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Perspective

Acute Kidney Injury in Low-Resource Settings: Barriers to Diagnosis, Awareness, and Treatment and Strategies to Overcome These Barriers

Joseph Lunyera, MBChB, MSc,[1,2] Kajiru Kilonzo, MBChB, MMED,[3] Andrew Lewington, MBChB,[4] Karen Yeates, MD, MPH,[5] and Fredric O. Finkelstein, MD, FNKF[6]

Acute kidney injury (AKI) is increasingly recognized as a major health problem worldwide, responsible for an estimated 1.4 million deaths per year. The occurrence of and approach to AKI in low-resource settings (LRS) present special challenges due to often limited health care resources, including insufficient numbers of trained personnel, diagnostic tools, and treatment options. Although the International Society of Nephrology set a goal of eliminating preventable deaths from AKI by 2025, implementation of this program in LRS presents major challenges not only because of the lack of resources, but also because of the lack of awareness of the impact of AKI on patient outcomes, factors that are complicated by the challenge of cognitively dissociating the care of patients with AKI from the care of patients with chronic kidney failure. To better understand how to increase the awareness of AKI and develop strategies to improve the identification and treatment of patients with AKI in LRS, we administered an 18-item web-based questionnaire to physicians actively engaged in providing nephrology care in LRS. A checklist was then developed of meaningful and targeted approaches for implementation, with focus on engaging local and regional stakeholders, developing education programs and appropriate guidelines, enhancing training of health care workers, expanding health care resources, linking with other regional health care projects, and broadening research opportunities.
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Acute kidney injury (AKI) is a major global health problem in both developed and developing nations, negatively affecting patient morbidity and mortality.[1] Recognizing this, the International Society of Nephrology (ISN) recently set a goal of eliminating preventable or treatable deaths from AKI by 2025, the "0×25" initiative.[1] Implementation of this program in low-resource settings (LRS) presents major challenges for this initiative for a variety of reasons. First, there are few data addressing the epidemiology and causes of AKI in LRS.[1-4] Second, health care resources to diagnose and manage AKI are often limited, with a lack of appropriate medications, equipment, and trained personnel.[5-8] Third, governments and other institutions (eg, hospitals, nongovernmental organizations, and global health initiatives) have not focused sufficiently on the problems of AKI.[1-4] Last, there is limited awareness by health care workers of the problems presented by AKI in terms of diagnosis, treatment, and management.[1-4,7,8] Thus, developing and implementing effective strategies to eliminate preventable deaths from AKI in LRS will require that efforts be made to better understand how to increase the awareness of AKI by health care workers and institutions. Further, it will require better understanding of how to implement innovative approaches for the early and effective treatment of AKI in the context of the local health care environment and available resources.

EPIDEMIOLOGY OF AKI IN LRS

Despite the paucity of quality data for the epidemiology of AKI in LRS, the prevalence of AKI in this setting is estimated to be higher than in developed countries.[1,3,8] It has been suggested that AKI is

From the [1]Duke Global Health Institute, Duke University, Durham, NC; [2]Makerere University College of Health Sciences, Kampala, Uganda; [3]Kilimanjaro Christian Medical Center, Moshi, Tanzania; [4]St. James's University Hospital, Leeds, United Kingdom; [5]Queen's College, Kingston, Ontario, Canada; and [6]Yale University, New Haven, CT.

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Address correspondence to Fredric O. Finkelstein, MD, 136 Sherman Ave, New Haven, CT 06515. E-mail: fof@comcast.net

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responsible for up to 1.4 million deaths per year and that AKI-related problems account for up to 3% of hospital admissions in general health care facilities in LRS.[7,8] In a recent study from the largest tertiary hospital in Uganda, the prevalence of AKI among patients admitted with sepsis, a relatively common cause of hospitalization, was 16%, whereas in-hospital mortality was 21% for patients with sepsis and AKI.[9] In 2 separate studies from India, the incidence of AKI in in-patient wards and pediatric intensive care units ranged between 5%-9% and 25%-36%, respectively.[10,11] Of note, patients in LRS are typically young and otherwise healthy, whereas patients with AKI in the developed world generally are older and have multiple comorbid conditions.[1,2,4,8-12] Although all situations are tragic, the deaths of young patients with AKI in LRS can have devastating impacts on both the economic and social structure of families.

The cause of AKI can be broadly categorized as hospital acquired and community acquired (Box 1).[8] The etiologic spectrum of hospital-acquired AKI in LRS, which has been described primarily in large urban centers in these nations, is similar to the causes in more affluent countries. It includes postsurgical complications, hemorrhage, infections, septic shock, and drug toxicity.[7,8] In contrast, community-acquired AKI in LRS is mostly encountered in rural areas, and its true prevalence and leading causes are not well known, reflecting under-reporting, limited diagnostic capacity, and lack of awareness by health care workers.[3,7,8] Causes of AKI discussed in the literature include infections, such as pneumonia, diarrhea, sepsis, and tropical illnesses (malaria, leptospirosis, dengue, etc); acute glomerular diseases; obstetric complications; exacerbations of underlying kidney disease; intake of herbal remedies and other nephrotoxins; cardiac disease; traumatic injury; and environmental exposures such as snake bites.[7-11]

Box 1. Causes of AKI in Low-Resource Settings

Community-acquired AKI
- Tropical infections (eg, malaria, leptospirosis, dengue)
- Other infections (gastroenteritis, pneumonia, skin)
- Acute glomerular diseases
- Obstetric causes
- Underlying chronic disease (kidney disease, cardiac disease, diabetes, etc)
- Herbal remedies
- Trauma (traffic injuries, natural disasters)
- Nephrotoxins
- Environmental causes (eg, snake bites)
- Hemolytic uremic syndrome

Hospital-acquired AKI
- Major surgeries
- Hemorrhage
- Infections
- Septic shock
- Drug toxicity
- Underlying chronic diseases

Abbreviation: AKI, acute kidney injury.

BARRIERS TO DIAGNOSIS AND TREATMENT OF AKI IN LRS

There are major challenges to developing strategies to establish an early diagnosis and institute appropriate treatment of AKI in LRS.[1-5] AKI diagnosis and treatment are limited by available resources, including a lack of appropriate tools (including laboratory supplies and necessary therapeutic armamentarium) and adequate medical infrastructure and personnel.[13,14] The scarcity of resources for AKI care in LRS is compounded by substantial disparities in delivery of health care resources between large urban areas and rural centers. For example, a recent study describing the availability and quality of laboratory services in sub-Saharan Africa noted that 37 of 49 countries had no laboratories accredited to international quality standards.[14] Moreover, the laboratory services that were available were generally available only in large urban centers.

Additional challenges to treating patients with AKI include delays in patients seeking health care and an inability of patients to get to, pay for, and avail themselves of such services. For example, during the earthquake in Haiti in January 2010, only 19 patients were referred to the Renal Disaster Relief Task Force in Port-au-Prince despite more than 300,000 casualties.[15] The causes of such delays are multifactorial; in addition to financial issues, factors include transportation and communication gaps, as well lack of awareness among patients and health care workers of the urgency of early treatment for AKI. This holds true even though the benefits of early interventions in critically ill patients, in terms of AKI prevention and the need for kidney replacement therapy, have been well documented and discussed.[16,17]

BARRIERS TO RAISING AKI AWARENESS IN LRS

Global Survey Development and Dissemination

Because AKI has not been recognized as a major health problem in LRS, implementing strategies to increase awareness of the importance of AKI among health care providers and in the community has received insufficient attention.[1,5,7,8] To better understand the barriers to improving awareness of AKI in LRS, a questionnaire (Item S1) was developed by a group of 20 nephrologists during the 2014 International Society of Peritoneal Dialysis (ISPD) meetings in Madrid. These nephrologists included physicians from sub-Saharan Africa, Southeast Asia, North and