

# New Models for Peritoneal Dialysis Education

Shweta Bansal, MD, FASN

Associate Professor of Medicine

Division of Nephrology/Department of Medicine

University of Texas Health San Antonio, Texas

ISPD-NAC Day, ADC, March 5-8, 2021

# Why we are talking about new models now

- Finally, the recognition of need for expanding treatment modalities available to patients with kidney failure.
- AAKHI established the goal of 80% of ESRD patients treated with either home dialysis or transplant by 2025.
- Transplantation accounts 30% and home hemodialysis – 2%
- PD will need to increase markedly from its current share of about 10%
  - Better experience and satisfaction
  - Quicker initiation avoiding the need for CVC
  - Better handling in patients with heart failure and pulmonary hypertension

# Goals of New Models of PD Education

- Which must overcome
  - Social barriers
  - Clinical barriers
  - Financial barriers
- Which are directed towards
  - Patients and their care partners
  - Physicians including residents and fellows
    - Nephrologists as well as PCPs, access surgeons, cardiologists and endocrinologists
  - Nurses including students
  - Dieticians and social workers

# Traditional Methods



## Dialyspa® Patient Information Packet

### WELCOME & INTRODUCTION

2. Welcome Letter
3. Patient Information User's Guide
4. Guidelines for Total Wellness
7. Health Benefits of Dialysis

### KIDNEY DISEASE & ESRD

10. Kidney Disease Facts and Key Terms
11. Symptoms of Kidney Failure
12. Causes of Kidney Failure
13. Main Risk Factors
14. Reducing Your Risk
15. Stages of Chronic Kidney Disease
16. End Stage Renal Disease Treatment Options
17. Kidney Transplant Overview

### DIALYSIS

20. Dialysis Facts and Key Terms
21. Dialysis for Your Health
22. Hemodialysis Pros, Cons and Care
24. Peritoneal Dialysis Pros, Cons and Care
26. Home Hemodialysis

### DIET & NUTRITION

28. Nutrition Key Terms
29. Dialysis and Nutrition
30. The Sodium Diet
31. Fluid
32. Protein
33. Potassium
34. Phosphorus and Phosphorus Binders
47. What to Eat and What to Avoid

### SOCIAL WORK

49. Your Social Worker
50. Common Emotional Effects of ESRD
52. Maintaining a Positive Outlook
53. Advance Directive Overview
54. Financial Assistance Programs
56. Frequently Requested Phone Numbers
58. Additional Resources

### THE DIALYSPA DIFFERENCE

60. The Dialyspa Patient-Centric Philosophy
62. Dialyspa Amenities
64. Dialyspa Healthcare Features
66. Neil's Story
68. The Dialyspa Family

### MY INFORMATION

73. My Information User's Guide
75. Essential Information Record
81. Emergency Preparedness Guide
85. My Notes

© 2013 Dialyspa Medical Center, LLC

One to one



## In-Depth Review

### Peritoneal Dialysis First: Rationale

Kunal Chaudhary,<sup>1\*</sup> Harshad Singh,<sup>2</sup> and Ramesh Khanna<sup>3</sup>

#### Summary

The use of peritoneal dialysis (PD) has become widespread since the introduction of continuous ambulatory PD more than 25 years ago. Over this time, many advances have been made and PD is an alternative to hemodialysis (HD), with excellent comparable survival, lower cost, and improved quality of life. The percentage of prevalent PD patients in the United States is approximately 7%, which is significantly lower compared with the 15% PD prevalence from the mid-1980s. Despite comparable survival of HD and PD and improved PD technique survival over the last few years, the percentage of patients performing PD in the United States has declined. The increased numbers of in-center HD units, physician comfort with the modality, perceived superiority of HD, and reimbursement incentives have all contributed to the underutilization of PD. In addition to a higher transplantation rate among patients treated with PD in the United States, an important reason for the low PD prevalence is the transfer to HD. There are various reasons for the transfer (e.g., episodes of peritonitis, membrane failure, patient fatigue, etc.). This review discusses the various factors that contribute to PD underutilization and the rationale and strategies to implement "PD first" and how to maintain it. The PD first concept implies that when feasible, PD should be offered as the first dialysis modality. This concept of PD first and HD second must not be seen as a competition between therapies, but rather that they are complementary, keeping in mind the long-term goals for the patient.

Clin J Am Soc Nephrol 4: 447–456, 2011. doi: 10.2215/CJN.09290910

#### Introduction

As of December 31, 2007 of the approximately 368,000 patients undergoing dialysis in the United States, the point prevalence for peritoneal dialysis (PD) patients was only 7.2% (1). The percentage of incident PD patients in 2007 was even lower at 5.8%, which is a significant decline from the peak at 15% in the mid-1980s (2). There are numerous reasons contributing to the low incidence and prevalence of PD in this country (2,3). There are concerns regarding patient morbidity and mortality and the effect of a particular modality. There seems to be a perception among the U.S. nephrologists that survival on PD is inferior to hemodialysis (HD). Nephrologists are also concerned that infectious complications, particularly peritonitis in PD patients, are excessive. There seems to be a perception among nephrologists that there is inadequate small-solute clearance by PD, especially in large patients and in those with no residual renal function (RRF). The level of physician comfort in dialysis with a particular therapy, especially when complications arise, may also influence the choice of therapy. There may be subtle financial incentives unique to the United States that can influence modality use. In the current pay-for-what-is-used system, providers may be able to make a bigger margin per patient when more "injectables" are used, and there is also less of a cost to put a patient on in-center HD because the infrastructure is already there. Contrary to prevailing practices, when U.S. nephrologists were surveyed regarding the best dialysis therapy they would offer, home therapies were the most common answer. In a survey of nephrology professionals, most picked con-

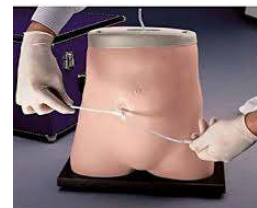
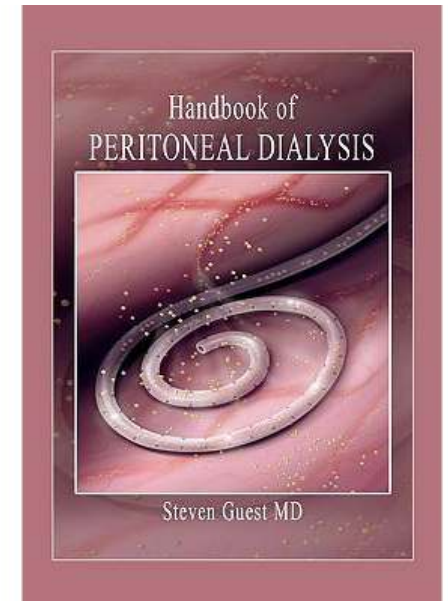
tinuous ambulatory peritoneal dialysis (CAPD)/ambulatory peritoneal dialysis (APD) as the best initial therapy for the patient. Of the >1000 nephrologists from the Americas, ~40% picked CAPD/APD as the initial therapy (4).

Over time, few PD patients stay on PD ≥3 years from initiation of therapy. A large proportion of dialysis patients transfer from PD to HD every year (5,6). According to the U.S. Renal Data System (USRDS) database, approximately 19% of PD patients changed to HD over the 2-year period between 2002 and 2004, translating to an annual mean rate of 9.5% (1). Transfer to HD could be a significant cause for the underutilization of PD worldwide and particularly in the United States (Table 1). Modality issues such as recurrent episodes of peritonitis, inadequate dialysis, or ultrafiltration failure and system issues as well as personal or social reasons make up most reasons for the transfer to HD. In some patients, especially if a transplant is not immediately available, transfer to HD may improve survival (7). PD-to-HD switch rates of >35% have been reported in the first 2 years in the United States (8). Nevertheless, over the past 2 decades, two important causes of transfer—peritonitis and inadequate dialysis issues—have received great attention, and the incidences have consequently decreased, but the underutilization of PD still remains rather widespread. Strategies to prevent peritonitis, ultrafiltration failure, and culture-related complications and improving adequacy of dialysis, education of patients, and medical staff may all help with increasing PD utilization (Table 2). In this review, we will rationalize why the "PD first" approach to dial-

\*Kunal S. Chaudhary, MD, PhD, is a Senior Lecturer, Division of Nephrology, Department of Internal Medicine, University of Missouri, Columbia, Missouri.

Correspondence: Dr. Kunal S. Chaudhary, Division of Nephrology, Department of Internal Medicine, University of Missouri, 1 Hospital Drive, CL 422, Columbia, MO 65211. E-mail: kchaudh@missouri.edu

Phone: 573.485.8536; Fax: 573.484.4023; Email: kchaudh@missouri.edu



# Current Challenges in Education for Any Learner



Different Types  
of Learners



Less Time



# We must adapt as educator



## Medical educator job roles

- Diagnostic Assessor
- Content Curator
- Technology Adopter
- Learner-centered navigator and professional coach
- Clinician role model or champion



# Online Learning: E-learning



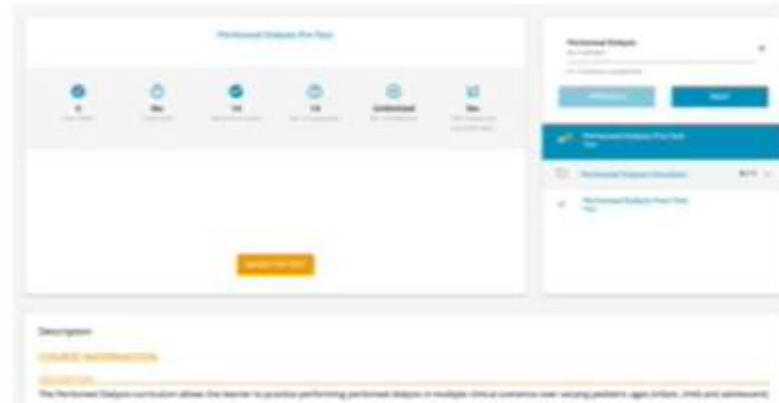
- The latest technologies have transformed our personal and professional lives.
- It has progressed at an exponential rate and presents an opportunity to enhance our work.
- Appeals to Millennial learners
- Incorporate interactivity and competition (increases engagement)
- Follows adult learning theory principles
- Provide scalable, convenient methods to practice skills such as PD administration
- In a safe, contextualized environment with
- directed feedback
- Individualized control of pace and timing of learning

# Online Learning Modalities: E-learning

## Videos



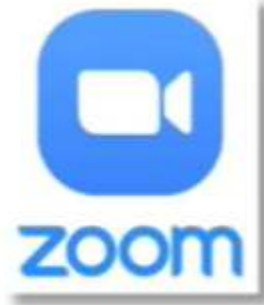
## Courses



## Podcasts



## Video Conferencing




## Serious gaming









# British Columbia Resources for Health Professionals and Patients

<http://www.bcrenal.ca/health-professionals/clinical-resources/peritoneal-dialysis>



Follow us   

Search...



Kidney ServicesHealth InfoResearchAboutContactHealth ProfessionalsLearning/EventsCareers

MenuHealth Professionals / Clinical Resources / Peritoneal Dialysis

SHAREA A

## Peritoneal Dialysis

Guidelines & Tools

Pediatric Dialysis

Best Practice Guideline

+

Adding Medication To Dialysate Solutions

+

Assessing a Patient for PD

+

Alteplase (Cathflo®) Administration for Occluded Peritoneal Dialysis Catheter

+

Bedside Catheter Insertion

+

Catheter Care

+

Contamination

+

CT Scan

+

Disposal of Used PD Supplies and PD Fluid Waste in the Home Environment

+

Peritoneal Dialysate Effluent Collection

+

Exit Site Care

+

Infectious Diseases

+

Inflow and Outflow Complications

-

Rural Remote

>

Novel coronavirus (COVID-19)

>

Transitions

>

Symptom Assessment and Management

>

Important information about guideline development and use

>

PD Patient Training Modules

>

Quick Links:

- NEW! [Live Your Life PD Poster](#)
- [Best Practices: Peritoneal Dialysis Programs](#)
- [Functional Assessment - PD](#)

## BCRenal Peritoneal Dialysis Functional Assessment

BASIC SKILL	CAN PERFORM	CANNOT PERFORM	COMMENTS
1. Pick up the PD solution bag and hold it over head for a count of 3.			
2. Hang PD solution bag on IV pole.			
3. Hold the transfer set and twist the clamp open and closed until it clicks.			
4. Open a minicap package and place on the end of the transfer set without contamination.			
5. Remove the mini cap from the transfer set.			
6. Remove the colored ring from the PD solution bag.			
7. Attach the red clamp anywhere along the PD tubing and snap it closed. Release the clamp to open.			
8. Pick up the tongue depressor and snap it into 2 pieces.			
9. Look at the picture of the home choice cyclor below and record what is seen in the display screen.			



What is displayed on the screen?

---

---

## PD Patient Training Modules

The BC Renal Peritoneal Dialysis Committee has developed a series of online, self-paced training modules covering various aspects of peritoneal dialysis care.

This series of eight modules is for the use of patients new to PD and for any patients who wish to review the procedures required for PD care. To access any of the modules, click on a title below.

- [PD Module 1 - Introduction to PD](#)
- [PD Module 2 - Preventing Infection](#)
- [PD Module 3 - CAPD](#)
- [PD Module 4 - APD](#)
- [PD Module 5 - Caring for your Exit Site](#)



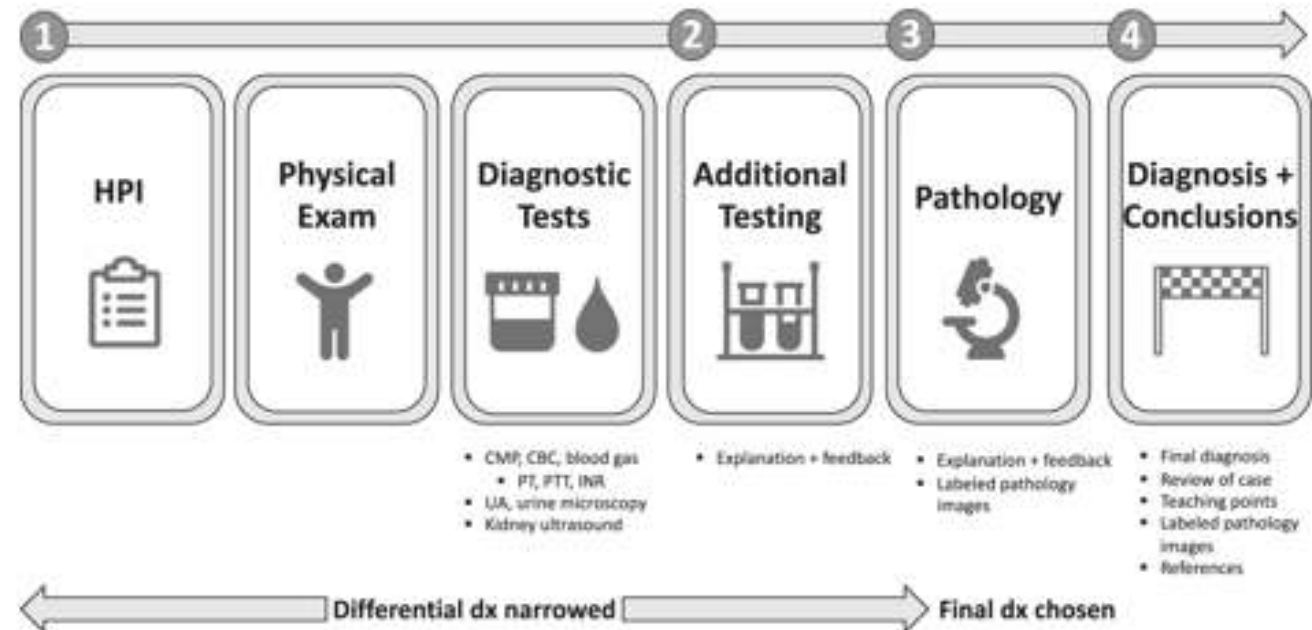
British Columbia  
Resources for  
Health

Professionals  
and Patients

<http://www.bcrenal.ca/health-professionals/clinical-resources/peritoneal-dialysis>

# NephSim: A Free, Mobile-Optimized Nephrology Teaching Tool

J Grad Med Educ. 2019;11(6):708-712. doi:10.4300/JGME-D-19-00443.1



## Case 10: Diagnosis & Conclusions

Case Published: July 2018

### Case 10 Index

#### Diagnosis: Peritonitis in Peritoneal Dialysis (PD)

**Case Summary:** Well done! This patient has peritonitis in the setting of peritoneal dialysis, one of the potential complications of PD. This young woman has had, until now, an uncomplicated 2 years on PD and is now presenting with abdominal pain worsening over 1 day. Just like with any non-PD patient, abdominal pain has a wide differential diagnosis, and we should be cautious not to anchor too quickly on peritonitis or other PD complications.

Let's briefly review the differential diagnosis for abdominal pain that should not be forgotten just because your patient is on PD!

Gynecologic

Urinary

Peritoneal

Intra-abdominal

Other

While keeping our eyes out for non-PD related pathology, it is important to act quickly with any suspicion for peritonitis. Looking at the PD fluid itself can also be helpful in making a diagnosis. PD fluid should be sent immediately for **cell count with differential, gram stain, and culture**.



#### Bloody (hemoperitoneum):

Coagulopathy  
Retrograde menstruation  
Ovulation  
Strenuous exercise  
Ovarian cyst rupture  
Adhesions  
Catheter-associated trauma



Normal

## Learn Peritoneal Dialysis

Home

^ Nuts & Bolts of PD

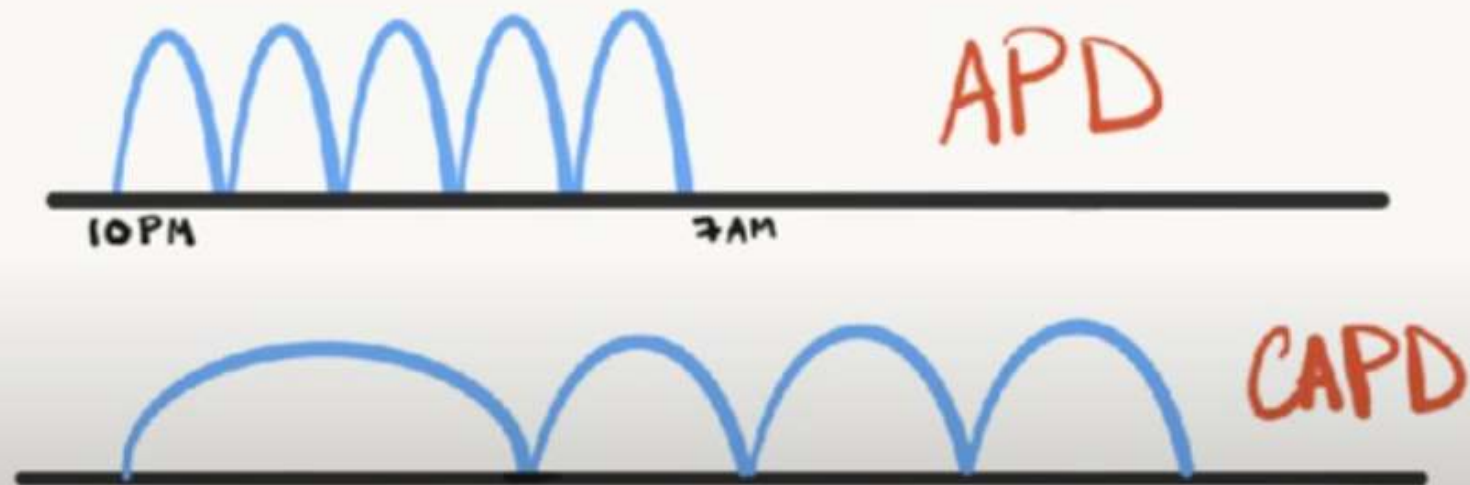
**Modes of PD**

Clearance in PD

UF in PD

Peritoneal Transport  
Assessment

# Modes of Peritoneal Dialysis



- [https://www.youtube.com/watch?v=kx7PZF-A\\_vs&feature=youtu.be&ab\\_channel=SuperSalms](https://www.youtube.com/watch?v=kx7PZF-A_vs&feature=youtu.be&ab_channel=SuperSalms)

# Virtual PD Simulator

## Course directors

- Aleksandra E. Olszewski, MD
- Deborah Stein, MD
- Traci Wolbrink, MD, MPH

The screenshot displays the OPENPEDIATRICS platform interface for the Peritoneal Dialysis Pre-Test. The top navigation bar includes a search bar and user icons. The main content area features a 'Peritoneal Dialysis Pre-Test' section with a grid of test details: 0 Pass Mark, No Time limit, 14 Maximum Score, 14 No. of questions, Unlimited No. of attempts, and No Test cannot be resumed later. A 'BEGIN THE TEST' button is prominently displayed. To the right, a sidebar shows the course progress, indicating 0/3 lessons completed, with buttons for 'PREVIOUS' and 'NEXT'. Below this, a list of course items includes 'Peritoneal Dialysis Pre-Test', 'Peritoneal Dialysis Simulator' (0/1), and 'Peritoneal Dialysis Post-Test'. The bottom section provides a 'Description' of the course, highlighting its interactive nature and the inclusion of a simulator. It also lists 'Learning Objectives' such as explaining basic science-based definitions, understanding concepts influencing PD delivery, and discussing the components of a PD prescription.

OPENPEDIATRICS™

Search content in the platform

< Back Content Suggested for You > My Courses and Learning Plans > Peritoneal Dialysis

### Peritoneal Dialysis Pre-Test

0	No	14	14	Unlimited	No
Pass Mark	Time limit	Maximum Score	No. of questions	No. of attempts	Test cannot be resumed later.

BEGIN THE TEST

Peritoneal Dialysis  
ID: E-0EY481  
0 / 3 lessons completed

PREVIOUS NEXT

Peritoneal Dialysis Pre-Test  
Test

Peritoneal Dialysis Simulator 0 / 1

Peritoneal Dialysis Post-Test  
Test

### Description

#### COURSE INFORMATION

##### DESCRIPTION

The Peritoneal Dialysis curriculum allows the learner to practice performing peritoneal dialysis in multiple clinical scenarios over varying pediatric ages (infant, child and adolescent) and disease states (acute kidney failure, chronic kidney failure, sepsis, peritonitis, congenital malformations), providing real-time feedback for learner actions. The curriculum includes a pre-test, interaction with our peritoneal dialysis simulator, and a post-test.

The simulator promotes a systematic approach in response to problems and complications that arise while a patient is being managed on peritoneal dialysis. The learner virtually diagnoses conditions and complications, manipulates the PD set-up and prescription, and administers medications. The simulator is organized into sections:

1. Knowledge guide: A primer on peritoneal dialysis that includes interactive text-based sections and some short videos
2. Tactics: Short case-based problems to virtually diagnose and manage
3. Case simulations: Less-directed cases that push learners to care for a variety of simulated patients over a longer amount of clinical time, making decisions regarding diagnostics, testing, and treatment

##### LEARNING OBJECTIVES

- Explain key basic science-based definitions (dialysis, osmosis, diffusion, convection, membrane properties)
- Understand concepts that influence PD delivery, and apply these to management of PD clinically (indications and contraindications, ultrafiltration, clearance, and infection control)
- Discuss and identify the various components of a PD prescription (sodium, potassium, dextrose, heparin, antibiotics, fill time, drain time, dwell time, cycle number, fill



## ▼ Knowledge Guide



### Definitions



### Concepts



### Prescriptions



### Administration



### Complications and Troubleshooting



### Dialysis

[Redo](#)

### Osmosis

[Redo](#)

### Diffusion

[Redo](#)

### Convection

[Redo](#)

### Peritoneal Membrane

[Redo](#)

### Properties of Compounds that are Dialyzed

[Redo](#)

## > Tactics

## > Case Studies

## Your Patient Chart

### Patient Information



**Patient Name:** Stephan

**Patient Age:** 6 months

**Patient Weight:** 6 kg

**Location:** PICU

### History

Stephan, a 6-month-old infant, has just returned from surgical repair of congenital heart disease. His weight prior to surgery was 4 kilograms. The procedure required him to undergo cardiopulmonary bypass for repair. He also required a significant volume of fluids during and shortly after the procedure to maintain hemodynamics. He had an elevated creatinine prior to surgery, and a peritoneal dialysis catheter was placed electively with appropriate technique in the operating room. His weight is now recorded as 6kg. In the hours since returning from the procedure, the patient has not made any urine. Several trials of diuretics including an infusion have been unsuccessful and the infant is becoming progressively more difficult to ventilate.

**Begin Simulation**

## Dialysis Prescription

Na 132 mEq/L

K

Dextrose

Heparin

Antibiotics

Fill Volume

Cycle Time

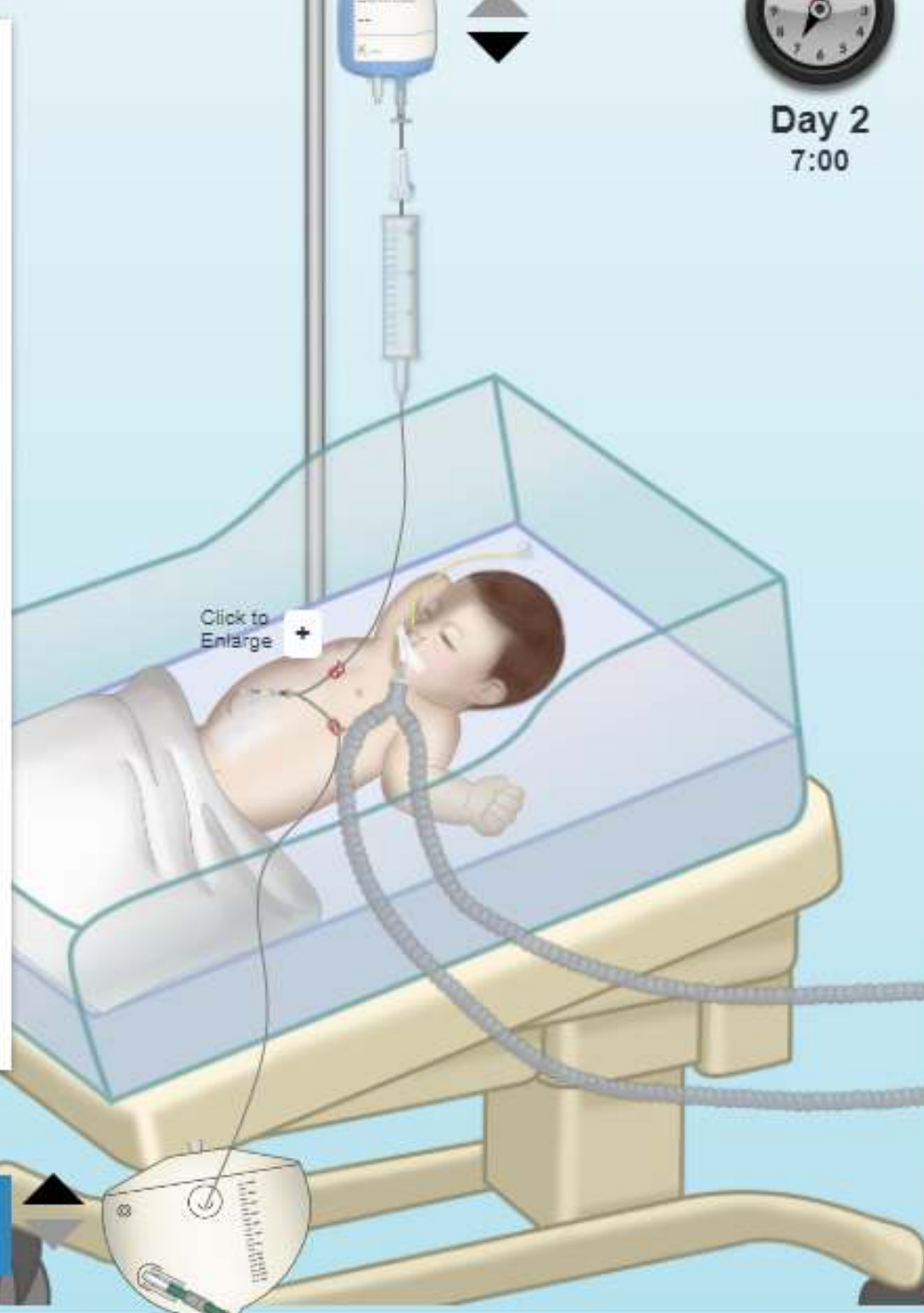
Fill Time 10 min

Drain Time 10 min

Dwell Time (calculated)

Cycles   /24hr

[Switch to SI Units](#)



0% Your Score

### Task 1

Your patient's peritoneal dialysis catheter is in place and ready to use. Please select your initial dialysis prescription.

**Click the continue button when you have completed your actions.**

[Continue](#)

### Patient Info

[View Case History](#)

**Name:** Stephan **Weight:** 6 kg

**Age:** 6 months **Location:** PICU





**Table 3. Median time spent in simulator, with mean pre- and post-test scores for users completing the structured curriculum (n=300)**

User	N	Median Time Spent in Simulator per User in Minutes (Interquartile Range)	Mean Pretest Score (SD)	Mean Post-Test Score (SD)	Mean Difference in Score (SD)	95% Confidence Interval	P Value
All users	300	85 (46–95)	29.5 (17.5)	66.0 (16.7)	36.4 (19.9)	34.1 to 38.6	<0.001
Only nursing students	246	84 (42–94)	26 (14.6)	64.9 (16.1)	38.5 (19.8)	36.0 to 41.0	<0.001
Nursing students excluded	54	91 (59–106)	44.0 (21.8)	71.0 (18.1)	27.0 (17.6)	22.2 to 31.8	<0.001
<b>Occupation</b>							
Physician	32	96 (74–150)	44.6 (22.4)	69.7 (19.5)	25.0 (18.4)	18.4 to 31.7	<0.001
Medical student	13	96 (91–101)	23.2 (11.3)	58.3 (16.4)	35.2 (18.3)	24.1 to 46.2	<0.001
Resident	7	73 (21–77)	54.3 (16.5)	65.5 (20.8)	11.2 (14.2)	<sup>a</sup>	<sup>a</sup>
Fellow	3	192 (126–252)	60.0 (10.6)	93.0 (0)	33.0 (10.6)	<sup>a</sup>	<sup>a</sup>
Attending	9	158 (95–256)	63.0 (12.9)	81.4 (10.4)	18.4 (13.2)	<sup>a</sup>	<sup>a</sup>
Nurse	259	84 (42–94)	27.3 (15.5)	65.4 (16.3)	38.2 (19.7)	35.8 to 40.6	<0.001
Nursing student	246	84 (42–94)	26.4 (14.6)	64.9 (16.1)	38.5 (19.8)	36.0 to 41.0	<0.001
Registered nurse	13	81 (50–99)	43.7 (22.2)	75.8 (17.8)	32.2 (16.9)	21.9 to 42.4	<0.001

<sup>a</sup>Subanalyses of nursing students and non-nursing students are also presented due to the large representation by nursing student users in this dataset. Paired *t* test not performed on groups with <10 subjects.



# Virtual or Augmented Reality

---

- “Perception of being physically present in a non-physical world”.
- Patients or nurses finds themselves in a virtual environment in which they are enabled to move and interact with certain stimuli in a similar way to the real world.
- Training experience relies on VR technology which enables the user
  - To feel like being in a different environment (**immersion**)
  - To interact with the items and stimuli around her/him like in the real world (**interaction**).
- Benefit to trainees seeing and feeling a new task rather than reading about it step by step.



# Virtual Reality Simulation in Peritoneal Dialysis Training: The Beginning of a New Era

Panagiota Zgoura<sup>a</sup> Daniel Hettich<sup>b</sup> Jonathan Natzel<sup>b</sup> Fedai Özcan<sup>a</sup>  
Boris Kantzow<sup>b</sup>

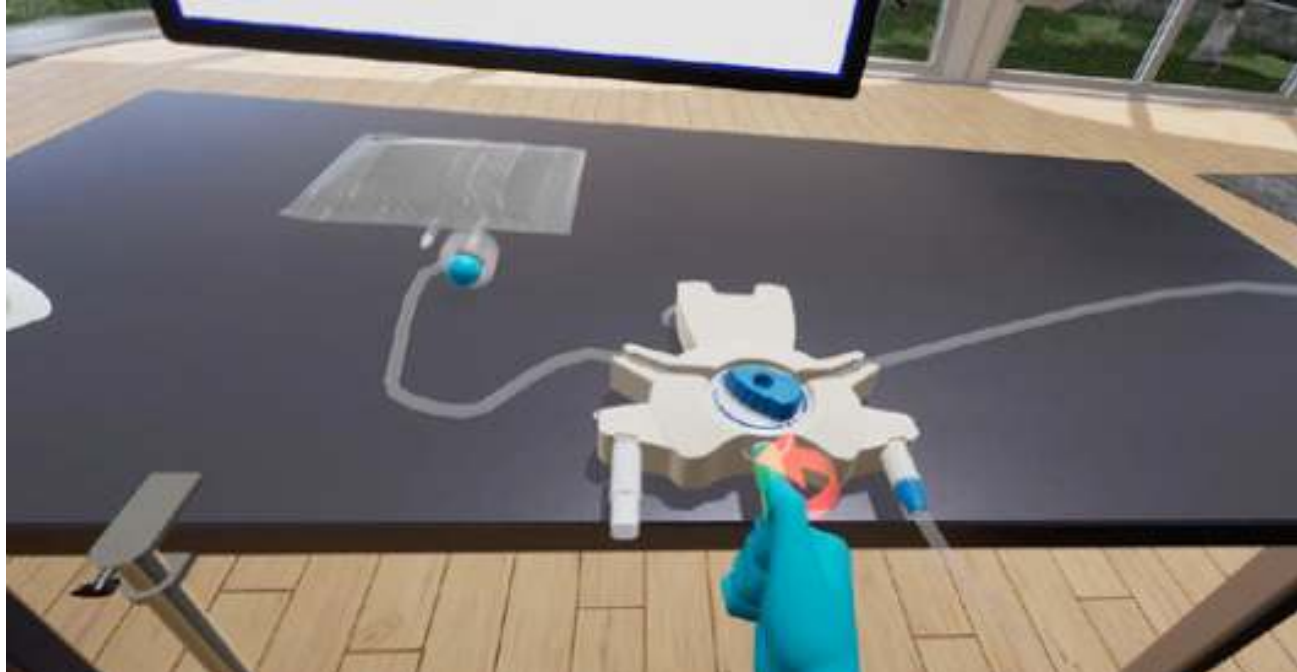
<sup>a</sup>Department of Nephrology, Klinikum Dortmund, Dortmund, Germany; <sup>b</sup>Weltenmacher GmbH, VR Training-Application, Düsseldorf, Germany

Standardized training

Faster and easier.

Follow up is pending

Established in endoscopy



# Advanced PD Training

# Joanna Lee Neumann RN CNN

Satellite Healthcare, San Jose Ca

## Senior Healthcare Policy & Procedure Writer

## ISPD NAC Committee Member

March 2021



# Learning Outcome

Upon completion of this presentation, the participants will understand when to apply advanced PD training for nurses and PD patients as well as the relevant topics

# Outline

- What is advanced PD training
- Resources to train PD nurses and patients
- Brief overview of how to conduct training
- Compare basic and advanced training for PD nurses
- When to do advanced training for PD patients

# Disclosure

Joanna Lee Neumann RN CNN - None

# Dr. Benner's Stages of Clinical Competence

Dr. Benner developed a concept known as “From Novice to Expert.” This concept explains that nurses develop skills and an understanding of patient care over time from a combination of a strong educational foundation and personal experiences.

The theory identifies five levels of nursing experience:

1. Novice
2. Advanced Beginner
3. Competent
4. Proficient
5. Expert



# “Advanced” definition

Ahead, further along in progress, complexity, knowledge, skill, etc

Advanced training takes place after the individual has completed the basic training.

- Might not be equivalent to:
  - Age
  - Years in practice
- Can be affected by
  - Frequency of encountering
  - Past experience

## 2 Different Studies Conducted

### Influence of Peritoneal Dialysis Training Nurses' Experience on Peritonitis Rates

- 200 consecutive inception PD patients in a single center from September 1999 through April 2003Patients
- Patients were followed up until death or October 30, 2006
- Effects of PD nurse trainers on the clinical outcomes of Gram-positive peritonitis were evaluated

**Conclusions:** The finding of negative association between the trainers' length of time in practice and peritonitis incidence reminds us that active continued learning and applying principles of adult learning might be the answers for the nurses to teach the patients.

Ongoing active efforts are warranted to maintain competency in teaching PD, which in and of itself might not be acquired passively through accumulating experience. In addition, continuing education of trainers may be beneficial if it is shown that updated courses for the trainers can decrease the risk for Gram-positive peritonitis, a question that has not yet been examined.

Kai Ming Chow, Cheuk Chun Szeto, Man Ching Law, Janny Suk Fun Fung and Philip Kam-Tao Li  
CJASN July 2007, 2 (4) 647-652

### Advanced Nursing Experience Is Beneficial for Lowering the Peritonitis Rate in Patients on Peritoneal Dialysis

- Observational cohort study followed 305 incident PD patients until a first episode of peritonitis, death, or censoring. Patients were divided into 3 groups according to the work experience in general medicine of their nurses
  - least experience (<10 years),
  - moderate experience (10 to <15 years),
  - advanced experience (≥15 years).
- Analyze the association of risks for all-cause and gram-positive peritonitis with patient training provided by nurses at different experience levels.

**Conclusions:** The experience in general medicine of nurses might help to lower the risk of gram-positive peritonitis among PD patients. These data are the first to indicate that nursing experience in areas other than PD practice can be vital in the training of PD patients

Zhikai Yang, Rong Xu, Min Zhuo, and Jie Dong  
[Perit Dial Int.](#) 2012 Jan-Feb; 32(1): 60–66.



# Resources to train PD nurses and patients

# Patient education: Peritoneal dialysis (Beyond the Basics)

- **The Basics** — The Basics patient education pieces answer the four or five key questions a patient might have about a given condition. These articles are best for patients who want a general overview and who prefer short, easy-to-read materials.
- **Beyond the Basics** — Beyond the Basics patient education pieces are longer, more sophisticated, and more detailed. These articles are best for patients who want in-depth information and are comfortable with some medical jargon.
- **Professional level information** — Professional level articles are designed to keep doctors and other health professionals up-to-date on the latest medical findings. These articles are thorough, long, and complex, and they contain multiple references to the research on which they are based. Professional level articles are best for people who are comfortable with a lot of medical terminology and who want to read the same materials their doctors are reading.

- Author: John M Burkart, MD Section
- Editor: Thomas A Golper, MD Deputy
- Editor: Shveta Motwani, MD, MMSc, FASN
- Last updated February 27, 2020

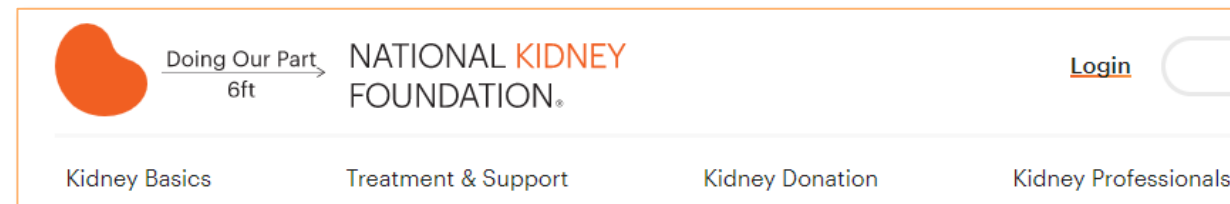
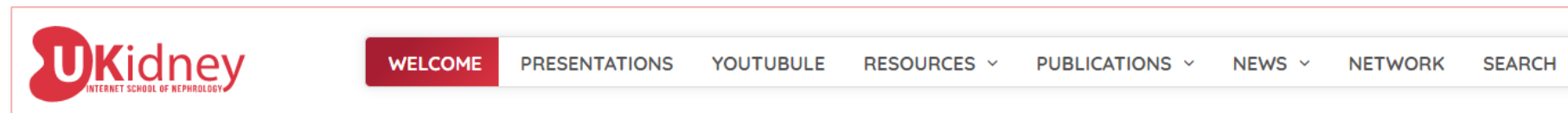
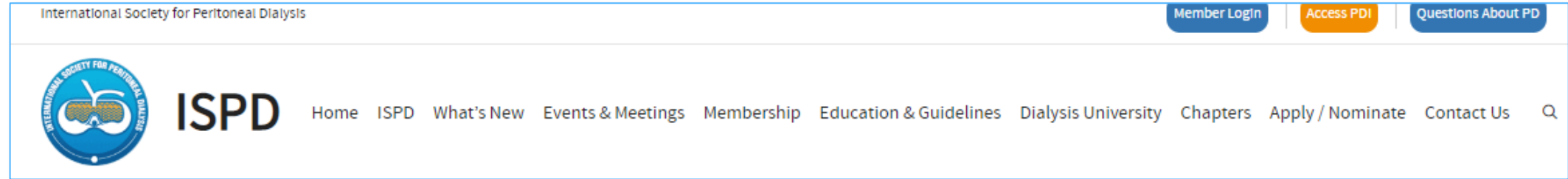
# Nursing Liaison Committee of ISPD



## A Syllabus for Teaching Peritoneal Dialysis Patients and Caregivers Feb 2016

- Help PD nurses train patients and caregiver based on a consensus of training program reviews, utilizing current theories and principles of adult education.
- The course can be modified to meet individual trainee's needs.

# Other Web Sites





# Training 101

- Utilize adult learning principles
  - Identify the preferred learning style of the trainee
  - Adjust teaching style to assist trainee to learn
  - Identify learner's readiness and barrier to learn
- ❖ Be a mentor, not just another senior staff who shows and tells

# Adult Learning Principles

## Andragogy

1. Need to know	The value of the learning in their lives
2. Need to take responsibility	Empower them to learn and take responsibility
3. Bring experience to learning	Respect and value the experience and utilize it wisely
4. Ready to learn	One of the most important factors. Take the moment
5. Task-oriented	Teach as the “task happens”

Adult Learning,” by Malcolm S. Knowles

# VARK theory of Learning Styles

VARK theory of learning styles

by Fleming and Mills' is very conducive to patient education

Determine the learner's learning style

- Visual
- Auditory
- Read or Write
- Kinesthetic

There are also articles to turn the theory down!



# Learning Style and Teaching Style

Be flexible and be willing to adjust the teaching style to meet the learner

Be other-centered

Be observant

Individualized

Ask questions, get feedback

PDCA

Adjust and evaluate

There is no “one size fits all”

# Assessment and Evaluation

Assess and evaluate the nurse's or patient's level of understanding before providing further training

- Formal
- Informal

Confirm Basic knowledge

Ask open-ended questions

Observe procedures performed

Read documentation

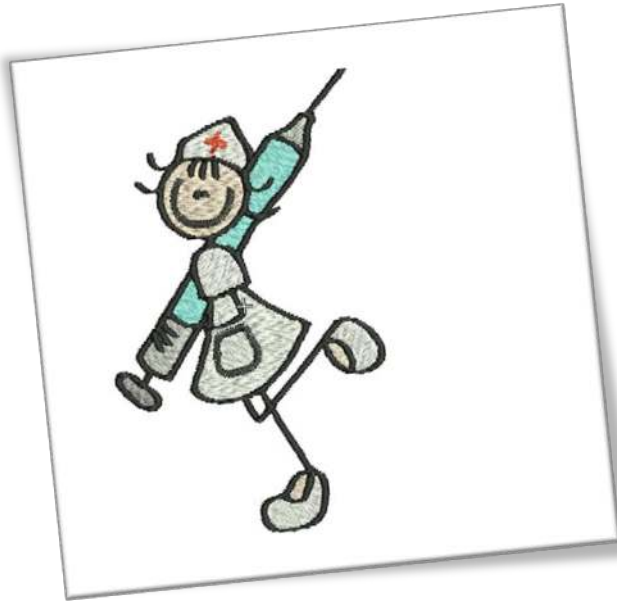




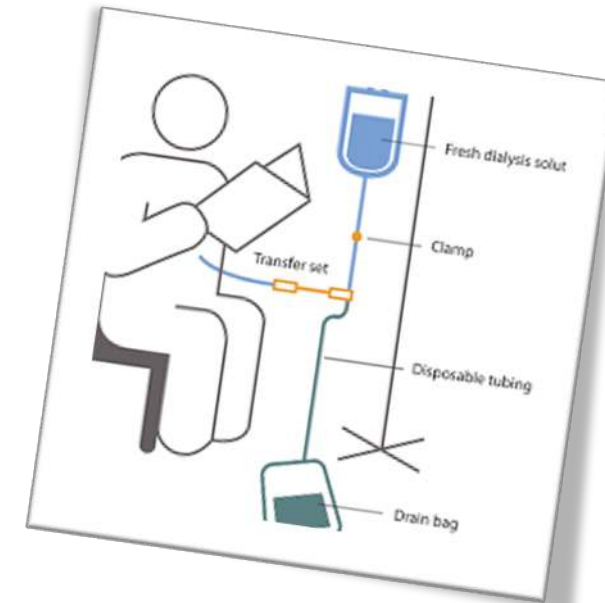
# Advanced PD training

Apply solution to real-world situations

PD Nurses



PD Patients



# PD Nurses

## BASIC

1. Complete a clinic visit
2. Conduct medication review
3. Perform PD exit site care

## ADVANCED

1. Ask the patient open-ended questions, read the home dialysis logs and provide appropriate and relevant care and education
2. Explain the uses and side effects of the medications. Skillfully ask the patient questions to confirm compliance
3. Carefully examine the PD exit site and identify any risk factors, which can cause exit site infection and then educate the patient

# PD Nurses

## BASIC

1. Teach the patient to perform PD exchanges
2. Treat a PD exit-site infection according to the protocol and the nephrologist's order
3. Treat peritonitis as ordered

## ADVANCED

1. Utilize the understanding of the physiology of peritoneal dialysis and perform trouble shooting
2. Perform more frequent PD exit-site check to assess the patient's response to treatment and make appropriate adjustments. Find the root cause of the infection and conduct focused training / retraining to emphasize prevention
3. Interpret the PD effluent culture result and trend the effluent cell count results. Assess the patient's response to treatment and make appropriate adjustments. Find the root cause of the peritonitis and conduct focused training / retraining to emphasize prevention

# PD Nurses

## BASIC

1. Perform venipuncture and blood draw as ordered. Send the results to the nephrologist
2. Perform regular monthly and / or weekly clinic visit

## ADVANCED

1. Trend all the lab results and be able to identify variances. Competent in managing: anemia and mineral bone disease. Identify the need for immunization. Early recognition of change in adequacy and be proactive in reporting and changing prescription
2. Utilize case management skill to take care of the patient as a whole. Work with the interdisciplinary team to establish individualized plan of care. Be able to communicate with the patient and / or care partner effectively. Identify the opportunity and conduct “advanced training” for the patient

# PD Nurses

## BASIC

1. Perform Peritoneal Equilibration Test correctly

## ADVANCED

1. Be able to identify incorrect results and not to utilize incorrect results to model the patient prescription
2. Be able to utilize the PET result to customize and individualize the patient's PD prescription
3. Recognize the signs and symptoms to call for a repeat PET



# PD Nurses

## BASIC

1. Train the patient on how to use the PD cyclers

## ADVANCED

1. Monitor the patient remotely by accessing the treatment record after the completion of the treatment. (Machine with cloud based data – AMIA). Be able to analyze the record and be proactive in identifying potential problems. Example: Catheter flow, ultrafiltration, constipation, compliance, operator's error, etc. Then execute early intervention to reduce the potential for complications that can lead to hospitalizations.

# How to Conduct Advanced PD Nurse Training

- Classes
- Journals
- Conferences
- Nephrologist / Medical Directors guided case studies
- Webinars
- On site training or mentoring

*Tell me and I forget. Teach me and I remember. Involve me and I learn*

# PD Patients

## ISPD Guidelines / Recommendations –

### A syllabus for Teaching Peritoneal Dialysis to Patients and Caregivers

At the end of the training, the patient and / or caregivers:

- Is able to safely perform PD procedures using aseptic technique for connections
- Recognizes contamination and verbalizes appropriate action
- Identifies modification of fluid balance and its relationship to hypertension / hypotension
- Can detect, report and manage potential dialysis complications using available resources
- Understands when and how to communicate with the home dialysis unit

Ana E. Figueiredo, Judith Bernardini, Elaine Bowes, Miki Hiramatsu, Valerie Price, Chunyan Su, Rachael Walker, and Gillian Brunier

# Advanced PD Patient Training

## Patient education: Peritoneal dialysis (Beyond the Basics)

- Patient education: Dialysis or kidney transplantation — which is right for me? (Beyond the Basics)
- Patient education: Hemodialysis (Beyond the Basics)
- Patient education: Chronic kidney disease (Beyond the Basics)
- Patient education: Constipation in adults (Beyond the Basics)
- Patient education: High-fiber diet (Beyond the Basics)
- Patient education: Low-sodium diet (Beyond the Basics)

John Burkart, MD, Thomas Colper, MD, Shveta Motwani, MD





# Advanced PD Patient Training

## When?

### Any teaching moment

- During casual conversation – identified knowledge gap
- During exit-site care – demonstrate and reinforce the importance of hand washing before exit-site care
- During storm season, high fire danger, news of power outage – emergency preparedness
- When the patient has vital signs outside of his/her normal range and needs adjustments
- When the patient has signs and symptoms of fluid retention such as increased weight and edema

# Advanced PD Patient Training

## When?

**Every clinic visit**

### **Review treatment log**

- Read the treatment log with the patient and question variances. Ask open-ended questions and then followed by explanations

### **Review medications**

- Ask open-ended questions:
  - “What is this medication for?”
  - “Do you know the dosage you are taking?”
  - “How many pills and how many time you take this per day?”
  - “Do you know the possible side effects or when you should stop taking it?”

# Advanced PD Patient Training

## When?

### **During infectious and non-infectious complications**

- Must ask all the questions in a non-threatening manner
- Explain the facts according to the patient's learning style
- Make relevant examples to help them understand
- Focus on prevention
- Avoid saying, "Don't you remember what I told you" or "I told you!"
- Continue to assess patient's knowledge during the subsequent visits

# Advanced PD Patient Training

## When?

### Before a vacation

- Supplies arrangements
- Dialysis supplies and accessories to pack
- Dialysis clinic at the destination contact information
- Dialysis prescription and medication list
- What to do in case of emergency



# Summary

## Advanced PD Training

Review of basic

Beyond basic

Application

Trouble shooting

### When to do it

- The right moment
- The right teaching skill / method to ensure understanding





# References

- Patient education: Peritoneal dialysis (Beyond the Basics)  
Author: John M Burkart, MD Section, Editor: Thomas A Golper, MD Deputy,  
Editor: Shveta Motwani, MD, MMSc, FASN Last updated February 27, 2020
- Influence of Peritoneal Dialysis Training Nurses' Experience on Peritonitis Rates  
Kai Ming Chow, Cheuk Chun Szeto, Man Ching Law, Janny Suk Fun Fung and Philip Kam-Tao Li  
CJASN July 2007, 2 (4) 647-652
- Advanced Nursing Experience Is Beneficial for Lowering the Peritonitis Rate in Patients on Peritoneal Dialysis  
Zhikai Yang, Rong Xu, Min Zhuo, and Jie Dong Perit Dial Int. 2012 Jan-Feb; 32(1): 60–66.
- ISPD A Syllabus for Teaching Peritoneal Dialysis Patients and Caregivers Feb 2016





“Great mentorship is priceless.”

Lailah Gifty Akita



Joanna Lee Neumann [neumannj@satellitehealth.com](mailto:neumannj@satellitehealth.com)

# International Society of Peritoneal North American Chapter Peritoneal Dialysis: Insights and Innovation

---

Matthew Oliver MD MHS  
University of Toronto  
Sunnybrook Health Sciences Centre



# Objectives

---

1. To provide a overview of PD use in North America
2. To review current challenges facing PD
3. To review innovative practices in PD

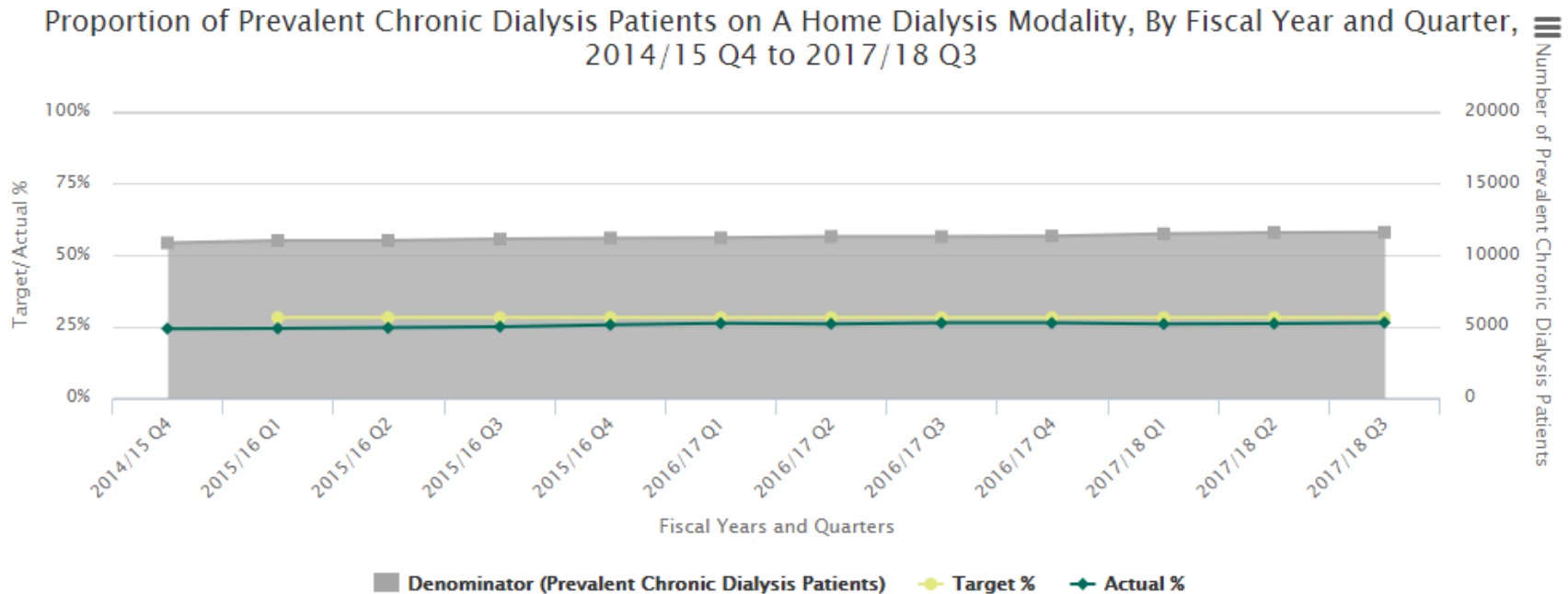
# Declarations

---

- Speaking honorarium from Baxter Healthcare
- Advisory board for Janssen and Amgen
- Co-inventor of DMAR systems



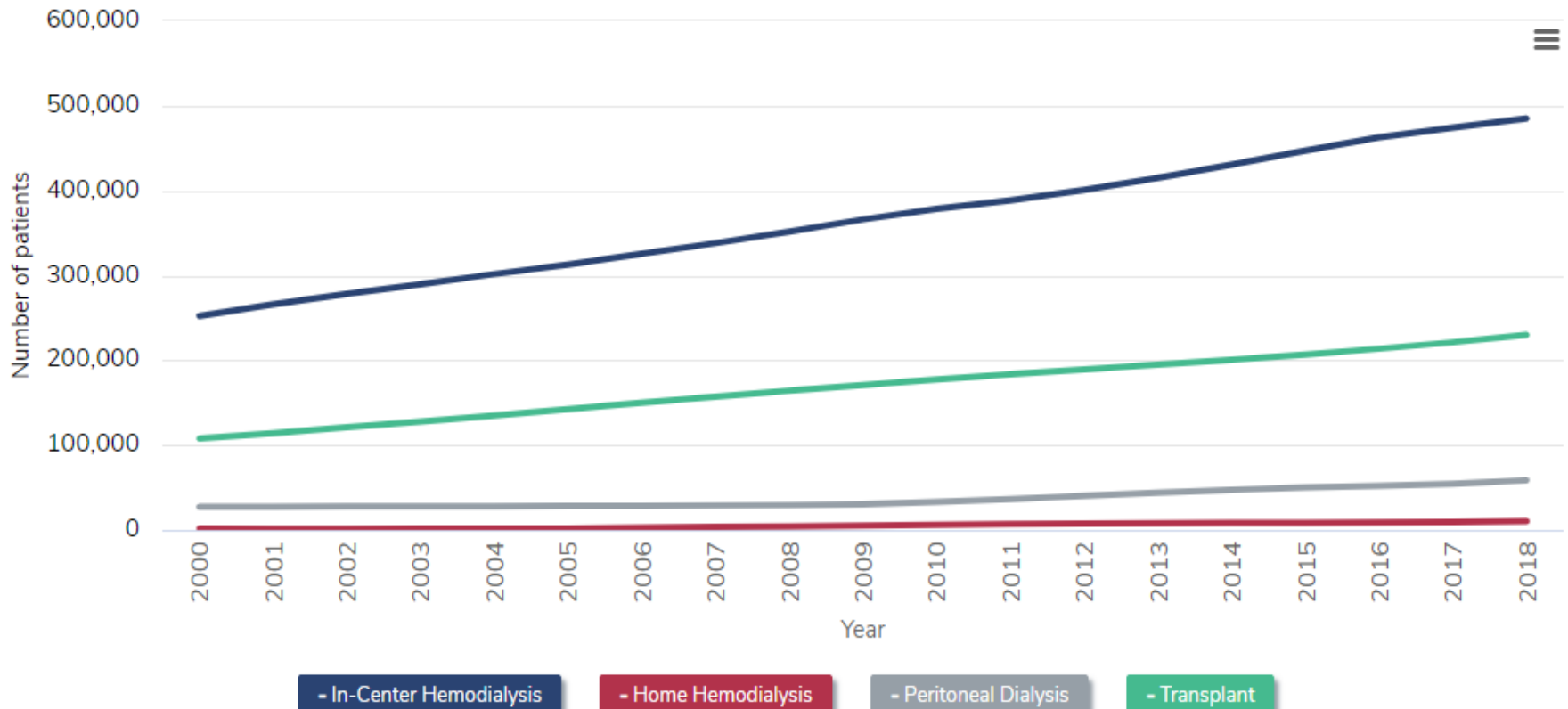
# PD use in Ontario over time



Home dialysis (25%) = Peritoneal Dialysis (21%) + Home hemodialysis (4%)

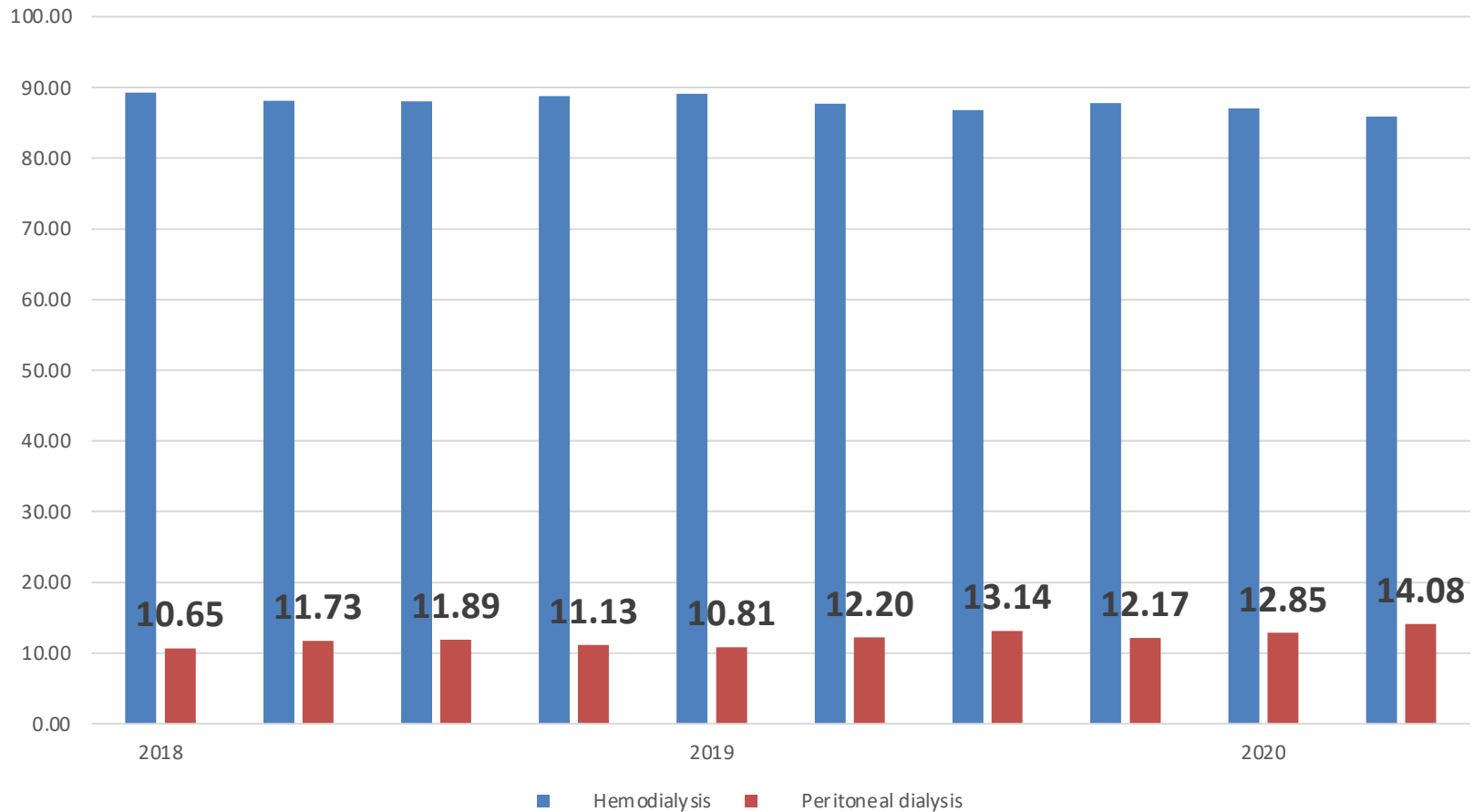
# PD use in the U.S over time

**Figure 1.6** Number of prevalent ESRD patients, by modality, 2000-2018



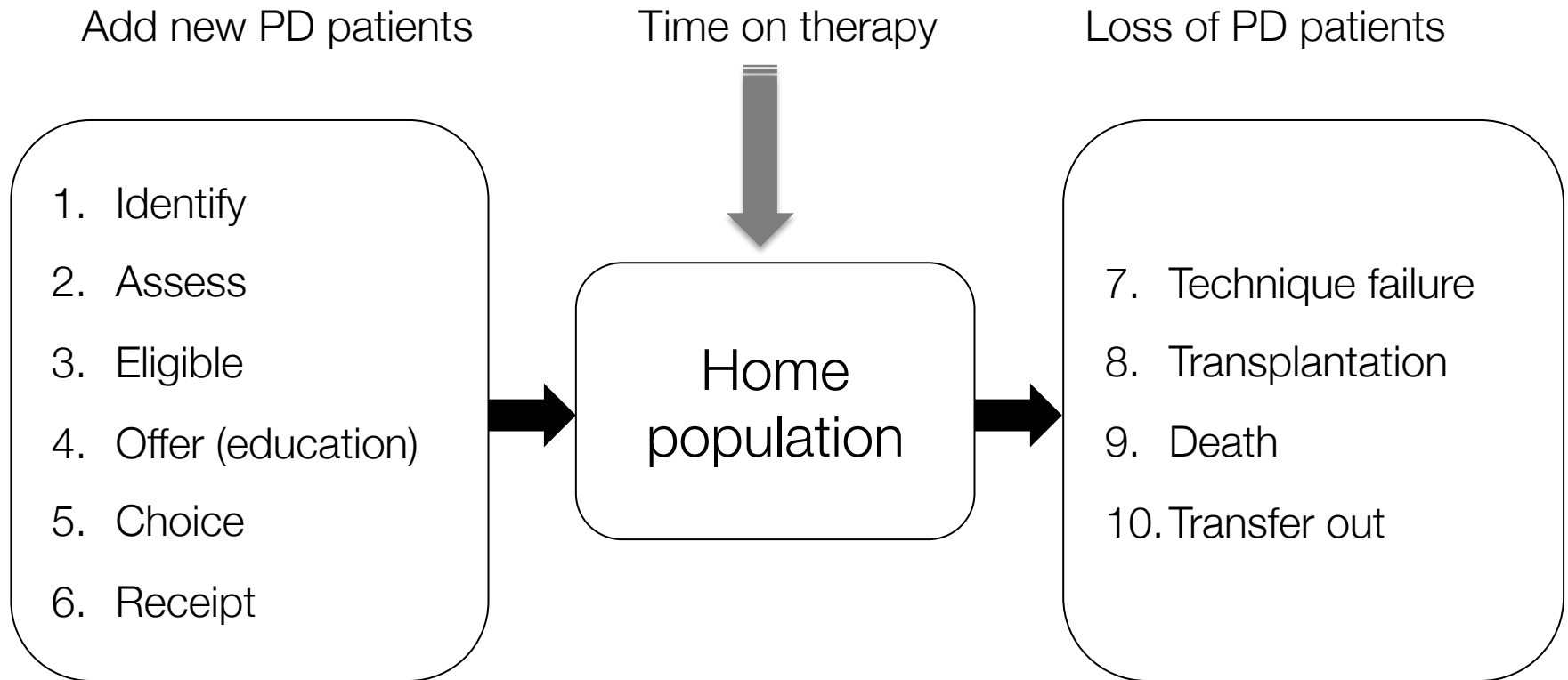
Home dialysis (13%) = Peritoneal Dialysis (11%) + Home hemodialysis (2%)

# Incident PD use in the U.S

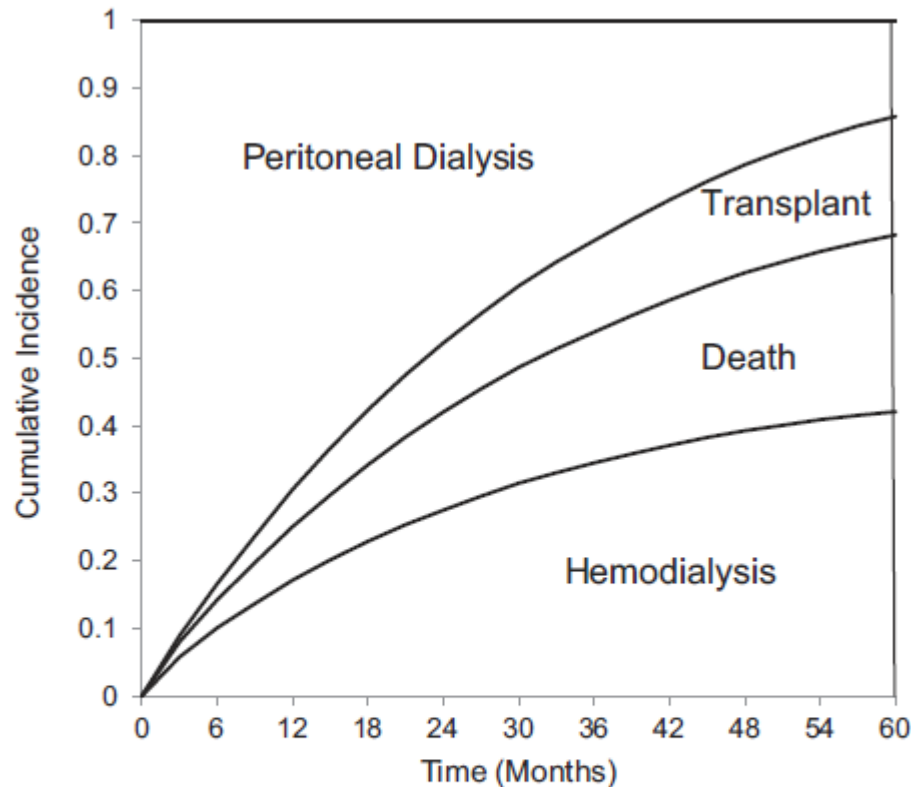


Data provided by USRDS.

# The complexity of PD



# The loss from PD



**Figure 2.** Hemodialysis transfer, kidney transplantation, and death over time for all incident peritoneal dialysis patients. The prevalence of each outcome is shown as the vertical height of the appropriate area at each time point on the horizontal axis.

N=29,573 PD starts

USRDS Data

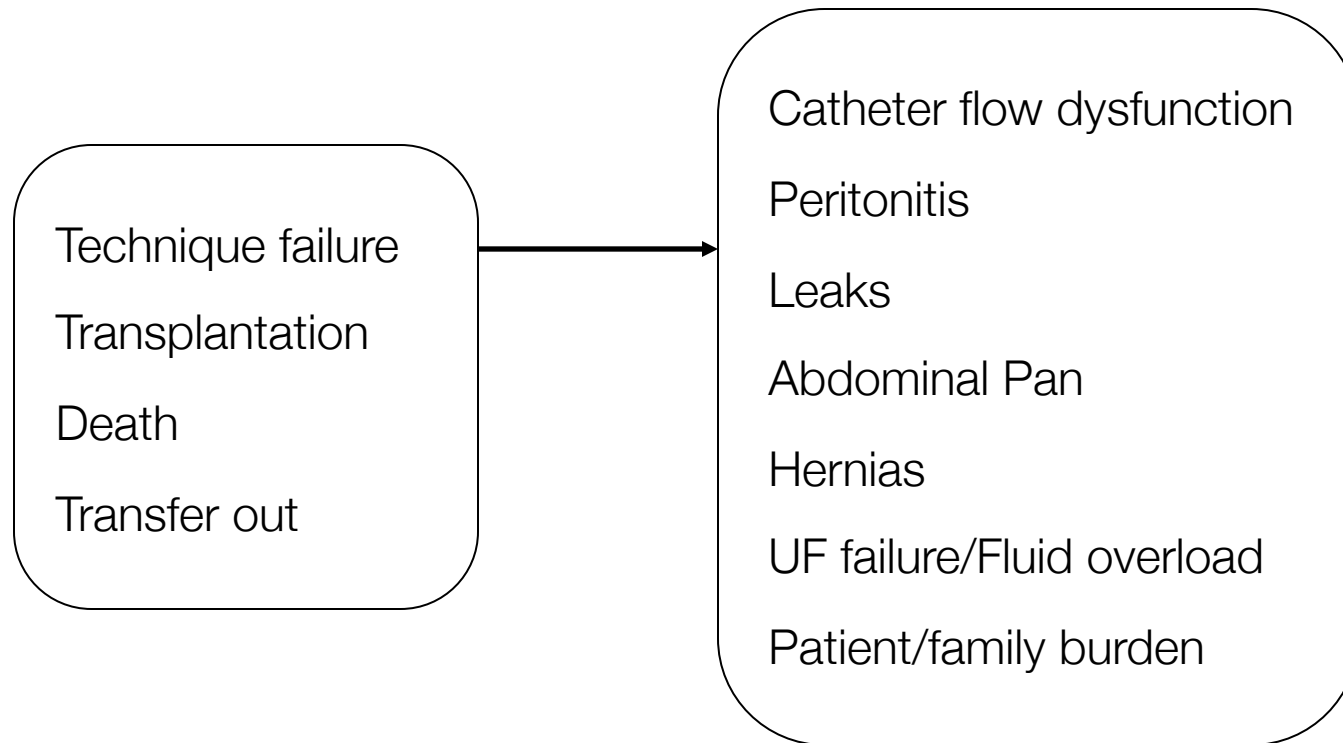
Years: 2008-2011

During follow-up, 12,175  
(41.2%) patients  
transferred  
to HD

One or more claims for  
peritonitis  
were present in 12,121  
(28.5%) patients

Median time on PD = 22  
months

# The multifactorial causes of loss





# The Kitchen Sink

Education

Peer support

More tech in the  
home

New Start Unit

Better patient  
training

Reduce Peritonitis

Urgent start PD

Prevent PD catheter  
malfunction

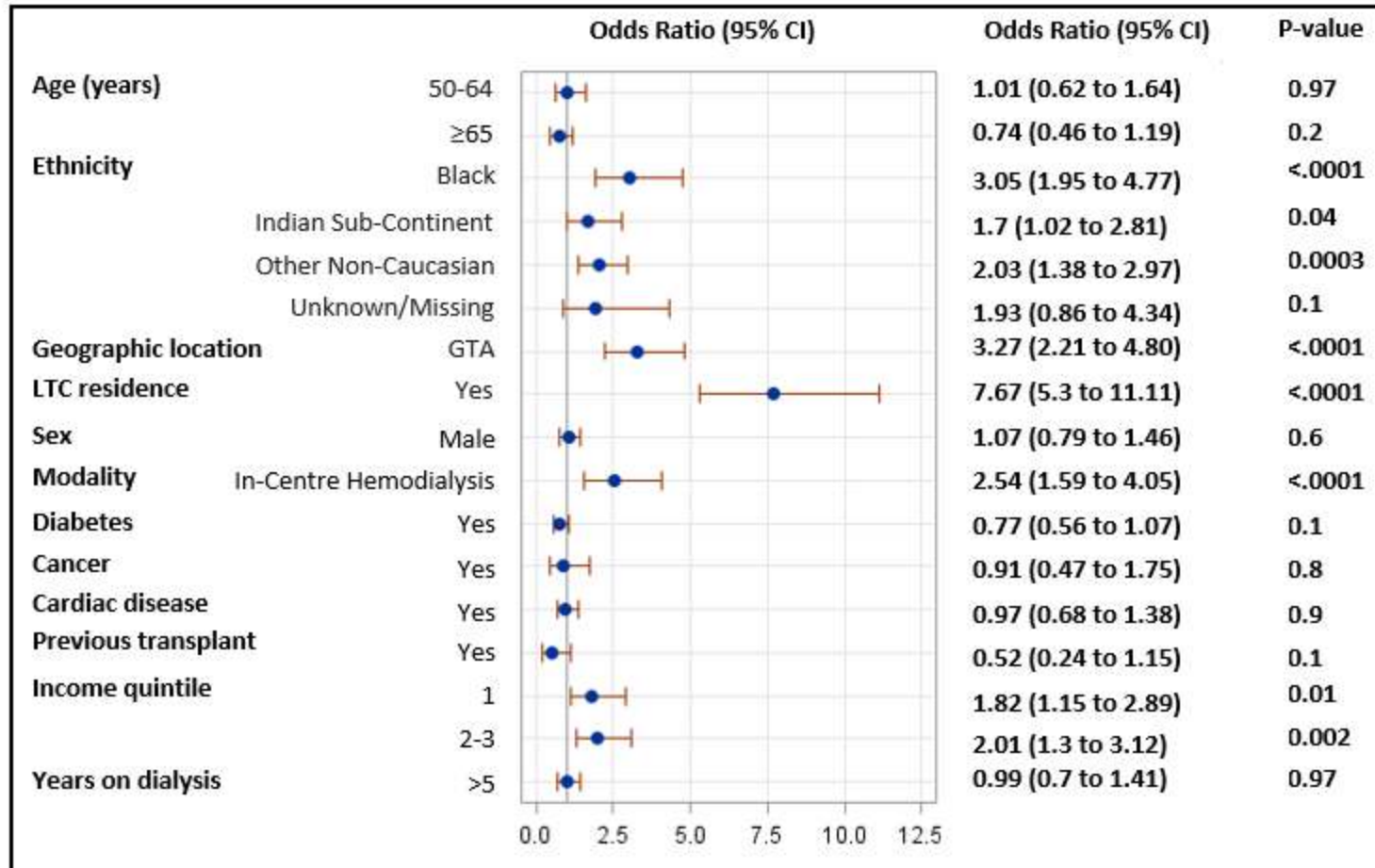
More home visits

Nephrologist PD  
insertion

Assisted PD

Strategic retreats

# PD and COVID-19



# PD and COVID-19

	All	HD	PD
No. of patients	3285	3160	125
Age at diagnosis, yr, median (IQR)	71.7 (60.6–80.5)	71.8 (60.8–80.6)	70.2 (59.4–78.5)
0–19	9 (0.3)	8 (0.3)	1 (0.8)
20–44	225 (6.8)	215 (6.8)	10 (8.0)
45–64	854 (26.0)	817 (25.9)	37 (29.6)
65–74	857 (26.1)	823 (26.0)	34 (27.2)
≥75	1340 (40.8)	1297 (41.0)	43 (34.4)
Sex			
Male	2077 (63.2)	1993 (63.1)	84 (67.2)
Female	1208 (36.8)	1167 (36.9)	41 (32.8)
Primary renal disease			
Glomerulonephritis	381 (11.6)	363 (11.5)	18 (14.4)
Diabetes	839 (25.5)	813 (25.7)	26 (20.8)
Hypertension/RVD	695 (21.2)	671 (21.2)	24 (19.2)
Other	1370 (41.7)	1313 (41.6)	57 (45.6)
Treatment modality			
HD	3160 (96.2)	NA	NA
PD	125 (3.8)	NA	NA
Year of KRT start, median (IQR)	2017 (2014–2018)	2017 (2013–2018)	2018 (2017–2019)

Adjusted 28-day  
Mortality

HD 18.0  
PD 21.6

# Summary

---

- Most governments, regions and programs are trying to grow home dialysis
- Growth is flat or modest at both overall
- Peritoneal dialysis can have high rates of loss from a variety of reason (Jack of all trades)
- There are many proposed solutions

# The way forward





# Learning from standards

## SONG-PD



### 1 CORE OUTCOMES

Critically important  
to all stakeholder groups  
Report in all trials

### 2 MIDDLE TIER

Critically important to  
some stakeholder groups  
Report in some trials

### 3 OUTER TIER

Important to some or  
all stakeholder groups  
Consider for trials



OPTIMIZING PREVENTION OF  
PD-ASSOCIATED PERITONITIS IN THE US

A PDOPPS ANCILLARY STUDY



# Learning from standards

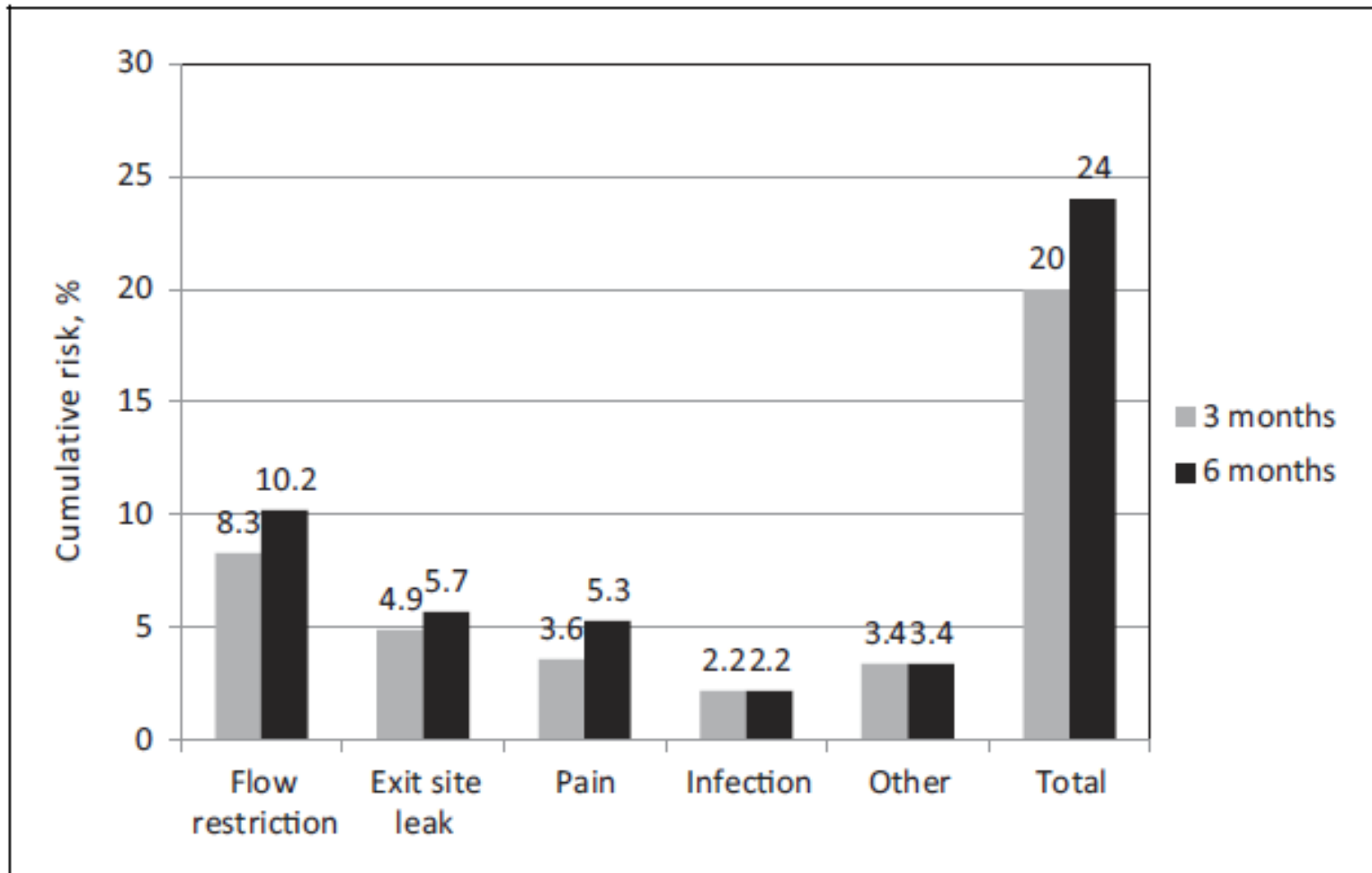
## FY 2020/21 Q2 12-Month Peritonitis Rate

PROGRAM	12-MONTH RATE
SHN	0.07
SJH	0.13
HHS	0.13
RVV	0.14
RVH	0.15
HRH	0.15
JHH	0.16
OSM	0.16
WOH	0.16
LHS	0.17
UHN	0.17
HSN	0.17
SBK	0.18
NBH	0.19

PROGRAM	12-MONTH RATE
NHS	0.20
THP	0.21
KGH	0.25
PET	0.26
MAH	0.26
WRH	0.27
TBH	0.27
SMH	0.28
LHC	0.28
SAH	0.29
GRH	0.30
TOH	0.32
TDH	0.80
MGH	N/A

Cases  
reported per  
Year at Risk

# Learning from standards



# Analytics

Apr 1/20 ORN PD Census = 64

**1. New starts – 28**

- Predialysis Clinic – 17 (61%)
- KFRE>50%- 14(50%)
- Modality Coach referral- 17(61%)
- HD as bridge to LRT -0(0%)

**2. Assessed for PD– 24 (86%)**

**3. Eligible for PD – 16 (67%)**

**4. Offered PD – 16 (100%)**

**5. Chose PD (PD catheter attempt) – 9 (56%)**

**6. Receipt of PD – 9 (100%)**

- None to receive PD in a future report

**Additions: Not New starts**

PD re-starts – 1  
Transfers in- 1  
HD to PD – 1

**Total Ins (Additions + New starts): 12**

**PD  
Population**

**Other  
Considerations**  
HHD choice - 1

Jun 30/20 ORN PD Census = 69

**7. Technique Failure – 3(43%)**

- Peritonitis – 2(67%)
- UF failure – 0 (0%)
- Catheter dysfunction – 0(0%)
- Leak – 0(0%)
- Exit site infection – 0(0%)
- Tunnel infection – 0(0%)
- Failure to cope – 0(0%)
- Other – 1(33%)

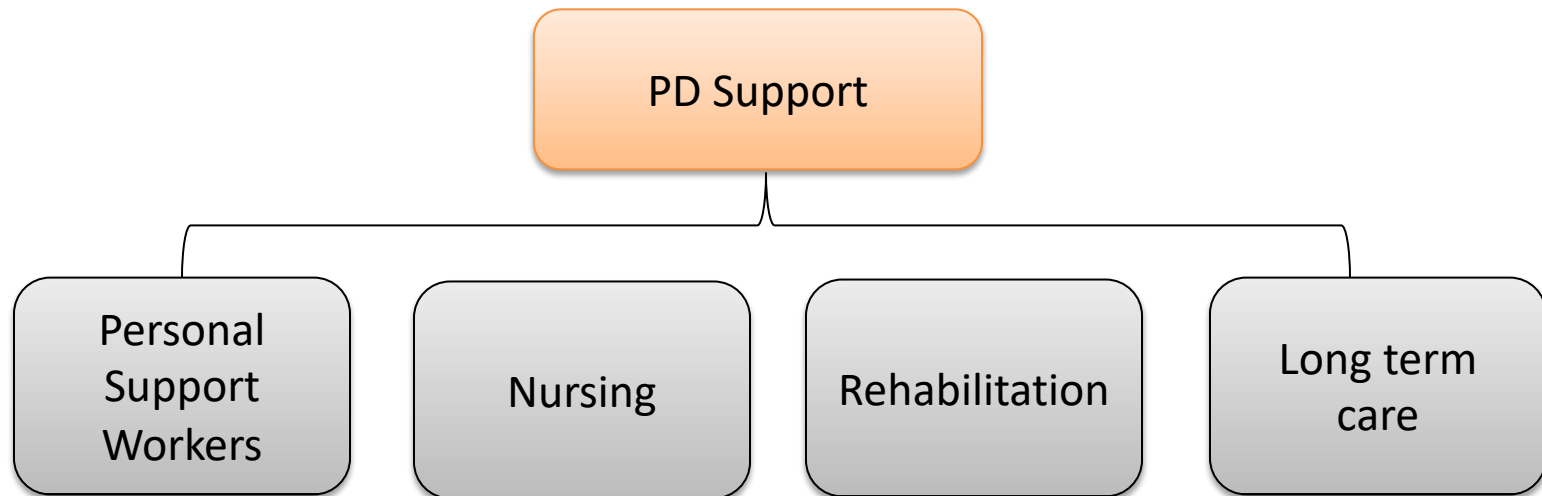
**8. Transplantation - 1 (14%)**

**9. Death/Withdrawal - 2 (29%)**

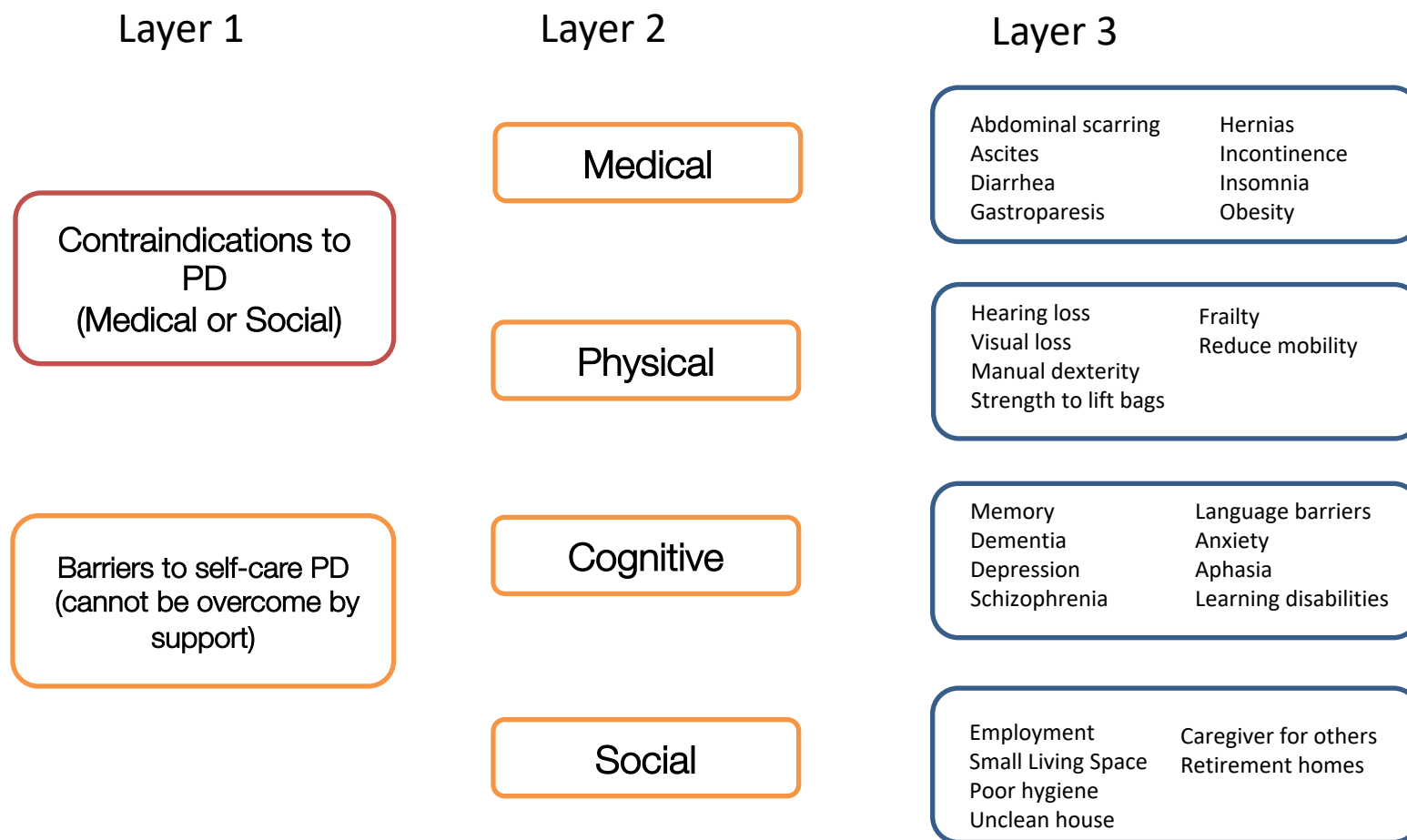
**10. Other loss – 1 (14%)**

**Losses Sum = 7**

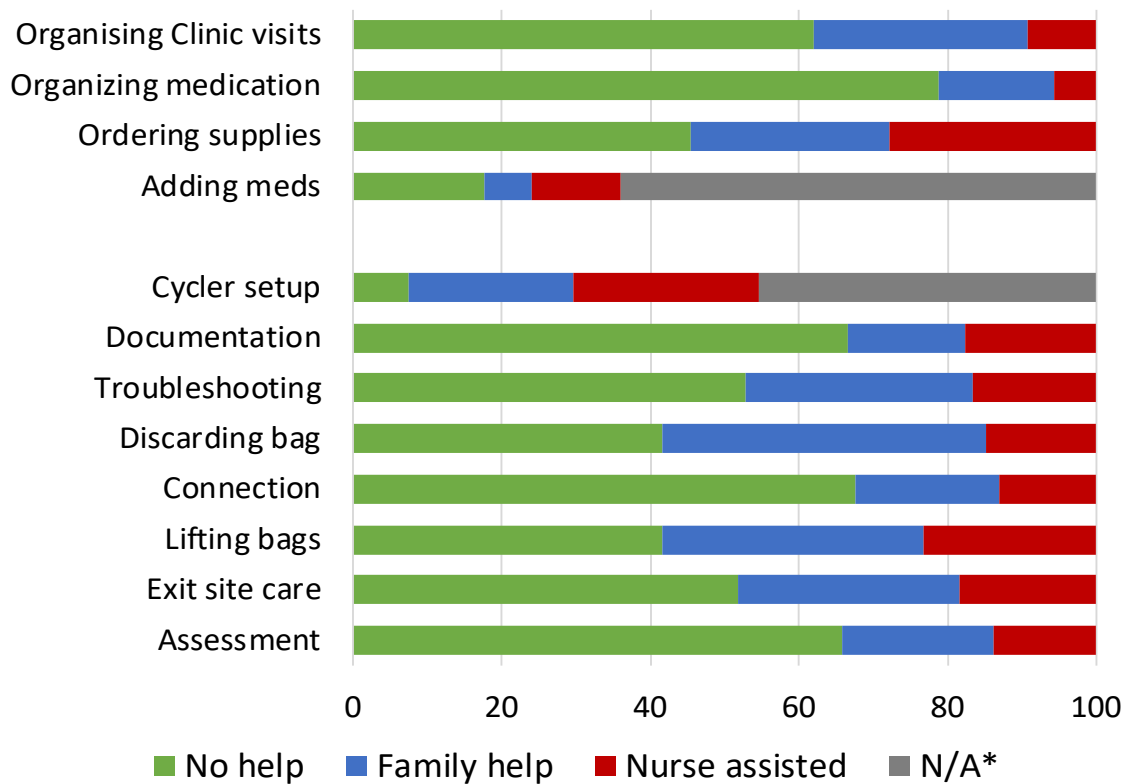
# Bringing more support for PD



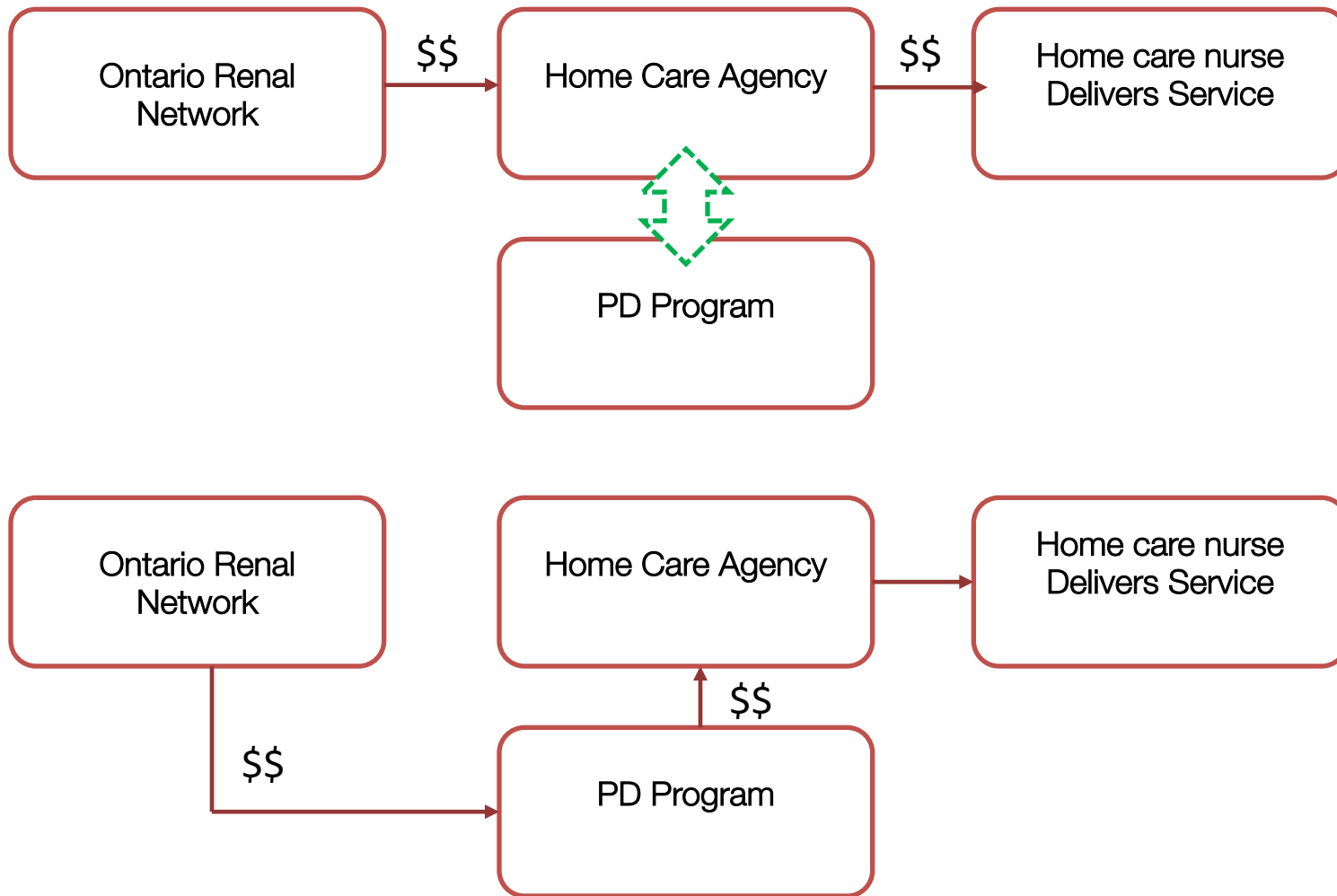
# Barriers to self-care PD



# PD tasks being assisted



# Innovative models of care





# Technology



What is the role of technology to amplify the impact of assistance?

**Table 3.** Laboratory values and outcomes at 90 days in the 2 groups

Characteristics	HC group, mean $\pm$ SD	AMIA group, mean $\pm$ SD	<i>p</i> value
Number of training days	5.4 $\pm$ 2.7	3.6 $\pm$ 1.4	0.022
Serum albumin, g/dL	3.6 $\pm$ 0.42	3.4 $\pm$ 0.37	0.092
Serum phosphorous, mg/dL	5.0 $\pm$ 1.6	5.5 $\pm$ 1.4	0.348
Calcium-phosphate product	45.4 $\pm$ 12.3	48.9 $\pm$ 12.2	0.387
Hemoglobin, g/dL	10.1 $\pm$ 3.1	10.9 $\pm$ 1.9	0.337
Dialysis adequacy, kt/V	2.5 $\pm$ 0.8	2.3 $\pm$ 0.6	0.414

# Machine Learning / AI

	N	Not Eligible for PD (%)	Eligible for PD (%)
<b>Disc. character.</b>			
Gender			
Female	216	56 (25.9)	160 (74.1)
Male	396	76 (19.2)	320 (80.8)
Dialysis location			
Started dialysis inpatient	260	82 (31.5)	178 (68.5)
Started dialysis in ICU	33	16 (48.5)	17 (51.5)
<b>Predialysis care</b>			
Predialysis care	564	113 (20.0)	451 (80.0)
Predialysis care(4 months)	526	101 (19.2)	425 (80.8)
Predialysis care(12 months)	426	77 (18.1)	349 (81.9)
<b>Comorbidity</b>			
Diabetes	336	81 (24.1)	255 (75.9)
Other cardiac conditions	116	28 (24.1)	88 (75.9)
Polycystic kidney disease	28	7 (25.0)	21 (75.0)
Gastrointestinal bleeding	24	7 (29.2)	17 (70.8)
Coronary artery disease	137	33 (24.1)	104 (75.9)
Congestive heart failure	88	30 (34.1)	58 (65.9)
Cancer	82	22 (26.8)	60 (73.2)
Cerebrovascular disease	53	11 (20.8)	42 (79.2)
Per. Vascular disease	56	16 (28.6)	40 (71.4)
C. O. lung disease	57	24 (42.1)	33 (57.9)
TOTAL	612	132 (21.6)	480 (78.4)
<b>Numer. Character.</b>	N=612	Median (IQR*)	Median (IQR)
Age		64 (17)	60 (23.3)
Body Mass Index (BMI)		28.7 (10.1)	27.5 (7.9)
Creatinine		612 (242.5)	644.5 (291.5)
Urea		31.1 (17.0)	31.4 (14.4)
Albumin		30 (10.8)	34 (9)
Hemoglobin		92.5 (20.8)	96 (20)
Parathyroidhormone		29.8 (69.3)	53 (113.1)
Phosphate		2.0 (0.8)	1.9 (0.7)
Calcium		2.1 (0.3)	2.1 (0.3)
Bicarbonate		20 (6)	20 (5)

TABLE I

DEMOGRAPHICS AND CLINICAL CHARACTERISTICS OF PATIENTS IN PD

	TP	TN	FP	FN	Acc.	F1 for E=0	F1 for E=1
ADD (confidence=95%)	457	47	85	23	<b>82.35%</b>	0.465	0.894
K-Means	275	86	46	205	<b>58.98%</b>	0.407	0.687

# New perspectives

## **International Society for Peritoneal Dialysis practice recommendations: Prescribing high-quality goal-directed peritoneal dialysis**

An incremental PD prescription consists of any of the following:

- (1) continuous ambulatory peritoneal dialysis (CAPD) with fewer than four dwells daily, <2-L dwell volume, or <7 d/wk or
- (2) automated PD with no day dwell, <10-L total daily dose, or <7 d/wk

# Summary

---

- Optimizing and growing PD use is an significant challenge
- We need to improve our ability to measure outcomes so we can benchmark our practices and learn form each other
- New forms of support that leverage technology will play a major role as the population ages.
- Data form these technologies can be use to provide advanced analytics to improve our care.
- Shifting to more holistic, patient focused goals will expand methods of providing PD.
- Quality improvement and research will continue to show us innovative practices to improve patient care.

# PD In Non-Traditional Patients

Jenny Shen, MD, MS

Assistant Professor Of Medicine

Division of Nephrology, Harbor-UCLA Medical Center

Annual Dialysis Conference 2021

# Disclosures

- Grant from NIH

# Learning Objectives

- To describe strategies for optimizing peritoneal dialysis in obese patients.
- To understand the potential pitfalls and advantages to peritoneal dialysis as the modality for patients with cirrhosis.
- To appreciate the special considerations for peritoneal dialysis in patients with polycystic kidney disease.
- To identify individuals who may be candidates for assisted peritoneal dialysis.



# Concerns about Obesity & PD

- Obese patients cannot be adequately dialyzed with PD because of their volume
- Obese patients will have many infections because of their body habitus

# Optimizing PD for Obese Patients

- PD catheter placement
  - Stencil with the patient upright to judge beltline and potential pannus interference
  - Pre-sternal catheters another option
- PD prescription
  - Larger volumes
  - Take advantage of residual kidney function
  - Plan ahead for transitions to HD

# Concerns about Cirrhosis and PD

- Increased risk of peritonitis
- Increased loss of protein

# Potential Advantages to PD in Cirrhosis

- No anti-coagulation
- Less hemodynamic instability
- No need for therapeutic paracenteses

# Optimizing PD for Cirrhosis

- Do not drain all of the fluid initially (take off slowly over a week)
- Extra vigilance for infections

# Concerns about PKD and PD

- Not enough surface area for adequate dialysis
- Increased intra-abdominal pressure leading to leaks
- Increased infections from colonic diverticuli

# Optimizing PD for PKD

- Nephrectomy not necessary (may even reduce residual kidney function)
- Use supine PD as much as possible
- No data showing there is an increased risk of infection



# Concerns about Patients who Cannot Perform Self-Care

- Poor eyesight (common in older patients & those with diabetes)
- Cognitive difficulties (difficult to learn PD)
- Frail (too weak or not enough dexterity to manage bags, connections)

# Assisted PD

- Who?
  - Family, friends
  - Paid caregivers
  - Does not need to be a nurse-can be trained just as the patients are
- When?
  - Household members usually can manage CAPD or APD
  - Paid caregivers can come twice a day for APD to connect at night and then disconnect in the AM