

# Assessing and Improving the Capacity of District Health Services in the Management of Acute Kidney Injury in Low- and Middle-Income Countries

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*Kidney Int Rep* (2020) ■, ■-■; <https://doi.org/10.1016/j.ekir.2020.04.025>

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The burden of acute kidney injury (AKI) is predicted to be high in low- and middle-income countries (LMICs), with a number of differences compared with AKI encountered in better-resourced parts of the world.<sup>1</sup> AKI is predominantly community acquired and affects younger patients in LMICs, and high rates of HIV coupled with an increasing prevalence of noncommunicable diseases such as diabetes and hypertension make patients here at particular risk of kidney disease. Although the main causes of AKI (infectious illness, hypovolemia, and nephrotoxin use) in LMICs are preventable and treatable, delayed presentation, lack of

diagnostic capacity, and limited resources for management mean outcomes for patients are currently poor.<sup>2,3</sup> Service improvement initiatives, such as the International Society of Nephrology (ISN) Oby25 and Kidney Care Network Projects ([www.theisn.org/programs/isn-kidney-care-network](http://www.theisn.org/programs/isn-kidney-care-network), accessed May 1, 2020), have been established to address these concerns.<sup>4,5</sup>

The structures of many health-care systems in LMICs, particularly in sub-Saharan Africa, are similar. Most patients present to community health centers or district hospitals, which act as primary care facilities in this region. Basic to intermediate care is delivered at these sites, with referral to provincial and then tertiary hospitals being made for only the sickest patients requiring specialist services. Specialists, including nephrologists, are based in tertiary centers and usually have little

input regarding the care of patients in community settings. Health centers are run by mainly nurses and clinical officers (healthcare workers with basic medical training, equivalent to a physician's assistant), and one general physician will often be responsible for all inpatient and outpatient district hospital medical care. Hence, most patients with AKI in LMICs are likely to initially present to district healthcare facilities run by nonspecialists, and ensuring that kidney disease can be appropriately identified and managed at this level is a crucial part of improving patient outcomes from AKI in this part of the world. To achieve this goal, sub-tertiary facilities must have the appropriate resources for diagnosis and treatment of kidney disease, and they must be staffed by healthcare workers with the relevant training in how to manage AKI. An assessment of the capacity of health systems at a national and regional level to achieve this goal is an important first step on the path to improving kidney care in LMICs.

In this issue, Igiraneza *et al.*<sup>6</sup> assess the capacity of district and provincial facilities to diagnose and manage AKI in Rwanda. This assessment was undertaken by surveying 10 sub-tertiary hospitals from across the country and 193 healthcare workers (nurses, doctors, and midwives) who worked in these settings. Specifically, using a structured questionnaire, the authors determined the laboratory capacity to identify kidney injury and the availability of medical equipment and supplies for its treatment. Thereafter, they assessed healthcare worker knowledge and confidence with respect to AKI management using a series of profession-specific case

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vignettes. Both of these resources are published alongside the main article and may be used as a basis for similar assessments elsewhere. The authors identified significant practical and infrastructural challenges to AKI management, namely a lack of diagnostic capacity, limited treatment options, and shortcomings in primary health-care worker ability to manage kidney disease. In our experience, these are common features seen in other healthcare systems within the region, and in other LMICs worldwide.

As a result of limited symptoms until its late stages, identification of kidney disease is primarily reliant on measurement of serum creatinine using either a laboratory-based biochemical analyzer or a point-of-care device.<sup>7</sup> Being unable to reliably measure creatinine level (or another biomarker of renal function) makes the practice of nephrology almost impossible, no matter where you are based. The timely identification of renal dysfunction remains, in our opinion, the greatest challenge faced by healthcare workers managing kidney disease in LMICs. Although most facilities in the current study were able to measure serum creatinine level, in our experience in sub-tertiary hospitals elsewhere within the region, this is frequently not the case. This inability is often due to lack of a laboratory technician and a functioning analyzer, or the reagents for its use. As highlighted by the authors, involvement of frontline clinicians in procurement processes and the undertaking of advocacy activities with government officials may help ensure funding for this essential aspect of nephrology care.<sup>6</sup> We encourage the global nephrology community to complement these efforts by research

activities aimed at producing simpler and more cost-effective methods of determining renal function, with either currently used or novel biomarkers of kidney function, for use in LMICs.

The management of AKI in LMICs commonly involves relatively simple interventions such as correction of hypovolemia with oral or intravenous fluid therapy, treatment of an underlying infection, avoidance of the use of nephrotoxic drugs, and subsequent monitoring of physiological response. Crystalloid intravenous fluids, antimicrobials, urinary catheters and measuring bags, and equipment to monitor vital signs were largely available in the current study for these purposes, and we would advocate for these to be made essential items in sub-tertiary hospitals in LMICs.<sup>6</sup> The development of an international consensus for the minimum requirements for AKI care in sub-tertiary hospitals may improve government collaboration in these efforts and should be considered. Patients who are unresponsive to initial therapy and in need of renal replacement therapy must then be identified early, with transfer to tertiary nephrology services if renal replacement therapy cannot be provided locally. Improving communication between district and tertiary healthcare services may facilitate referrals, as may the development of protocolized referral pathways and improved education of district healthcare workers to identify appropriate patients, as outlined below. The development of provincial acute peritoneal dialysis services, which has been proven to be a safe and effective modality for the management of AKI in patients of all ages in LMICs, may be considered in countries where distances are too great for transfer of patients to tertiary care.<sup>8,9</sup>

The adequate provision of resources for the management of AKI in sub-tertiary settings is meaningless unless healthcare workers at these sites are trained in the identification and management of kidney disease. This requires inclusion of AKI in undergraduate and postgraduate curricula for medical, nursing, and midwifery trainees. We advocate that this training be supported by continued and regular professional development thereafter. As highlighted in the current study, overall healthcare worker ability was moderate to poor, and in doctors, ability worsened with age.<sup>6</sup> As in other countries in sub-Saharan Africa, district healthcare workers encountered AKI frequently but wanted more help with its management.<sup>9</sup> The development of online AKI training modules, increased interaction between district and tertiary services through outreach education programs, and the development of country/region-specific AKI management protocols may be useful initiatives in providing better support to district healthcare workers who often manage patients in challenging environments.

## Conclusions

Ensuring the capacity of sub-tertiary healthcare facilities to manage kidney disease is vital in efforts to improve outcomes from AKI in LMICs. An assessment of current capacity within individual countries and regions is a useful way of identifying areas that require improvement. The development of an international consensus on the minimum requirements for AKI care at sub-tertiary hospitals should be considered. This set of requirements could then be used to advocate with governments for the resources and training required to

improve AKI management in LMICs worldwide.

## DISCLOSURE

All the authors declared no competing interests.

## SUPPLEMENTARY MATERIAL

Supplementary File (PDF)

**Supplementary References.**

## REFERENCES

1. Lewington AJP, Cerdá J, Mehta RL. Raising awareness of acute kidney injury: a global perspective of a silent killer. *Kidney Int.* 2013;84:457–467.
2. Cerdá J, Mohan S, Garcia-Garcia G, et al. Acute kidney injury recognition in low- and middle-income countries. *Kidney Int. Rep.* 2017;2:530–543.
3. Evans RDR, Hemmilä U, Craik A, et al. Incidence, aetiology and outcome of community-acquired acute kidney injury in medical admissions in Malawi. *BMC Nephrol.* 2017;18:21.
4. Mehta RL, Cerdá 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. *Lancet.* 2015;385:2616–2643.
5. Mehta RL, Burdmann EA, Cerdá J, et al. Recognition and management of acute kidney injury in the International Society of Nephrology Oby25 Global Snapshot: a multinational cross-sectional study. *Lancet.* 2016;387:2017–2025.
6. Igiraneza G, Dusabejambo V, Finkles-tein FO, Rastegar A. Challenges in the recognition and management of acute kidney injury by hospitals in resource-limited settings [e-pub ahead of print]. *Kidney Int. Rep.* <https://doi.org/10.1016/j.ekir.2020.04.003>.
7. Raimann JG, Riella MC, Levin NW. International Society of Nephrology's Oby25 initiative (zero preventable deaths from acute kidney injury by 2025): focus on diagnosis of acute kidney injury in low-income countries. *Clin Kidney J.* 2018;11:12–19.
8. Smoyer WE, Finkelstein FO, McCulloch MI, et al. "Saving Young Lives" with acute kidney injury: the challenge of acute dialysis in low-resource settings. *Kidney Int.* 2016;89:254–256.
9. Evans R, Rudd P, Hemmila U, et al. Deficiencies in education and experience in the management of acute kidney injury among Malawian healthcare workers. *Malawi Med J.* 2015;27:101–103.