



Outcomes of acute kidney injury in children and adults in Sub-Saharan Africa

Jorge Cerdá¹, Dwomoa Adu², Norbert H. Lameire³

¹Albany Medical College, Albany, New York, USA; ²School of Medicine and Dentistry, University of Ghana, Accra, Ghana; ³Department of Medicine and Nephrology, University Hospital, Ghent, Belgium

Correspondence to: Jorge Cerdá, MD, MS, FACP, FASN. Professor of Medicine, Albany Medical College, Albany, New York, USA.

Email: cerdaj@mail.amc.edu or cerda@nycap.rr.com.

Comment on: Olowu WA, Niang A, Osafo C, *et al.* Outcomes of acute kidney injury in children and adults in sub-Saharan Africa: a systematic review. *Lancet Glob Health* 2016;4:e242-50.

Received: 11 October 2016; Accepted: 26 October 2016; Published: 09 January 2017.

doi: 10.21037/jphe.2016.12.21

View this article at: <http://dx.doi.org/10.21037/jphe.2016.12.21>

In low and middle income countries (LMIC), the burden of acute kidney injury (AKI) is increasingly high, and associated with a higher mortality when compared with high income countries (1). Recently, Prof. Olowu and collaborators performed an important and informative systematic review (2) on the status of AKI in Sub-Saharan Africa to assess the outcomes of the condition and to identify barriers of care.

Their studies spanned between April, 1990 and November, 2014, and the search scope was quite exhaustive. As in other recent systematic reviews (3-7) and meta-analysis (1,8), the authors had to deal with the usual obstacles facing such studies in LMIC, including poor AKI recognition and gross underreporting. Expectedly, most of the articles reviewed were limited in scope and predominantly biased towards large health centers with some form of dialysis available. In spite of those limitations, Olowu *et al.* were correct in including as many studies as possible, and in making a strong effort to extract generalizable results out of a very heterogeneous dataset.

Unfortunately, this study can only describe the characteristics and outcomes of those patients with community-acquired AKI who eventually made it to the hospital: the study cannot inform what happens to the majority of the patients who never make it beyond the local dispensary or the traditional healer. The clinical presentation and outcomes of those patients remains unknown. Such lack of worldwide data inspired the International Society of Nephrology to establish the

“0 by 25” AKI Initiative, with the aim of preventing all avoidable deaths from AKI worldwide by 2025 (9) and the Saving Young Lives (SYL) project in collaboration with the International Society of Peritoneal Dialysis, the International Pediatric Nephrology Association and the Sustainable Kidney Care Foundation, to provide training and education in LMIC to establish sustainable programs of peritoneal dialysis treatment for patients with AKI (10).

Limitations in AKI recognition and care are illustrated by the enormous delays faced by patients attempting to reach referral hospitals. Patients spend days with worsening untreated AKI, and when they finally reach the hospital, they are severely sick and experience high mortality. Further delays continue to occur while in hospital, where erratic dialysis availability and lack of funds impairs timely care and dialysis, leading to high mortality and impaired recovery.

The situation is especially distressing among children, whose mortality is enormous and in some regions worsening instead of improving, due to late recognition and poor availability of dialysis (11). Ongoing review of the results of the recent Global Snapshot of the “0 by 25” International Society of Nephrology initiative (12) among children, confirms these findings.

Problems start with a severe lack of AKI recognition. Underreporting, caused by under-recognition compounded by poor data collection, decreases AKI awareness and minimizes its political impact, making AKI a low-priority public health problem (13). Under-recognition is not an

exclusive problem of Sub Saharan Africa (14); many other areas such as Latin America (15) and China (16,17) are affected by limitations that are only starting to become evident.

In the Sub-Saharan community environment, very few physicians are available; most commonly, patients are first seen and often treated by either nurses or healthcare-givers with limited training, who rarely recognize AKI or treat it aggressively (5). Such lack of early recognition allows progression to more severe stages. Delays of up to 3 weeks between onset of symptoms and presentation to hospital were described in three African adult studies (18-20) and in multiple pediatric studies (21-23). By the time they reach the hospital, few patients recover; the majority either receives dialysis or dies due to unavailability of dialysis.

Clearly, early AKI recognition is impaired by inappropriate education of healthcare-givers. If better outcomes are to be achieved, it will be necessary to provide educational tools at all levels of the healthcare system, from the providers of the most basic care at the local dispensary level, to the nurses and physicians at the regional and referral center. In rural centers, primary caregivers must be trained to recognize and treat common AKI causes and to organize the timely transfer of individuals requiring critical care to hospitals able to deal with AKI, including the provision of renal replacement therapies (11). As proposed by the current "0 by 25" Initiative, currently developing pilot projects are expected to inform the implementation of early recognition and management of AKI in multiple LMIC contexts (12).

As illustrated in the Olowu study, in the community setting, pervasive economic and gender inequalities limit the treatment of female adults and children. Such discrimination, together with an unacceptably high incidence of pregnancy-related AKI, either as a complication of septic abortion or late-pregnancy and neonatal complications, is the cause of a disproportionate burden of disease for females and their offspring. As described in the United Nation's Millennium Goals and Sustainable Growth Initiatives, addressing such problems and sources of inequality should be a key priority for action (24-27).

Countries with limited resources are unable to fund a consistent system of dialysis throughout the region, so a search for inexpensive solutions to dialysis delivery (such as locally developed peritoneal dialysis solutions) should be implemented (28,29).

But as this report describes, in LMIC and especially

in Sub-Saharan Africa, AKI is primarily a public health problem. Notwithstanding the efforts to improve the availability of dialysis, the majority of the effort must focus on the organization of local, regional and national public health initiatives leading to prompt management of the main mechanisms leading to AKI, including ensuring availability of clean water; management of high malaria and HIV prevalence; control of other endemic conditions such as typhoid fever; minimization of the exposure to nephrotoxins; and provision of adequate prenatal care that ensures eradication of obstetric and neonatal complications. Concerns with the allocation of foreign aid to LMIC, which in some cases cause unbalanced allocation of human resources and funding, must be addressed so that the underfunded primary healthcare clinics that treat all diseases are protected and promoted as the key components of community success (11).

The importance of local health facilities is reinforced in Sub-Saharan Africa, where communities are often faced with limited government resources and have to organize themselves to provide health services to community members. As a result, the ability of communities to engage in collective action (e.g., by maintaining health facilities) and to promote the relevant social norms (e.g., introducing sound hygiene practices) would appear to be crucial for health improvements in Africa (30).

Our research demonstrates a clear correlation between investment in health and incidence and mortality associated with AKI (1). Undoubtedly, investment in such pressing problems will be the most effective and in the long run, least expensive model to decrease the incidence and mortality of AKI among the young, thriving populations of Sub Saharan Africa. If these patients were treated in the early stages at the community level, when early interventions driven by appropriate early recognition and availability of treatment protocols are most likely to limit the severity of the condition, millions of young lives would be saved and their quality of life would dramatically improve, thus making AKI in low middle income countries, as commented by Drs. Perico and Remuzzi (31), no longer a death sentence.

Acknowledgments

Funding: None.

Footnote

Provenance and Peer Review: This article was commissioned

by the editorial office, *Journal of Public Health and Emergency*. The article did not undergo external peer review.

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/jphe.2016.12.21>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Open Access Statement: This is an Open Access article distributed in accordance with the Creative Commons Attribution-NonCommercial-NoDerivs 4.0 International License (CC BY-NC-ND 4.0), which permits the non-commercial replication and distribution of the article with the strict proviso that no changes or edits are made and the original work is properly cited (including links to both the formal publication through the relevant DOI and the license). See: <https://creativecommons.org/licenses/by-nc-nd/4.0/>.

References

- Mehta RL, Cerdá J, Burdmann EA, et al. International Society of Nephrology's 0by25 initiative for acute kidney injury (zero preventable deaths by 2025): a human rights case for nephrology. *Lancet* 2015;385:2616-43.
- Olowu WA, Niang A, Osafo C, et al. Outcomes of acute kidney injury in children and adults in sub-Saharan Africa: a systematic review. *Lancet Glob Health* 2016;4:e242-50.
- Cerdá J, Bagga A, Kher V, et al. The contrasting characteristics of acute kidney injury in developed and developing countries. *Nat Clin Pract Nephrol* 2008;4:138-53.
- Jha V, Parameswaran S. Community-acquired acute kidney injury in tropical countries. *Nat Rev Nephrol* 2013;9:278-90.
- Naicker S, Aboud O, Gharbi MB. Epidemiology of acute kidney injury in Africa. *Semin Nephrol* 2008;28:348-53.
- Lameire NH, Bagga A, Cruz D, et al. Acute kidney injury: an increasing global concern. *Lancet* 2013;382:170-9.
- Cerdá J, Lameire N, Eggers P, et al. Epidemiology of acute kidney injury. *Clin J Am Soc Nephrol* 2008;3:881-6.
- Susantitaphong P, Cruz DN, Cerda J, et al. World incidence of AKI: a meta-analysis. *Clin J Am Soc Nephrol* 2013;8:1482-93.
- Remuzzi G, Horton R. Acute renal failure: an unacceptable death sentence globally. *Lancet* 2013;382:2041-2.
- Finkelstein FO, Smoyer WE, Carter M, et al. Peritoneal dialysis, acute kidney injury, and the Saving Young Lives program. *Perit Dial Int* 2014;34:478-80.
- Lameire N, Van Biesen W, Vanholder R. Epidemiology of acute kidney injury in children worldwide, including developing countries. *Pediatr Nephrol* 2016. [Epub ahead of print].
- Mehta RL, Burdmann EA, Cerdá J, et al. Recognition and management of acute kidney injury in the International Society of Nephrology 0by25 Global Snapshot: a multinational cross-sectional study. *Lancet* 2016;387:2017-25.
- Lewington AJ, Cerdá J, Mehta RL. Raising awareness of acute kidney injury: a global perspective of a silent killer. *Kidney Int* 2013;84:457-67.
- Feehally J, Couser W, Dupuis S, et al. Nephrology in developing countries: the ISN's story. *Lancet* 2014;383:1271-2.
- Lombardi R, Yu L, Younes-Ibrahim M, et al. Epidemiology of acute kidney injury in Latin America. *Semin Nephrol* 2008;28:320-9.
- Xu X, Nie S, Liu Z, et al. Epidemiology and Clinical Correlates of AKI in Chinese Hospitalized Adults. *Clin J Am Soc Nephrol* 2015;10:1510-8.
- Yang L, Xing G, Wang L, et al. Acute kidney injury in China: a cross-sectional survey. *Lancet* 2015;386:1465-71.
- Bah AO, Kaba ML, Diallo MB, et al. Renal diseases--morbidity and mortality in Nephrology Service, National Hospital Donka. *Mali Med* 2006;21:42-6.
- Lengani A, Kargougou D, Fogazzi GB, et al. Acute renal failure in Burkina Faso. *Nephrol Ther* 2010;6:28-34.
- Arogundade FA, Sanusi AA, Okunola OO, et al. Acute renal failure (ARF) in developing countries: which factors actually influence survival. *Cent Afr J Med* 2007;53:34-9.
- Aloni MN, Nsibu CN, Meeko-Mimaniye M, et al. Acute renal failure in Congolese children: a tertiary institution experience. *Acta Paediatr* 2012;101:e514-8.
- Olowu WA, Adelusola KA. Pediatric acute renal failure in southwestern Nigeria. *Kidney Int* 2004;66:1541-8.
- Balaka B, Douti K, Gnazingbe E, et al. Etiologies et pronostic de l'insuffisance rénale de l'enfant à l'hôpital universitaire de Lomé. *Journal de la Recherche Scientifique de l'Université de Lomé* 2012;14:11-8.
- GBD 2015 SDG Collaborators. Measuring the health-related Sustainable Development Goals in 188 countries: a baseline analysis from the Global Burden of Disease Study

2015. *Lancet* 2016;388:1813-50.
25. Mathews S, Martin LJ, Coetzee D, et al. Child deaths in South Africa: Lessons from the child death review pilot. *S Afr Med J* 2016;106:851-2.
26. Moran AC, Jolivet RR, Chou D, et al. A common monitoring framework for ending preventable maternal mortality, 2015-2030: phase I of a multi-step process. *BMC Pregnancy Childbirth* 2016;16:250.
27. Munamati M, Nhapi I, Misi S. Exploring the determinants of sanitation success in Sub-Saharan Africa. *Water Res* 2016;103:435-43.
28. Smoyer WE, Finkelstein FO, McCulloch M, et al. Saving Young Lives: provision of acute dialysis in low-resource settings. *Lancet* 2015;386:2056.
29. 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;89:254-6.
30. Hollard G, Sene O. Social capital and access to primary health care in developing countries: Evidence from Sub-Saharan Africa. *J Health Econ* 2016;45:1-11.
31. Perico N, Remuzzi G. Acute kidney injury in low-income and middle-income countries: no longer a death sentence. *Lancet Glob Health* 2016;4:e216-7.

doi: 10.21037/jphe.2016.12.21

Cite this article as: Cerdá J, Adu D, Lameire NH. Outcomes of acute kidney injury in children and adults in Sub-Saharan Africa. *J Public Health Emerg* 2017;1:18.