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Where There is No Peritoneal Dialysis Fluid: A Case Series from Malawi

M. Munthali Khomba¹, C. K. Munthali¹, C. Mulenga^{1,2}, E. C. Bjornstad^{3,*}

¹Department of Medicine, Renal Unit, Kamuzu Central Hospital, Lilongwe, Malawi

²University of Malawi, Kamuzu College of Nursing, Lilongwe, Malawi

³Department of Medicine, Division of Nephrology, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

Editor:

A low-income country in Southern Africa, Malawi has limited access to peritoneal dialysis (PD). Malawi is not unique in its struggles to provide PD, which is growing in demand for both acute renal failure (ARF) and end-stage renal disease (ESRD) worldwide. Malawi relies heavily on donated supplies and suffers frequent shortages of basic supplies (intravenous fluids, laboratory reagents, electricity) and PD fluid. The majority of Malawian ESRD patients are on hemodialysis rather than PD. Malawian providers are hesitant to embrace PD due to infection concerns and reliance on donated supplies.

Evaluations are mixed as to whether PD or hemodialysis is cheaper, but studies in the poorest countries suggest that PD may be more cost-effective (1, 2). If supplies are available, PD is drastically less time-intensive, with less equipment maintenance than hemodialysis. The International Society for Peritoneal Dialysis (ISPD)'s 2014 guidelines provide formulas for making local PD fluid for regions with shortages (3), yet practical reports of successful use have rarely been published.

In Malawi in 2018, there were only a few patients on chronic PD, but in April the entire country ran out of commercially prepared dialysate fluid. With no alternative, we created our own locally prepared fluid based on ISPD guidelines (3). Adapted sterile techniques were used to prepare local dialysate fluid with Ringers lactate and dextrose (Table 1). Intravenous tubing was modified to connect the Ringers lactate bag with dextrose to PD catheters (Figure 1). To decrease access frequency and minimize infections, dialysis prescriptions were decreased for patients, who initially dialyzed in-center. Our 2 patients survived the 8-week outage on locally prepared dialysate fluids.

Their survival highlights that dialysis on locally prepared PD fluids is possible. It is time-intensive and unlikely sustainable for long-term chronic dialysis, yet our experience

* ericaecuador@yahoo.com.

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highlights the possibility of performing PD with locally prepared fluids for short periods (i.e., temporary shortages, acute inpatient therapies, regions initiating PD programs). The majority of nations in sub-Saharan Africa rely on imported or donated PD fluid (4). After this prolonged outage, Malawi's Ministry of Health established a contract to import PD fluid and formed a Renal Task Force to bolster the country's own national program. Worldwide, the Saving Young Lives Program (4) strives to bring PD therapy for ARF to low-resourced areas, but there is a paucity of evidence-based, locally relevant data to guide practical clinical management in such places as Malawi. Hopefully these cases highlight possible management solutions for renal failure where commercially prepared PD fluid is lacking.

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Figure 1 —.

Modified connections for peritoneal dialysis catheter to intravenous fluid tubing and bag. The transfer set tubing is from a hemodialysis vascular catheter set. This is connected to patient's PD catheter; the intravenous giving set is any standard tubing connection from an intravenous fluid bag to an intravenous line; the connections allow the transfer set tubing to be connected to the intravenous giving set at these points.

Table 1

Supplies and Steps for Preparing Local Peritoneal Dialysate Fluid

Supplies	Steps
Intravenous giving sets	1) Perform hand washing
Transfer set tubing (can use hemodialysis vascular catheter sets or intravenous giving sets)	2) Put on personal protective equipment (non-sterile gloves, apron, mask)
20- to 50-mL syringes	3) Clean the area for supplies with antiseptic solution
50% dextrose	4) Assemble all necessary equipment on a flat surface (i.e., table or trolley)
1-liter bottles or bags of Ringers lactate	5) Clean drip stand, trolley, intravenous giving set, syringes, outer containers for the dextrose and Ringers lactate with antiseptic solution
Gloves, non-sterile and sterile	6) Hang the Ringers lactate bag on the drip stand
Sterile dressing pack	7) Remove PD catheter from the pouch and place it on a clean material (preferably sterile)
Plaster/gauze/cotton	8) Repeat hand washing
Iodized dressing	9) Put on sterile gloves
Disposable aprons/gowns/masks	10) Fill syringe with 50% dextrose volume according to desired dextrose concentration. See ISPD 2014 Guidelines (3).
Hand washing soap/water	11) Add the 50% dextrose volume to 1-liter Ringers lactate bag
Antiseptic solution (spirits, alcohol)	12) Connect an intravenous giving set to the Ringers lactate bag
	13) Drape the patient
	14) Perform cleansing and care of the PD catheter and exit site
	15) Put on a new pair of sterile gloves
	16) Connect the intravenous giving set to the PD transfer set
	17) Wrap the connection area with iodized dressing
	18) Locally prepared PD fluid can then be infused according to local practices and prescriptions for PD

ISPD = International Society for Peritoneal Dialysis; PD = peritoneal dialysis.