

# “Saving Young Lives” with acute kidney injury: the challenge of acute dialysis in low-resource settings



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**A**cute kidney injury (AKI) in low-resource settings is an often fatal consequence of common health events such as severe infection (e.g., malaria or leptospirosis) or volume depletion (e.g., severe diarrhea or obstetric hemorrhage). It disproportionately affects children and young adults, and represents a major preventable loss of life years.

The International Society of Nephrology (ISN) has recently launched 0by25, an ambitious agenda to eliminate all preventable deaths from AKI by 2025.<sup>1,2</sup> The 0by25 effort will focus on evidence and awareness, building the case for AKI as a common, preventable, and treatable cause of morbidity and mortality across the world. 0by25 will also focus on education and training for health workers to increase early detection of AKI and institute simple preventative management, such as fluid repletion.

But what of those dying from AKI now? Even when oliguria with life-threatening hyperkalemia or acidosis has supervened, survival in excess of 50% can be expected if acute dialysis is available to maintain the patient for the 5 to 15 days it typically takes for spontaneous recovery of kidney function. However, in many low-resource settings there is therapeutic nihilism; oliguric AKI is often regarded as a death sentence since health care resources are limited, and focused on other treatable acute illnesses.

Provision of acute hemodialysis is an unrealistic prospect in very low-resource settings, as unreliable electricity and water supplies, the high cost of machines and consumables, and lack of expertise all conspire against success. By contrast, acute peritoneal dialysis (PD) is realistic to deliver; it is affordable, technically simple, and does not rely on machines or electricity. Our experience in establishing acute PD programs in very low-resource settings shows what is possible, but also the many frustrations and challenges “on the ground” that must be overcome to establish truly sustainable acute PD programs in low-resource countries.

## WHAT IS THE SAVING YOUNG LIVES PROGRAM?

We established the Saving Young Lives (SYL) program in 2012 with the goal of establishing proof-of-principle sustainable acute PD programs in very low-resource settings, measuring their success, and providing a template for the extension of such programs across the many parts of the world where they will save lives. Our initial efforts were built on our experience in a pilot project in Moshi, Tanzania.<sup>3</sup> SYL is a complementary partnership between 3 international nephrology organizations whose major roles are to provide education and training—the ISN, the International Pediatric Nephrology Association (IPNA), and the International Society for Peritoneal Dialysis (ISPD)—and a fourth, the Sustainable Kidney Care Foundation (SKCF), a nonprofit organization whose goal is to make dialysis supplies available in very low-resource settings. SYL was established with 5 years of funding from the Recanati-Kaplan Foundation.

## CHOOSING SYL CENTERS

Our choice of sites has been both pragmatic and opportunistic. We have worked initially in sub-Saharan Africa and Southeast Asia, because of the contacts and past experience of the partner organizations. A local leader and champion is critical, a physician with passion, commitment, and appropriate training, and often someone who has previously received a training fellowship with the ISN, IPNA, or ISPD. Equally important are nurses with the same commitment, since acute PD can only be delivered using a clinical team approach. There must also be a strong commitment from the hospital, usually in the form of a signed agreement that if PD supplies (catheters and fluids) are provided for 2 years, the hospital will commit to continuing the SYL program thereafter, usually meeting future costs by ring-fencing the small treatment fees paid by patients. A data sharing agreement is also needed, since SYL must be in a position to audit its progress and achievements. This has the additional benefit of assisting participating

William E. Smoyer<sup>1,2</sup>,  
 Fredric O. Finkelstein<sup>3</sup>,  
 Mignon I. McCulloch<sup>4</sup>,  
 Mary Carter<sup>5</sup>,  
 Ariane Brusselmanns<sup>6</sup> and  
 John Feehally<sup>6</sup>  
<sup>1</sup>Nationwide Children's  
 Hospital, Center for Clinical  
 and Translational Research,  
 The Research Institute at  
 Nationwide Children's Hospital,  
 Columbus, Ohio, USA;  
<sup>2</sup>Department of Pediatrics,  
 The Ohio State University,  
 Columbus, Ohio, USA;  
<sup>3</sup>Department of Medicine,  
 Yale University, New Haven,  
 Connecticut, USA; <sup>4</sup>Red Cross  
 Children's Hospital, Cape Town,  
 South Africa; <sup>5</sup>Sustainable  
 Kidney Care Foundation,  
 New York, New York, USA; and  
<sup>6</sup>International Society of  
 Nephrology, Brussels, Belgium  
**Correspondence:** John  
 Feehally, International Society  
 of Nephrology, Rue des  
 Fabriques 1, 1000 Brussels,  
 Belgium. E-mail: [Jf27@le.ac.uk](mailto:Jf27@le.ac.uk)

SYL centers to begin to understand the epidemiology of AKI in their own regions.

**EDUCATION AND TRAINING**

Practical hands-on training is critical to empower and embolden physician and nurse teams to initiate acute PD programs; such training opportunities are few in low-resource settings. To date, the SYL program has supported more than 50 nurses and physicians from our selected centers to travel to an annual training course at the Red Cross War Memorial Children’s Hospital in Cape Town, South Africa, the only such course to date in sub-Saharan Africa. This course provides the participants with training in all aspects of acute PD, including PD catheter insertion, PD fluid prescription, and clinical problem solving. We have also utilized other training sites where there are well-established acute PD programs, including centers in Sudan and Brazil. This training is given only when all the other elements of a new SYL program are in place, so that these physician–nurse teams can immediately begin to use their freshly learned skills when they return from training.

**MENTORSHIP**

Despite excellent training, the practicalities of starting and maintaining a PD program can seem daunting to a young team. To address this, we have organized for each SYL center a remote mentor, an experienced nephrologist who commits to prompt availability by e-mail and phone, to advise in real time on clinical care, and to offer advice and encouragement when various organizational and institutional challenges threaten success. Mentors are identified on the basis of personal contacts, appropriate language skills, and familiarity with the local health care issues, and they are proving critical to the success of the SYL programs.

**DIALYSIS SUPPLIES**

Reliable availability of PD catheters and fluid has often proved challenging, and represents the single major issue requiring site-specific resolution if acute PD is always to be available when needed. Newly developed international guidelines for acute PD<sup>4</sup> now make clear that commercial PD fluid represents the gold standard, but that when this is not available, locally prepared fluids are an acceptable alternative that can be lifesaving. Likewise, conventional cuffed PD catheters remain the optimal PD

access, but when they are not available, a range of available multipurpose catheters can be substituted. Commercial PD fluid is not yet manufactured in sub-Saharan Africa, so transport costs, import duties, and a variety of other “required” payments, some of which may be either inappropriate or illegal, all contribute to expense. The SKCF has substantial experience with these issues, yet there are countries where delivery of affordable PD fluid and catheters is still not possible. What are the possible resolutions of this issue? Can lessons be learned from the international agreements that have in recent years made affordable antiretroviral therapy very widely available in the developing world? Major international suppliers of PD fluid have yet to make sufficient changes in their pricing structures to make PD fluid realistically affordable for low-resource areas, particularly in light of significant existing transport and storage fees. Fluid and catheters are now beginning to be manufactured at significantly lower cost in other countries, for example India and Mexico, which will enhance access to care. But for the foreseeable future it seems likely that, at least at some sites, locally produced PD fluid based on available intravenous fluids will be required, and SYL centers are encouraged to use them.

**WHAT HAS BEEN ACHIEVED?**

We can report that SYL has supported the development of acute PD programs in 10 centers where dialysis was previously unavailable (Table 1). Outcome data are available from 8 centers, in which, between January 2013 and September 2015, 175 children and adults have now received acute dialysis. These patients had a mean age of 12 + 13 (SD) years, and PD

**Table 1 | Saving Young Lives centers and number of treated cases with available outcome data**

Saving Young Lives centers Country (city) <sup>a</sup>	Cases treated
	Jan. 2013–Sep. 2015
Benin (Cotonou)	24
Cambodia (Phnom Penh)	3
Cameroon (Mbingo)	27
Ethiopia (Addis Ababa)	3
Ghana (Accra)	8
Ghana (Kumasi)	80
Ivory Coast (Abidjan)	24
Tanzania (Moshi)	6
<b>Total</b>	<b>175</b>

<sup>a</sup>Two other centers have treated patients although additional case details are as yet unavailable—Democratic Republic of the Congo (Goma) and Tanzania (Mwanza).

was performed for a mean of 13 + 14 (SD) days. We are cautious in reporting successful outcomes, restricting this to those patients who left the hospital with complete recovery of renal function; this occurred in 33% of cases, reflecting 58 young lives saved. While it is a small start, we continue to learn lessons that we believe will lead us to a template for acute PD that can be adapted to be deliverable in many very low-resource settings worldwide.

**UNEXPECTED CHALLENGES**

Even when the principles of the program are clearly laid out, key personnel are trained and supported, and supply issues are resolved, there are unexpected challenges that can threaten an SYL center either temporarily or permanently. In one center, for example, the hospital’s only clinical biochemistry analyzer broke and was unrepaired for 6 months, making it impossible to measure either serum creatinine or potassium. In another center a key physician whom ISN had supported to train elsewhere for a year found on return that her post had been withdrawn. In another center, institutional financial and political support promised in a signed agreement proved untrustworthy. These are just a few examples of the case-by-case challenges that require detailed and ongoing attention to optimize the chances to develop truly sustainable acute PD programs. Proper sensitivity to the culture in which a program is being established can be critical in resolving issues. A common additional problem is that referral of patients to established programs has usually been much less than anticipated, highlighting the need to raise awareness of the challenge of AKI among health care workers, not only those working at referral hospitals hosting the

PD program, but also those working at district hospitals and community health centers. In this context, the 0by25 initiative will have an important role to play in raising community awareness about AKI.

**WHERE NEXT FOR SAVING YOUNG LIVES?**

Encouraging results after the first 3 years of the SYL program must be reinforced by demonstration of real sustainability and expansion. A program supported by SYL in Kumasi, Ghana, has been highly successful, treating 80 children in 3 years, and its physician leader has in turn already provided mentorship to a nearby hospital which has provided acute PD for the first time. But real sustainability will only come when governments are made aware of what is already being achieved and what is possible, and understand that acute PD is not a luxury therapy, but is affordable and deliverable and will save lives even in very low-resource settings. We have made an encouraging start, and invite others to join us in sustaining and expanding the SYL program worldwide. If you are interested in assisting us in our efforts, please go to <http://www.theisn.org/initiatives/saving-young-lives-project> or contact us at [abrusselmans@theisn.org](mailto:abrusselmans@theisn.org).

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