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# FAST FLUID FACTS

By Casey Collins, BSN, RN, CCRN-CMC

## THE KIDNEYS AND A CALL FOR INTRAVASCULAR FLUID OPTIMIZATION

As the body's built in chemist, the kidneys function to balance the body's concentration of electrolytes and water to maintain homeostasis. As any good chemist will tell you, solute and solvent concentrations must exist in ideal proportions for expected reactions to succeed, and the environment within the kidneys is no different.

The effects of hypovolemia and under perfusion are well appreciated sources of injury to the kidneys, and prerenal azotemia may progress to acute tubular necrosis and renal dysfunction.[1] However, less appreciated is that because the kidney is an encapsulated organ, it is very sensitive to excess fluid and volume overload. The kidney is particularly affected by increased venous pressure, which leads to increased renal subcapsular pressure and lowered renal blood flow and glomerular filtration rate.[2] Tailoring fluid administration to meet a patient's unique therapeutic fluid index matters to this delicate organ.

In their hospital registry study published in 2017, Shin et al.[3] evaluated the dose-response relationship between intraoperative fluid administration and postoperative outcomes in a large cohort of surgical patients and found both restrictive and liberal extremes of intraoperative fluid administration to be harmful to kidney function (Figure 1).

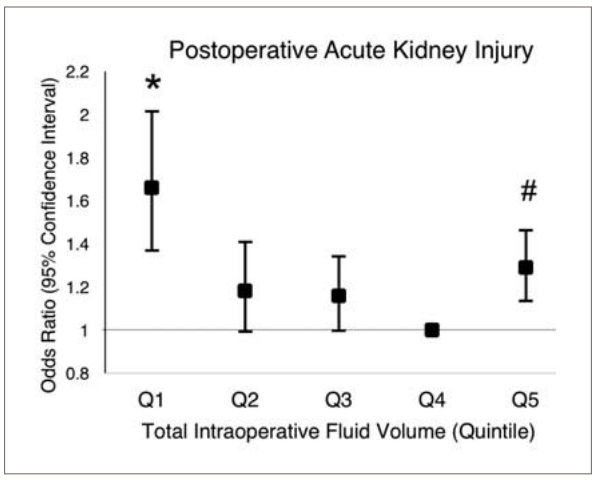


Figure 1. Restrictive and liberal fluid administration are associated with increased risk of acute kidney injury according to multivariable logistic regression model (*P < 0.001, #P < 0.001). Quintile 1 (Q1) = restrictive fluid balance (≤ -6 mL/kg/hr); quintile 2 (Q2) = moderately restrictive (> -6 to -3.6 mL/kg/hr); quintile 3 (Q3) = moderate (> -3.6 to -1.5 mL/kg/hr); quintile 4 (Q4) = moderately liberal (> -1.5 to +1.2 mL/kg/hr); quintile 5 (Q5) = liberal (> +1.2 mL/kg/hr).

**Remember:** Critically ill patients typically have complex hemodynamic presentations. Therefore, relying on a single measurement (such as blood pressure) to make clinical decisions could lead to poor outcomes.[4]

Incorporating dynamic assessments of fluid responsiveness and customizing fluid therapy to optimize stroke volume in the ICU and OR has been shown to reduce the incidence of renal failure, as well as pulmonary complications, surgical wound infections, and length of stay.[5,6]

References:
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3. Shin, Christina H. et al. Effects of intraoperative fluid management on postoperative outcomes: A hospital registry study. Annals of Surgery 2018. 267(6):1084–1092.
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5. Latham HE et al. Stroke volume guided resuscitation in severe sepsis and septic shock improves outcomes. Journal of Critical Care 2017; 42: 42-46.
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600 SE Maritime Ave Suite 220, Vancouver, WA 98661 USA
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