

# Estimated Glomerular Filtration Rate

## More Bang for the Buck

CME

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RENAL dysfunction, traditionally quantified by elevated serum creatinine, is an established risk factor for perioperative morbidity and mortality.<sup>1-3</sup> Nonetheless, further refining the risk-stratification tools currently available to practicing anesthesiologists is an important way to enhance perioperative value—better patient outcomes per dollar spent. In this issue of ANESTHESIOLOGY, Mooney *et al.*<sup>4</sup> demonstrate an opportunity to achieve this goal with the estimated glomerular filtration rate (eGFR).

In their comprehensive meta-analysis, these investigators demonstrate that decreases in preoperative eGFR significantly predicted mortality and major morbidity both in the short and long term.<sup>4</sup> In allowing the quantification of kidney failure based on grades of preoperative renal dysfunction, eGFR may thus provide practitioners with insights on perioperative risk beyond those that could be gleaned from traditional definitions of renal dysfunction that employ simple cut-off values for preoperative creatinine.<sup>1-2</sup>

The calculation of eGFR in the selected studies for this meta-analysis was based on standard estimates such as the Cockcroft–Gault and/or the Modification of Diet in Renal Disease equations.<sup>5†</sup> The quantification of eGFR



***“The first message [is clear: assess the potential for eGFR instead of a single creatinine to improve the accuracy of current preoperative risk stratification models] for noncardiac surgery.”***

for clinicians is now straightforward due to ready availability of online bedside calculators that only require entry of routine clinical parameters such as age, gender, race, weight, and serum creatinine.<sup>†</sup>

Furthermore, the National Kidney Foundation has adopted eGFR as the basis for classifying renal dysfunction into five stages.<sup>‡</sup> Based on this accepted staging system, Dr. Mooney *et al.*<sup>4</sup> have demonstrated the powerful association between the grades of chronic renal dysfunction and important perioperative outcomes.<sup>5†</sup> This is a powerful concept, as it means that even subclinical increases in creatinine significantly elevate perioperative risk. Given the powerful evidence provided by this study and the clinical convenience of eGFR calculators, perioperative clinicians should strive to recognize these patients before surgery.

Where do we go from here? Given that eGFR has more predictive power than a single serum creatinine measurement, it follows that eGFR should be tested, validated, and potentially included in contemporary approaches to perioperative risk stratification. This concept has already been adopted in defining risk more accurately after cardiac surgery. The recently released second version of the European System for Cardiac Operative Risk Evaluation (EuroSCORE II) has included eGFR in its multivariate model and online risk calculator.<sup>2‡</sup> In contrast, the cardiac surgery risk models developed by the Society of Thoracic Surgeons have yet to include

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† National Kidney Foundation. Available at: <http://www.kidney.org/professionals>. Accessed December 12, 2012.

‡ European System for Cardiac Operative Risk Evaluation. Available at: <http://www.euroscore.org>. Accessed December 12, 2012.

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eGFR. The current renal function entries for the Society of Thoracic Surgeons models are preoperative creatinine and dialysis. It is likely that an update of the Society of Thoracic Surgeons risk scores will include additional criteria such as eGFR.<sup>3</sup>

What is the status quo in noncardiac surgery? Recently developed adaptations of the Revised Cardiac Risk Index for lung and vascular surgery still utilize simple creatinine and not eGFR.<sup>6-9</sup> The first message to investigators from this important meta-analysis is to delineate whether eGFR rather than a single creatinine threshold improves the predictive power of current risk models for noncardiac surgery.<sup>6-10</sup>

The second message to investigators from this meta-analysis is that the prognostic value of eGFR merits further evaluation beyond cardiac and vascular surgery, as the overwhelming majority of the analyzed studies had a cardiovascular focus.<sup>4</sup> This question could be readily tackled through analysis of existing large datasets such as the multicenter National Surgical Quality Improvement Program database maintained by the American College of Surgeons, or the National Anesthesia Clinical Outcomes Registry currently under development by the Anesthesia Quality Institute.<sup>10,11</sup>

Finally, a key question regarding a risk model is how the information from the model will be used in clinical practice.<sup>12</sup> If research demonstrates that eGFR alters clinical decision making, as reflected by a decision to defer surgery or to adjust risk-reduction strategies, then incorporating eGFR into routine anesthetic practice is clearly worthwhile.

The weight of the evidence, as summarized in this important meta-analysis, suggests that the time has come to move beyond discrete creatinine measurement for risk assessment. A refined approach based on eGFR may facilitate better recognition of patients at excessive perioperative risk to offer more bang for the buck. Future investigations should also assess interventions to improve outcomes in these patients.<sup>13-15</sup>

In summary, Dr. Mooney *et al.*<sup>4</sup> are to be congratulated for stressing the outcome importance of eGFR. They have demonstrated that this measure of renal dysfunction significantly improves prediction of adverse outcomes. Their meta-analysis has contributed meaningfully to making the perioperative period even safer for our patients.

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§ Society of Thoracic Surgeons Risk Calculator. Available at: <http://www.riskcalc.sts.org>. Accessed December 12, 2012.

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