Acute Kidney Injury: Comment on "Trends in the Incidence of Acute Kidney Injury in Patients Hospitalized With Acute Myocardial Infarction

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While acute kidney injury (AKI), a newer term for acute renal failure, has long been recognized as a common and serious complication of hospitalized patients, the study of AKI epidemiology has lagged. An important advance took place with the introduction of consensus AKI definitions by expert panels—first the Risk, Injury, Failure, Loss, and ESRD (RIFLE) criteria by the Acute Dialysis Quality Initiative in 2004,[1] and then the Acute Kidney Injury Network (AKIN) criteria in 2007.These have allowed researchers to examine AKI epidemiology using a common case definition and to overcome one important limitation in the prior literature when cases were defined using different criteria in different studies, rendering it difficult to interpret variations in reported disease incidence. Since then, several studies have characterized AKI incidence in various settings, with wide range of incidences across different hospital and intensive care unit cohorts, but relatively few studies have examined secular trends in AKI epidemiology.

In this issue of the *Archives*, Amin et al[5] used a large registry of electronic records from 56 US hospitals to explore the temporal trend in the AKI incidence among patients hospitalized with acute myocardial infarction. They observed an overall decline in crude AKI incidence from 26.6% in 2000 to 19.7% in 2008, an overall adjusted decline of 4.4% per year. The study is strengthened by the authors' careful consideration to extensively adjust for demographic variables (age, race/ethnicity, sex) and comorbidities (presence of diabetes mellitus, heart failure, cardiogenic shock, and baseline renal function) that are known AKI risk factors, along with surveillance patterns for AKI, to ensure that the observed temporal trend is not due to an aging and sicker population over time or due to differences in vigilance of renal function monitoring. The data's robustness is further supported by the authors' thoughtful sensitivity analyses ensuring that the duration of hospital participation in the database and severity of AKI did not account for the observed overall trend.

The findings are different from those of prior studies demonstrating a rising incidence of AKI. One study using national representative hospital discharge data had shown an increase in AKI incidence on a population level from 1988 to 2002 in the United States. Another study using data from a large Northern California integrated health system found a parallel increase in the population incidence of both dialysis-requiring and non–dialysis requiring AKI from 1996 to 2003.[7] The availability of actual serum creatinine measurements in the latter study is important since *International Classification of Diseases, Ninth Revision* (*ICD-9*) codes for non–dialysis requiring AKI is known to be insensitive and suffer "code-creep" bias. These discrepant trends suggest that AKI may be occurring more frequently overall but occurs less commonly in certain subgroups of patients (eg, those with acute myocardial infarction). Certain clues from the current study shed light on possible reasons AKI incidence is declining, specifically in patients with acute myocardial infarction.

The authors performed important stratified analyses demonstrating a more prominent decline in AKI incidence in patients with acute myocardial infarction who underwent cardiac catheterization than in those who did not. In addition, they also demonstrated a significant trend in the increasingly more pervasive use of N-acetyl cysteine over time. Since it is not clear that N-acetyl cysteine is effective, its use may be a marker for better process of care. These findings suggest that the decline in AKI incidence may be due to improved efforts at preventing contrast-induced AKI in those undergoing cardiac catheterization, such as adequate hydration and limiting contrast load.

The interesting subanalysis finding of wide hospital variations in AKI incidence after multivariable adjustment further support that differing practice patterns (ie, systems-based protocols or angiographer skill levels) may play a role specifically in the incidence of contrast-induced AKI. This is a hopeful message. Although current treatment after onset of AKI is largely supportive, prevention of AKI may be a fruitful area of endeavor.

Future work needs to be performed on several fronts. One, further population-based epidemiology studies should be conducted to better define contemporary AKI disease incidence—overall and in specific demographic, clinical, and geographic subgroups. Two, if the incidence of AKI is increasing overall but falling in some subgroups (eg, among patients with acute myocardial infarction), we need to understand what is driving up the AKI rate in other groups. Three, we need to understand determinants of variations in AKI in a particular setting and identify modifiable risk factors in order to find effective preventive therapies. Finally, in the future, we may be able to adopt AKI incidence among hospitalized patients as a quality and safety outcome measure, akin to the incidence of central line infections, or the incidence of decubitus ulcers among hospitalized patients, as focusing attention to this may translate into considerable improvements in patient outcomes.

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