

[Test Your Knowledge: Volume Assessment](#)

[NephMadness 2019](#) featured the [Volume Assessment](#) region. What is the best way to objectively assess the volume status of patients with end-stage kidney disease (ESKD), and on what volume-related endpoints should we base our fluid management decisions? Test your knowledge on volume assessment with the quiz* below.

1. A 27-year-old obese man with ESKD secondary to posterior urethral valves on hemodialysis is found to have 1+ peripheral edema on exam in the dialysis clinic. True or False: In ESKD, peripheral edema is more associated with volume overload than BMI.
 - A. True
 - B. False

2. A 56-year-old man with ESKD from HTN on hemodialysis for 3 years presents for routine outpatient dialysis. Which of the following methods has the highest sensitivity and specificity at predicting volume overload in him?
 - A. Lung Ultrasound B-Line Measurement
 - B. Blood Volume Monitoring
 - C. Bioelectrical Impedance Analysis

3. A 55-year-old man with ESKD from HTN on hemodialysis for 2 years frequently shortens his treatment as he doesn't find the dialysis unit chairs comfortable and generally leaves the dialysis unit 1-2 kg above his estimated dry weight. He still has objective measures of volume overload including peripheral edema and an enlarged IVC on echocardiogram. Compared to an individual leaving at their estimated dry weight, he is at higher risk for which of the following?
 - A. Cramping
 - B. All-cause mortality
 - C. Hypotension
 - D. Decline in residual renal function

4. A 49-year-old woman with ESKD from type 2 diabetes mellitus on hemodialysis for 1 year has her estimated dry weight challenged at an additional weight loss of 0.1kg/10 kg body-weight over her current dry weight (similar to what was used in the DRIP trial) due to elevated blood pressures. In the dialysis sessions following this reduction in her dry weight, she is at higher risk to experience which of the following?

- A. Shortness of breath
- B. Nausea
- C. Hypotension
- D. Chest pain

- Quiz prepared by [Anna Burgner](#), NephMadness Executive Team and AJKD Social Media Advisory Group Member. Follow her [@anna_burgner](#).

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[Answers to Test Your Knowledge: Volume Assessment](#)

1. B. False

A study of hemodialysis patients found that pedal edema correlates with age, body mass index, and left ventricular mass but does not reflect volume in hemodialysis patients.

Reference:

Agarwal, R., Andersen, M.J., and Pratt, J. H. (2008). On the importance of pedal edema in hemodialysis patients. *CJASN* 2008; 3(1): 153-8.

2. A. Lung Ultrasound B-Line Measurement

Lung ultrasound B-Line measurement has been shown to be more sensitive and specific in predicting both volume overload and volume depletion in chronic dialysis patients than the other options listed. In this study, indexed inferior vena cava diameter was used as the reference method.

Reference:

Alexiadis, G., Panagoutsos, S., Roumeliotis, S., Stibiris, I., Markos, A., Kantartzi, K., and Passadakis, P. Comparison of multiple fluid status assessment methods in patients on chronic hemodialysis. *Int Urol Nephrol* 2017; 49(3): 525-32.

3. B. All-cause mortality

A recent cohort study of over 100,000 patients on hemodialysis found that patients whose post-dialysis weight was >1 kg above their prescribed dry weight more than 30% of the time were at higher risk for 30-day hospitalizations, all-cause mortality, and cardiovascular mortality.

Reference:

Assimon, M.M., Wang, L., and Flythe, J.E. (2018). Failed Target Weight Achievement Associates with Short-Term Hospital Encounters among Individuals Receiving Maintenance Hemodialysis. *JASN* 2018; 29(8): 2178-88.

4. C. Hypotension

The DRIP trial randomized patients to either receive usual care or protocolized probing of a patient's dry weight and evaluated blood pressure outcomes. Patients randomized to the extra ultrafiltration group experienced more hypotension, cramping, and dizziness.

Reference:

Agarwal, R., Alborzi, P., Satyan, S., and Light, R.P. (2009). Dry-weight reduction in hypertensive hemodialysis patients (DRIP): a randomized, controlled trial. *Hypertension* 2009; 53(3): 500-7.

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