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, 3021

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

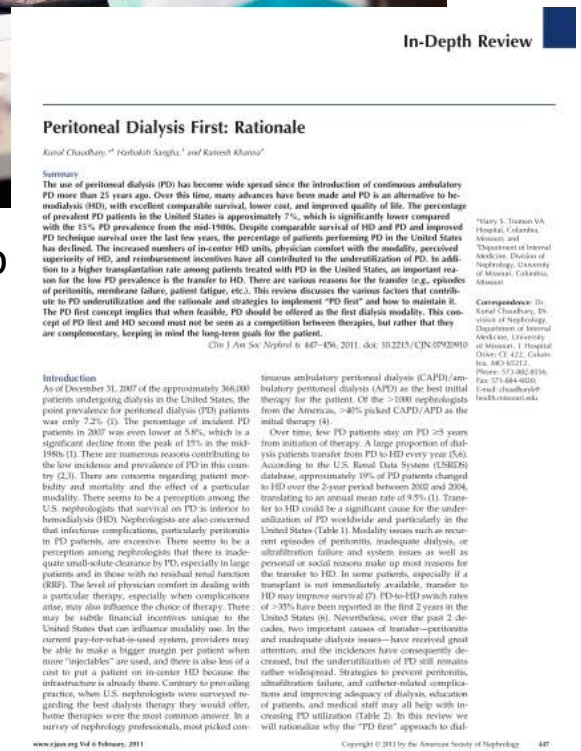
- Which are directed towards
  - Patients and their care partners
  - Physicians including residents and fellows
    - Nephrologists as well as PCPs, access surgeons, cardiologists and endocrinologists
  - Nurses including students
  - Dieticians and social workers

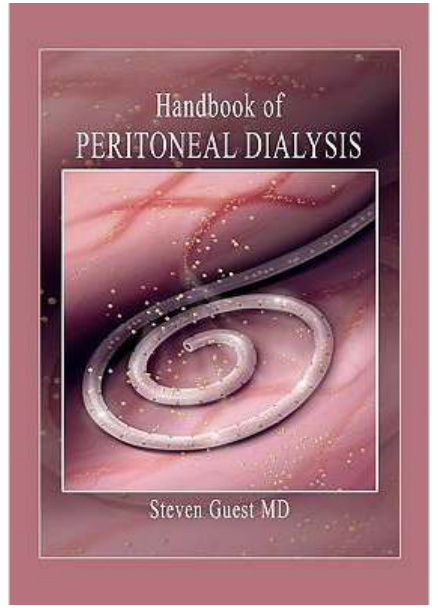
Traditional Methods

Classroom style

One to one

Gro





Current Challenges in Education for Any Learner

More to Learn

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

Frank et al. Health professionals for a new century. Lancet 376: 1923–1958, 2010
Simpson et al. Job roles of 2025 medical educator. Journal of Graduate Medical Education, June 2018

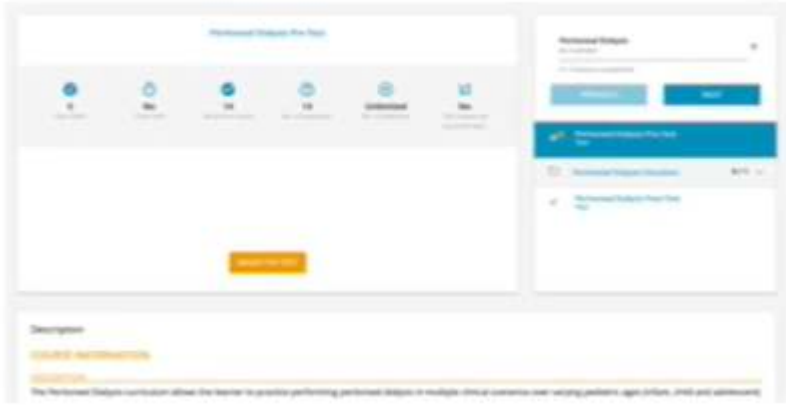
Online Learning: E-learning

- 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

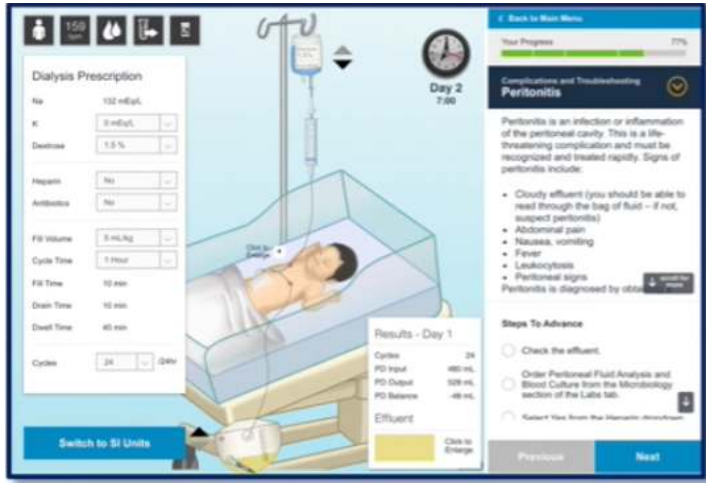


Podcasts

Video Conferencing

zoom

Serious gaming



British Colombia Resources for Health Professionals and Patients

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

BCRenal

Follow us

Search...

Kidney Services | Health Info | Research | About | Contact | Health Professionals | Learning/Events | Careers

Menu

Health Professionals / Clinical Resources / Peritoneal Dialysis

SHARE A 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 cycler below and record what is seen in the display screen.			

What is displayed on the screen?

_____

_____

BCRenal

Follow us

Search...

Kidney Services | Health Info | Research | About | Contact | Health Professionals | Learning/Events | Careers

Menu

Health Professionals / Clinical Resources

SHARE A A

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.

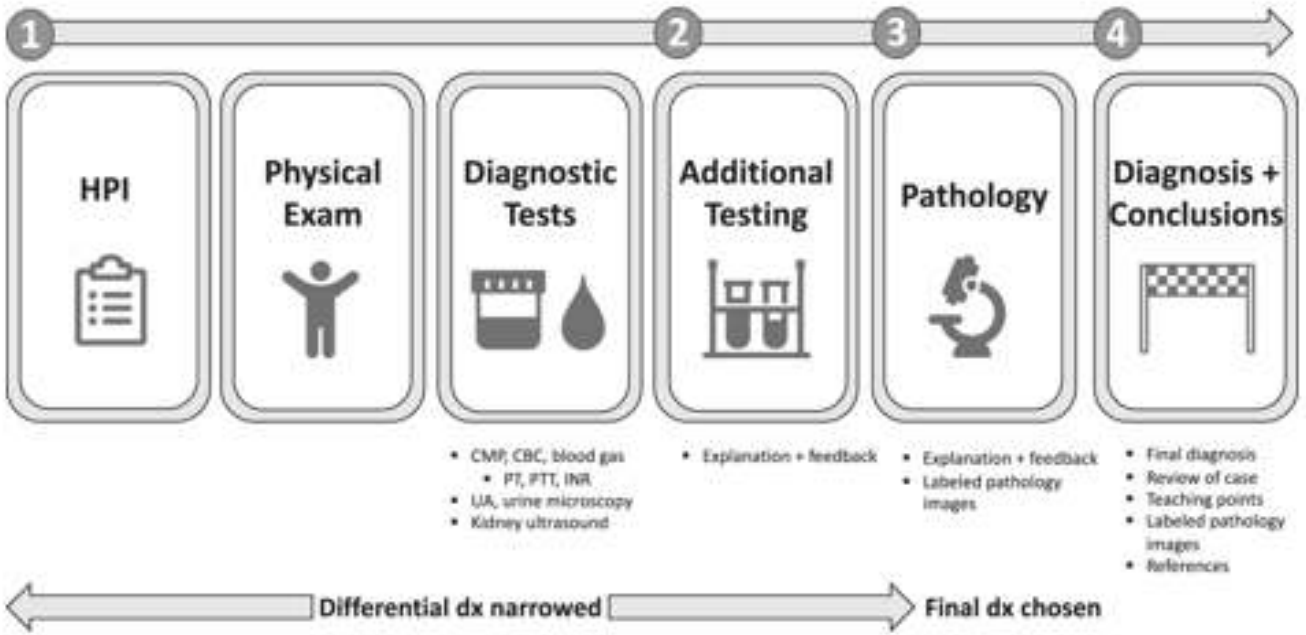
This series of eight modules is for the use of patients new to PD and for any patients who wish to review the procedures required for PD care. To access any of the modules, click on a title below.

- 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 Colombia 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

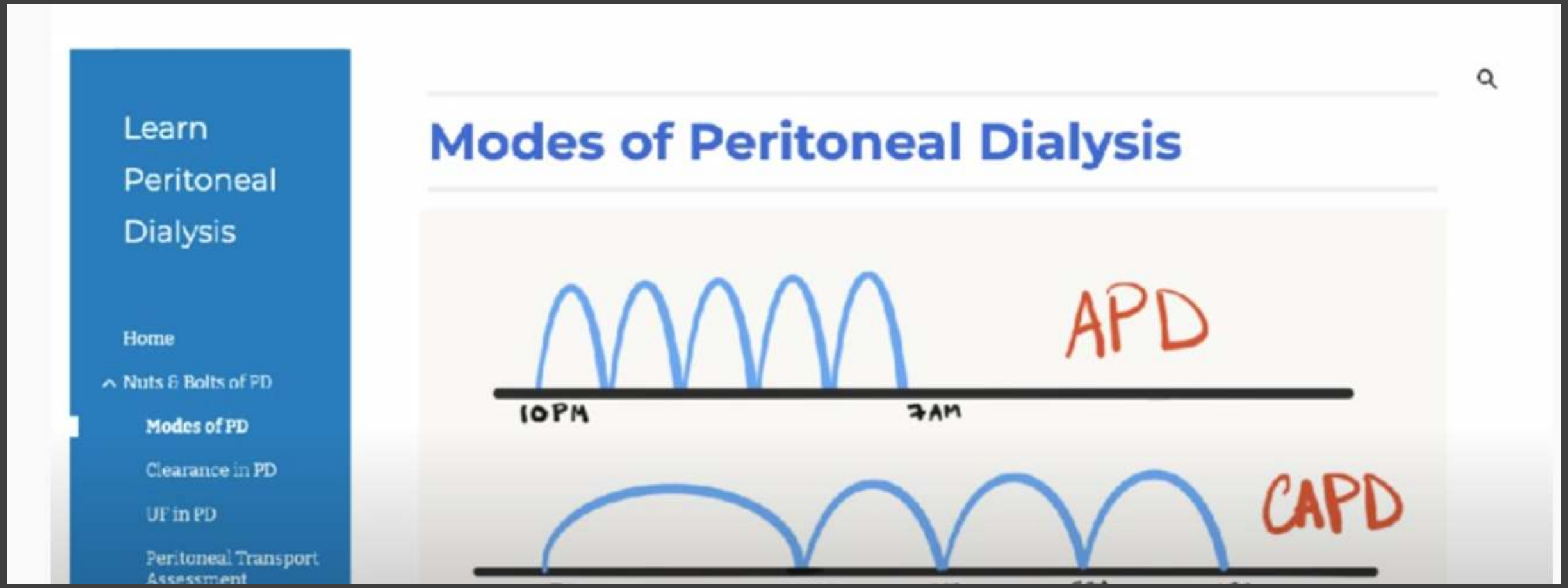
While keeping our eyes out for non-PD related pathology, it is important to act quickly with any suspicion for peritonitis. Looking at the PD fluid itself can also be helpful in making a diagnosis. PD fluid should be sent immediately for **cell count with differential, gram stain, and culture**.

NephSim
PICK YOUR CASE! IMAGE GALL
ACID/BASE SUBMIT A CASE

NephSim
PICK YOUR CASE! IMAGE GALLERY
ACID/BASE SUBMIT A CASE

Bloody (hemoperitoneum):
Coagulopathy
Retrograde menstruation
Ovulation
Strenuous exercise
Ovarian cyst rupture
Adhesions
Catheter-associated trauma

Normal

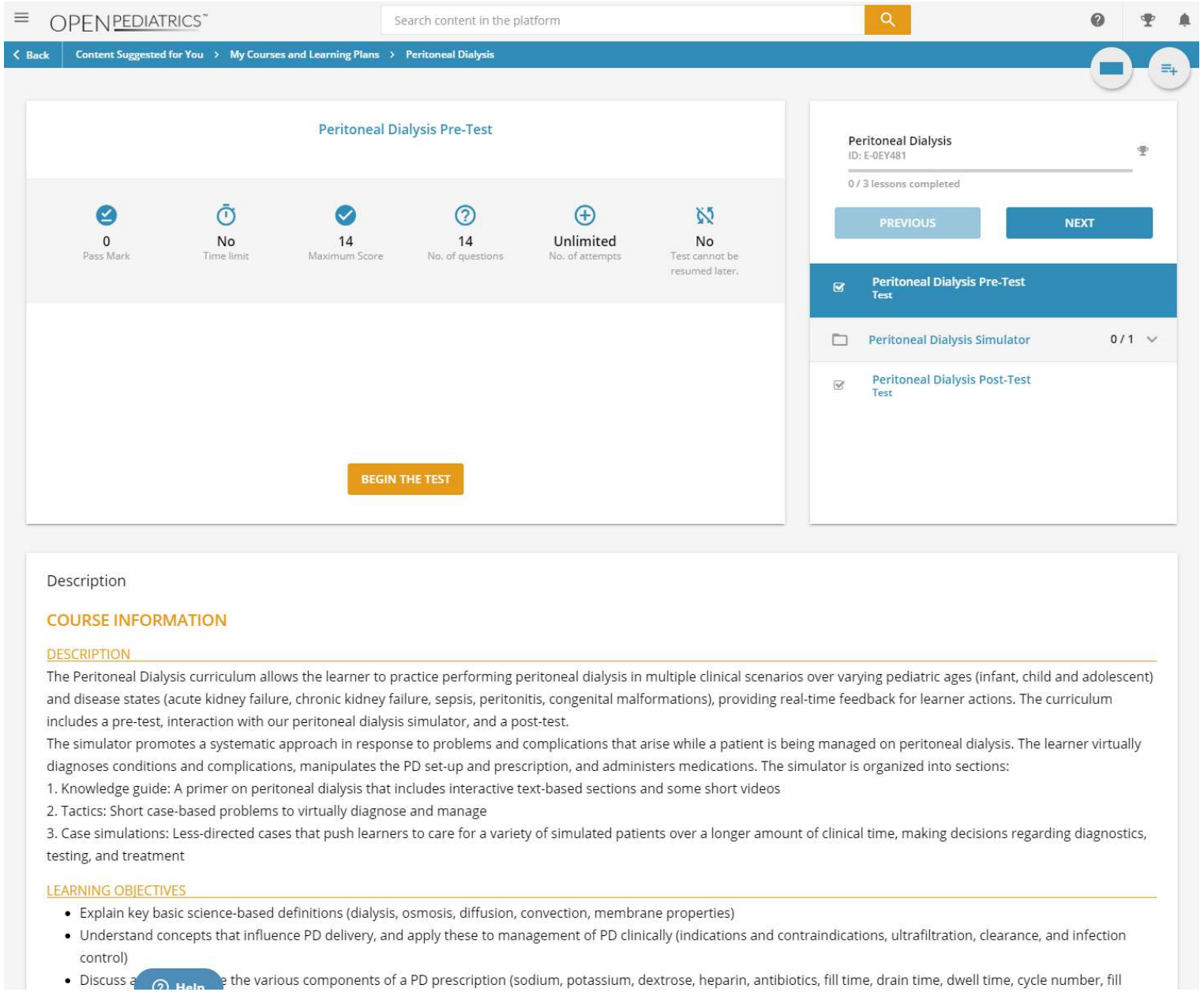


- https://www.youtube.com/watch?v=kx7PZF-A_vs&feature=youtu.be&ab_channel=SuperSalms

Virtual PD Simulator

Course directors

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



OPENPediatrics - Peritoneal Dialysis Simulator

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	Select
Dextrose	Select
Heparin	Select
Antibiotics	Select
Fill Volume	Select
Cycle Time	Select
Fill Time	10 min
Drain Time	10 min
Dwell Time	(calculated)
Cycles	Select /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


A
OPEN PEDIATRICS
Dialysis Prescription
Day 1
Prescription
Fill Volume
Steps To Advance
B
OPEN PEDIATRICS
Dialysis Prescription
Day 1
11:00
Tactic 6
Results - Day 1
Effluent
Patient Info
C
OPEN PEDIATRICS
Your Patient Chart
Patient Information
History
D
OPEN PEDIATRICS
Congratulations! Your final score is 90%.
Scoring Summary
Task 1: Initial Setup 100%
Task 2: Inadequate Drain Bag Height 100%
Task 3: Poor Ultrafiltration 100%
Task 4: Dehydration 100%
Task 5: Hyponatremia 58%
Task 6: Hypokalemia 100%

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
Occupation							
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)	[a]	[a]
Fellow	3	192 (126–252)	60.0 (10.6)	93.0 (0)	33.0 (10.6)	[a]	[a]
Attending	9	158 (95–256)	63.0 (12.9)	81.4 (10.4)	18.4 (13.2)	[a]	[a]
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

[a]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.

Olszewski et al. Clin J Am Soc Nephrol 13: 900–906, 2018

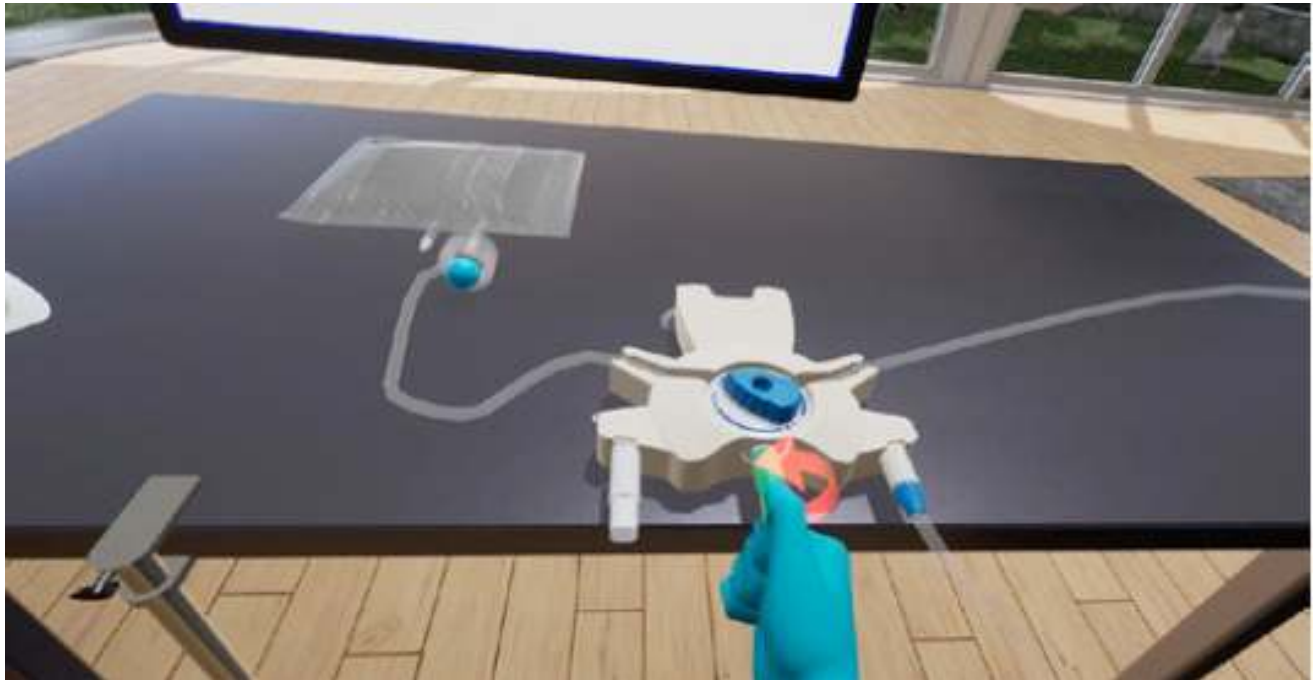
Virtual or Augmented Reality

- “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[a] Daniel Hettich[b] Jonathan Natzel[b] Fedai Özcan[a]
Boris Kantzow[b]

[a]Department of Nephrology, Klinikum Dortmund, Dortmund, Germany; [b]Weltenmacher GmbH, VR Training-Application, Düsseldorf, Germany



Standardized training

Faster and easier.

Follow up is pending

Established in endoscopy

SATELLITE HEALTHCARE

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

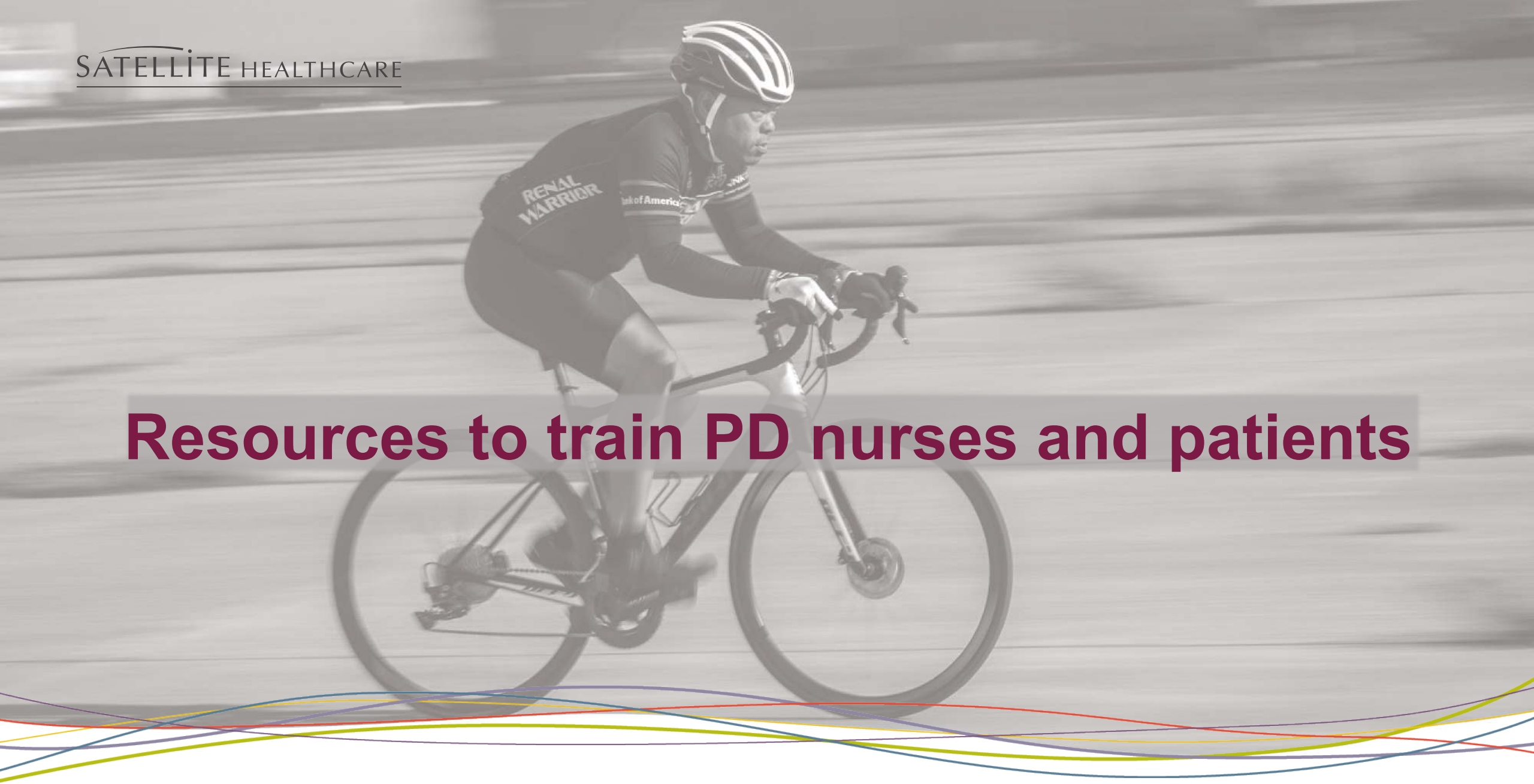
Advanced Nursing Experience Is Beneficial for Lowering the Peritonitis Rate in Patients on Peritoneal Dialysis

- 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.

SATELLITE HEALTHCARE



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, MDSection
- Editor:Thomas A Golper, MDDeputy
- Editor:Shveta Motwani, MD, MMSc, FASN
- Last updated February 27, 2020

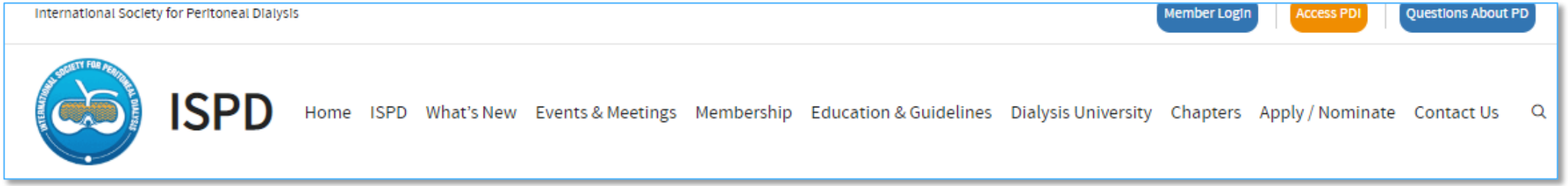
Nursing Liaison Committee of ISPD

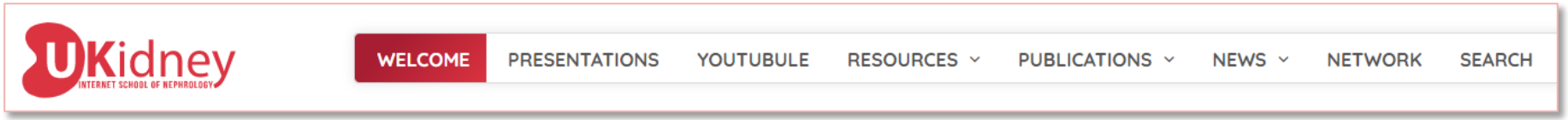
A Syllabus for Teaching Peritoneal Dialysis Patients and Caregivers Feb 2016

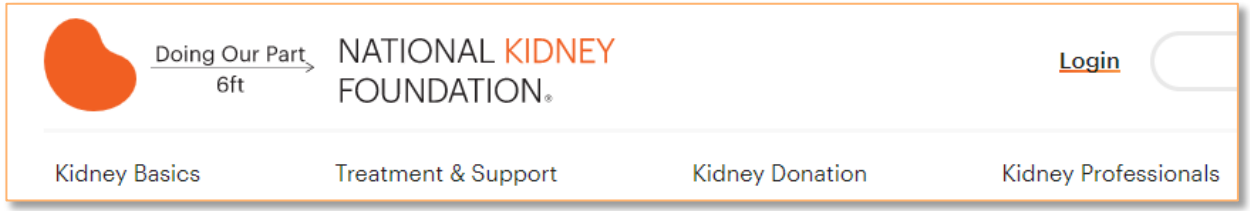
- Help PD nurses train patients and caregiver based on a consensus of training program reviews, utilizing current theories and principles of adult education.

- 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 conductive 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

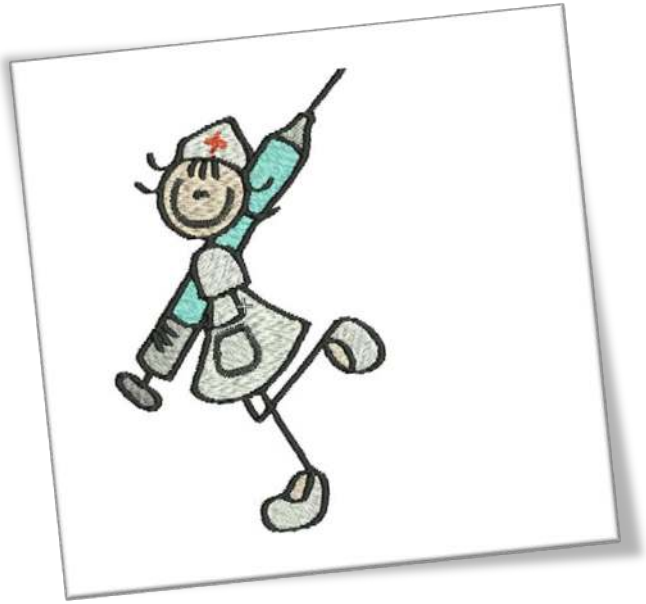
Observe procedures performed

Read documentation

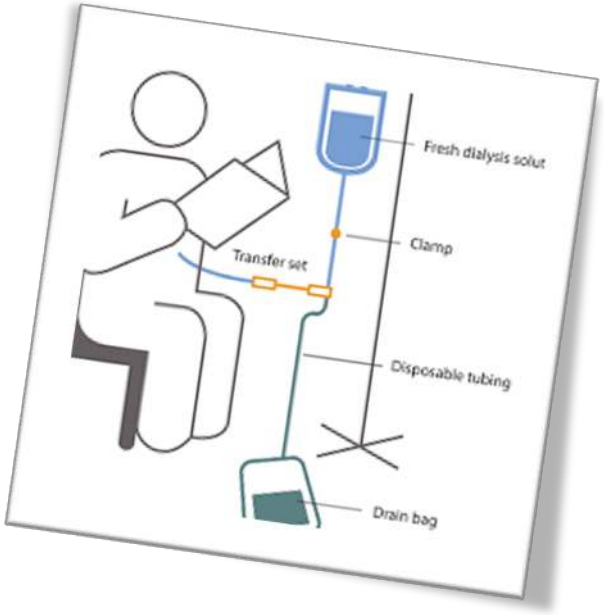
Advanced PD training

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 route 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 cycler

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 analysis 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
- Every clinic visit
- Review treatment log
- Review medications
- Infectious and non-infectious complications
- Before a vacation

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 emema

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, MDSection, Editor:Thomas A Golper, MDDeputy,
  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

SATELLITE HEALTHCARE

“Great mentorship is priceless.”

Lailah Gifty Akita

Joanna Lee Neumann 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

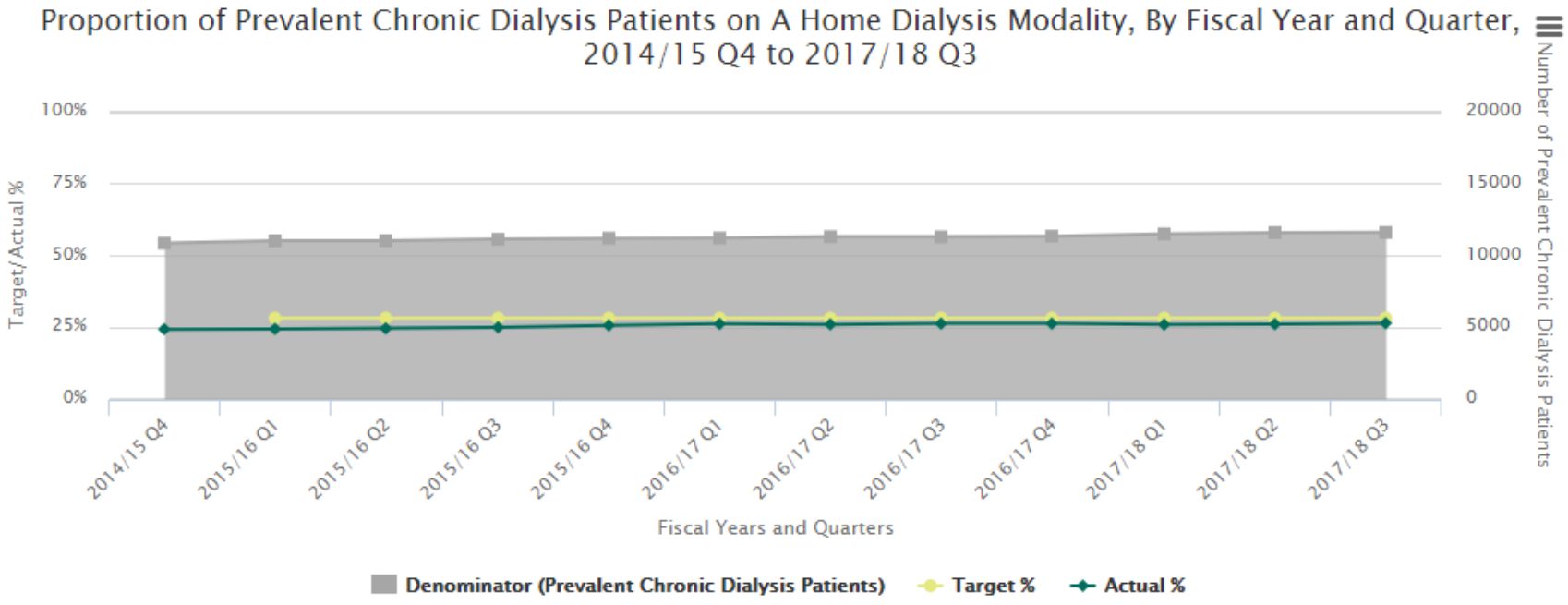
Objectives

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

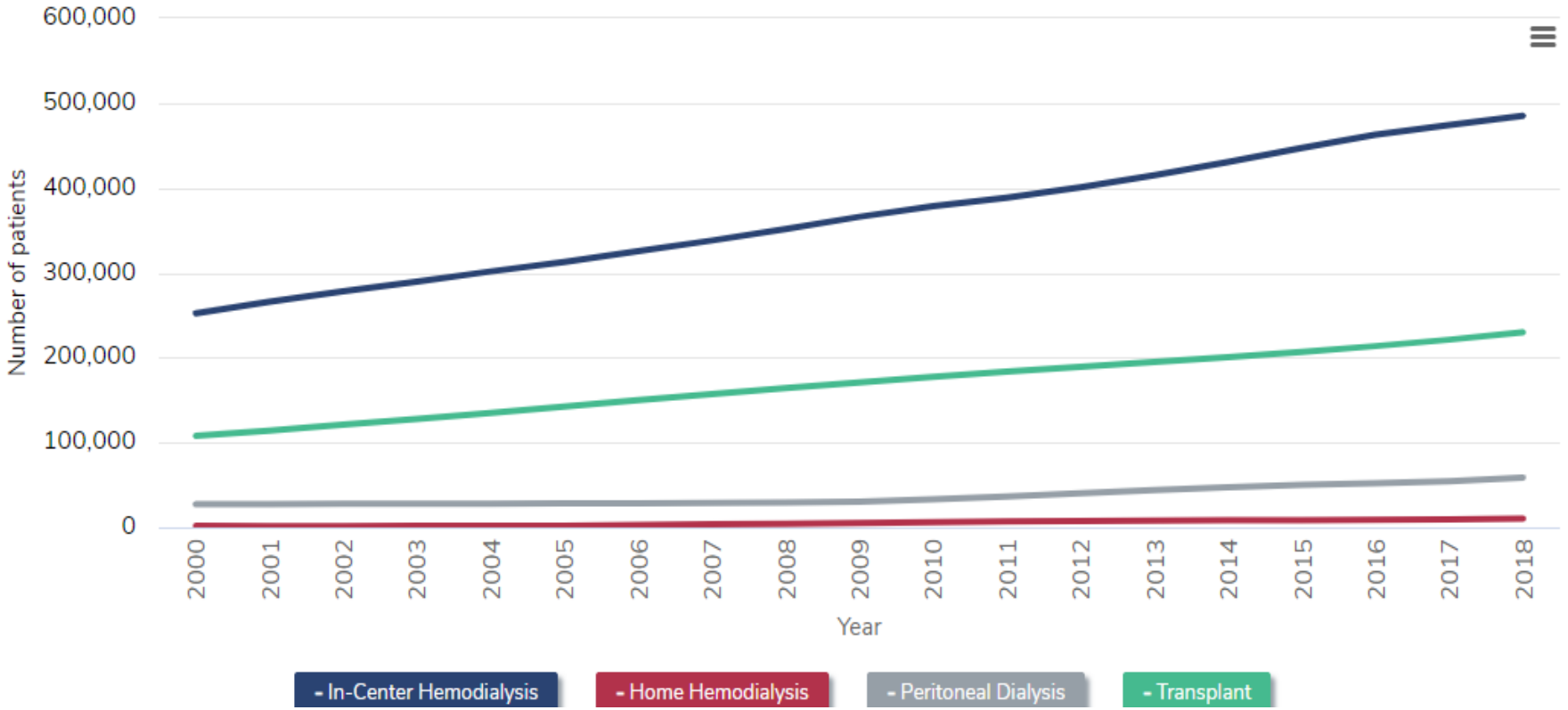
PD use in Ontario over time



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

PD use in the U.S over time

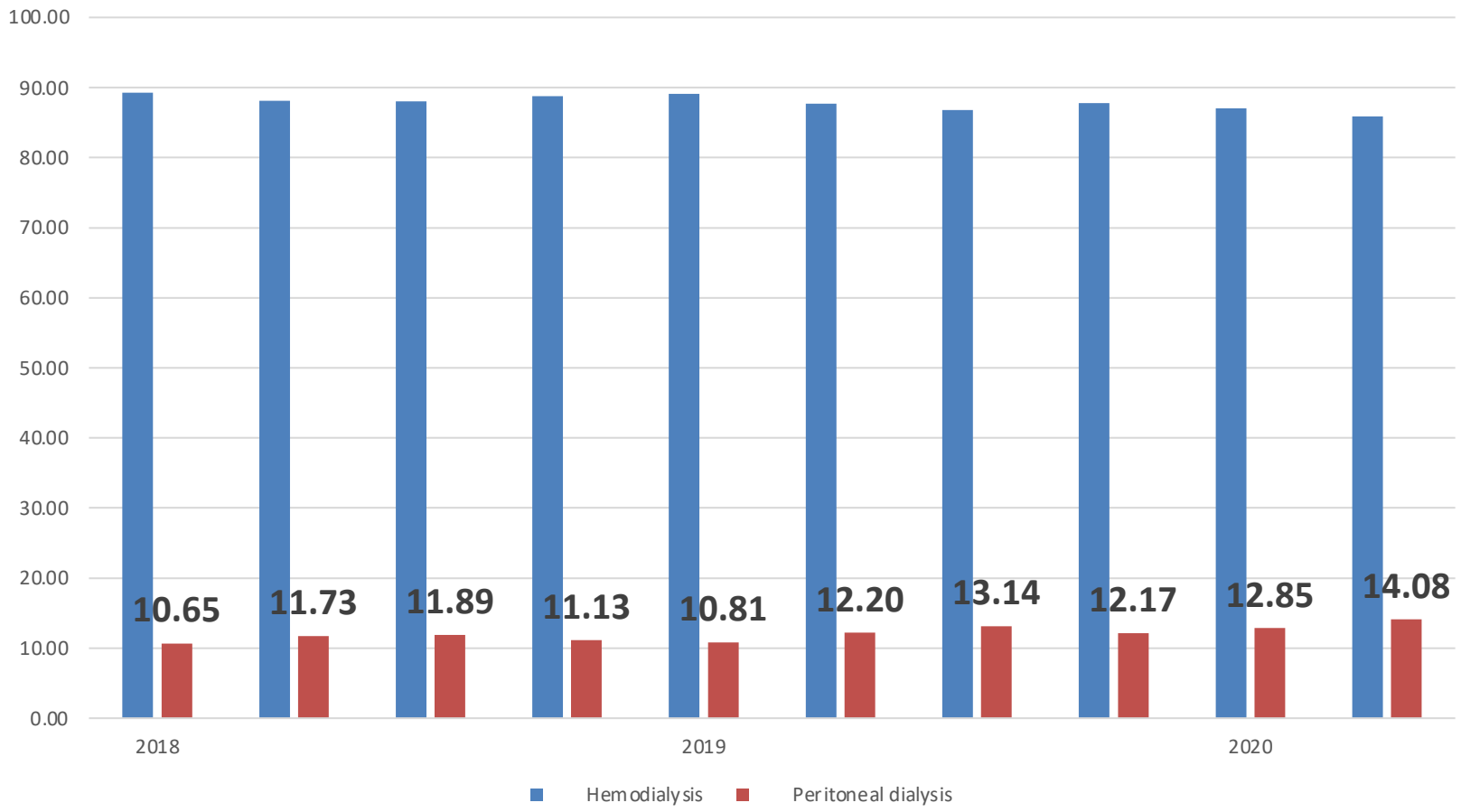
Figure 1.6 Number of prevalent ESRD patients, by modality, 2000-2018



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

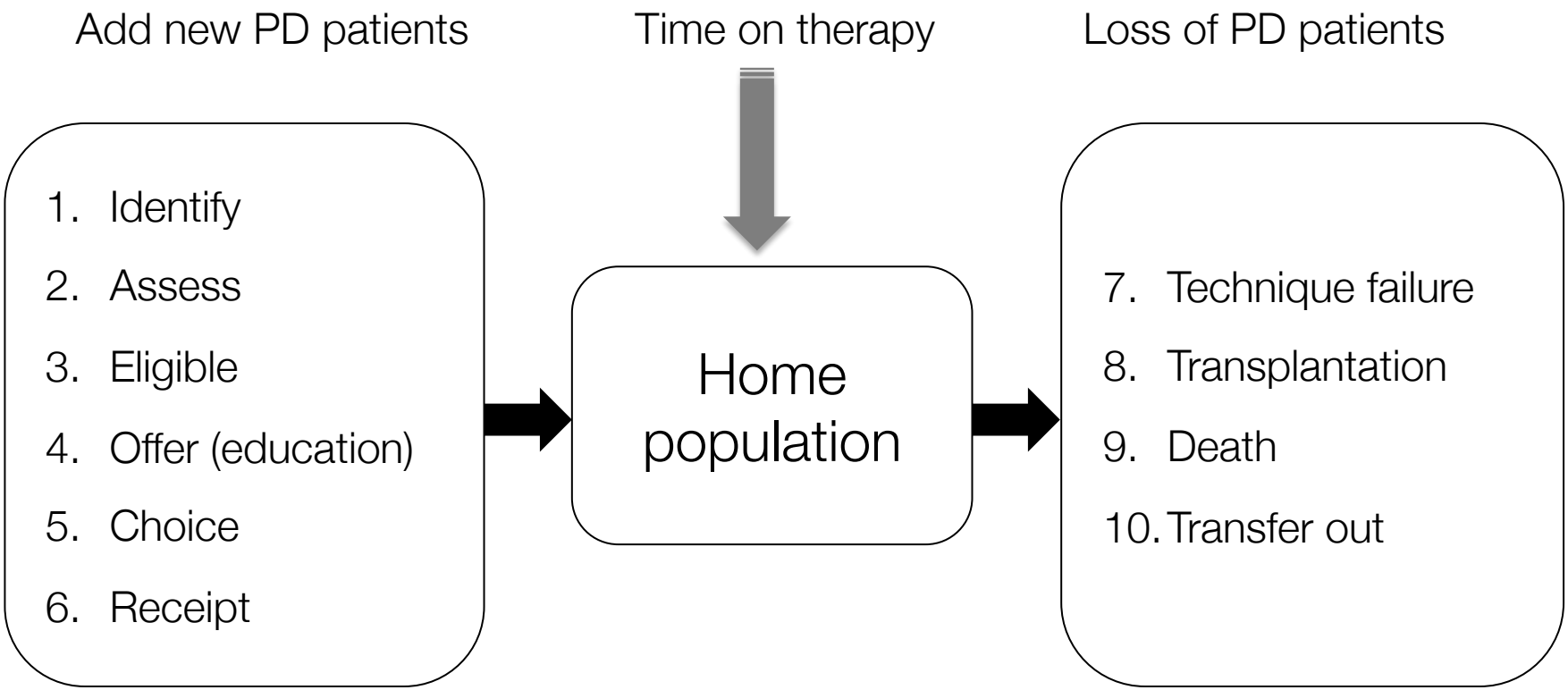
Data provided by USRDS.

Incident PD use in the U.S



Data provided by USRDS.

The complexity of PD



Blake PG, Quinn RR, Oliver MJ. Perit Dial Int. 2013 May-Jun;33(3):233-41.

The loss from PD

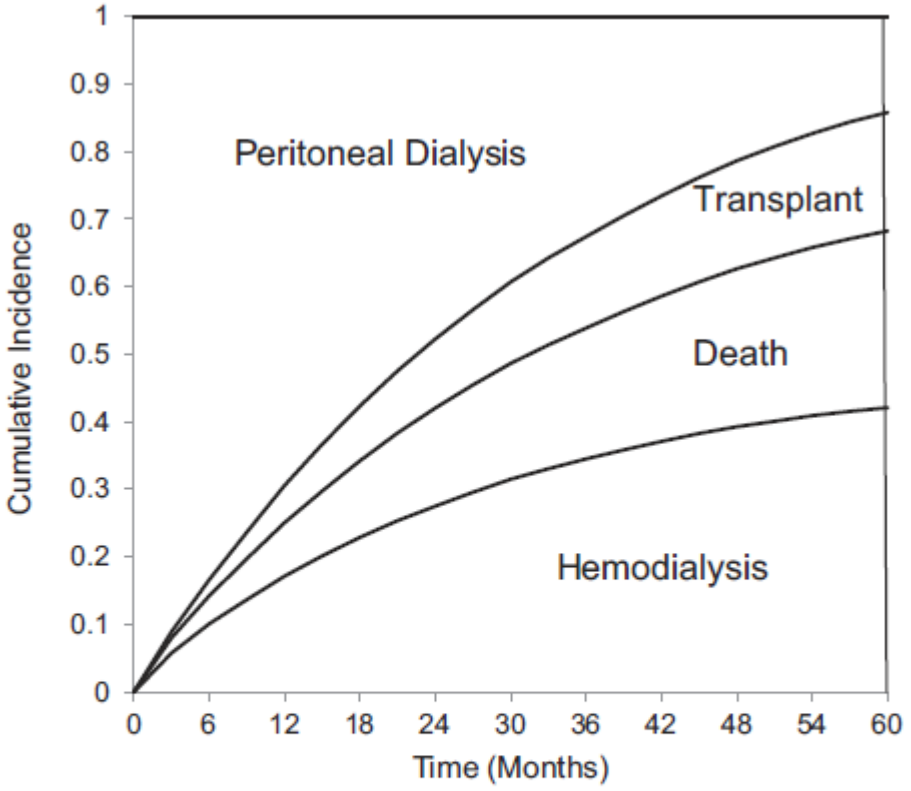


Figure 2. Hemodialysis transfer, kidney transplantation, and death over time for all incident peritoneal dialysis patients. The prevalence of each outcome is shown as the vertical height of the appropriate area at each time point on the horizontal axis.

N=29,573 PD starts

USRDS Data

Years: 2008-2011

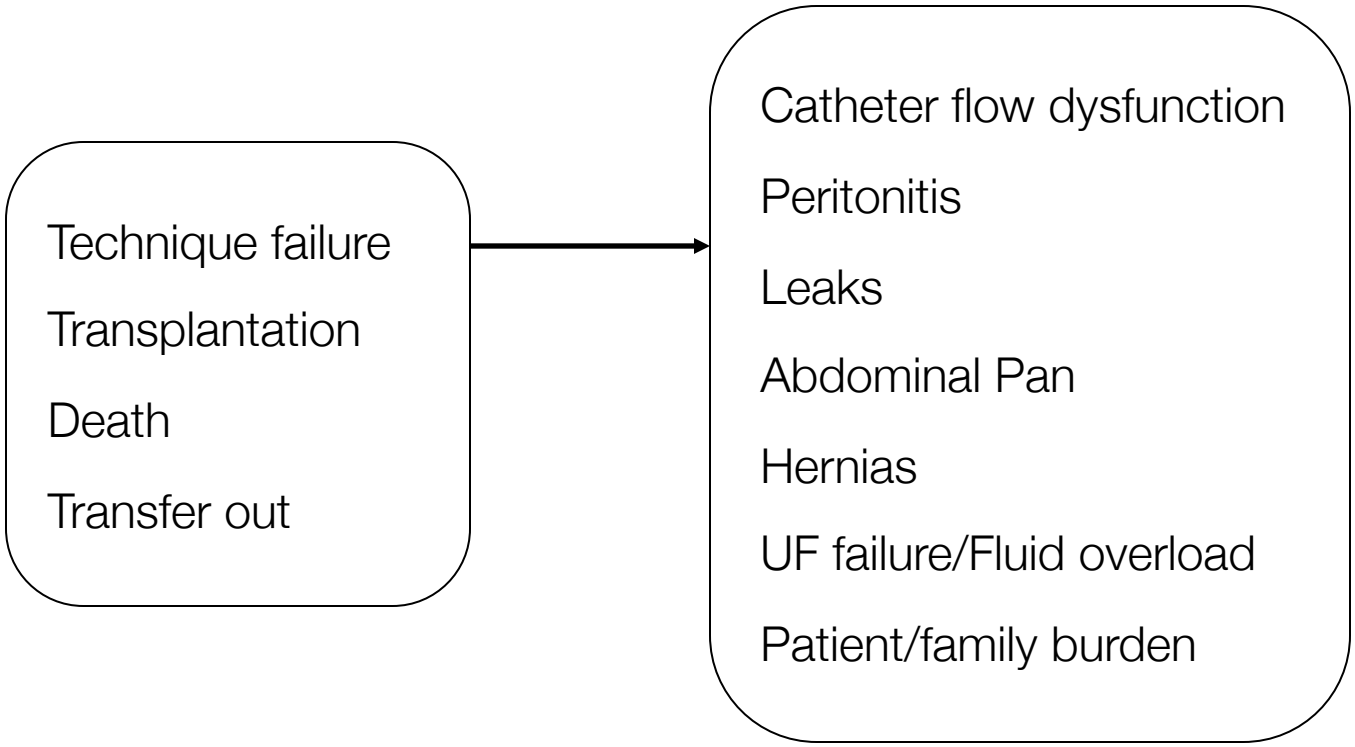
During follow-up, 12,175 (41.2%) patients transferred to HD

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

Median time on PD = 22 months

McGIll RL. AJKD Am J Kidney Dis. 74(5): 620-628

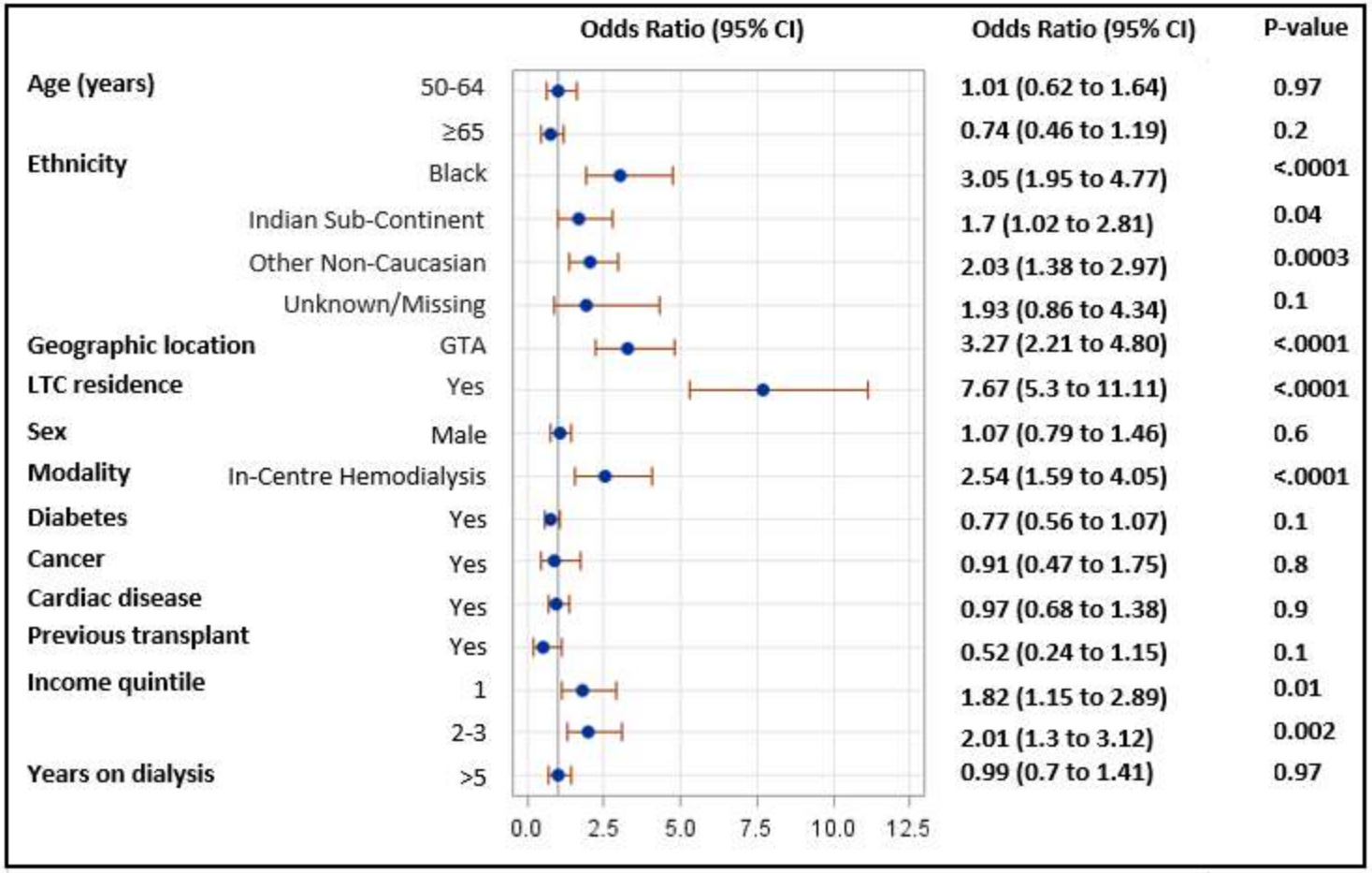
The multifactorial causes of loss



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



Taji L, Oliver MJ, Blake PG et al. CMAJ. 2021 In press

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

KJ Jager et al. Kidney International (2020) 98, 1540–1548

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

OPPUS

Optimizing Prevention of PD-Associated Peritonitis in the US

A PDOPPS Ancillary Study

www.arborresearch.org
www.songinitiative.org

Learning from standards

FY 2020/21 Q2 12-Month Peritonitis Rate

PROGRAM	12-MONTH RATE	PROGRAM	12-MONTH RATE
SHN	0.07	NHS	0.20
SJH	0.13	THP	0.21
HHS	0.13	KGH	0.25
RVV	0.14	PET	0.26
RVH	0.15	MAH	0.26
HRH	0.15	WRH	0.27
JHH	0.16	TBH	0.27
OSM	0.16	SMH	0.28
WOH	0.16	LHC	0.28
LHS	0.17	SAH	0.29
UHN	0.17	GRH	0.30
HSN	0.17	TOH	0.32
SBK	0.18	TDH	0.80
NBH	0.19	MGH	N/A

Cases reported per Year at Risk

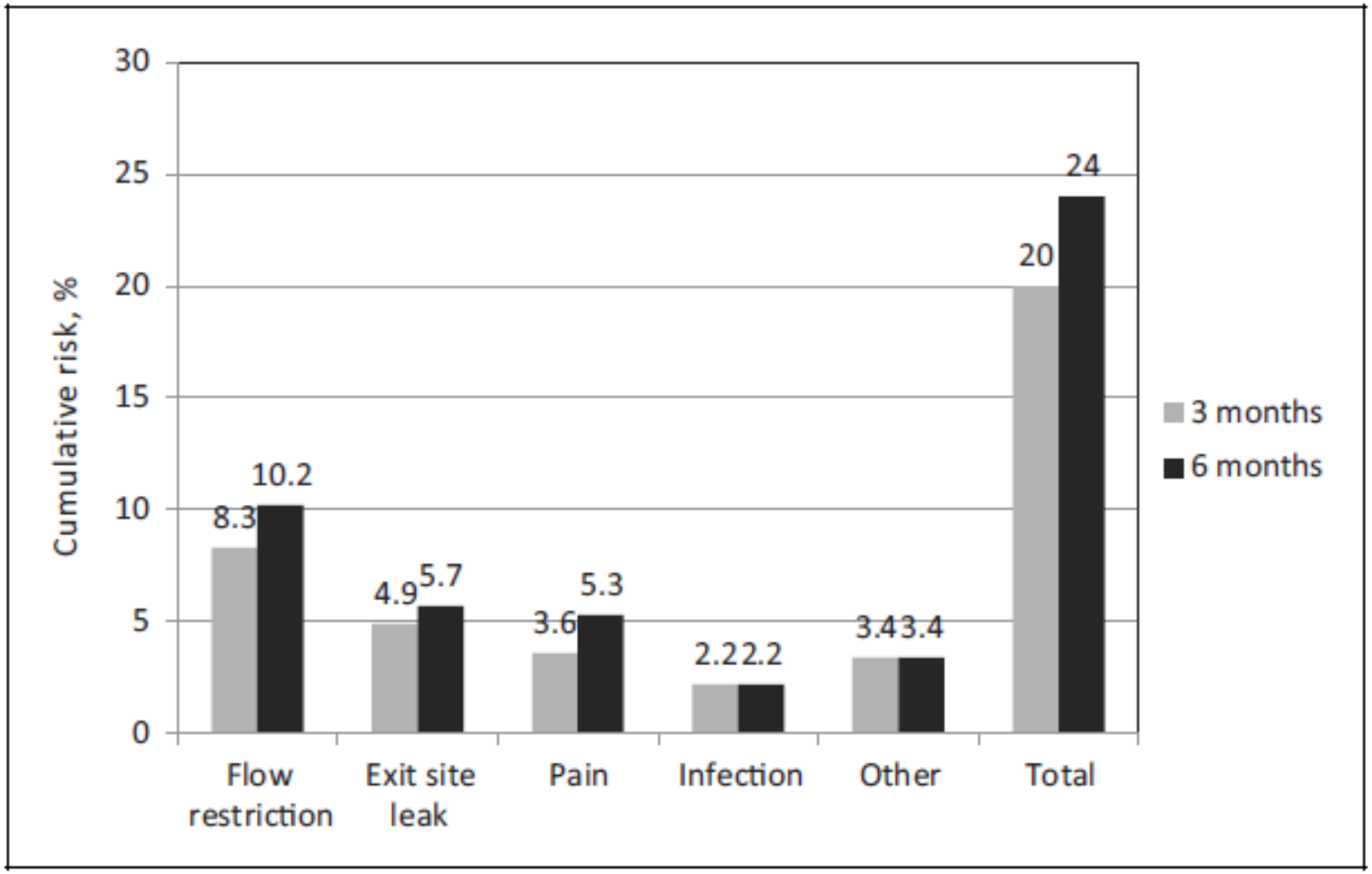
Ontario Health
Ontario Renal Network

ONTARIO	0.20

19

Data provided courtesy, The Ontario Renal Network

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

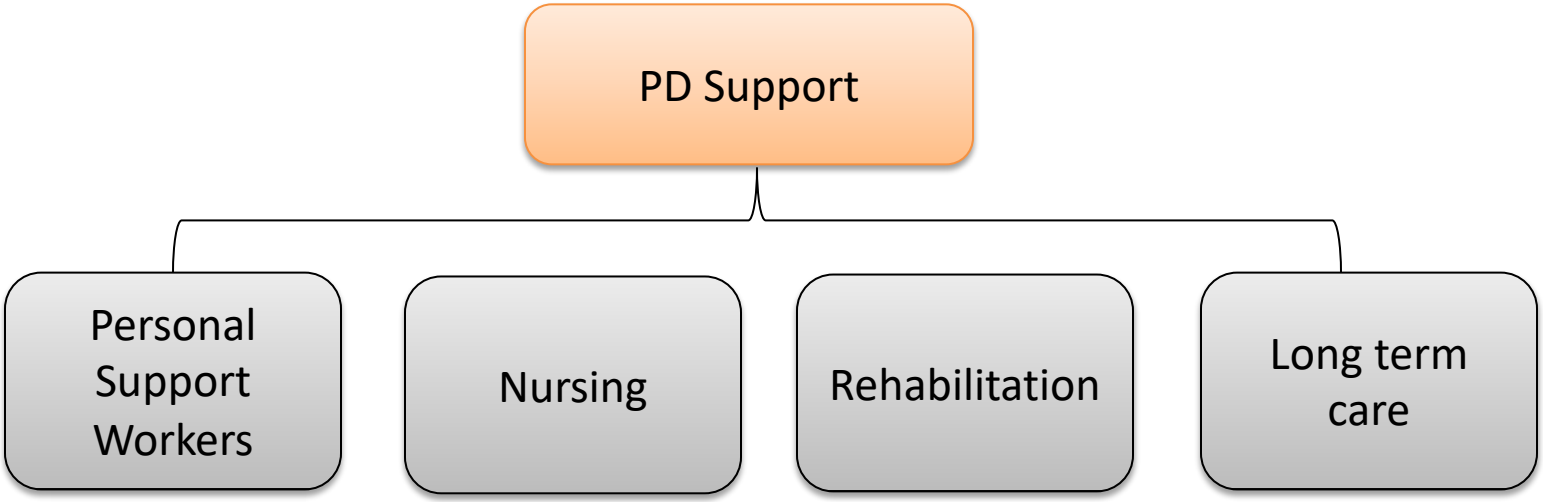
Other Considerations
HHD choice - 1

Jun 30/20 ORN PD Census = 69

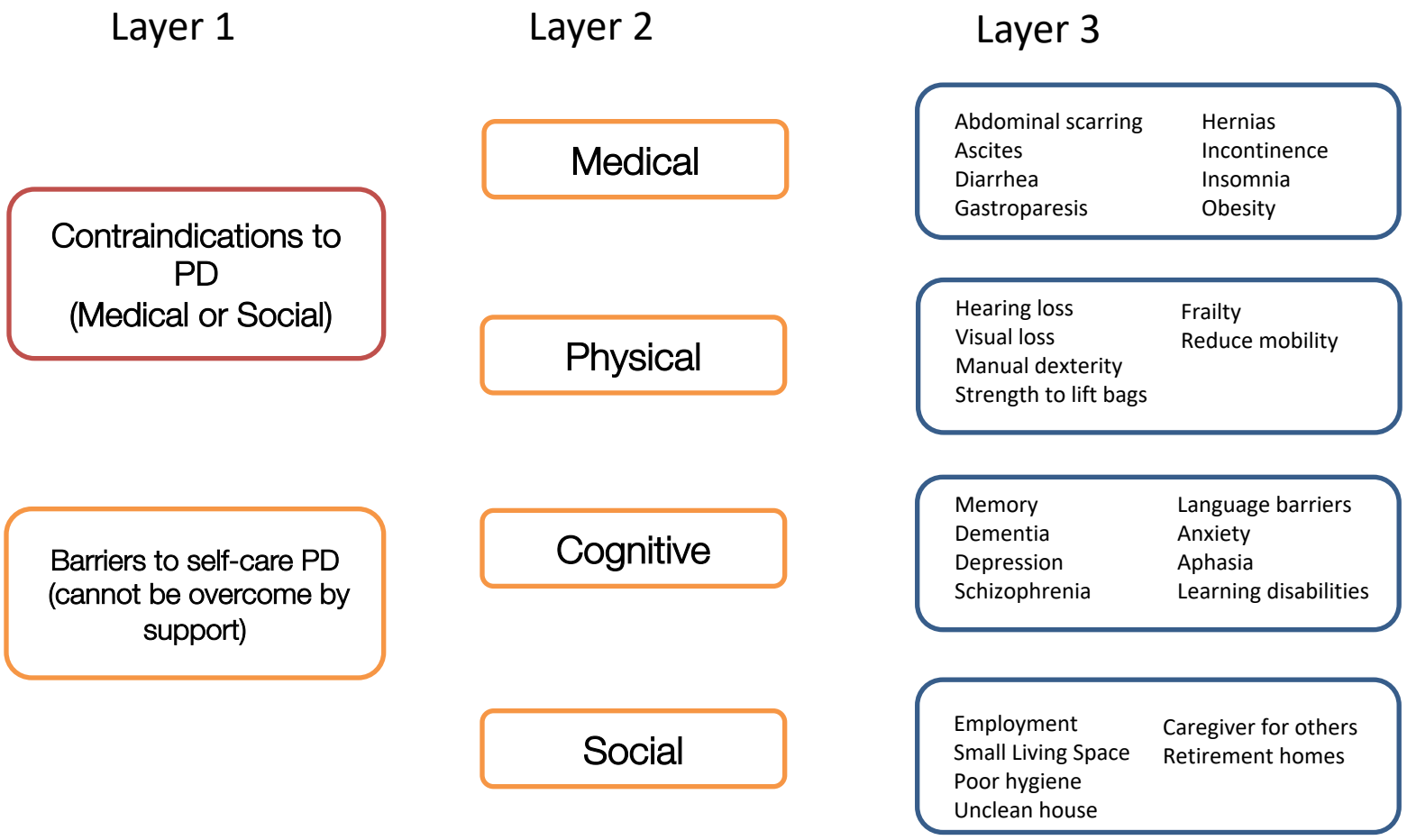
7. **Technique Failure – 3**(43%)
   - Peritonitis – 2(67%)
   - UF failure – 0 (0%)
   - Catheter dysfunction – 0(0%)
   - Leak – 0(0%)
   - Exit site infection – 0(0%)
   - Tunnel infection – 0(0%)
   - Failure to cope – 0(0%)
   - Other – 1(33%)
8. **Transplantation - 1** (14%)
9. **Death/Withdrawal - 2** (29%)
10. **Other loss – 1** (14%)

Losses Sum = 7

Bringing more support for PD

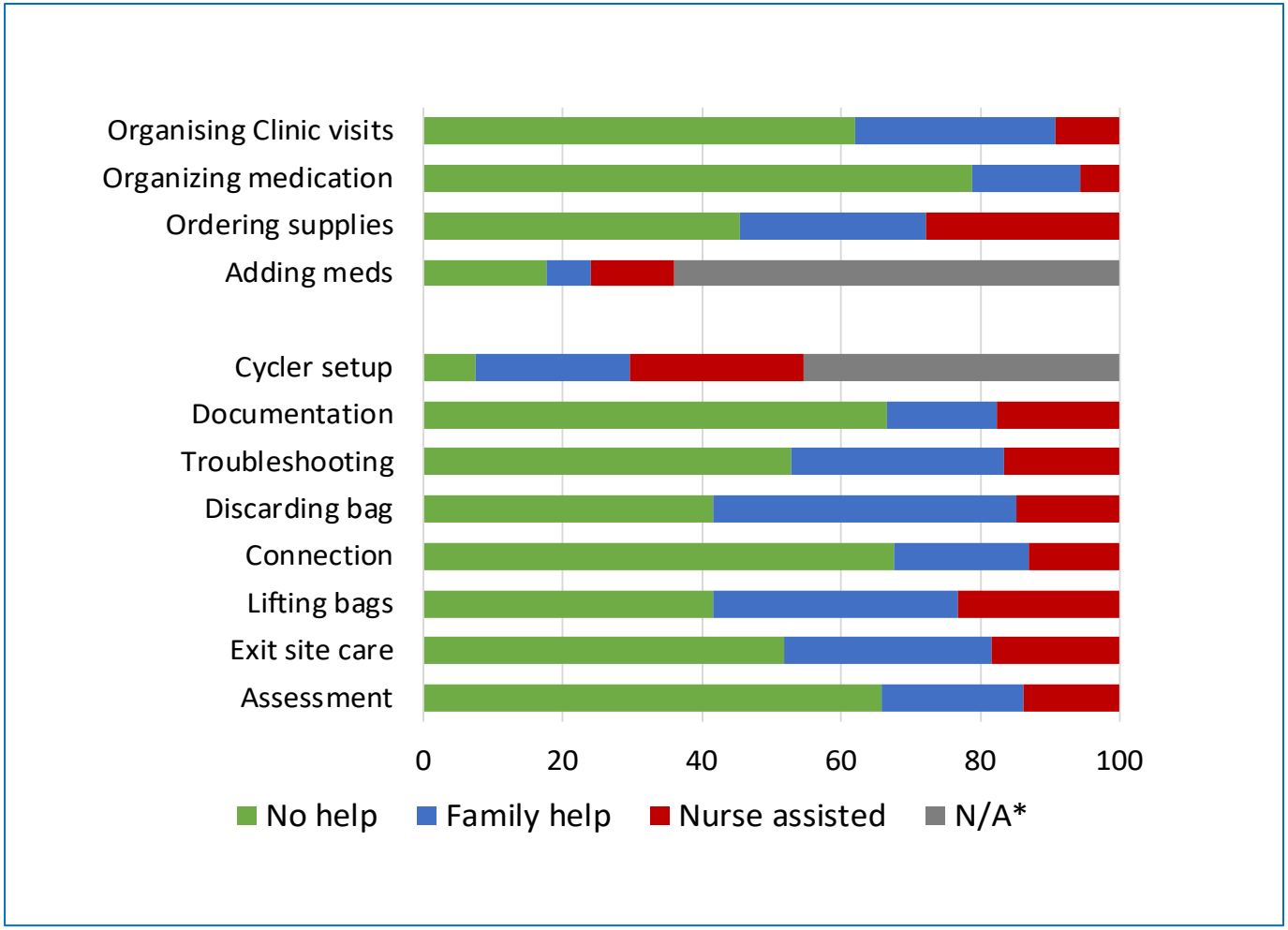


Barriers to self-care PD



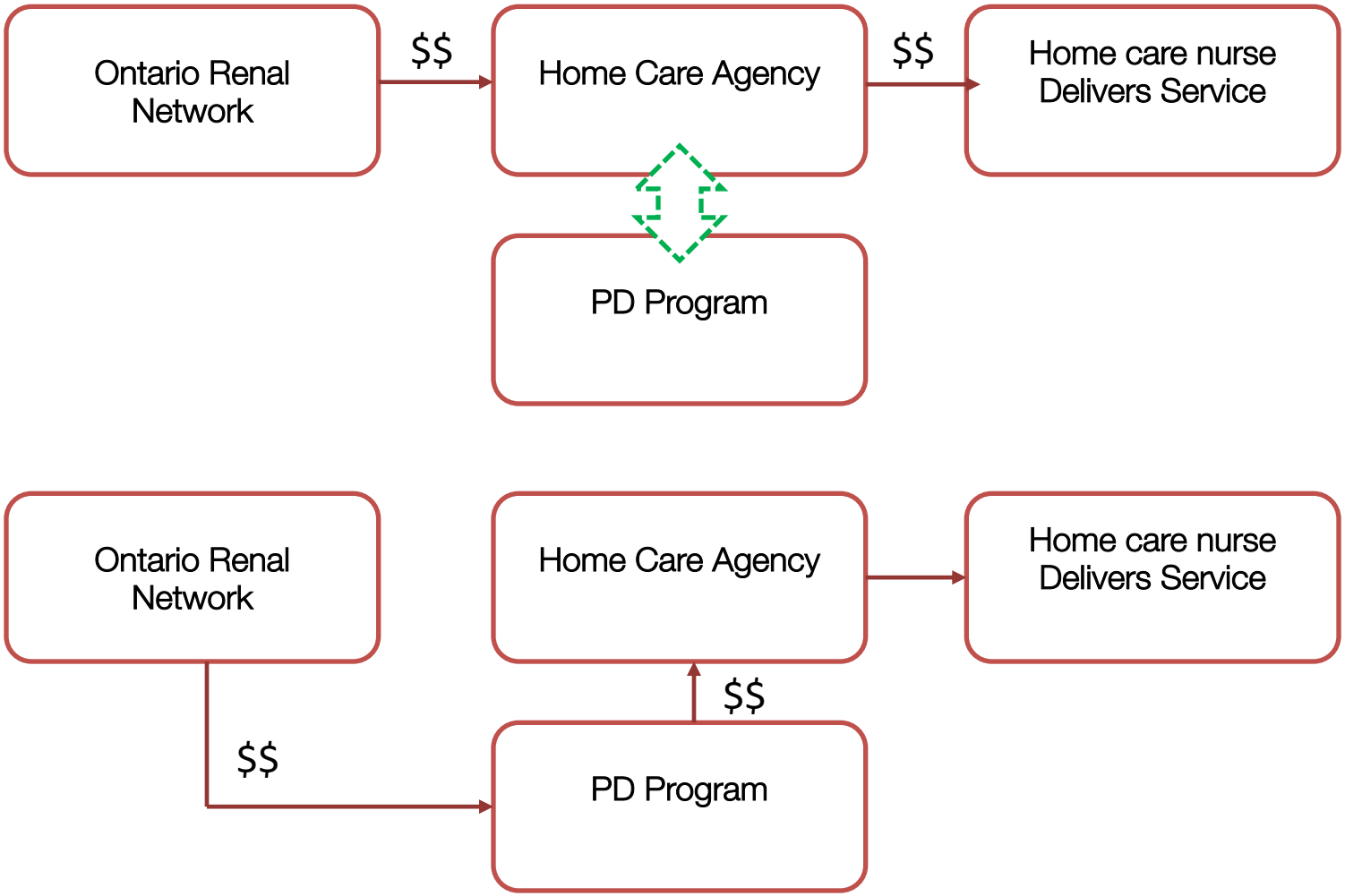
Blake PG, Quinn RR, Oliver MJ. Perit Dial Int. 2013 May-Jun;33(3):233-41.

PD tasks being assisted



Farragher JF, Oliver MJ et al. *Perit.Dial.Int. 39 (4):375-381, 2019.*

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

Sharma et al. Blood Purif 2019; 48:138-141

Machine Learning / AI

	N	Not Eligible for PD (%)	Eligible for PD (%)
Disc. character.			
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)
Predialysis care			
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)
Comorbidity			
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)
Numer. Character.	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	**82.35**%	0.465	0.894
K-Means	275	86	46	205	**58.98**%	0.407	0.687

Zhou P, Quinn RR, Oliver MJ. **IEEE International Conference on Bioinformatics & Biomedicine December 16-19, 2020**

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

Brown EA. Peritoneal Dialysis International 2020, Vol. 40(3) 244–253

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