

# Hemodialysis Machines Capable of Performing Isolated Ultrafiltration in the Absence of Adequate Water Supply Are Needed During Disasters



**To the Editor:** Immediate life-threatening events associated with the interruption of extracorporeal renal replacement therapies during disaster situations are mainly caused by volume overload and hyperkalemia.<sup>1,2</sup> When the interruption of standard hemodialytic methods is due to lack of adequate dialysis water, convection-only<sup>S1</sup> renal replacement therapy aimed at removing excess volume with variable degrees of solute clearance can be life-saving in patients with acute kidney injury and end-stage kidney disease. This has been done in the Syrian conflict during the siege of Aleppo of 2016 using a conventional hemodialysis machine,<sup>3</sup> and even with a stand-alone blood pump to treat acute kidney injury during the same conflict.<sup>4</sup>

The simplest form of convection-only renal replacement therapy is isolated ultrafiltration,<sup>S1</sup> which can be used to manage patients with acute kidney injury or end-stage kidney disease with hemodynamic instability<sup>S2</sup> and some selected patients with refractory congestive heart failure.<sup>S3</sup> It is an excellent tool to treat volume overload, but the solute clearance is negligible.

On February 15, 2021, Louisiana was affected by a severe and long-lasting winter storm that led to the freezing of municipal water in many areas. In the private practice with which 2 of the authors (KS and PH) are affiliated, 4 dialysis facilities treating more than 250 outpatient hemodialysis patients were affected. The facilities were forced to shut down on February 15, then operated with a limited capacity on the 16th and the 17th. Loss of water pressure on the 18th and 19th of the month prevented normal operation despite the availability of adequate human resources, electricity, and functional machines. The regional hospital serving this population was affected with the same problem and only the critical care units' machines (NxStage; NxStage Medical, Inc., Lawrence, MA) that could use premade dialysate bags were operational.

The possibility of performing isolated ultrafiltration on February 18 and 19 using the available machines

(Fresenius 2008 T<sup>R</sup>; FMC, Waltham, MA) in the volume-overloaded patients who do not have significant hyperkalemia was entertained but it turned out, according to the facility's technical departments, that this was not feasible because the setting-up process requires the presence of dialysis water in the system before switching to the ultrafiltration-only mode.

The water returned to the facilities on February 20, and since then they have been operating normally. Ten patients required hospitalizations at remote hospitals due to interruption of dialysis, including 2 for hyperkalemia and 8 for volume overload.

While providing extra layers of safety, this lack of flexibility in at least some of the standard hemodialysis machines can be an obstacle to providing life-saving measures in disaster situations, and may increase the burden on already stretched to the limits emergency departments, hospitals, and functioning dialysis clinics.

The authors call on the manufacturers of hemodialysis machines to provide safe ways to operate readily available hemodialysis machines that can perform isolated ultrafiltration in the absence of adequate dialysis water.

## DISCLOSURE

MS, PH, and KS report receiving monetary compensation for working as medical directors at Fresenius Kidney Care dialysis facilities in the United States.

## SUPPLEMENTARY MATERIAL

[Supplementary File \(PDF\)](#)

### Supplementary References.

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