3 Day Emergency Dialysis Kit

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Introduction

Following natural disasters, dialysis clinics are unable to provide treatment for their patients. Many city facilities and vital services, such as water and power, can remain damaged or unavailable for as many as a few weeks. In one instance, it was reported that after a natural disaster the five leading causes of dialysis clinics becoming inoperable were: damage to reverse osmosis systems, interruption of water supply, failure of electrical power supply, structural damage to buildings and failure of telecommunications. Unfortunately, patients with end stage renal disease have the potential to become very sick in a matter of days without treatment. There is a need for the ability to provide dialysis treatment to patients in the midst of natural disasters wherever the patients may be.

Overview of Design

1. Connect power supply to water purification system.
2. Connect power supply to dialysis machine. The machine can be primed while the water purification is nearing completion.

Water Supply

- Use as little water as possible
- Weigh as little as possible
- Easy to use
- Power Source
- Is able to power water purification system and two sessions of dialysis

Dialysis Machine

- Uses a gas power generator or solar power.
- The machine weighs about 75 lbs and requires about 14 times less water than a conventional in-center dialysis machine.

Water Purification System

The water purification system developed herein consists of a disposable 0.2 micron pre-filter, a reverse osmosis membrane, two inline booster pumps to force water through the filter and membrane, and water reservoirs for storage of filtered and pure water. The design also contains a recycle stream which improves percent recovery of water to as high as 70 percent. The purification system was designed to fulfill project objectives to be reusable, rugged, and cost effective.

Future Work

- Purchase components and assemble designs.
- Test designs and make adjustments as needed.
- Design dialysate warmer to lower energy requirements.
- Adapt designs to work with peritoneal dialysis machine.

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References

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