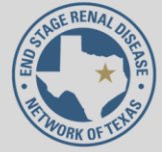


# AREP Home Dialysis Workshop



KIDNEY COLLABORATIVE



Home Webinar Series:  
**Urgent Start Peritoneal Dialysis**

2/23/21

# Who is the ESRD Network of Texas

Network 14 is a non-profit organization incorporated in Texas and provides services on behalf of the Centers for Medicare & Medicaid Services (CMS) to kidney patients and their providers since 1977.

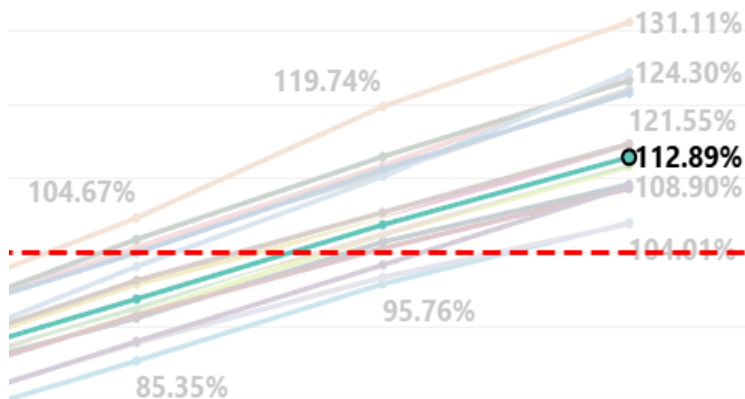
## Our Mission

To support equitable patient- and family-centered quality dialysis and kidney transplant health care through the provision of patient services, education, quality improvement, and information management.

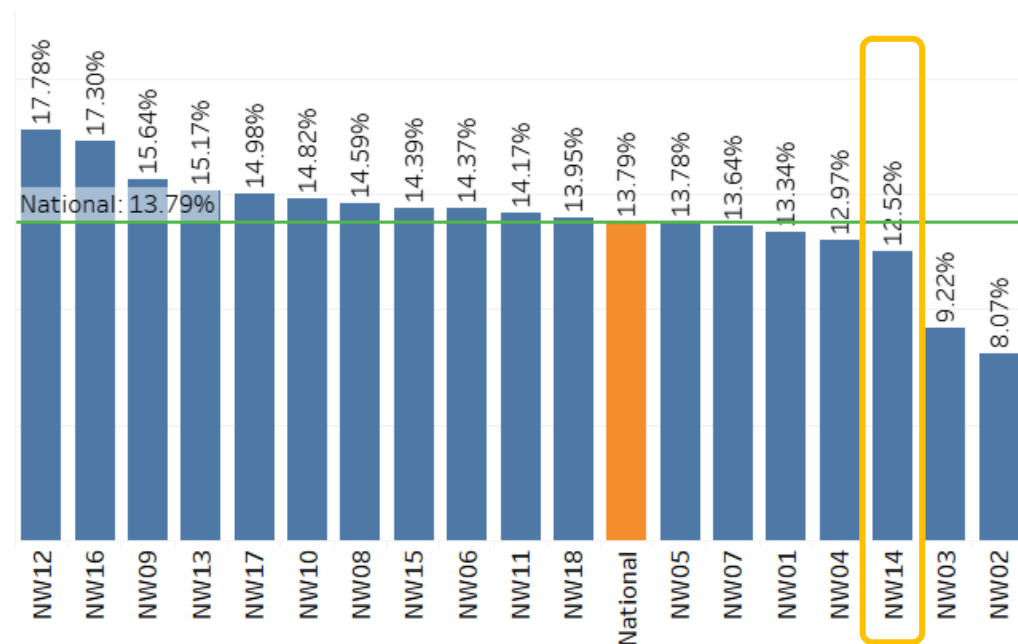
# Network's Home Dialysis Rate

## 2020 Modalities QIA:

- Jan – October 2020
- Included 156 facilities
- Added **3,277** home patients



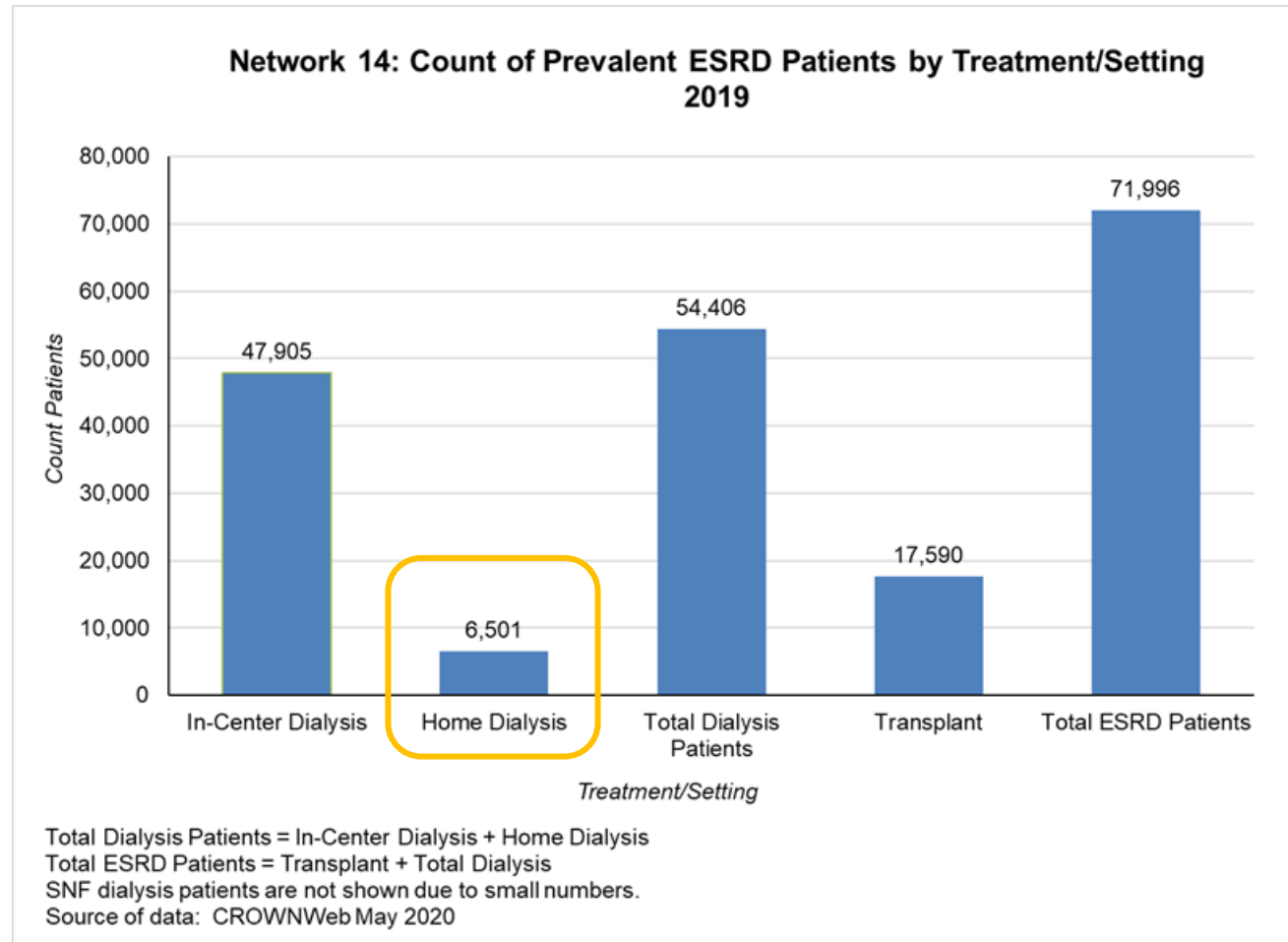
## PERCENT IN HOME THERAPY



# Prevalent Patients by ESRD Setting

Only **12%** of dialysis patients in 2019 were in a **home modality**.

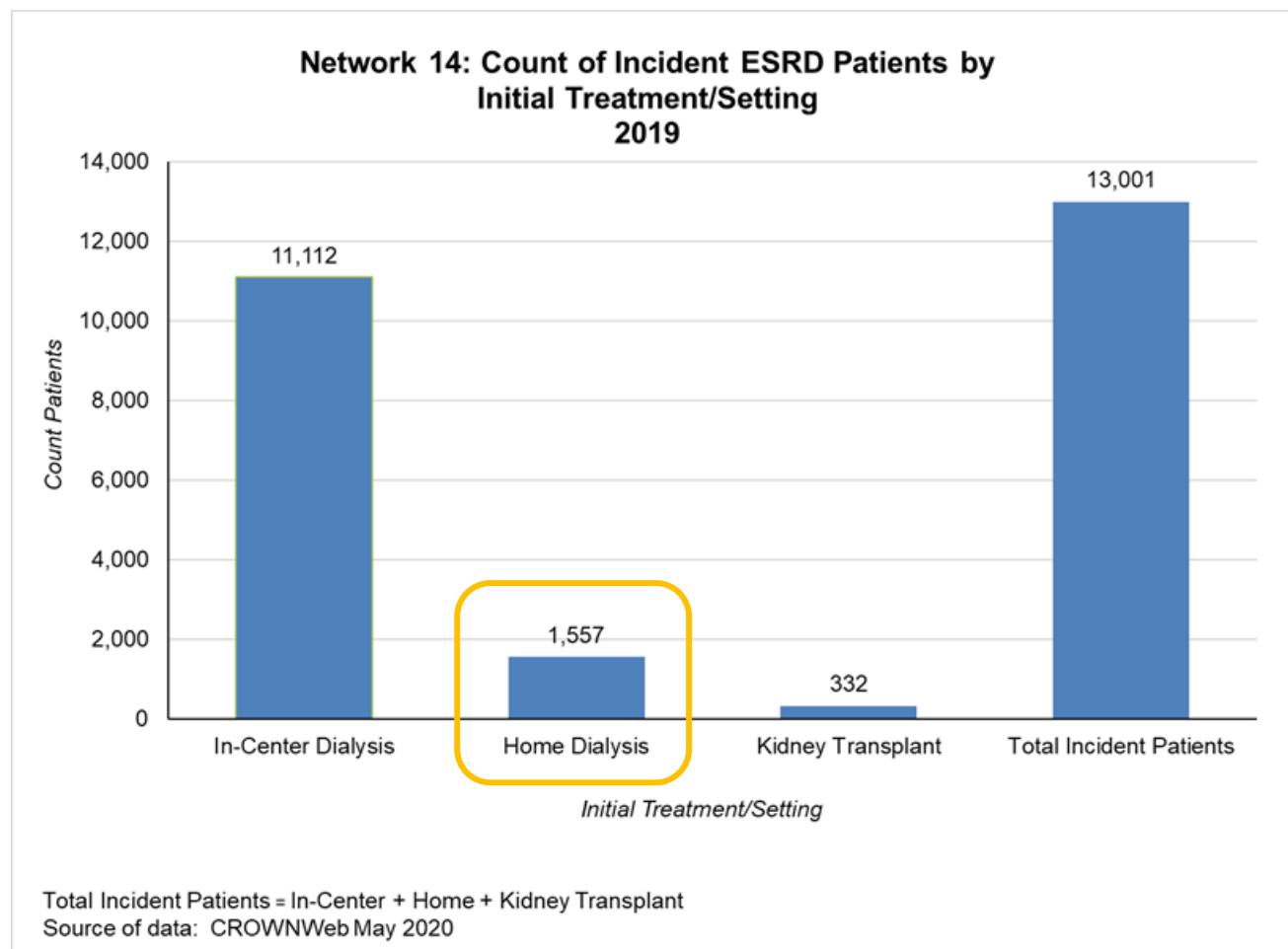
While **88%** of dialysis patients were **in-center**.



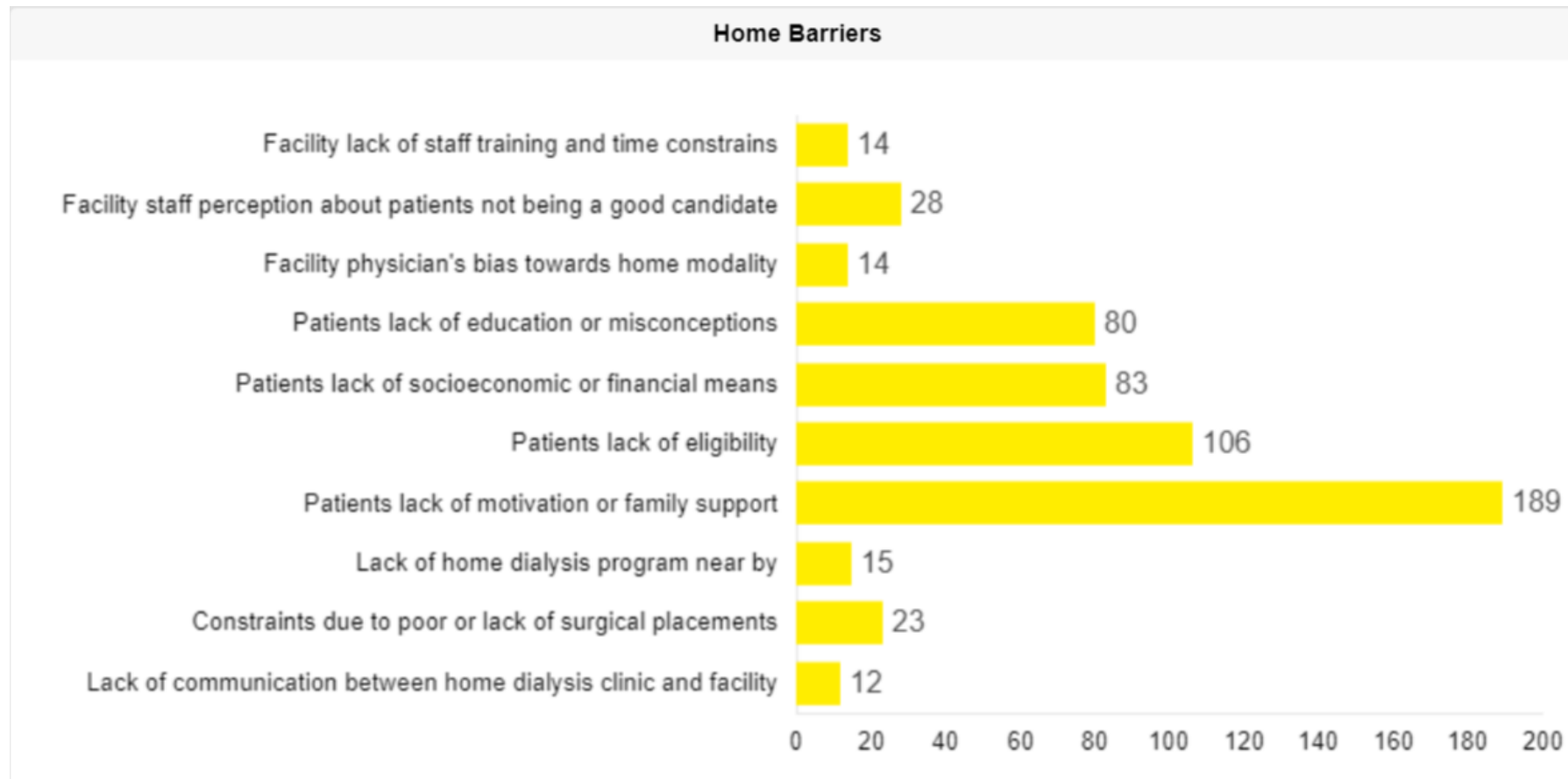
# Incident Patients by ESRD Setting

Only **11.97%** of incident patients in 2019 were initiated in a **home modality**.

While **85.47%** of patients were initiated **in-center**.

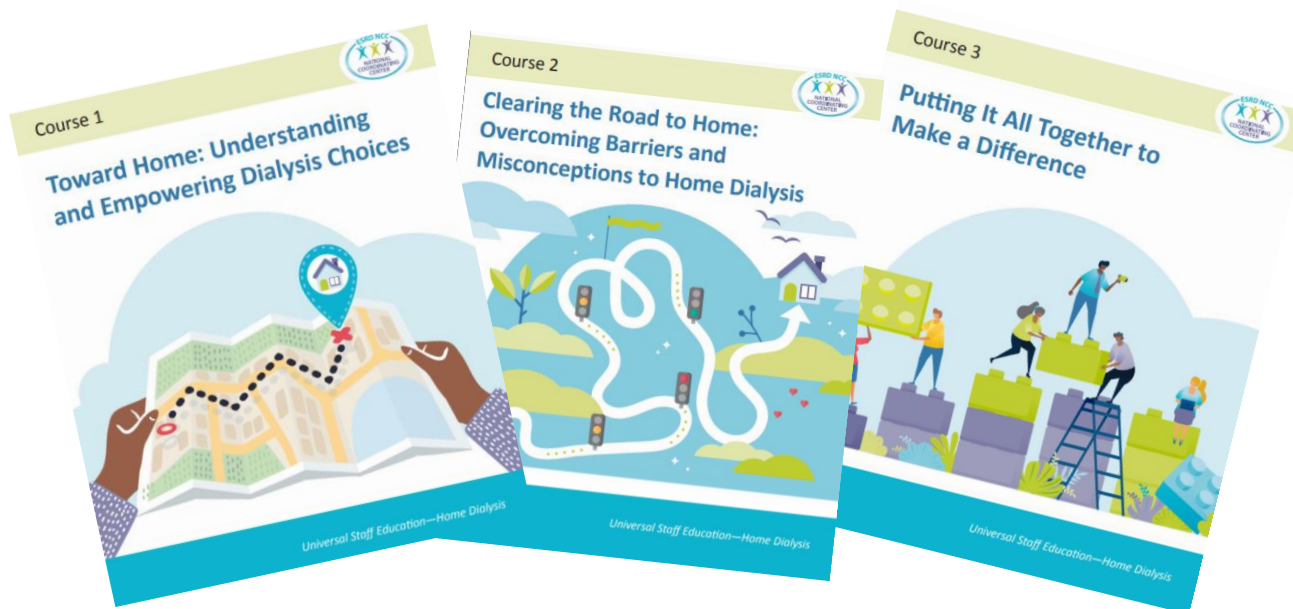


# What is the Main Barrier?



# Home Change Package

- NCC's Universal Staff Education
- Network's Home Dialysis Coalition
- Home Hero Interactive Events



A **Home Dialysis Hero** is a home dialysis patient who performs dialysis treatments at home and can offer guidance & emotional support to others.

Join the Home Dialysis Hero Interactive Event with the **ESRD Network of Texas** & the **Patient Advisory Committee (PAC)** as the PAC members and Dr. Christie Gooden, a transplant surgeon discuss Home & Peritoneal Dialysis, and answer questions you might have. We want to hear from you. See you then!

**Home Dialysis Hero Interactive Event**

*Learning More About Home & Peritoneal Dialysis*

**February 11, 2021**

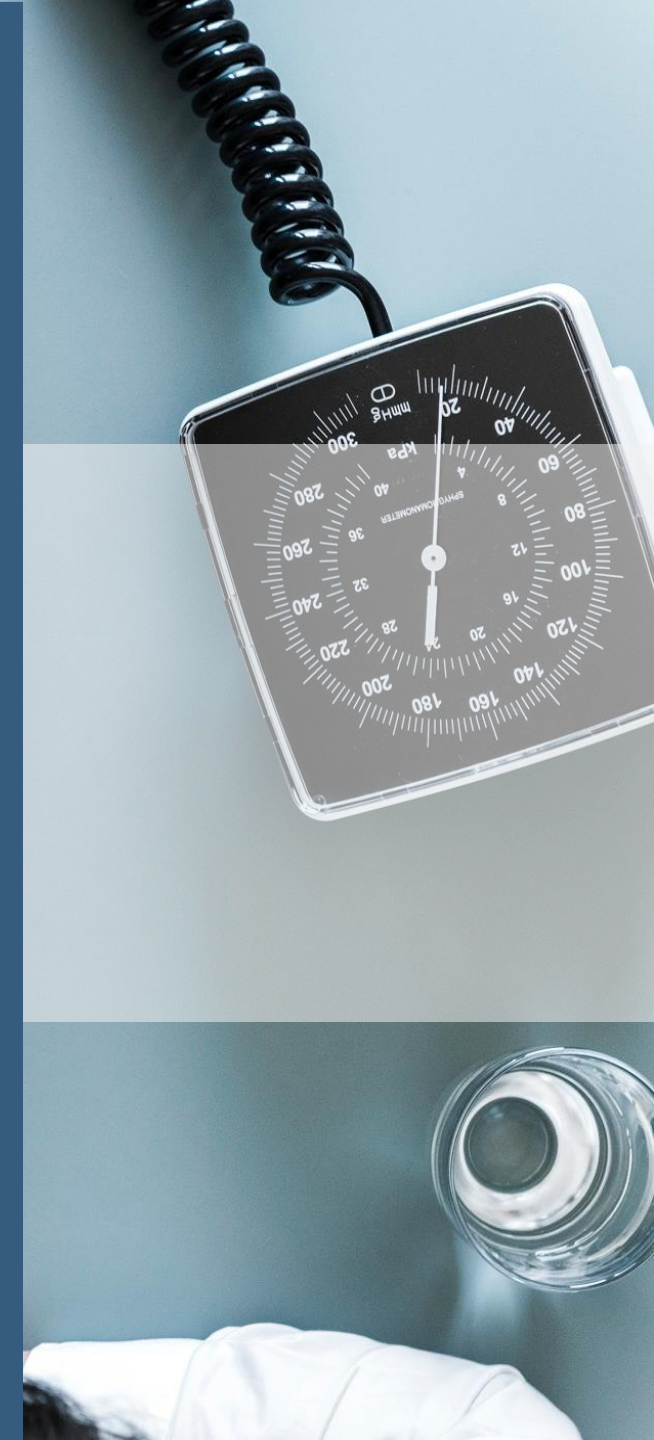
**3:00 PM CST**

[Click HERE to Register](#)

Scan the QR Code with your smart phone to register

**SCAN ME**

Created under CMS contract number: HHSM-500-2016-0014C  
To file a grievance please contact ESRD Network of Texas (Network 14) at 1-877-866-4435 or  
ESRD Network of Texas, Inc. 4099 McEwen Rd, Ste. 820 Dallas, TX 75244. Office: 872-5003-3215, fax: 972-503-3219,  
email: nw14info@allianthealth.org, website: www.esrdnetwork.org/



**Contact Us:**  
**Maryam Alabood 469-916-3803**

**Visit: [www.esrdnetwork.org](http://www.esrdnetwork.org)**

 **ALLIANT**  
QUALITY



KIDNEY COLLABORATIVE



# WELCOME

## Home Dialysis Workshop Webinar Series

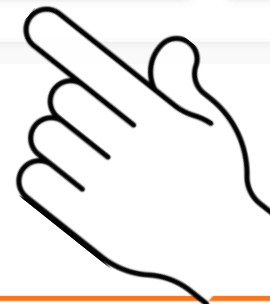
### Urgent Start PD

Tuesday, February 23, 2021





[www.advancedrenaleducation.com](http://www.advancedrenaleducation.com)



Welcome and Instructions

PD Calculator

← Prev

Clear Values →

### 1. Patient Data

Age

Gender

Please Select ▼

Height

☒ cm ☐ in

Weight

☒ kg ☐ lb

Transport Status ⓘ

Please Select ▼

Residual Renal Function ⓘ

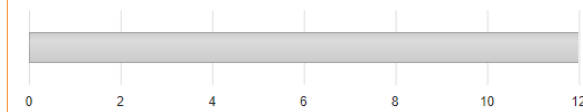
☒ Krenat/V ☐ mL/min

### 2. Estimated Prescription Data

Max. Fill Volume (L) ⓘ

Min. Number Of Exchanges (per day) ⓘ

Peak Time UF with 1.5% Glucose (hrs) ⓘ



Min. Total Daily Volume (L) ⓘ

BSA: --

Urea Distribution Volume: --

Renal Weekly Kt/V: --

### 3. Physician Modeling

Desired Fill Volume (L)

Desired Number Of Exchanges (per day)

Desired Time Per Exchange

Please Select ▼



--  
total volume



--  
total time

Est. Total Weekly Kt/V ⓘ



Modality Input ⓘ

☒ Simple ☐ Day/Night

1 Welcome

2 HHD Calculator

← Prev

Clear Values ↻

### 1. Patient Parameters

Age

Gender

Please Select ▼

Height

☒ cm

☐ in

Weight

☒ kg

☐ lb

Residual Renal Function (ml/min) ⓘ

Body Water Volume Calculator ⓘ

Watson-based ▼

Body Water Volume (L)

### 2. Prescription

Treatment Frequency (per week) ⓘ

3



3

7

Treatment Duration (hrs) ⓘ

1.5



1.5

8

Dialysate Volume (L) ⓘ

25 ▼

This tool calculates expected clearances for dialysate flow rates up to 300 ml/min. [More ...](#)  
Dialysate Flow Rate (ml/min) 277

Blood Flow Rate (ml/min)

Ultrafiltration Volume per Treatment (L) ⓘ

0

### 3. Result

spKt/V ⓘ

Weekly stdKt/V ⓘ



Patient Normalized UFR (ml/kg/hr) ⓘ

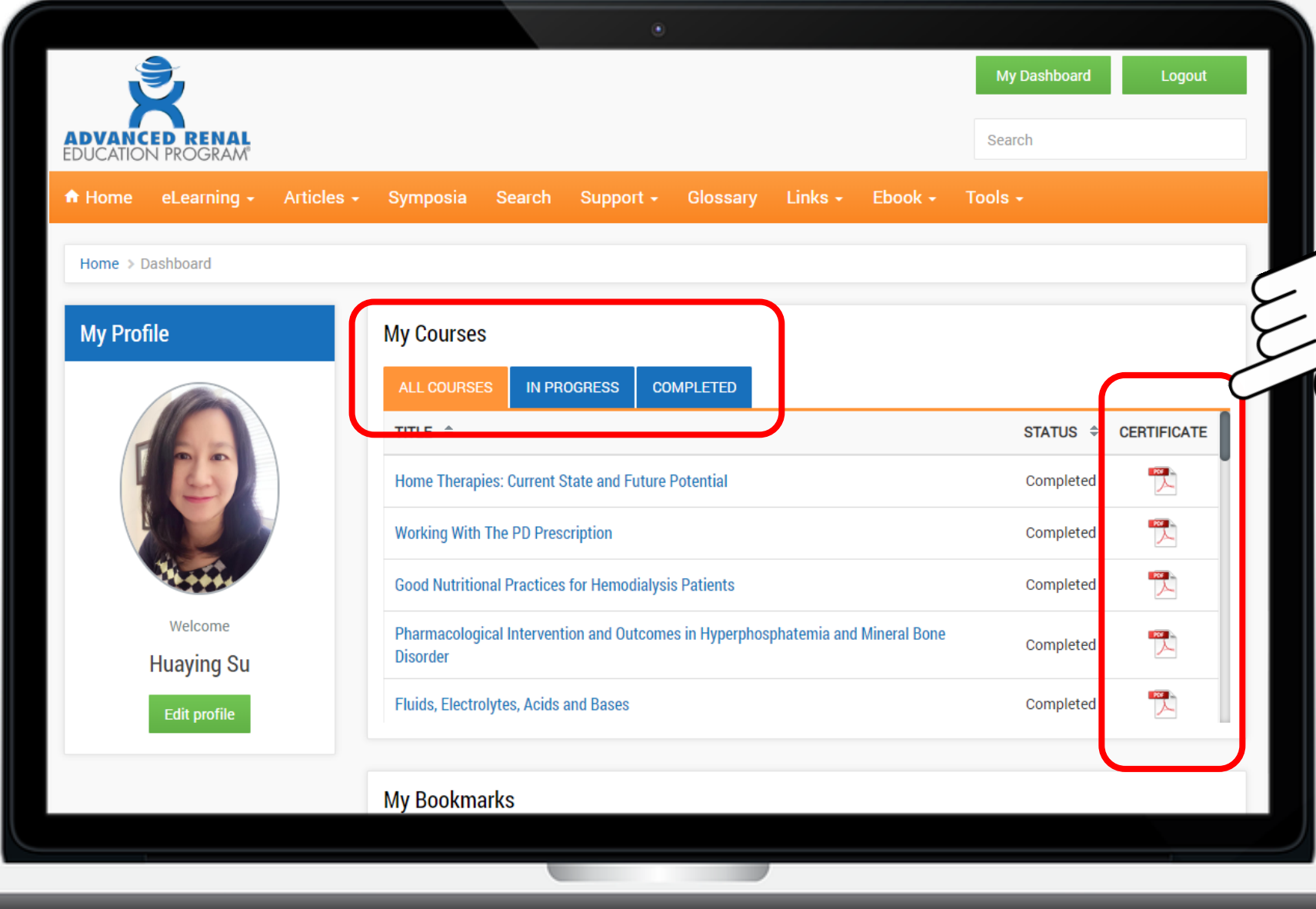


Weekly Treatment Duration (hrs) ⓘ

Dialysate Flow Rate (L/hr)

Ultrafiltration Rate (L/hr) ⓘ

Fluid Efficiency ⓘ



**ADVANCED RENAL**  
EDUCATION PROGRAM


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**Huaying Su**  
[Edit profile](#)

### My Courses

ALL COURSES IN PROGRESS COMPLETED

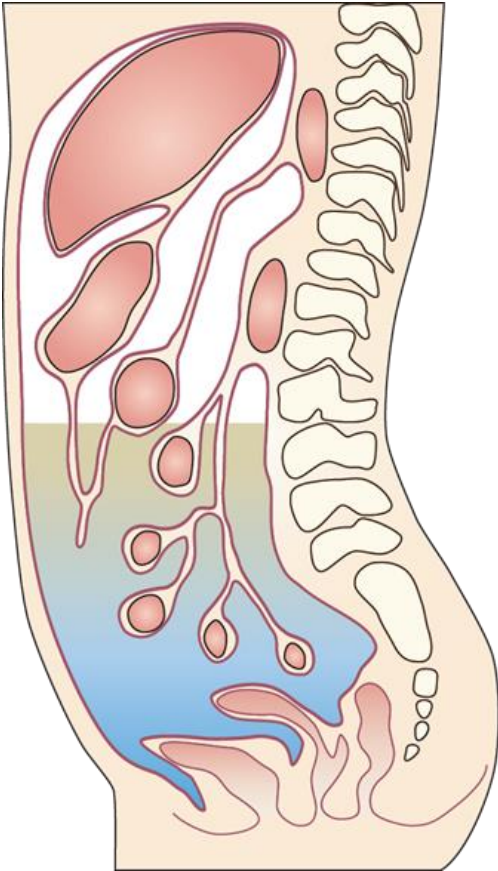
TITLE	STATUS	CERTIFICATE
Home Therapies: Current State and Future Potential	Completed	
Working With The PD Prescription	Completed	
Good Nutritional Practices for Hemodialysis Patients	Completed	
Pharmacological Intervention and Outcomes in Hyperphosphatemia and Mineral Bone Disorder	Completed	
Fluids, Electrolytes, Acids and Bases	Completed	

### My Bookmarks



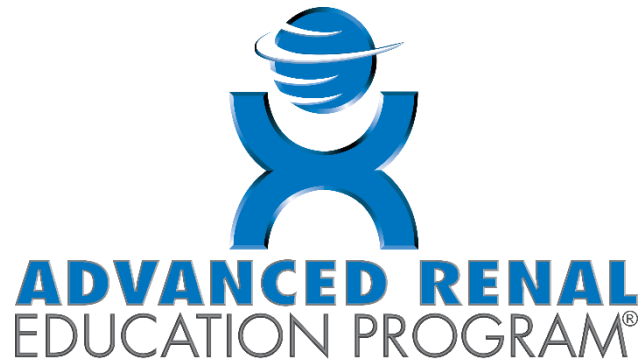
# Dr. Anjali Saxena

Director of Peritoneal Dialysis,  
Santa Clara Valley Medical Center, San Jose, CA  
Clinical Associate Professor of Medicine,  
Stanford University, Stanford, CA



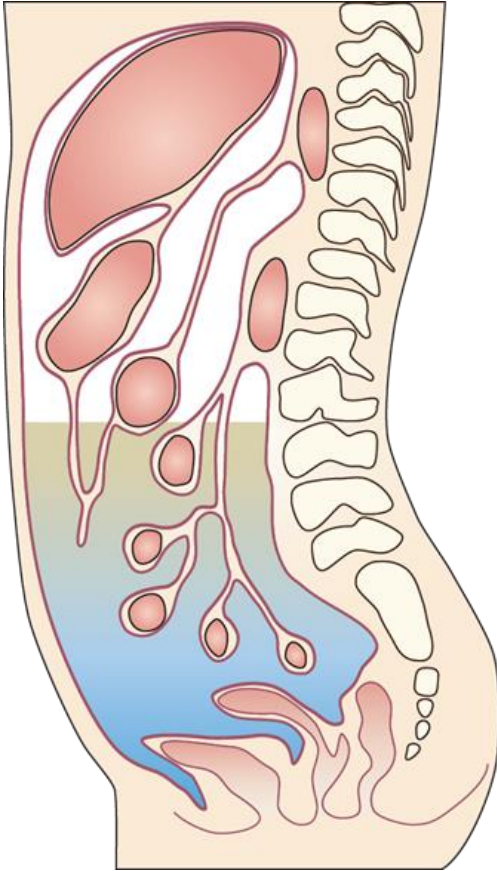
# Urgent Start Peritoneal Dialysis

# Course Disclosure



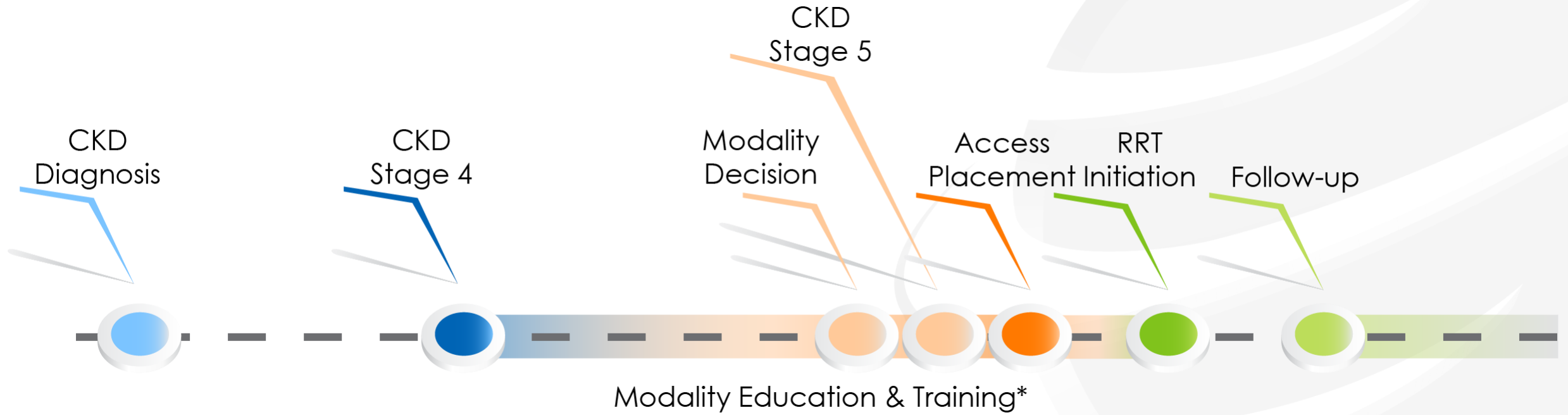
- This educational program has been developed by the Medical Information and Communication Office of the Fresenius Medical Care Renal Therapies Group.
- It is intended to provide pertinent data to assist health care professionals in forming their own conclusions and making decisions.
- It is not intended to replace the judgment or experience of the attending physician or other medical professional.
- The treatment prescription is the sole responsibility of the attending physician.
- The presenter is AREP faculty under contract with the Fresenius Medical Care Renal Therapies Group.

# Course Objectives



- ✓ Describe history of dialysis initiation and define urgent start PD
- ✓ Understand the outcomes, potential benefits, and risks associated with urgent start PD
- ✓ Review logistic and prescriptions considerations of urgent start PD
- ✓ Examine the use of PD for acute kidney injury

# Ideal Dialysis Initiation



\* Training if home modality is chosen

# Unplanned Dialysis Initiation

40 – 60% of patients have a “suboptimal” dialysis start

Acute illness  
Late referral  
Rapid eGFR decline  
No permanent access

## Suboptimal initiation:

- In-hospital dialysis initiation
- Initiation with a CVC
- Not initiating with chosen modality

Urgent-Start  
HD

Transfer to  
In-Center

Follow-up



# Pre-ESRD Care Does Not Prevent Suboptimal Initiation

Study 1: Nephrology Care

>12 months

56% Suboptimal Initiation<sup>1</sup>

- Patient-related delays
- Acute-onset CKD
- Surgical delays
- Late decision making by nephrologist

Study 2: Nephrology Care

> 4 months

45% Suboptimal Initiation<sup>2</sup>

- Lack of referral or time waiting for access creation
- Rapid decline of RRF
- Missed or cancelled appointments

<sup>1</sup>Hughes SA, et al. Nephrol Dial Transplant. 2013;28(2):392-397

<sup>2</sup>Buck J, et al. Nephrol Dial Transplant. 2007;22(11):3240-3245

# Another Option for Dialysis Initiation

Peritoneal dialysis is possible in both planned or unplanned, and urgent or non-urgent start situations

Need  
for RRT

Modality  
Decision

PD Catheter  
Placement

PD  
Initiation

PD  
Training

Home PD  
Initiation

Follow-up

In-Hospital  
Modality Education

# Urgent Start vs. Early Start vs. Acute

## Urgent Start PD<sup>1</sup>

- Option for patients with advanced CKD who urgently and unexpectedly need dialysis are treated with PD
- Catheters are used within 48-72 hours of placement

## Early Start PD<sup>1</sup>

- More elective variant
- PD is initiated 3-14 days after catheter insertion

## Acute PD<sup>2</sup>

- Renal replacement therapy for patients with AKI
- Generally, temporary until renal function resumes

<sup>1</sup>Blake PG, Jain AK. Clin J Am Soc Nephrol. 2018;13(8):1278-1279

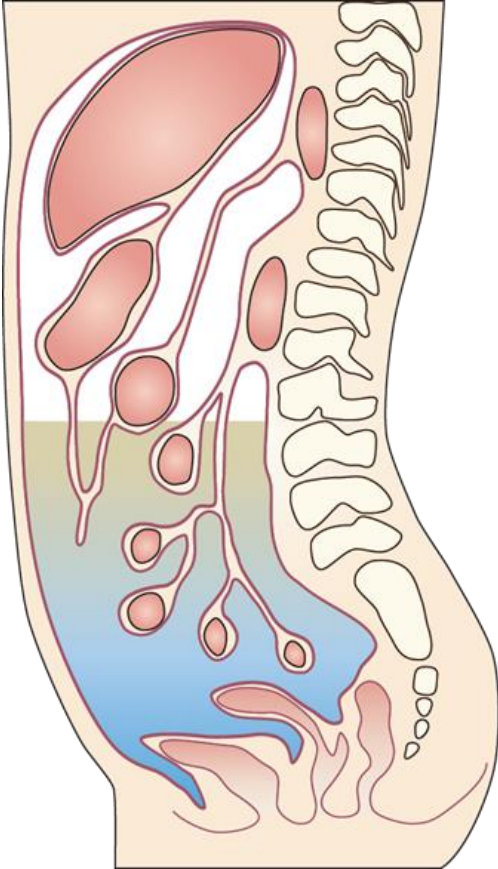
<sup>2</sup>Cullis B, et al. Perit Dial Int. 2014;34:494-517

# Polling Question

Which of the following have you experienced in your practice?

(select all that apply)

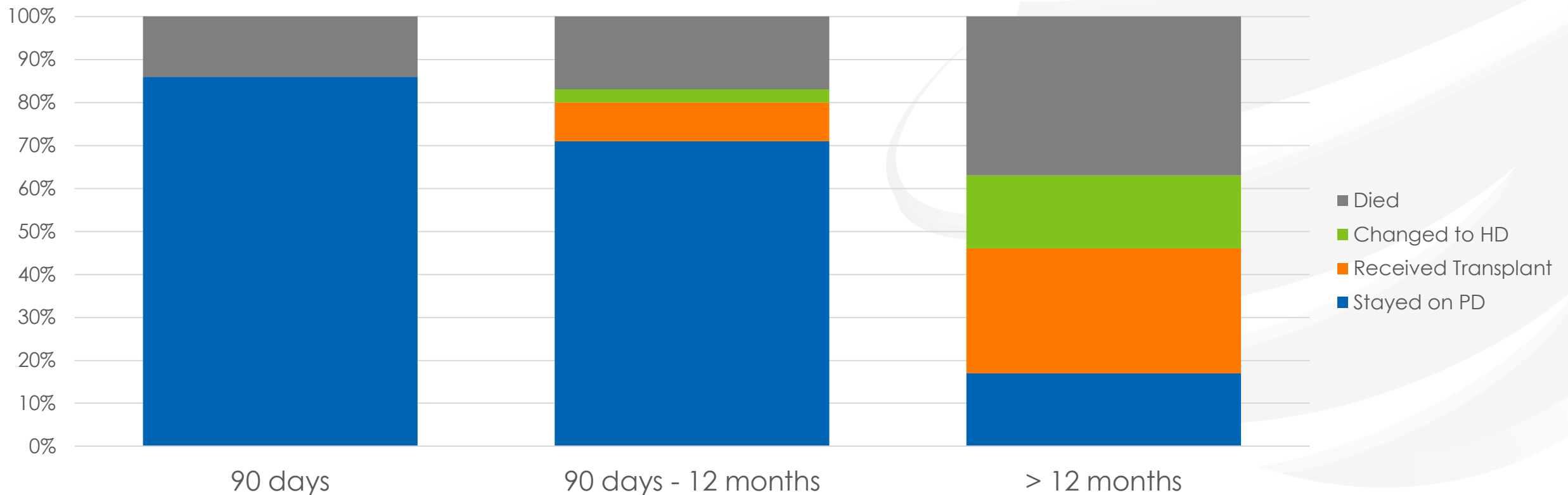
- A. Planned Start PD
- B. Urgent Start PD
- C. Early Start PD
- D. Acute PD



# Outcomes, Potential Benefits, and Risks with Urgent Start PD

# Patient Disposition After Urgent Start PD

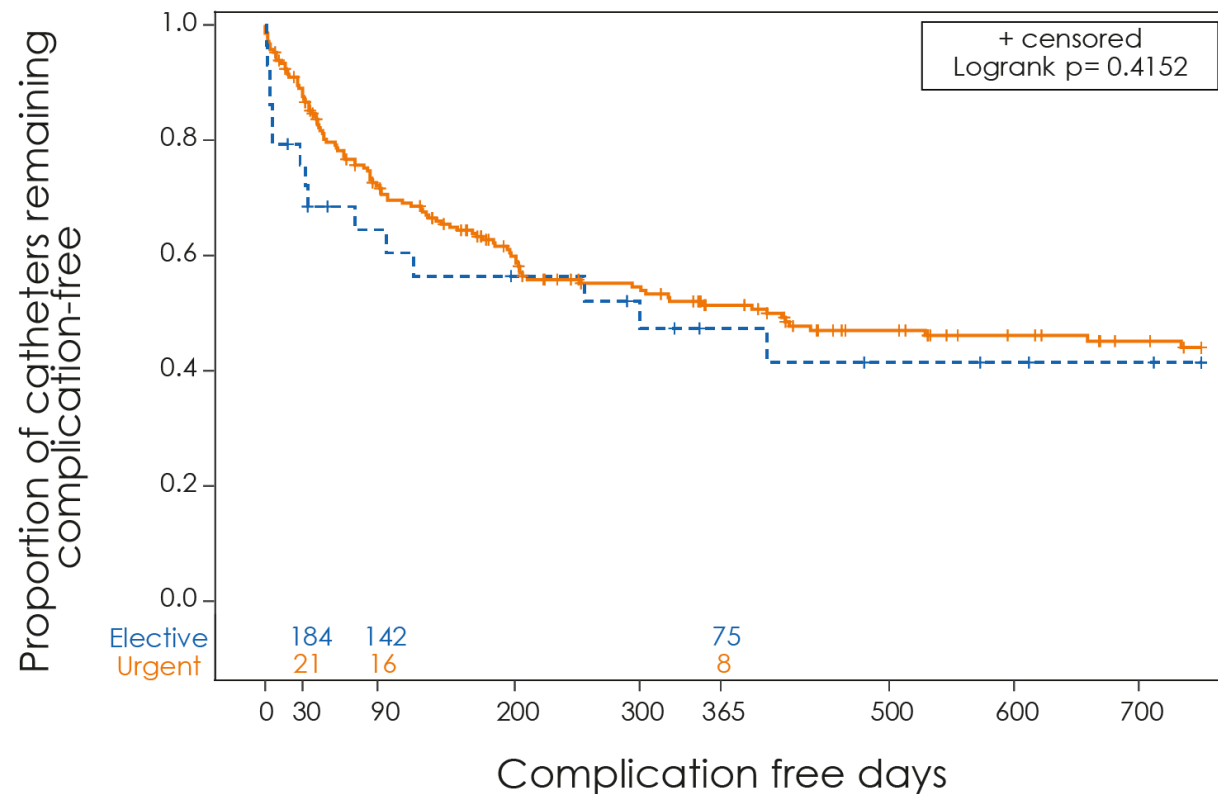
Patients who initiate dialysis with urgent start PD\*  
tend to stay on PD in the first year



\*Mean time between catheter insertion and PD initiation was  $3.5 \pm 2.3$  days, range 0 - 8 days, n=35.

# Complication Rates with Urgent Start PD

Except for catheter leaks, urgent start\* and elective start PD have similar rates of catheter complications



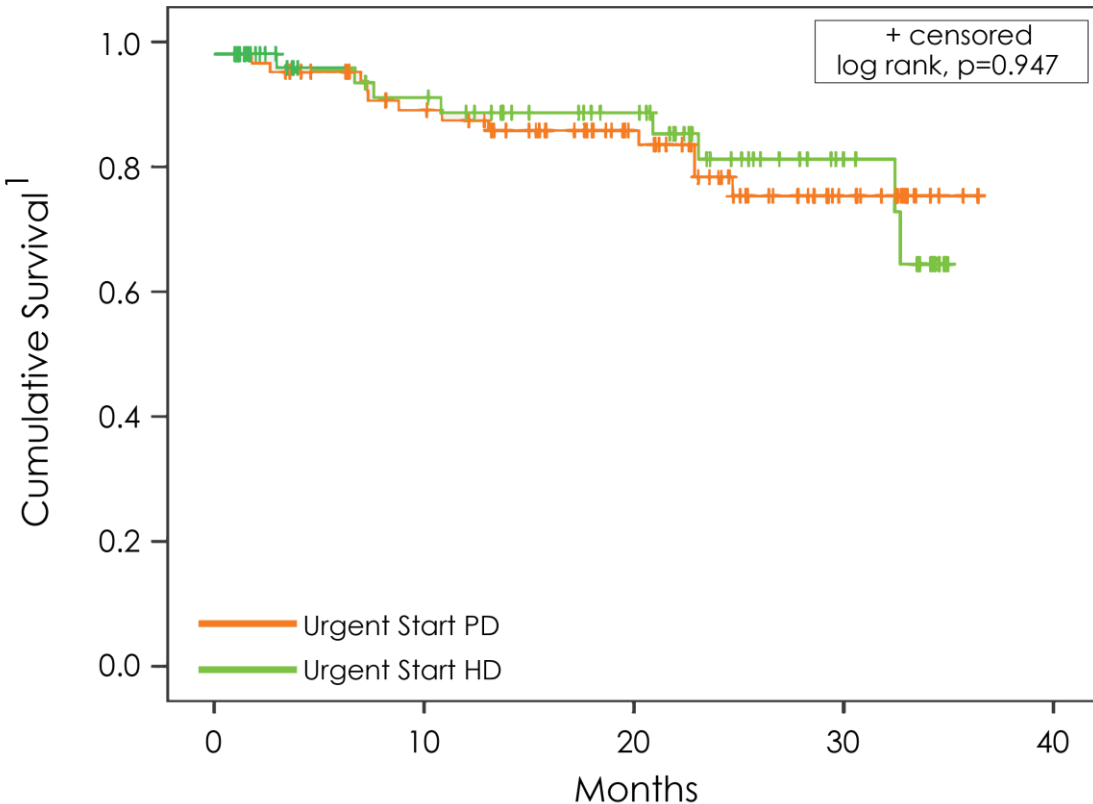
## Catheter Complications in Urgent Start and Elective Start PD

	Elective (%)	Urgent (%)	p value
Exit site infection	5.2	3.5	0.683
Peritonitis	15.1	27.6	0.092
Catheter malfunction	28.4	17.2	0.203
<b>Cather leak</b>	<b>3.3</b>	<b>13.8</b>	<b>0.011</b>
Primary leak	1	3.5	0.256
Hernia	4.3	10.3	0.159
Hematoma or bleeding	2.8	0	0.358
Bowel perforation	0.5	0	0.710

\* In the urgent start group, dialysis was started within 48 hrs of catheter placement.

# Urgent Start PD vs Hemodialysis

Survival and outcomes are comparable  
for urgent start PD and urgent start HD



## Outcomes with Urgent Start PD and Urgent Start HD<sup>2</sup>

	PD (%)	HD (%)	p Value
Infection	35.4	44.0	0.10
Mechanical complication	24.7	37.4	0.06
Readmission within 30 days of discharge	35.4	44.0	0.10
Death	19.9	29.6	0.10

<sup>1</sup>Jin H, et al. *PLoS One*. 2016;11(11):e0166181.

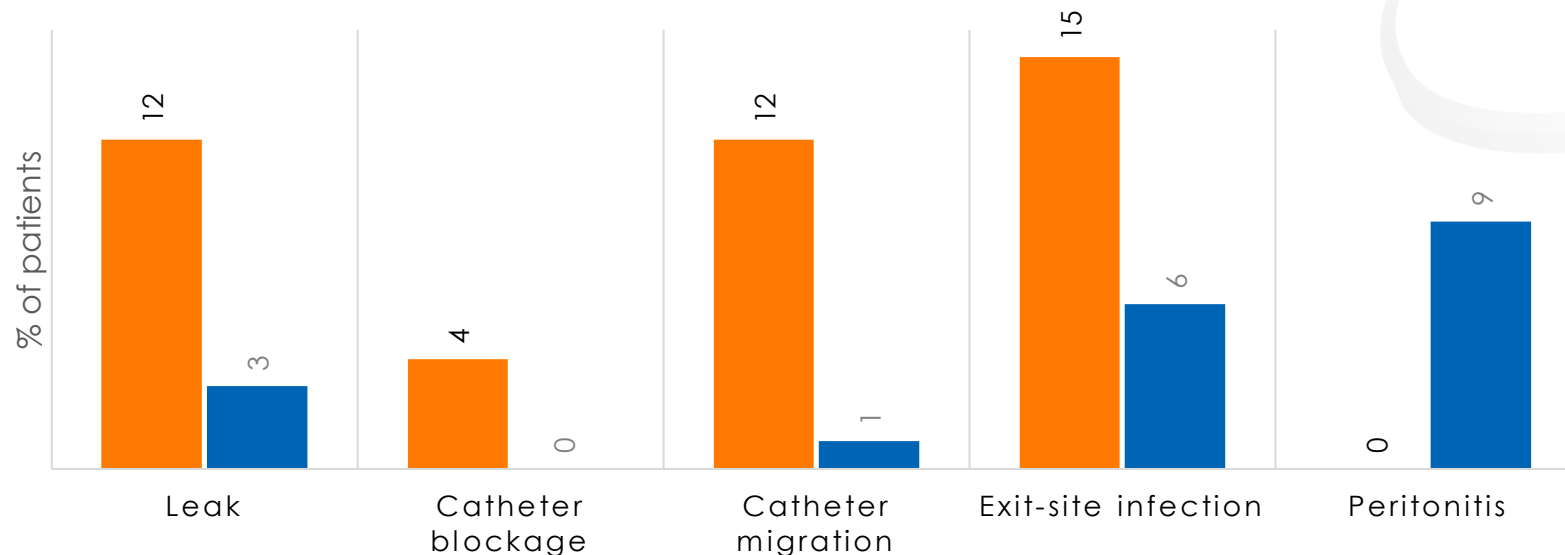
<sup>2</sup>Dias DB, et al. *Perit Dial Int*. 2020.

# Risks with Urgent Start PD

Urgent start PD is associated with an increased risk for catheter complications, mostly catheter migration and leaks, compared to planned start PD

## Complications Within 4 Weeks of PD Commencement<sup>1</sup>

■ Urgent Start\* ■ Planned Start



Risk of leaks can be mitigated with low volume, supine, intermittent exchanges<sup>2</sup>

\*Median time between catheter insertion and PD initiation was 4 days, range 1 - 7 days

<sup>1</sup>See EJ, et al. *Perit Dial Int*. December 2016.

<sup>2</sup>Ghaffari A. UpToDate; 2019:Topic 95328, Version 11.0.

# Why Utilize Urgent Start PD?

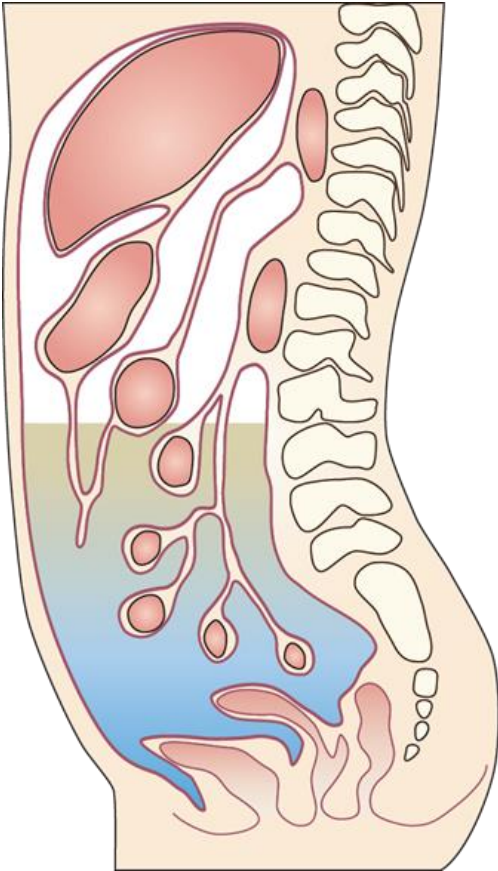
Avoid the need for two access types in patients who wish to eventually do PD

Avoids use of CVC and unnecessary HD exposure

Can be a safe and effective option for renal replacement therapy

Increases PD utilization

Possible preservation of residual renal function



# Logistic Considerations for Urgent Start PD

# Logistic Considerations for Urgent Start PD

Infrastructure and protocols to support:

Identifying appropriate candidates

Patient education

PD catheter placement

Trained nursing staff & Available equipment

PD Prescription

# Identifying Candidates

Identifying  
Candidates

Patient  
Education

PD Catheter  
Placement

Staff and  
Equipment

PD  
Prescription



- Patients who require urgent, but not emergent dialysis
- Could wait 24 – 48 hours before initiating



- Patients requiring emergent dialysis should initiate with hemodialysis.
- Particularly patients required immediate treatment for:
  - Critical illness
  - Volume overloaded
  - Hyperkalemia
  - Acidotic
  - Overdose

# Polling Question

Which of the following patients is a potential candidate for urgent start PD?  
(select one option)

- New patient
- Shortness of breath
- Hb 12.5, Cr 13.6, K 7.2

A

- Known CKD patient
- No SOB, normotensive
- Hb 11, Cr 6, GFR 10, K 4

B

- New patient, increasing fatigue over last 4 weeks
- Ankle edema
- Hb 10.9, Cr 8.4, K 5.8

C

- New patient
- Liver cirrhosis, history of social instability
- Active drug abuse confirmed
- Hb 9, Cr 7.2, K 4, Alb 2.4

D

SOB: shortness of breath

# Identifying Candidates

Survey to quickly evaluate possible candidates:

Identifying  
Candidates

Patient  
Education

PD Catheter  
Placement

Staff and  
Equipment

PD  
Prescription

## Work/Home

- Do you plan to work while on dialysis?
- Do you have a place you consider home?
- Do you have an accessible restroom for handwashing and effluent disposal?
- Do you have storage space?
- Can your home be kept clean?
- Do you have caregiver responsibilities?

## Medical/Surgical

- What medical problems do you have?
- Do you suffer from any psychiatric disorders or memory problems?
- What abdominal surgeries have you had?
- Can you walk without the help of others?
- Can you lift 10-20 lb bag of fluid?
- Do you have any vision or hearing problems?

# Patient Education

Identifying  
Candidates

Patient  
Education

PD Catheter  
Placement

Staff and  
Equipment

PD  
Prescription

- Many urgent start patients have little to no knowledge of dialysis or therapy options
- In-hospital education should allow patients make an informed decision about their therapy choice

Provide support and empathy

Patient centered

Basic knowledge of kidney function

Therapy options available

Discuss benefits, risks, and challenges

Use of visual and written teaching aids

# Urgent Education Influences Modality Choice

Identifying  
Candidates

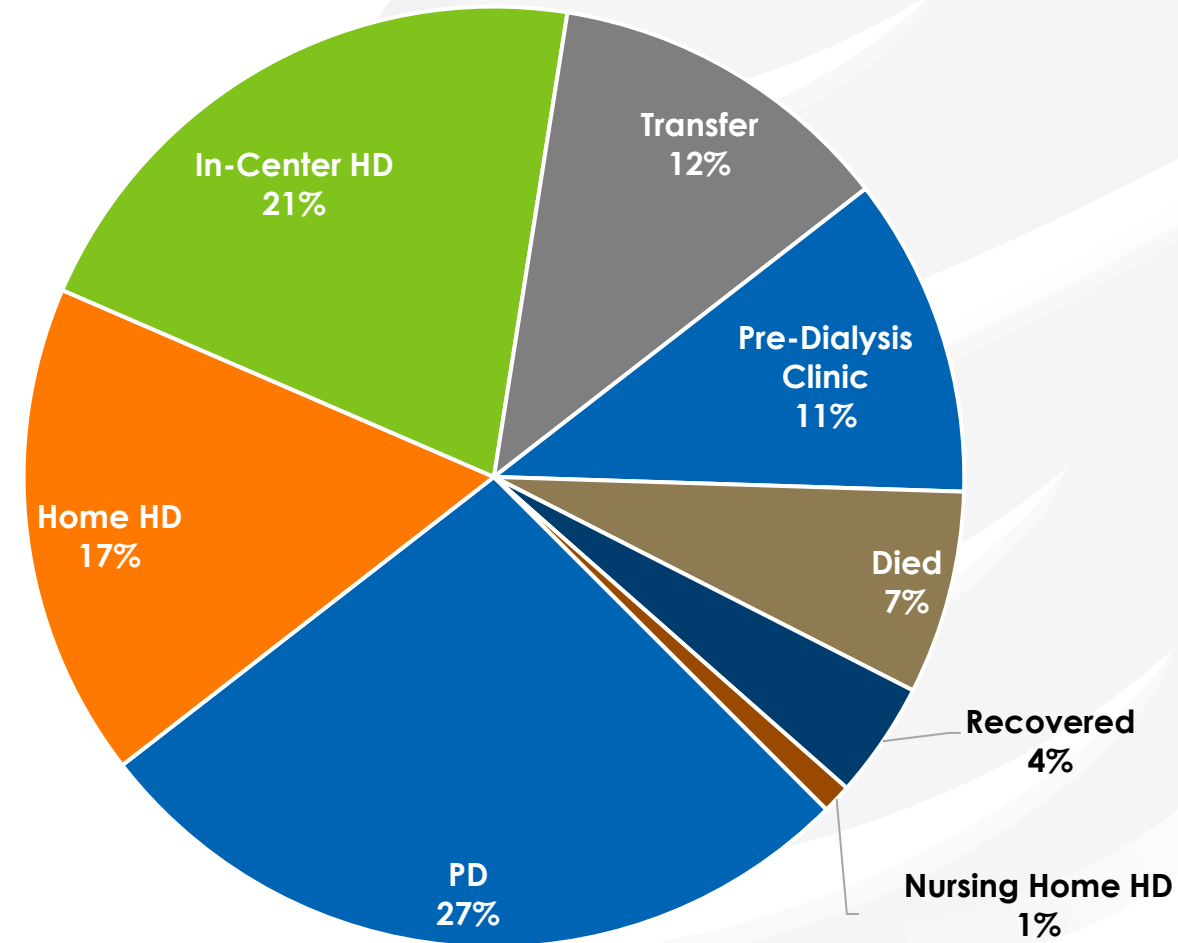
Patient  
Education

PD Catheter  
Placement

Staff and  
Equipment

PD  
Prescription

- In-hospital education programs for urgent starters are feasible and effective
- Following an in-hospital education program, most patients pursued a home dialysis option



# Polling Question

How are your PD catheters placed today?  
(choose all that apply)

- A. Open surgical insertion
- B. Percutaneous needle-guidewire
- C. Basic laparoscopy
- D. Laparoscopy with adjunctive procedures

# Urgent Start PD Catheter Placement

Identifying  
Candidates

A major limiting factors in urgent start PD is the availability of willing surgeons, nephrologists, or interventional radiologists to place PD catheters competently on short notice<sup>1</sup>

Patient  
Education

PD Catheter  
Placement

Staff and  
Equipment

PD  
Prescription

## Catheter Outcomes in Urgent Start PD<sup>2</sup>

	Surgical	Laparoscopic	Percutaneous
Total Patients	374	33	103
Catheter Leaks	9 (2.5%)	3 (9%)	8 (8%)
Catheter Migration	18 (5%)	2 (6%)	9 (9%)
Catheter Revision	11 (2%)	2 (6%)	9 (9%)

- Studies are limited, but placement technique in urgent start PD does not appear to influence catheter mechanical outcomes
- In planned start PD, laparoscopic placement with adjunctive procedures has been shown to have better catheter function outcomes compared to surgical and percutaneous placement methods<sup>3</sup>

<sup>1</sup>Blake PG, Jain AK. *Clin J Am Soc Nephrol*. 2018;13(8):1278-1279. <sup>2</sup>Javaid MM, Khan BA. *Semin Dial*. 2019;32(3):225-228.

<sup>3</sup>Shrestha BM, et al. *Perit Dial Int*. 2018;38(3):163-171.

# Staffing Requirements

Identifying  
Candidates

Program coordinators are typically used to run urgent start programs and coordinate between nephrologist, surgeon, social workers, and outpatient clinic staff

Patient  
Education

PD Catheter  
Placement

Staff and  
Equipment

PD  
Prescription

## Hospital

- Social worker or nurse to provide counseling and education to the patient and family
- Nurses with PD experience who have been trained specifically on urgent start PD, PD equipment, and post-operative catheter care
- Nephrologists with know-how to prescribe urgent start PD

## Clinic

- PD nurses with availability to administer outpatient, intermittent PD to an untrained patient in the clinic or patient's home
- Nurses with flexibility to train patients who come in urgently

# Equipment Requirements

Identifying  
Candidates

Manual exchanges (CAPD) or PD cyclers (APD) can be used for urgent start PD

Patient  
Education

- Hospitals should have a ready supply of equipment and disposables:

PD Catheter  
Placement

- PD Catheters
- Catheter extension sets compatible with stocked supplies/equipment
- Dialysate options
- Cyclers
- Ancillaries (caps, drain bags, adapters, etc)

Staff and  
Equipment

PD  
Prescription

# Urgent Start PD Prescription Considerations

## Identifying Candidates

Evaluate patient for uremic symptoms to determine if dialysis is needed urgently or if early start PD is more appropriate (wait 3-14 days)

## Patient Education

If patient is not overtly uremic, delaying initiation or doing intermittent PD 3 – 5 days/week may be considered

## PD Catheter Placement

Initial PD prescription administered by hospital or clinic nurses until patient is trained

## Staff and Equipment

## PD Prescription

Prescription modeling can assist in determining an adequate prescription for urgent start

# Urgent Start PD Prescription

Identifying  
Candidates

There are currently no consensus guidelines or best practice recommendations regarding urgent start PD prescriptions

Patient  
Education

PD Catheter  
Placement

Staff and  
Equipment

PD  
Prescription

- Balance benefits of initiating urgent start PD with risk of early catheter leaks
- Adjust prescription to reduce risk of pericatheter leaks and other complications related to early use of the catheter
- Lower volume and supine positioning keep intraperitoneal pressure low
- Dry periods allows the incision site to heal

General suggestions  
from the literature:

- ✓ Lower volume
- ✓ Supine positioning
- ✓ Dry periods

# Urgent Start PD Prescription

## Example 1: Based on BSA and GFR

Identifying  
Candidates

Patient  
Education

PD Catheter  
Placement

Staff and  
Equipment

PD  
Prescription

### Initial Urgent Start Prescription

	BSA $\leq 1.7 \text{ m}^2$	BSA $> 1.7 \text{ m}^2$
GFR $> 7$ mL/min	750 mL 4 cycles 5:00 hrs/day	1000 mL 5 cycles 6:40 hrs/day
GFR $\leq 7$ mL/min	1000 mL 6 cycles 8:00 hrs/day	1250 mL 6 cycles 8:00 hrs/day

### Other considerations:

- Solutions:
  - 1.5%: no peripheral edema or SOB
  - 2.5%: presence of edema or SOB
  - 4.25%: for severe volume overload in conjunction with oral diuretic
- Logistics
  - All supine exchanges
  - Patient uses restroom before being connected
  - Fluid is completely drained if patient needs to sit or walk
  - Cough suppressants as necessary
  - Avoid eating unless draining

# Urgent Start PD Prescription

## Example 2: Incremental Increases

Identifying  
Candidates

Patient  
Education

PD Catheter  
Placement

Staff and  
Equipment

PD  
Prescription

### CAPD Urgent Start Regimen

Day  
1-3

- Fill volume: 500mL (1.5% glucose + 1000 U/L heparin)
- Dwell time: 3 hours
- Supine

Day  
4-6

- Fill volume: 1000mL
- Dwell time: 4 hours
- Ambulatory

Day  
7+

- Fill volume: 2000mL
- 4 exchanges/day

# Polling Question

How would you initiate PD in this patient?  
(select one option)

- 58-year old female
- Presenting with nausea and worsening hypertension
- Peripheral edema, and mild SOB
- Hb 11, Cr 8.4, K 5.6

A

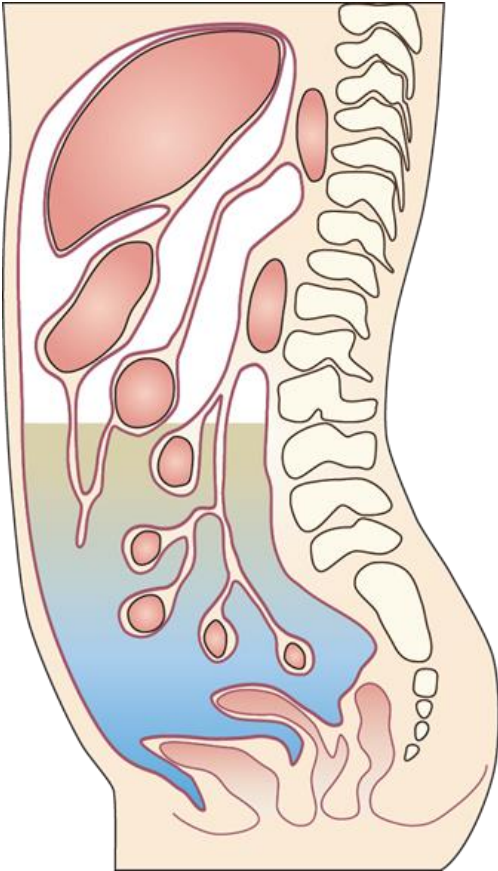
Urgent start PD: Immediate initiation of PD after catheter insertion, 1 L fills, 1-hour dwells, supine, for 24 hours/day

B

Urgent start PD: Initiate PD 24h after catheter insertion with 1 L fills, 2-hour dwells, supine, for 10 hours/day

C

Early start PD: Initiate PD 7 days after catheter insertion with 1 L fills, 2-hour dwells, supine, for 8 hours/day



# PD for Acute Kidney Injury

# Guidelines for Acute PD

- Published by the International Society of Peritoneal Dialysis (ISPD)
- Includes:
  - Potential advantages and possible challenges
  - Catheter insertion options
  - Solution types for various situations
  - Prescription considerations
- Available from the ISPD website:
  - <https://ispd.org/ispd-guidelines/>

Peritoneal Dialysis International, Vol. 34, pp. 494-517  
doi: 10.3747/pdi.2013.00222

0896-8608/14 \$3.00 + .00  
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## ISPD GUIDELINES/RECOMMENDATIONS

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### PERITONEAL DIALYSIS FOR ACUTE KIDNEY INJURY

---

Brett Cullis,<sup>1,2</sup> Mohamed Abdelraheem,<sup>3</sup> Georgi Abrahams,<sup>4</sup> Andre Balbi,<sup>5</sup> Dinna N. Cruz,<sup>6</sup>  
Yaacov Frishberg,<sup>7</sup> Vera Koch,<sup>8</sup> Mignon McCulloch,<sup>9</sup> Alp Numanoglu,<sup>10</sup> Peter Nourse,<sup>9</sup>  
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Peritoneal dialysis (PD) was initially used in the 1920s to treat acute kidney injury (AKI), but it was not until 1946 that it was first described to save the life of a patient (1). Dialysis solutions initially produced hyperchloremia and overhydration, but refinements such as the addition of sodium lactate or bicarbonate rather than sodium chloride, as well as the use of gelatin or dextrose to increase tonicity, led to better outcomes (2). As solutions and peritoneal dialysis catheters improved, so did outcomes, with a resulting increase in PD utilization. Peritoneal dialysis for AKI has, however, more recently become sidelined by newer, more technologically advanced treatments such as hemofiltration and hemodialysis (HD) (3,4). In a recent review on the dose of dialysis in AKI, PD was not even mentioned as a potential modality (5). This is despite studies demonstrating that it is at least as effective as daily HD and possibly hemofiltration (6,7). Galao *et al.*'s survey, amongst delegates at 3 major dialysis congresses, found that 36% felt PD was suitable for AKI in the intensive care unit (ICU); however, only 15% actually practiced it. When it came to treating AKI in the wards, more than 50% felt it was suitable. In the

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494

# PD for Acute Kidney Injury

PD should be considered as a suitable method of continuous renal replacement therapy in patients with acute kidney injury

## Benefits

- Technically simple
- Minimal infrastructure requirements
- Anticoagulation not necessary
- Gradual solute removal
- Potential for cytokine removal based on peritoneal physiology\*

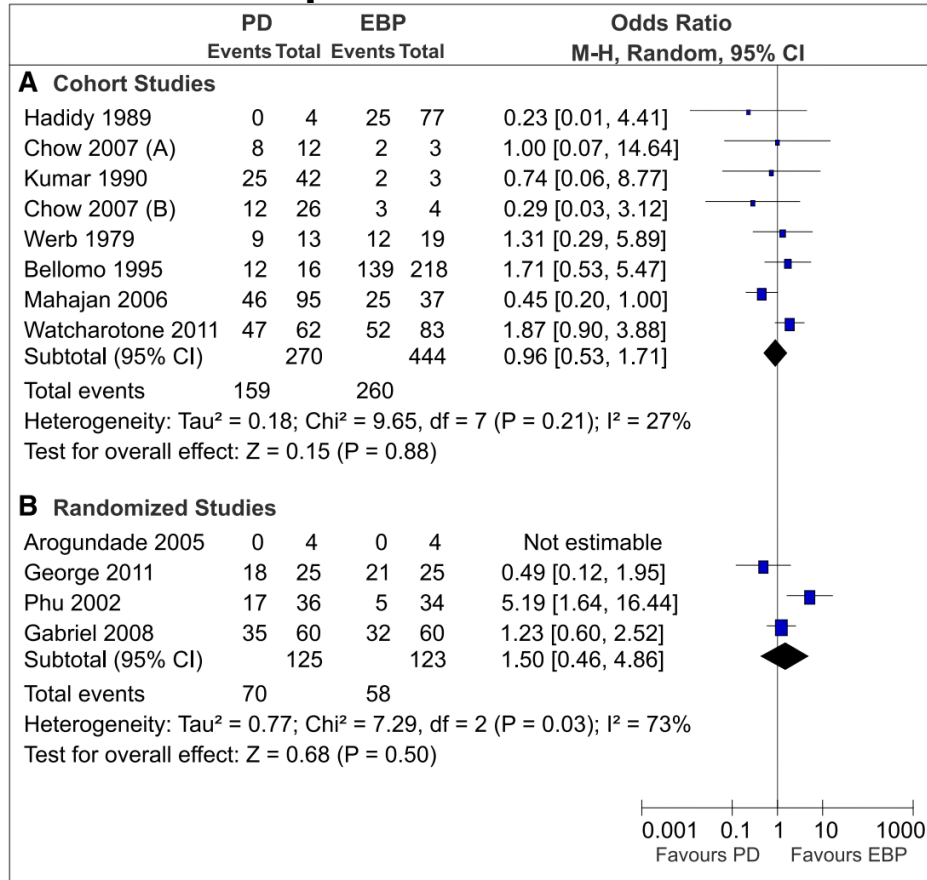
## Challenges

- Risk of peritonitis
- Unpredictable fluid removal rates
- Possibly inadequate solute clearance
- Glucose absorption and protein loss
- Impaired diaphragmatic movement
- Not appropriate for ventilated or prone patients

\* No studies have definitively demonstrated this occurs

# Outcomes with PD for AKI

## Effect RRT modality on mortality in patients with AKI



- Well-designed studies are limited
- Meta-analysis suggests no difference in mortality between PD and extracorporeal RRT

# Acute PD Prescription Considerations

Targeting a weekly Kt/V urea of 3.5 provides outcomes comparable to that of daily HD; for many patients with AKI targeting a weekly Kt/V of 2.1 may be acceptable

During initial 24 hrs of therapy, cycle times should be dictated by clinical circumstances. Initial correction of hyperkalemia, fluid overload, and/or metabolic acidosis requires shorter dwells.

Avoid fluid overload and hypovolemia by adjusting dextrose concentrations

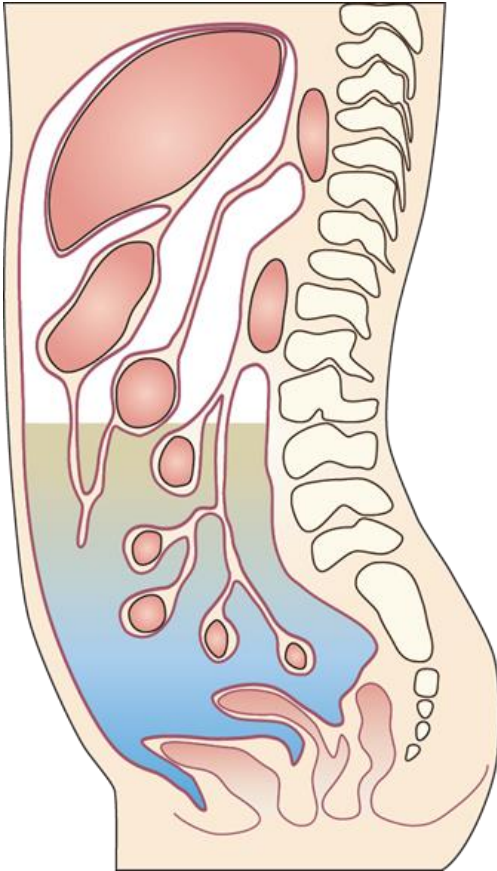
Monitor levels of medications as clearance may be enhanced

# Acute PD Prescription Example

Acute PD with Standard Dialysate  
using an APD Cycler

- ✓ Continuous therapy
- ✓ 2 L fill volumes
- ✓ Dwell time:
  - ✓ Initially: 1-3 hrs
  - ✓ After acidosis, pulmonary edema,  
and/or hyperkalemia resolved: 4-6 hrs
- ✓ 500 U/L IP Heparin

# Clinical Takeaways



- ✓ Urgent start PD is a safe and effective renal replacement therapy that can achieve similar outcomes to planned start PD and urgent start HD
- ✓ Infrastructure and clinical protocols are necessary for successful urgent start programs
- ✓ Ensuring low volume, supine exchanges mitigates risk of catheter leaks
- ✓ PD can be used to treat AKI in some cases



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# Audience Q&A

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