Cheetah Medical™ Education presents —

FAST FLUID FACTS

THE KIDNEYS AND A CALL FOR INTRAVASCULAR FLUID OPTIMIZATION – PART II: CASE STUDY

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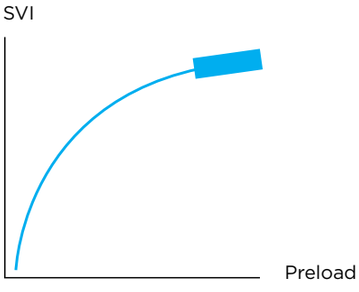
A 70-year old male with a history of chronic renal failure is admitted with septic shock. The patient's MAP is 55 mmHg, and the provider is disinclined to administer fluids given the patient's history of renal failure. The nurse performs a fluid challenge in the form of a passive leg raise to empirically determine the patient's ability to respond to fluids. Stroke volume monitoring with Cheetah yields a 25% increase in stroke volume index (SVI) resulting from the fluid challenge.



Quickly get your Dynamic Assessment Results by seeing where the patient resides on the Starling Curve

≥10% ΔSVI patient is likely fluid responsive

<10% ΔSVI (including negative numbers) patient is not likely fluid responsive

Still reluctant to treat the hypotension with fluid in the face of significant kidney disease, the provider instead orders CRRT with the slow removal of fluid. Within 10 minutes of CRRT initiation, the SVI decreases significantly from baseline, followed by a reduction in MAP to 50 mmHg. The dialysis nurse administers a small fluid bolus and discontinues CRRT. The provider is notified and an order for 1L of lactated ringers is placed.

Optimizing intravascular volume in critically ill patients can be a challenging task. Despite a narrow therapeutic window, patients with kidney failure and heart failure have necessary intravascular volume requirements. Such comorbidities demand a preload optimization strategy rooted in precision and accuracy. A meta-analysis which pooled the results of 21 studies confirmed the excellent diagnostic value of the passive leg raise (PLR) to predict fluid responsiveness in critically ill patients with a global area under the receiver operating characteristic curve of 0.94.[1]

Coupling a fluid challenge such as the PLR with real-time stroke volume monitoring can strengthen clinician confidence when making volume optimization decisions in tenuous patient populations. Such a strategy gives clinicians insight into a patient's relative position on the Frank-Starling Curve. This information helps to confirm or deny the value of fluid administration in a resuscitation attempt and challenges the dogma of absolute fluid restriction in patients with kidney and heart failure.

Remember: Critically ill patients can have complex hemodynamic presentations. Therefore, relying on a single measurement (such as blood pressure) to make clinical decisions could lead to poor outcomes.[2]

Clinical studies show that using a dynamic assessment of fluid responsiveness to guide treatment decisions can improve patient outcomes. Using stroke volume to guide fluid decisions in the ICU and OR has been shown to reduce the incidence of renal failure, pulmonary complications, and surgical wound infections as well as length of stay.[3,4]

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1. Monnet X, Marik P, Teboul JL. Passive leg raising for predicting fluid responsiveness: A systematic review and meta-analysis. Intensive Care Med 2015; In Press
2. Bentzer P et al. Will this hemodynamically unstable patient respond to a bolus of intravenous fluids. JAMA 2016; 316: 1298.
3. Latham HE et al. Stroke volume guided resuscitation in severe sepsis and septic shock improves outcomes. Journal of Critical Care 2017; 42: 42-46.
4. Calvo-Vecino JM et al. Effect of goal-directed haemodynamic therapy on post-operative complications in low-moderate risk surgical patients: a multicentre randomised controlled trial (FEDORA trial). British Journal of Anesthesia 2018; 120: 733-744.

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