

# Detection and Management of AKI in the Developing World: The 18th Acute Disease Quality Initiative (ADQI) International Consensus Conference



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*Kidney Int Rep* (2017) 2, 515–518; <http://dx.doi.org/10.1016/j.ekir.2017.03.013>

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Acute kidney injury (AKI) is a preventable and treatable disorder experienced by more than 13.3 million people worldwide every year. The disease afflicts all ages, from infants to adults, is seen across multiple different out-of-hospital and in-patient settings, and results from a myriad of causes, including infections, drug toxicity, surgery, and iatrogenic insults.<sup>1–4</sup> AKI carries a significant short- and long-term burden both for individuals and society at large, with a high mortality rate (>2.3 million people worldwide are estimated to die yearly); increased resource use (costs of care are increased 3-fold in patients with AKI); and the development of chronic kidney disease (CKD) in >30% of survivors, which often results in end-stage kidney disease that requires dialysis or transplantation.<sup>5</sup> More than 85% of people who have an episode of AKI live in low- and middle-income countries; however, we lack information on the spectrum of AKI and its management in many regions of the world.<sup>6</sup> Available data from high-income countries suggest that lapses in recognition, inadequate management, and poor follow-up are all modifiable elements to tackle this disease.<sup>7</sup> However, in low-resource countries, access to care for diagnosis and treatment of AKI and its life-threatening complications (e.g., hyperkalemia and fluid overload) with dialysis

may further limit timely management and contribute to the high mortality rate.

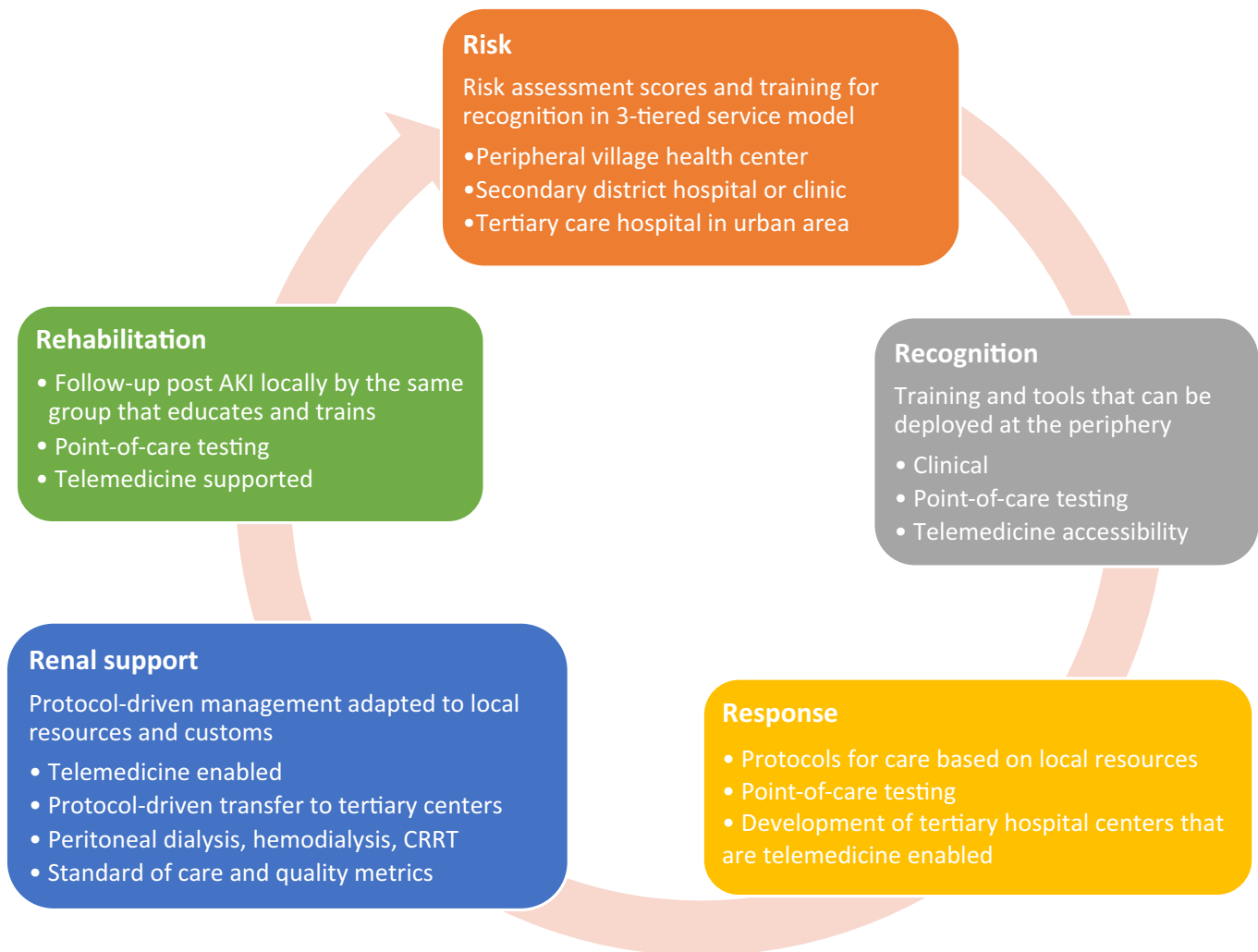
Recent data from the International Society of Nephrology (ISN) AKI 0by25 human rights initiative demonstrated the burden of AKI across the world.<sup>8</sup> The ISN Global Snapshot, an international cohort study that asked physicians from around the world to record information on patients they encountered with AKI during a single day in their regular practice, recorded information on >4000 pediatric and adult patients with AKI from 72 countries on 6 continents.<sup>9</sup> These unique data demonstrated that there are significant similarities in the risk factors and causes of AKI worldwide. However, there are differences in recognition, management, and outcomes of AKI in different health settings for both community- and hospital-acquired AKI that are influenced by the economic conditions in different countries.

By recognizing the wide variation in the spectrum of AKI and its management, particularly in the developing world, we conducted an Acute Disease Quality Initiative (ADQI) conference to develop consensus recommendations based on the 5R approach, which includes Risk assessment, early Recognition, appropriate Response, Renal support, and Rehabilitation (Figure 1). This consensus meeting followed the established ADQI process, as previously described.<sup>10</sup> The conference chairs (RLM, RC, and AB) convened a diverse panel representing relevant disciplines (i.e., internal medicine, nephrology, critical care, pediatrics, pathology) from multiple countries around the world. From this larger group, individual work groups were tasked with addressing each of the 5R domains to establish the current knowledge base and build practice recommendations. All of the individual workgroups performed

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This is a report from the 18th Acute Disease Quality Initiative (ADQI) International Consensus Conference, Hyderabad, India, September 27–30, 2016.

**Received 1 March 2017; accepted 15 March 2017; published online 25 April 2017**



**Figure 1.** Applying the 5R (Risk assessment, early Recognition, appropriate Response, Renal support, and Rehabilitation) approach for management of acute kidney injury (AKI) in the developing world. (Reprinted from The Lancet, Vol. 385, Mehta RL, Cerda J, Burdmann EA, et al. International Society of Nephrology's Oby25 initiative for acute kidney injury (zero preventable deaths by 2025): a human rights case for nephrology, Pages 2616–2643, Copyright © 2015; with permission from Elsevier.<sup>8</sup>) CRRT, continuous renal replacement therapy.

systematic reviews of the literature, iteratively presented their output at joint sessions with the larger group to achieve consensus, and the work product was finalized and evaluated by the entire group.

These deliberations led to the compilation of 5 meeting reports: “Acute Kidney Injury Risk Assessment: Differences and Similarities Between Resource-Limited and Resource-Rich Countries,” by Kashani *et al.*<sup>11</sup>; “Acute Kidney Injury Recognition in Low and Middle Income Countries,” by Cerdá *et al.*<sup>12</sup>; “Prevention and Therapy of Acute Kidney Injury in the Developing World,” by Kher *et al.*<sup>13</sup>; “Renal Support for Acute Kidney Injury in the Developing World,” by Annigeri *et al.*<sup>14</sup>; and “Strategies to Enhance Rehabilitation After Acute Kidney Injury in the Developing World,” by Silver *et al.*<sup>15</sup> Each article provides comprehensive guidance for a systematic appraisal of each patient, focusing on each of the following

domains, with a goal to achieve the best outcomes of renal functional recovery.

### Risk: Identifying Moderate- and High-Risk Individuals for Primary Prevention of AKI

Identification of patients at increased risk for AKI is the first step for improving their care. Inherent patient comorbidities (e.g., diabetes mellitus, CKD) predispose patients to AKI, and coupled with etiological factors (e.g., dehydration, sepsis) contribute to development of AKI. In addition, environmental factors (e.g., inadequate sanitation, limited clean water availability) and sociodemographic factors (e.g., poverty, illiteracy, and poor transportation) influence the course and outcomes of AKI.<sup>16</sup> Consequently, educational strategies need to include a standardized approach to assess patient risk to facilitate preventive strategies and early interventions. These include risk stratification tools to

identify patients at moderate to high risk for AKI who can be screened with a point-of-care test for blood creatinine to determine if they have AKI.

### Recognition: Prompt Diagnosis

Timely recognition of renal dysfunction is a major component of managing patients with AKI.<sup>17,18</sup> However, delays in recognizing AKI are common and occur frequently even in tertiary centers in developed countries. The lack of infrastructure or inaccessibility to diagnostic tools, often due to financial constraints, coupled with limited access to health care and physician referral, contribute to the high morbidity and mortality of AKI in low- to middle-income countries. Without team integration and protocols to maintain surveillance, delay in diagnosis and timely interventions are important factors that contribute to adverse outcomes. Point-of-care tests for blood creatinine and urinalysis should be available for physicians and other health care professionals in addition to increasing awareness and implementing protocols for management of AKI.

### Response: Interventions for High-Risk Patients and Established AKI

It is imperative that health care providers, not only physicians and nephrologists, are adequately trained to care for the growing cases of AKI around the globe. Of the known modifiable factors associated with AKI development and progression, extracellular volume depletion is likely the most frequent. However, attempts to correct volume depletion must be individualized and based on frequent monitoring of physiological parameters. Avoiding fluid overload should also be a main concern, because fluid accumulation has been associated with higher mortality in patients with AKI.<sup>19</sup> Monitoring of urine output and body weight is a simple and inexpensive way to prevent fluid overload.<sup>20–22</sup> The avoidance of drugs and nephrotoxins that cause AKI and the appropriate dose adjustment for kidney function medications are important for AKI management.<sup>23</sup>

### Renal Support: Renal Replacement Therapy in AKI

In low-income countries, renal replacement therapy (RRT) may not be available because it is expensive and requires specialized training and equipment. Decisions regarding initiation, method, and frequency have to consider the limited availability of trained personnel and RRT equipment. Mild to moderate cases could be treated in secondary level hospitals; if RRT is indicated, consideration should be given to treatment with peritoneal dialysis. In the context of multiorgan

dysfunction, the AKI patient should be transferred to a tertiary center.<sup>24–27</sup> There is a great need to educate health care providers on assessing the need for referral for RRT where it is available, and for the appropriate choice of RRT modality and its implementation in a standardized manner.

### Rehabilitation: Postdischarge Care of AKI Patients

With the increasing number of patients recovering from AKI, it will be necessary to direct efforts into education and training of health providers to follow kidney function recovery. Appropriate management of patients with incomplete kidney recovery may delay the progressive loss of kidney function, ultimately preventing the incremental increase in the need for long-term dialysis. Educational campaigns on the importance of long-term follow up of AKI patients must be planned accordingly to the level of health organization and involve the whole health care team, including physicians, nurses, and medical allied personal.

It is apparent that AKI is a multidisciplinary disease that requires education and training of multiple caregivers who will encounter these patients in diverse settings. Consequently, the consensus statements reflect the diversity in knowledge, socioeconomic conditions, availability of resources, and cultural factors that influence access to care and outcomes. There remain several gaps in our knowledge that will need to be addressed in future research. We hope that these recommendations will provide a framework for caregivers to identify and manage patients with AKI more efficiently and ultimately improve outcomes.

### DISCLOSURE

All the authors declared no competing interests.

### ACKNOWLEDGMENT

Supported through the UAB-UCSD O'Brien Center NIH-NIDDK Grant DK079337.

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