

Acute Kidney Injury Risk Assessment: Differences and Similarities Between Resource-Limited and Resource-Rich Countries

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The incidence of acute kidney injury (AKI) among acutely ill patients is reportedly very high and has vexing consequences on patient outcomes and healthcare systems. The risks and impact of AKI differ between developed and developing countries. Among developing countries, AKI occurs in young individuals with no or limited comorbidities, and is usually due to environmental causes, including infectious diseases. Although several risk factors have been identified for AKI in different settings, there is limited information on how risk assessment can be used at population and patient levels to improve care in patients with AKI, particularly in developing countries where significant health disparities may exist. The Acute Disease Quality Initiative consensus conference work group addressed the issue of identifying risk factors for AKI and provided recommendations for developing individualized risk stratification strategies to improve care. We proposed a 5-dimension, evidence-based categorization of AKI risk that allows clinicians and investigators to study, define, and implement individualized risk assessment tools for the region or country where they practice. These dimensions include environmental, socioeconomic and cultural factors, processes of care, exposures, and the inherent risks of AKI. We provide examples of these risks and describe approaches for risk assessments in the developing world. We anticipate that these recommendations will be useful for healthcare providers to plan and execute interventions to limit the impact of AKI on society and each individual patient. Using a modified Delphi process, this group reached consensus regarding several aspects of AKI risk stratification.

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KEYWORDS: acute kidney injury; acute renal failure; developed countries; developing countries; risk assessment; outcomes

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Acute kidney injury (AKI) is a common complication of acute illnesses in developed and developing countries.¹ The impact of AKI on patient outcomes and the cost of health care are significant. AKI effects in the developing world are even more appreciable.^{2,3} Identifying patients at risk of developing AKI allows healthcare providers to implement

preventive interventions to avoid AKI, mitigate the effects of the injury, and limit consequences of acute illness, including volume overload, electrolyte and acid-base imbalances, de novo chronic kidney disease (CKD) development or its progression, or the need for long-term renal replacement therapy (RRT). These measures seek to alleviate the impact of AKI on all-cause mortality and healthcare costs.⁴ The relationship between AKI and CKD is another issue to be considered. On one hand, the risk of AKI is higher among those with baseline CKD; therefore, close monitoring of CKD patients is crucial in AKI prevention. On the other hand, providing close monitoring

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and appropriate care to patients with acute kidney disease (AKD) after an AKI could result in less incidence of progressive CKD, with a significant impact on overall AKI outcomes.⁵ There are major differences among the causes, incidence, and follow-up care of AKI between developed and developing countries. The frequency of AKI in developing countries is not well understood due to under-reporting and resource constraints that limit the identification of high-risk patients with AKI. It is also difficult in developing countries to escalate to higher levels of care for severely ill patients.⁶ It is estimated that 85% of AKI cases occur in developing countries, which causes tremendous impact on their public health and economy.⁷ In these areas, the estimated incidence of AKI differs from developed countries, and there are major differences in the age range of patients, risk factors, and the causes of this devastating and fatal syndrome.³ In contrast to developed countries where older patients with multiple comorbidities develop AKI that is frequently related to the multiorgan failure, AKI in developing countries may occur in younger and healthier individuals, primarily due to a single cause, including bacterial, viral, and parasitic infectious diseases.⁸ Pinpointing the major risk factors and causes of AKI in each region is necessary to provide optimized care for the adult and pediatric acutely ill patients. Therefore, the approach to AKI risk stratification should be individualized to each region and country based on multiple dimensions that affect the overall incidence and outcomes of AKI.

To achieve this goal, the steering committee of the 18th Acute Dialysis Quality Initiative (ADQI) conference dedicated a work group with the task of identifying elements that might affect the risk of AKI based on the availability of resources. Using a modified Delphi process, this group reached consensus regarding strategies to assess AKI risk in each region of the globe. The group addressed the following 4 questions that served as the basis for accompanying consensus statements:

1. What are the recognized risk factors and exposures associated with AKI development in different regions of the globe?
2. What are the differences between risk factors for community-acquired AKI (CAKI) versus hospital-acquired AKI (HAKI)?
3. Can we identify populations and patients at high risk for AKI?
4. How can high-risk patients be monitored to prevent AKI development or progression?

Methods

This consensus meeting followed the established ADQI process, as previously described.⁹ The broad objective

of ADQI is to provide expert-based statements and interpretation of current knowledge for use by clinicians according to professional judgment and to identify clinical research priorities to address these gaps. The 18th ADQI Consensus Conference Chairs convened a diverse panel that represented relevant disciplines (i.e., adult and pediatric nephrology, critical care, and renal pathology) from several continents (e.g., Africa, Asia, North America, Latin America, and Europe) around the theme of "Management of Acute Kidney Injury in the Developing World" for a 2-1/2 day consensus conference in Hyderabad, India on September 27 to 30, 2016.

The preconference activities involved a search of the literature for evidence on the epidemiology, risk factor assessment, and management of AKI in developing countries and their differences with developed countries. Our work group was also tasked to summarize the scope, implementation, and evaluative strategies for AKI risk stratification based on the location, resource availability, and a critical evaluation of the relevant literature. A series of phone conferences and emails that involved work group members before the meeting identified the current state of knowledge to enable the formulation of main questions for which discussion and consensus would be developed. A formal systematic review was not conducted. During the conference, the work group developed consensus positions, and plenary sessions that involved all ADQI contributors were used to present, debate, and refine these positions. After the meeting, this summary report was generated, revised, and approved by all participants of the ADQI.

Supplementary Table S1 provides the definitions for "risk factor," "exposure," "community- and hospital-acquired AKI," "developing country," "Human Development Index," and "prevention."

Q1: What Are the Recognized Risk Factors and Exposures Associated With AKI Development in Different Regions of the Globe? Consensus Statements

1. AKI risk is determined by multiple dimensions, and each dimension includes several factors. The dimensions are environmental, socioeconomic and/or cultural, the process of care, acute exposures, and inherent factors (Figure 1a). In resource-limited regions, environmental, socioeconomic and/or cultural, and the process of care risk dimensions play a more important role, both in adult and pediatric populations (Figure 1b).
2. Each risk dimension needs to be evaluated at the population, healthcare system, provider, and patient levels (Table 1).¹⁰

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