



Nephrology Education Research and Development Consortium (NERDC)

Version: **For Fellow Testing 1.2**

Total Points: 22

17 JAN 2019

Dialysis Orders OSCE: 1 scenario (Peritoneal Dialysis)

Time: Up to 45 minutes

DO NOT PUT YOUR NAME OR THE NAME OF YOUR TRAINING PROGRAM ON THIS TEST

This is a formative test. Please read the following case carefully, write a set of dialysis orders as requested (you should use the standard order sets available at your institution, if permitted by your Program Director), and answer content questions. Normal laboratory values are given within the case.

Case:

A 50-year-old male with a history of ESRD on continuous ambulatory peritoneal dialysis (CAPD) for the last 4 years presents to your clinic with the complaint of abdominal pain. He has had abdominal pain for several days that has increased in intensity. His abdominal pain is described as sharp, constant, and diffuse. He reports nausea with two episodes of non-bloody emesis. His last bowel movement was yesterday and was loose. He did not perform some of yesterday's PD exchanges due to drain discomfort, but he did place his final 2.5 L exchange last night (about 8 hours ago.) He describes his dialysate effluent as “pretty clear” with his last exchange. He denies any change to his usual drain and fill times. He denies catheter site redness or drainage. He reports no recent issues with his sterile technique. He denies recent fevers, chills, night sweats, chest pain, cough, or shortness of breath.

PD History and Dialysis Prescription:

CAPD Prescription: 2.5 L (alternating 1.5% and 2.5% dextrose-containing PD fluid) exchanges four times per day (3 daytime and 1 overnight dwell).

Dry weight = 64 kg.

Low-average transporter on peritoneal equilibration test (PET)

Last Kt/V: 2.0 (PD 1.6 and Renal 0.4)

Never trained on cyclor

Past Medical History:

ESRD, secondary to FSGS

- PD for the last 4 years
 - o No history of complications
- Has never been on hemodialysis.

Coronary artery disease
 Hypertension
 Hyperlipidemia
 Acquired renal cystic disease

Past Surgical History:

Left upper extremity AV Fistula (never used)
 Peritoneal dialysis catheter

Medications:

Aspirin 81mg daily
 Amlodipine 2.5mg daily
 Metoprolol 50mg daily
 Pravastatin 20mg at night
 Calcium acetate 667mg with meals
 Multivitamin once daily

Allergies:

Lisinopril (angioedema)

Physical exam:

VITALS = Heart rate: 110 bpm, Blood pressure: 134/82 mmHg, Respiratory rate 16/minute, SpO2: 96% on room air, Pain: 8/10 (diffuse abdominal).

Temp, oral: 99.0 F

Weight: 63.3 kgs

GEN: thin male; appearing in discomfort, A&Ox3

HEENT: dry mucosal membranes

CV: regular rate and rhythm, +S4, tachycardic

PULM: Clear; no wheeze or crackles.

ABD: bowel sounds present; soft, diffuse tenderness. No rebound/guarding. Catheter tunnel and exit site without erythema or expressible discharge.

EXT: no edema; left upper extremity AV fistula with good bruit, pulsation, and thrill.

EKG: tachycardic. no peaked T-waves. Normal QTc. No ST depression/elevation.

LABS:

		Units	Ref Rng
Sodium	135	mmol/L	(136-145)
Potassium	5.2	mmol/L	(3.5-5.1)
Chloride	96	mmol/L	(98-107)
Carbon Dioxide	20	mmol/L	(22-29)
Urea Nitrogen	111	mg/dL	(5-20)
Creatinine	15.4	mg/dL	(0.7-1.2)
Glucose	85	mg/dL	(74-106)
Calcium	9.7	mg/dL	(8.6-10.2)
Magnesium	1.7	mg/dL	(1.6-2.6)
Phosphate	3.4	mg/dL	(2.5-4.5)

Protein	8.4	g/dL	(6.3-8.2)
Albumin	3.6	g/dL	(3.5-5.2)
Alkaline Phosphatase	112	U/L	(38-126)
Alanine Aminotransferase	17	U/L	(13-69)
Aspartate Aminotransferase	17	U/L	(0-40)
Bilirubin, total	0.6	mg/dL	(0.2-1.3)
WBC	10.4	x10(3)/mcL	(3.6-10.6)
Hemoglobin	13.5	g/dL	(12.8-17.7)
Hematocrit	43.2	%	(37.5-50.9)
Platelets	230	x10(3)/mcL	(162-427)
Amylase	275	U/L	(28-100)
Lipase	90	U/L	(13-60)
Lactate	0.2	mmol/L	(0.5-2.2)

Analysis of PD fluid:

Color	Colorless	
Appearance	Hazy	
WBC	1240	/mcL
RBC	17	/mcL
Neutrophils, Seg	89%	
Lymphocytes	2%	
Monocytes	9%	
Gram Stain	No Organisms	
Culture	Pending	

QUESTION GROUP #1 (8 points):

- A. Give the 3 diagnostic criteria for peritonitis in CAPD. (3 points).
 - a.
 - b.
 - c.

- B. Can this patient be diagnosed with peritonitis at this point in the evaluation? Please explain why or why not? (2 points)
 - a. Yes or no?
 - b. Why or why not?

- C. Would you manage this patient as an inpatient or an outpatient? Please explain what factors of this patient's presentation, chronic dialysis prescription, and living situation influence your decision—should discuss at least 3. (1 point)

- D. Is empiric antibiotic therapy indicated? (**1 point**)
- E. When utilized, what antimicrobial coverage (in general—you need not indicate specific antibiotics) is necessary for empiric antibiotic therapy for peritoneal dialysis associated peritonitis? (**1 point**)

You begin specific therapy. In addition, the patient received 1L of IV 0.9% NS with resolution of the tachycardia. Ondansetron was given for nausea with improvement. The following day the patient is assessed. He reports that the abdominal pain is improved with indicated therapy. You are given the following information detailing the patient's PD regimen in the last 24 hours and this morning's labs.

Time and Day	HR	Blood pressure	Drain Volume	Volume instilled	Dialysate Dextrose	Weight
0800 (yesterday)	110	134/82	2200mL*	2500mL	1.5%	63.3kg Presentation and Diagnosis + 1 liter IV saline
1200 (yesterday)	89	140/83	2300mL	2500mL	1.5%	
1700 (yesterday)	81	139/85	2250mL	2500mL	1.5%	
2200 (yesterday)	79	142/84	2300mL	2500mL	2.5%	
0700 (today)	83	150/89	2450mL	2500mL	1.5%	65 kg

***Initial drain on presentation to clinic**

		Units	Ref Rng
Sodium	134	mmol/L	(136-145)
Potassium	4.2	mmol/L	(3.5-5.1)
Chloride	92	mmol/L	(98-107)
Carbon Dioxide	25	mmol/L	(22-29)
Urea Nitrogen	78.8	mg/dL	(5-20)
Creatinine	12.0	mg/dL	(0.7-1.2)
Glucose	140	mg/dL	(74-106)
Calcium	8.6	mg/dL	(8.6-10.2)
Magnesium	2.1	mg/dL	(1.6-2.6)
Phosphate	4.2	mg/dL	(2.5-4.5)
WBC	7.3	x10(3)/mcL	(3.6-10.6)
Hemoglobin	11.4	g/dL	(12.8-17.7)
Hematocrit	35.7	%	(37.5-50.9)
Platelets	171	x10(3)/mcL	(162-427)

PD fluid (taken from 0600 drain):

Color	Straw	
Appearance	Cloudy	
WBC	50	/mcL
RBC	0	/mcL
Neutrophils, Seg	78%	
Lymphocytes	5%	
Monocytes	15%	
Gram Stain	No Organisms	

QUESTION GROUP #2 (8 points):

- A. What concerning feature is evident in the patient's PD exchanges? **(1 point)**
- B. What is your full/expanded differential diagnosis and initial evaluation (to be done at this time) for this issue? **(3 points)**
- a. Differential Diagnosis? **(2 points)**

 - b. Initial Evaluation? **(1 point)**
- C. Assuming no abnormalities are noted on evaluation, please write an updated set of orders for peritoneal dialysis (use institutional order sheets, if they are available). You need not include antibiotic orders. **(4 points)**

The Microbiology Lab calls you. PD fluid culture is positive for *Enterobacter cloacae*.

Ceftazidime	<=2 Susceptible
Cefazolin	>16 Resistant
Gentamicin	<=2 Susceptible
Trimethoprim+Sulfamethoxazole	<=0.5/9.5 Susceptible
Ciprofloxacin	<=0.5 Susceptible
Ceftriaxone	<=1 Susceptible
Aztreonam	<=2 Susceptible
Amoxicillin+Clavulanate	>16/8 Resistant

QUESTION GROUP #3 (6 points):

- A. Given the results above, what is your prescribed treatment for peritonitis in this patient? Please write as an order (using institutional order sheets, if available). Give antibiotic choice/dosing with route of administration, frequency of administration and total duration of therapy. **Do not use an IV administration route.** (ISPD Guide Tables 5 and 6 are attached for your convenience.) (4 points)
- B. a) List all the indications you can think of for PD catheter removal? b) Is PD catheter removal indicated in this patient? (2 points)
- a. (1 point)
- b. Yes or No? (1 point)

Intraperitoneal Antibiotic Dosing Recommendations for Treatment of Peritonitis

	Intermittent (1 exchange daily)	Continuous (all exchanges)
Aminoglycosides		
Amikacin	2 mg/kg daily (252)	LD 25 mg/L, MD 12 mg/L (253)
Gentamicin	0.6 mg/kg daily (254)	LD 8 mg/L, MD 4 mg/L (255,256)
Netilmicin	0.6 mg/kg daily (233)	MD 10 mg/L (257)
Tobramycin	0.6 mg/kg daily (253)	LD 3 mg/kg, MD 0.3 mg/kg (258,259)
Cephalosporins		
Cefazolin	15–20 mg/kg daily (260,261)	LD 500 mg/L, MD 125 mg/L (254)
Cefepime	1,000 mg daily (262,263)	LD 250–500 mg/L, MD 100–125 mg/L (262,263)
Cefoperazone	no data	LD 500 mg/L, MD 62.5–125 mg/L (264,265)
Ceftaxime	500–1,000 mg daily (266)	no data
Ceftazidime	1,000–1,500 mg daily (267,268)	LD 500 mg/L, MD 125 mg/L (236)
Ceftriaxone	1,000 mg daily (269)	no data
Penicillins		
Penicillin G	no data	LD 50,000 unit/L, MD 25,000 unit/L (270)
Amoxicillin	no data	MD 150 mg/L (271)
Ampicillin	no data	MD 125 mg/L (272,273)
Ampicillin/Sulbactam	2 gm/1 gm every 12 hours (274)	LD 750–100 mg/L, MD 100 mg/L (253)
Piperacillin/Tazobactam	no data	LD 4 gm/0.5 gm, MD 1 gm/0.125 gm (275)
Others		
Aztreonam	2 gm daily (242)	LD 1,000 mg/L, MD 250 mg/L (243,244)
Ciprofloxacin	no data	MD 50 mg/L (276)
Clindamycin	no data	MD 600 mg/bag (277)
Daptomycin	no data	LD 100 mg/L, MD 20 mg/L (278)
Imipenem/Cilastatin	500 mg in alternate exchange (244)	LD 250 mg/L, MD 50 mg/L (236)
Ofloxacin	no data	LD 200 mg, MD 25 mg/L (279)
Polymyxin B	no data	MD 300,000 unit (30 mg)/bag (280)
Quinupristin/Dalfopristin	25 mg/L in alternate exchange ^a (281)	no data
Meropenem	1 gm daily (282)	no data
Teicoplanin	15 mg/kg every 5 days (283)	LD 400 mg/bag, MD 20 mg/bag (229)
Vancomycin	15–30 mg/kg every 5–7 days ^b (284)	LD 30 mg/kg, MD 1.5 mg/kg/bag (285)
Antifungals		
Fluconazole	IP 200 mg every 24 to 48 hours (286)	no data
Voriconazole	IP 2.5 mg/kg daily (287)	no data

LD = loading dose in mg; MD = maintenance dose in mg; IP = intraperitoneal; APD = automated peritoneal dialysis.

^a Given in conjunction with 500 mg intravenous twice daily (281).

^b Supplemental doses may be needed for APD patients.

Table 5: Li et al. “ISPD Peritonitis Recommendations: 2016 Update on Prevention and Treatment.” *Perit Dial Int* 36: 481-508, 2016

TABLE 6
Systemic Antibiotic Dosing Recommendations for
Treatment of Peritonitis

Drug	Dosing
Anti-bacterials	
Ciprofloxacin (237)	oral 250 mg BD ^a
Colistin (288)	IV 300 mg loading, then 150–200 mg daily ^b
Ertapenem (289)	IV 500 mg daily
Levofloxacin (239)	oral 250 mg daily
Linezolid (290–292)	IV or oral 600 mg BD
Moxifloxacin (293)	oral 400 mg daily
Rifampicin (294,295)	450 mg daily for BW <50 kg; 600 mg daily for BW ≥50 kg
Trimethoprim/ Sulfamethoxazole (252)	oral 160 mg / 800 mg BD
Anti-fungals	
Amphotericin (296)	IV test dose 1 mg; starting dose 0.1 mg/kg/day over 6 hours; increased to target dose 0.75–1.0 mg/kg/day over 4 days
Caspofungin (297,298)	IV 70 mg loading, then 50 mg daily
Fluconazole (299)	oral 200 mg loading, then 50–100 mg daily
Flucytosine (296)	oral 1 gm/day
Posaconazole (300)	IV 400 mg every 12 hours
Voriconazole (301–303)	oral 200 mg every 12 hours

BD = twice a day; IV = intravenous; BW = body weight.

^a Ciprofloxacin 500 mg BD may be needed if residual glomerular filtration rate is above 5 mL/min.

^b Expressed as colistin base activity (CBA).

Table 6. Li et al. “ISPD Peritonitis Recommendations: 2016 Update on Prevention and Treatment.” *Perit Dial Int* 36: 481-508, 2016