mortality and incidence on the basis of the most recent year’s data. This approach also overestimated the incident population but was within 10% for the prevalent population, erring on the high side by assuming falling death rates in the dialysis population.

The lower end of the projection by McCullough et al.,² may be too conservative, because the incident 90-day death rates given in the US Renal Data System 2018 Annual Data Report show a decline.¹¹ As noted above, the upper end projection of 1,259,000 does not consider the effect of the two basic modalities of kidney transplantation and dialysis. Because the authors did not use an integrated approach to project these populations, it is difficult to assess the inter-related issues of access to organs—which drives growth in the transplant population and removes healthy patients from the dialysis pool—and changing death rates in the prevalent dialysis population.

It is important to acknowledge the inevitable uncertainties in 15-year projections. Ongoing efforts to prevent kidney disease and slow its progression may start to have an effect. Changes in organ availability and death rates will certainly have an important influence. Future models should build in a range of estimates of these possible changes. This would allow for greater clarity of the realities facing patients and providers today.

DISCLOSURES

A.J.C. served as Director of the US Renal Data System from 1999 to 2014 when the prior two projections were published. A.J.C. is currently the Chief Medical Officer of NxStage Medical, Inc., a home hemodialysis and acute dialysis product company.

REFERENCES


Postoperative AKI—Prevention Is Better than Cure?

Samira Bell¹,² and John Prowle³,⁴

¹Renal Unit, Ninewells Hospital, Dundee, United Kingdom; ²Division of Population Health Science and Genomics, School of Medicine, University of Dundee, Dundee, United Kingdom; ³Adult Critical Care Unit and Department of Renal Medicine and Transplantation, The Royal London Hospital, Barts Health National Health Service Trust, London, United Kingdom; and ⁴William Harvey Research Institute, Queen Mary University of London, London, United Kingdom

AKI could be considered as a sentinel postoperative complication, because it is relatively common and strongly associated with increased short- and long-term risk of death, the development of other postoperative complications, increased length of hospital stay, and potentially, the development of progressive CKD.¹ Consequently, patients with AKI after surgery are an area of unmet clinical need and a major burden on health care resources. In the absence of effective interventions to treat established AKI, preoperative identification of patients at high risk of AKI allows for perioperative optimization to prevent or reduce the severity of AKI. A number of large

Published online ahead of print. Publication date available at www.jasn.org.

Correspondence: Dr. Samira Bell, Division of Population Health Science and Genomics, School of Medicine, University of Dundee, Mackenzie Building, Kirsey Semple Way, Dundee DD2 4BF, United Kingdom. Email: Samira.bell@nhs.net

Copyright © 2019 by the American Society of Nephrology
retrospective studies have examined the associations of postoperative AKI in multivariable modeling; however, few of these have led to externally validated models that have been operationalized to give predictions in a clinical setting, particularly in patients undergoing noncardiac surgery.

There are currently several validated AKI risk scores for patients undergoing cardiac surgery, one in orthopedic surgery, and most recently, a model derived through machine learning capable of forecasting the development of a range of postoperative complications, including AKI, across a range of surgical settings. In this issue of the Journal of American Society of Nephrology, Park et al. address this gap in the literature through the development of the Simple Postoperative AKI Risk (SPARK) classification, an externally validated preoperative AKI risk score for noncardiac surgery. This model was developed in 51,041 patients and validated in 39,764 patients from South Korea, and it uses nine preoperative variables: age, sex, baseline eGFR, urinary albuminuria, expected surgery duration, emergency operation, diabetes mellitus, renin-angiotensin-aldosterone system blockade usage, hypoalbuminemia, anemia, and hyponatremia. In contrast to other risk scores, this risk score additionally considers AKI severity by predicting a composite “critical AKI”: outcome of stage 2 or greater AKI, need for RRT within 90 days of AKI, or death occurring after any AKI diagnosis. By allowing preoperative risk stratification of patients, this tool could assist clinicians in a number of ways. It can inform discussions with patients before surgery, allowing for a clearer and more candid quantification of the risks of an important medical complication of surgery and the potential benefits of surgical treatment to be better weighed against risks of complications and adverse longer-term outcomes. As we are increasingly facing an aging, multimorbid population, we need to carefully consider these adverse potential consequences that can often affect organ systems remote from the site of surgical disease. In addition, identifying high-risk patients can guide preoperative planning by influencing whether patients would benefit from more intensive monitoring in the postoperative period, possibly in a critical care setting.

Nevertheless, it could be argued that risk stratification is pointless, because it remains unclear what the proposed intervention(s) should be for patients at high risk for AKI and whether these interventions are, in fact, effective. However, recent studies have shown that risk stratification of patients at high risk of AKI diagnosis in the postoperative setting might enable effective intervention with a “bundle” of AKI-directed preventative measures. These studies examined the implementation of an AKI prevention bundle derived from recommendations in the Kidney Disease Improving Global Outcomes (KDIGO) 2012 AKI guidelines in patients deemed at high risk of AKI on the basis of postoperative urinary AKI biomarkers (IGF-binding protein 7 and tissue inhibitor of metalloproteinases-2). These interventions were composed of the avoidance of potentially nephrotoxic agents, close monitoring of serum creatinine and urine output, and optimization of volume status and hemodynamic parameters. In cardiac surgery, this approach has been shown to reduce postoperative AKI but without evidence of benefit for longer-term renal outcomes, whereas application of a similar strategy in general surgery was overall negative but showed a signal of benefit in a subgroup of patients with moderately elevated AKI biomarkers, suggestive of benefit in early but not more established AKI. Although preliminary, these results do suggest that a KDIGO-based AKI prevention bundle would be the obvious intervention in patients stratified as high risk for perioperative AKI. However, AKI biomarkers are costly, and they are not currently routinely or widely available; they have thus far only been used in relatively small studies with equivocal results. The application of a risk score using readily available preoperative parameters could provide a relatively cheap and simple means of risk stratification that could be applicable to postoperative AKI prevention and management of many patients in a variety of income settings. Importantly, in the setting of intensive care unit admissions, AKI risk prediction algorithms on the basis of routinely available data have been shown to have comparable diagnostic performance to AKI biomarkers, reinforcing the role of predictive models as an alternative or complement to biomarkers in risk stratification for clinical decision making.

The SPARK risk score is thus a promising tool that could be investigated in prospective studies for targeted AKI preventative bundled intervention either as randomized studies or perhaps, given the established nature of the components of bundled care, as a quality improvement intervention. Currently, this model is limited in its generalizability, because it was both developed and validated in Korean patients; additional external validation is required to ensure its applicability to other populations worldwide before consideration of widespread implementation. However, the approach of risk stratification of patients for sentinel surgical complications is likely to be an increasingly important method of improving not just perioperative care but also, the ongoing global health care of surgical patients and the ability of patients and doctors to make informed decisions about their surgical treatment.

DISCLOSURES
J.P. has consultancy agreements with Medibeacon Inc., Quark Pharmaceuticals Inc., GE Healthcare, and Nikkiso Europe GmbH and has received speakers’ fees and hospitality form Baxter Inc., Nikkiso Europe GmbH, and Fresenius Medical Care AG.

REFERENCES