC PD Process

Question:

Among ESKD patients who started their chronic dialysis during the period 2015-2017, can we identify instances where there were missed opportunities to recruit patients to a home-based modality?

		Chronic RRT modality			
		PD	HHD	HD	HD→Home
Modality Choice	PD				
	HHD				
	HD				
	Unknown				

- Appropriate outcome
- Missed opportunity
- Potential missed opportunity
- Possible data error


MYTHBUSTERS


BUSTED!

Myth #1

PD not as safe as HD?

1. Only one small RCT comparing PD and HD (Korevaar 2003); failed as patient preference prevented the study from meeting recruitment goals

2. 2004 → retrospective registry data found younger patients, those without diabetes/congestive heart failure (CHF) = benefit from PD, mainly in the first 2 years

3. 2010 → retrospective analysis of 6,337 paired patients from a cohort of 98,875 adults who initiated dialysis in 2003 found that the overall intention to treat mortality was 8% lower for PD than for matched patients on HD

4. 2018 → Comparison of PD and HD patient survival using only patients eligible for both modalities → Cohort of 2,032 incident ESRD patients = HD and PD associated with similar mortality, and effect did not change.

https://www.ajkd.org/article/S0272-6386(17)30978-2/fulltext

Myth #2

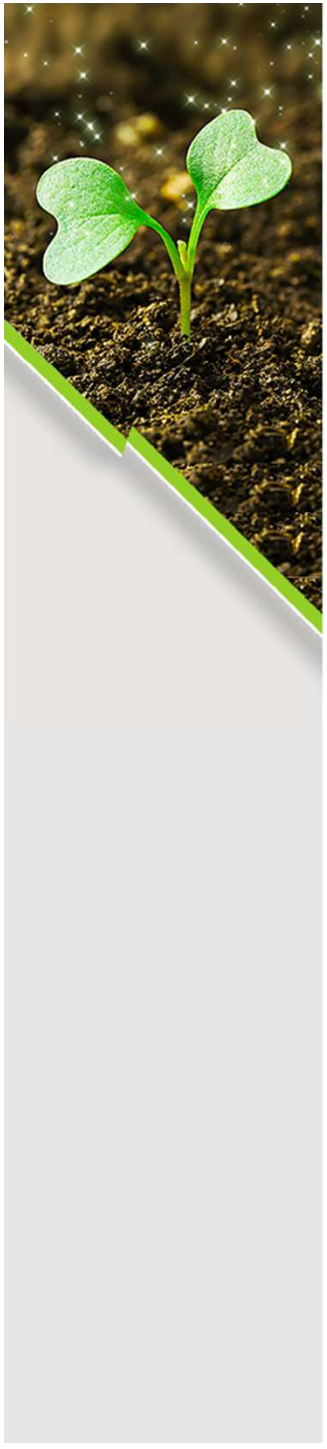
Less safe to be at home?

1. Overall, the risk for hospitalization does not differ between HHD, PD, and IHD
    - Some evidence that PD has fewer hospitalizations then IHD

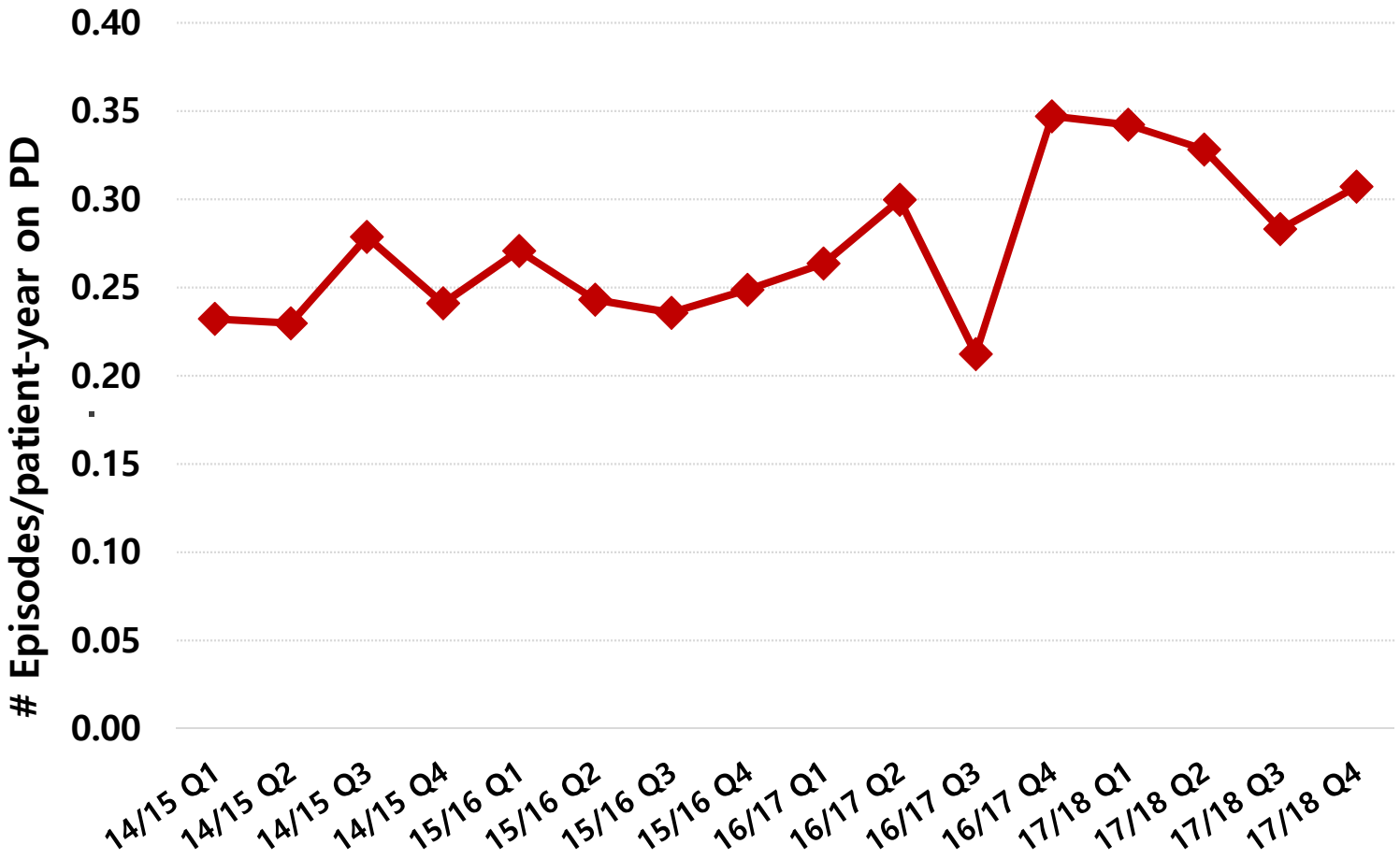
2. Uncertain whether HHD or PD have more adverse events compared with IHD
    - More likely to transfer from HHD to IHD and PD to IHD

3. Unknown whether there is a difference in QoL for HHD versus PD
    1. Being at home..
    2. HHD may offer a potential survival benefit compared PD (limited evidence)

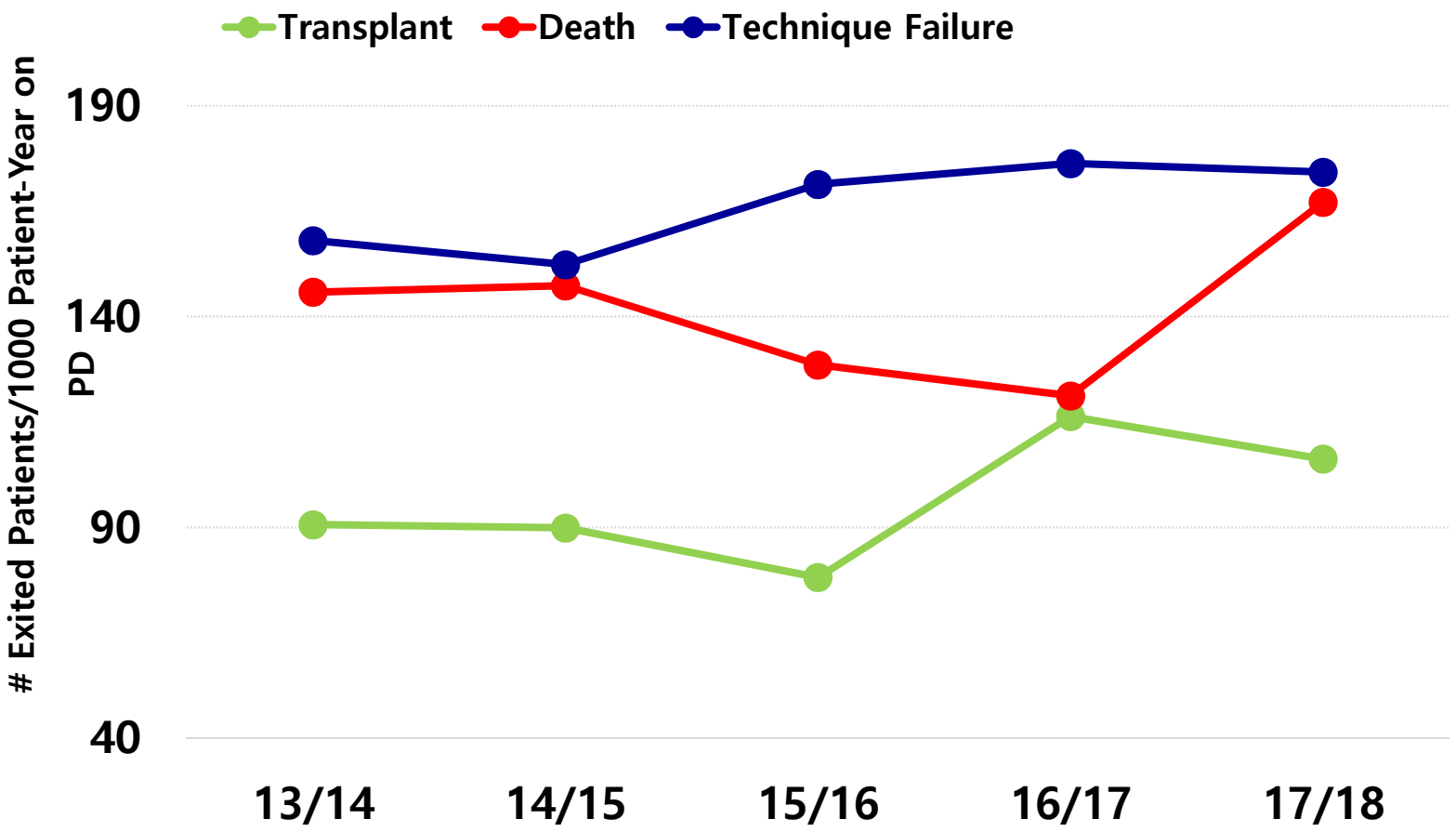
https://www.ajkd.org/article/S0272-6386(17)30978-2/fulltext



BC Peritonitis Rate Per Patient-Year on PD

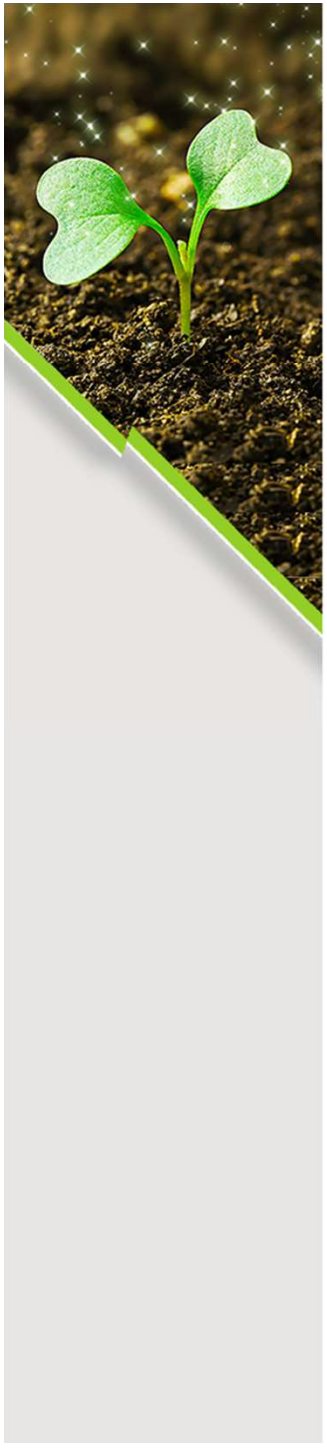


BC: Cause-Specific Annual PD Attrition Rate

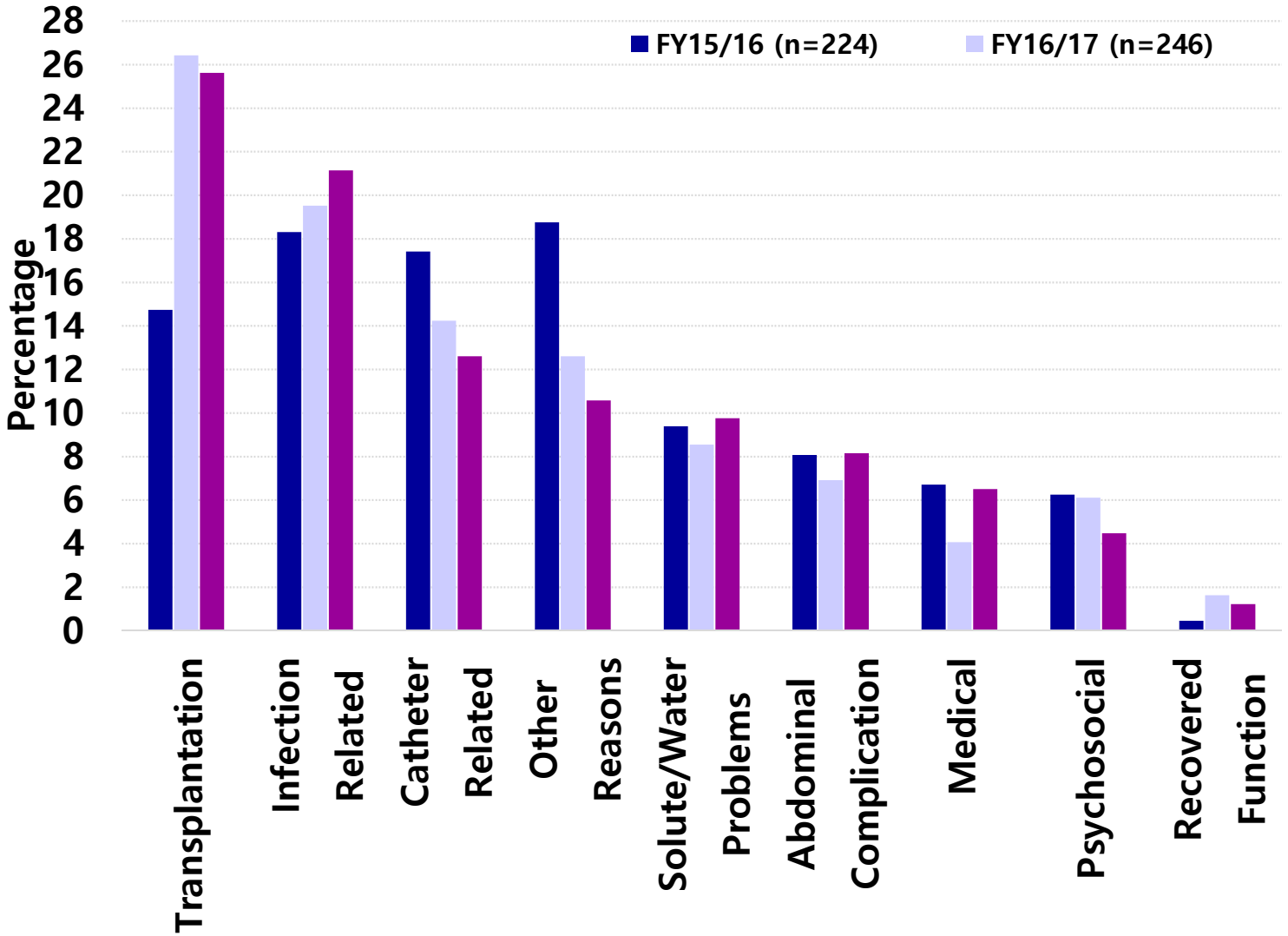


Annual # PD Exits by Types of Reasons

	FY13/14	FY14/15	FY15/16	FY16/17	FY17/18
Total Exits	**336**	**326**	**314**	**349**	**380**
Death/Dialysis Withdraw	*109*	*105*	*94*	*91*	*127*
Death within 1mo	*10*	*13*	*8*	*8*	*13*
Transplantation	*74*	*71*	*62*	*95*	*89*
Technique Failure (Switching Permanently to HD)	*129*	*122*	*136*	*144*	*146*
Move out of province/country or Lost to Follow-up	*2*	*8*	*6*	*4*	*1*
Recovered Function	*12*	*7*	*8*	*7*	*4*
Median Months on PD	**22**	**23**	**24**	**26**	**22**



Catheter Removal by Reasons



Myth #3

PD is more expensive than HD?

1. CADTH conducted a clinical and cost-effectiveness assessment of dialysis modalities:
    - Home-based therapies (PD/HHD) less costly than IHD for eligible patients
        - Significant initial training costs yet HHD is the least costly
        - Assisted PD delivered continuously → more costly than IHD
        - Short-term assisted PD (start) or intermittent assisted PD (for respite) less costly than IHD

    - Home-based therapies = lower patient travel costs, potential benefits in terms of home and workforce productivity

    - The need for assistance may be an additional cost or a source of financial loss if a family caregiver must decrease or cease employment

https://www.cadth.ca/

Myth #4

PD requires lots of room at home?

1. Delivery and storage of PD solutions are cumbersome and a burden on patients

2. In May 2017, Baxter International Inc., announced a new system for home production of sterile PD solution with the first patient planned to be on therapy in 2018 as part of a research trial.

3. Creative problem solving; work with Link RN and Team (e.g. more frequent delivery of smaller batches)

Lee,2016

Myth #5

PD is contraindicated in elderly patients?

1. Quality > quantity of life
   - Avoid hospitalizations and complications
   - Prefer more time at home with family/friends/hobbies
   - ↑ comorbidities with age → affects survival data (regardless of RRT)

2. Few studies specifically address this age group

3. Benefits: ↑ cardiovascular stability, ↓ travel requirements, ↓ vascular access, ↓ risk of GI bleeding, ↑ 1-year survival

4. Considerations: ↑ malnutrition risk, depression, dementia, impaired vision, and decreased physical and mental activity

Saxena,2011

Myth #5

PD contraindicated in elderly patients?

1. PD is not contraindicated in elderly and offers some advantages over IHD
2. Complication rates between PD and HD in the elderly are similar
3. Home care assistance can allow more elderly ESRD patients to receive PD
4. Assisted PD does not cost more than in-center HD (even with cost of home car e provider)

Saxena,2011

Myth #6

PD contraindicated in diabetic patients?

1. Benefits:
    - Home-based continuous therapy
    - Less dialysis-induced hypotension, coronary ischemia, and arrhythmia
    - Better BP control
    - Better preservation of residual renal function
    - Avoids vascular access
    - No systemic heparinization (significant diabetes mellitus(DM) retinopathy → retinal hemorrhage)
    - Less progressive DM retinopathy

2. Considerations:
    - Hyperglycemia
    - Weight gain
    - Hypertriglyceridemia
    - Peritoneal membrane changes

Saxena,2011

Myth #6

PD contraindicated in diabetic patient

1. Survival:
    - Non-diabetics and younger diabetics → superior/equivalent with PD then HD
    - Diabetics >45y → in US, HD>PD. In Canada and Denmark, HD=PD
    - First 1-2 years, PD>HD
    - Cohort studies → survival rates are improving in PD (stagnant in HD)

2. Considerations:
    - Avoidance of hypertonic dialysate
    - Use of Icodextrin
    - Maintain HgbA1C<7.5%
    - Maintain euvolemia and effective ultrafiltration
    - Encourage exercise and maintenance of appropriate body weight
    - Screen and treat for non-renal DM complications

Saxena,2011

Myth #7

PD contraindicated in obese patients?

1. Obese patients with ESRD are less likely to initiate PD in the U.S.
   - Misconceptions of outcomes of PD in obese patients
   - Obese patients are not offered PD
   - Clinicians inexperienced and less comfortable with management of PD in obese pts

2. BMI
   - Low BMI (<22) →increased risk of death, regardless of RRT modality
   - Obesity (BMI >30) may confer a survival advantage in ESRD

Saxena,2011

Myth #7

PD contraindicated in obese patients?

1. Obesity is not an absolute contraindication to PD and should not be denied solely on the basis of body weight or BMI

2. Minimal 'delivered' dose = PD + urine clearance
    - Total Kt/Vurea AT LEAST 1.7 per week
    - Kt/V urea values may be falsely low in obese patients
    - Adipose tissue ↑ body weight (the V, but water content of adipose is low)

3. Considerations
    - May require larger dwell volumes
    - May become more difficult if anuric, and adjust prescription
    - Survival studies of peritoneal dialysis in obese patients are inconclusive

https://ispd.org/NAC/wp-content/uploads/2010/11/Peritoneal-Dialysis-Adequacy-Watnick-April-2011-Notes.pdf

Myth #8

PD contraindicated in patients with PCKD?

1. Decreased intraperitoneal space – decreased effective peritoneal surface area

2. Increased intraabdominal pressure – risk of hernia, leaks

3. Theoretical risk of peritonitis due to presence of colonic diverticuli
   - Limited number of studies, but none have shown any increase in peritonitis rate in patients with PKD compared to those without PKD

4. Few studies have been published, 2 larger trials examining outcomes
   - No difference in ability to achieve solute clearance targets
   - No significant difference in ultafiltration achieved
   - No difference in outcomes

Saxena,2011

Myth #8

PD contraindicated in patients with PCKD?

1. Cystic kidneys do not preclude PD

2. Avoid excess intra-abdominal pressure as much as possible
   - Use larger fill volumes at night (supine)
   - Ensure proper PD catheter placement with a paramedian incision to prevent leaks and hernias

3. "Prophylactic" nephrectomy is not generally indicated, and may be harmful (eliminates the benefits of any residual kidney function)

Saxena,2011

Myth #9

PD contraindicated in patients with previous abdominal surgery or caesa rean section? Ostomy?

1. Adhesion or hernia formation after abdominal surgery is not predictable
    - There are large inter-individual differences in adhesion formation rate* after surgery
    - Adhesions cannot be assessed on physical exam

2. Ostomy
    - Leakage
    - Cross infection of the PD catheter or exit site by urine or feces
    - Catheter malfunction because of adhesions from prior surgery
    - Potential disruption of or need to terminate peritoneal dialysis upon su bsequent abdominal surgery to address the original pathology or its co mplications

Lee,2016

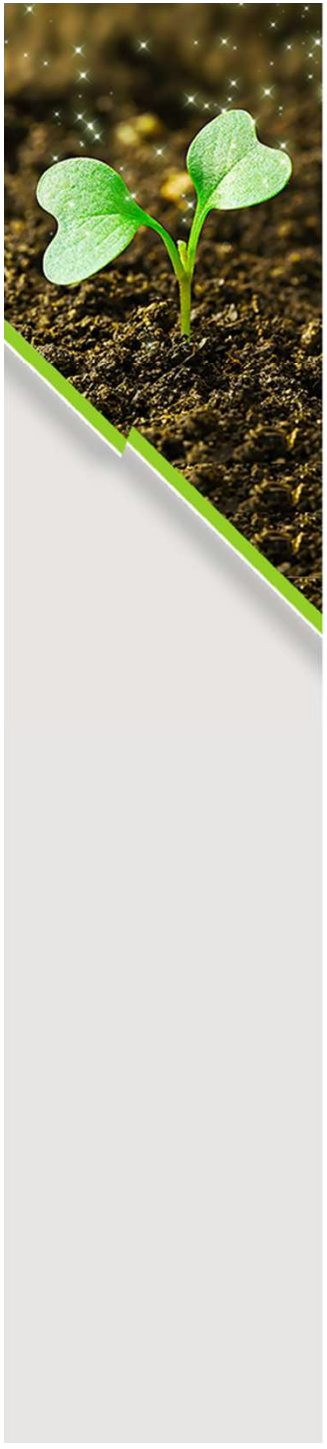
Myth #9

PD contraindicated in patients with previous abdominal surgery or caesa rean section? Ostomy?

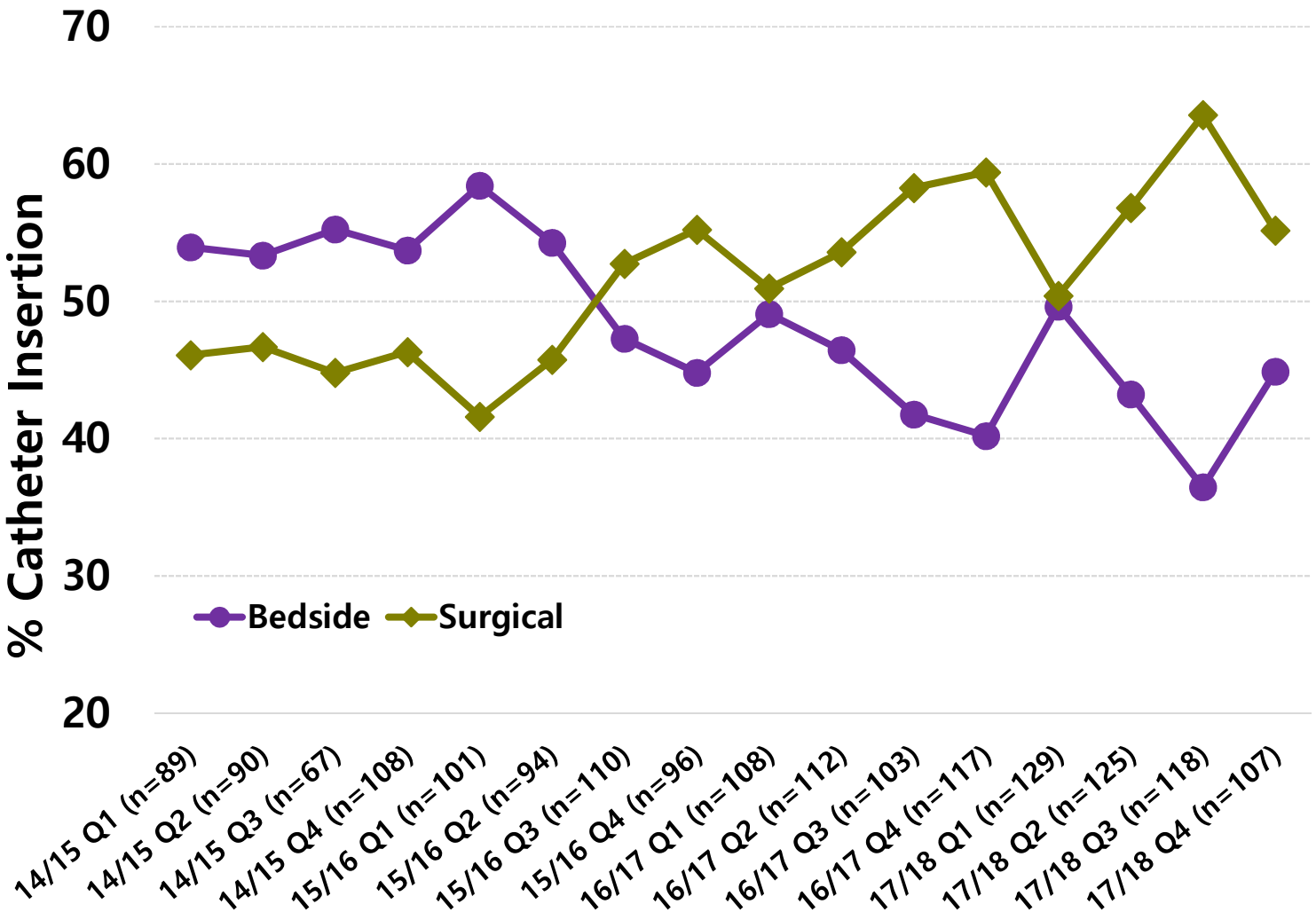
1. PD is feasible in selected patients with prior abdominal surgery, caesarean section and ostomies in the absence of active intra-abdominal inflammation, in centers with appropriate surgical expertise in peritoneal dialysis catheter placement and adhesiolysis

2. KDOQI guidelines acknowledged the concern about infection but suggested that the decision for peritoneal dialysis in the presence of an ostomy be individualized

Lee,2016



Catheter Insertion (Bedside vs Surgical)



Myth #10

PD is limited in terms of usage?

1. Acute Kidney Injury (AKI)
    - PD was widely accepted for AKI before the introduction of HD in 1970s
    - Commonly used for AKI in developing countries; low cost and simple technology
    - Asia>Europe or Northern America
    - Not a practical general approach to AKI
    - Advantages: avoidance of vascular access/anticoagulation, cardiovascular stability, earlier recovery of renal function, and ↓disequilibrium

- Conclusion:
    - Use of PD plays a crucial role in low-income countries for AKI
    - Even in developed nations, important to consider PD in AKI for certain patients

Bargman, 2018

Myth #10

PD is limited in terms of usage?

1. Heart Failure (HF)
    - Major cause of hospitalizations, health care costs, morbidity and mortality
    - Cardio-renal syndrome (CRS): maladaptive relationship
    - Acute or chronic HF leading to kidney failure (CRS I and II)
    - PD vs medical: lack of diuretics side effects such as activation of the renin-angiotensin- and the sympathetic nervous system, continuous fluid removal reduces risk of hypotension and hypoperfusion, and the removal of pro-inflammatory factors through PD might improve cardiac function
    - PD vs IHD: absence of myocardial stunning, not needing an arteriovenous access with the risk of high flow fistulas increasing cardiac work and precipitating high output HF

Bargman, 2018

Myth #10

PD is limited in terms of usage?

1. Heart Failure
    - CRS and non-ESRD: PD favourable outcomes in refractory volume overload, improved left ventricular ejection fraction, and ~90% reduction in hospitalization days. PD-specific complications were rare
    - CRS and ESRD: less favorable results for PD, but study designs differ
    - ↑ evidence that PD in CRS patients with refractory volume overload without ESRD might be a beneficial and feasible alternative to medical therapy alone
    - Focus in these often severely ill patients more on QoL>survival
    - PD regimens in patients without ESRD differ from a "full" dialysis dose

Bargman, 2018

Myth #10

PD is limited in terms of usage?

1. Incremental PD
    - Number of patients starting RRT have significant residual kidney function (RKF)
    - Further decline of kidney function → dialysis dosage is increased
    - Advantages: even a small amount of PD can improve uremic symptoms (with RKF), ↓ burden on the patient with a less intensive regimen (time to adjust to PD), glucose exposure of the peritoneum minimized and better conserve RKF.

- Conclusion:
    - Literature at least non-inferior survival patterns compared to standard PD, and suggests superiority for sustaining RKF
    - Incremental PD should be considered in patients with RRT

Incremental → **INDIVIDUALIZE**

Bargman, 2018

Myth #10

PD is limited in terms of usage?

1. Palliative PD?

- Those who have a terminal illness
- Those who are on PD with special circumstances and QoL focus

https://www.bayshore.ca/services/home-care/palliative/

My Choice, Home Dialysis
MYTH VS. REALITY

ESRD ALLIANCE
NETWORK 16 | NETWORK 18

Peritoneal Dialysis (PD)

MYTH	REALITY
You'll get an infection!	Peritonitis (an infection of your abdomen) is preventable and rare in good PD Clinics (occurs about once every seven years). An infection from a hemodialysis access is more common and more likely to be fatal.
You have to get rid of your pets to do PD at home.	Lots of people do PD at home and still have pets. Clean well and ensure your pets stay out of the room when you connect or disconnect.
If you had previous abdominal surgery, you can't do PD.	Routine abdominal surgeries, such as hernia repairs, C-sections, and some transplants, do not prevent PD as an option.
If you have vision or hearing problems, you can't do PD.	Assist devices are available to help with most tasks involved in doing PD.
You need to have some kidney function to do PD.	Kidney function will always be checked, but PD can be done without any kidney function.
If you are overweight, you can't do PD.	A catheter placed differently into your abdominal cavity may be a better option. PD can still be done.
If you are non-compliant in your dialysis center, you can't do PD.	People with a high need to control situations may actually do better at home.
You need to have a lot of space at home to do PD.	You do need some space for PD, but many people who live in efficiency apartments, trailers and other small spaces find a way to make PD work if they want it.
Only one kind of PD is available.	Yes and no. PD involves having a special fluid in your abdomen, but you can choose how to handle the process, for example, manually or automated (while you sleep).
When you do PD, you can eat and drink whatever you want.	Dietary and fluid intake limitations remain in place, but you have a bit more "wiggle-room" with your limits and choices.
When you do PD, you are free to take either a bath or a shower!	A bath is not permitted unless you have a pre-sternal catheter placement. A shower is permissible and you will be taught how to care for your catheter site after your shower.

Objectives

1. Why PD is important?

2. Why is PD important to you?

3. Why debunking PD myths is important for everyone?


Thank
you!