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Commentary: Absolute creatinine values and preoperative acute kidney injury in cardiac surgery patients: Are we barking up the wrong tree?

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Acute kidney injury (AKI) has been shown to occur in up to 22.3% of patients following cardiac surgery.¹ Multiple studies have demonstrated that pre- and post-operative AKI is associated with poor postoperative outcomes.¹⁻³ Previously, Hobson and colleagues² demonstrated that postoperative AKI was an independent predictor of mortality (hazard ratio, 1.39, 95% confidence interval [CI], 1.23-1.57). In a large database study, Cooper and colleagues³ found that declining preoperative estimated glomerular filtration rate was associated with increased operative mortality and increased postoperative AKI

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CENTRAL MESSAGE

AKI is an important cause of morbidity and mortality after cardiac surgery. Small changes in preoperative creatinine from baseline may also be harmful; however, the accuracy of this needs to be confirmed in future studies.

requiring dialysis, stroke, infection, prolonged ventilation, and hospital length of stay.

Until recently, the effect of preoperative kidney disease on postoperative outcomes has been investigated using an absolute creatinine value or single calculated estimated glomerular filtration rate. Griffin and colleagues⁴ sought to determine whether an acute change in preoperative creatinine from a baseline value would significantly influence postoperative outcomes in cardiac surgery patients. In this retrospective study of 1486 patients undergoing nonemergency cardiac surgery, a creatinine change from baseline (minimum creatinine available 3 months after surgery) to the presurgical value was calculated. They observed an

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Disclosures: Dr Arora has received an unrestricted educational grant from Pfizer Canada, Inc, and honoraria from Mallinckrodt Pharmaceuticals, Abbott Nutrition, and Edwards Lifesciences for work unrelated to this work. The other author has nothing to disclose with regard to commercial support.

Received for publication March 21, 2020; revisions received March 21, 2020; accepted for publication March 21, 2020; available ahead of print April 9, 2020.

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J Thorac Cardiovasc Surg 2022;163:1390-1
0022-5223/\$36.00

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<http://dx.doi.org/10.1016/j.jtcvs.2020.03.093>

increase in hospital mortality (odds ratio [OR], 1.27; 95% CI, 1.06-1.51; $P = .008$), postoperative infection (OR, 1.21; 95% CI, 1.09-1.35; $P < .001$), stage 3 AKI (OR, 1.34; 95% CI, 1.16-1.55; $P < .001$), prolonged intensive care unit length of stay (OR, 1.14; 95% CI, 1.05-1.24; $P = .002$), and hospital length of stay (OR, 1.11; 95% CI, 1.08-1.13; $P < .001$). The authors conclude that even small changes in creatinine levels before surgery have the potential to cause major adverse events and warrant increased awareness during the perioperative period.

Griffin and colleagues⁴ should be commended for their investigation into this novel predictor, yet questions remain about the accuracy in their determination of creatinine change. No data were available, unfortunately, regarding the circumstances around which the baseline serum creatinine value was drawn. Many factors can influence serum creatinine levels, including volume status, medications, diagnostic testing, and illness acuity. Further, the time frame between measurement of the baseline level and the preoperative creatinine measurement may also have important implications. For example, a patient's documented baseline creatinine level following a cardiac catheterization may represent a different state than his or her true baseline. If a patient were to undergo surgery soon thereafter, the preoperative level may not have normalized. This would make his or her creatinine change relatively minimal and thus confound the association with

postoperative complications. The authors acknowledge this limitation, and without several data points to determine an overall trend or slope of change over time, application of these data clinically is challenging.

Even taking these issues into consideration, there appears to be a signal toward increased morbidity and mortality in patients with an acute change in their creatinine level preoperatively. These findings warrant a future prospective study incorporating consistent methodology for the entire patient journey, including determination of the true baseline creatinine level, as well as subsequent investigation into interventions to identify and mitigate risk and enhance recovery in vulnerable cardiac surgery patients.

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Commentary: Changing the ship's course for a better outcome

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Correcting acute versus chronic physiologic derangements may alter a patient's trajectory.

CENTRAL MESSAGE

Management of preoperative acute kidney injury represents an area worth exploring to further optimize patients before cardiac surgery to improve their outcomes.

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Disclosures: Authors have nothing to disclose with regard to commercial support. Received for publication March 26, 2020; revisions received March 26, 2020; accepted for publication March 26, 2020; available ahead of print April 5, 2020.

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J Thorac Cardiovasc Surg 2022;163:1391-2
0022-5223/\$36.00

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<http://dx.doi.org/10.1016/j.jtcvs.2020.03.073>