

# What if a Disaster Happens Here?

## Questions and Answers

Based on lessons learned from past disasters

## For the Renal Community



Prepared by  
Northwest Renal Network



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Note: The information contained herein is only a guideline and is not intended to be an exhaustive compilation. Efforts have been made to address lessons learned from previous emergency and disaster situations. The contents are meant to be informative as well as thought provoking. The reader is encouraged to seriously consider the implications of how a disaster situation would impact his/her unique situation and develop preparedness and response plans accordingly.

## Preparing for the Unexpected

The public has been encouraged to have at least a 72-hour supply of provisions ready in case of disaster. If possible, each household should have a two-week (or longer) supply of food and water in reserve. Information on how dialysis patients can prepare is available at [www.medicare.gov/Publications](http://www.medicare.gov/Publications) : Publication number 10150 - Preparing for Emergencies: A Guide for People on Dialysis. General emergency preparedness information is available at [www.redcross.org](http://www.redcross.org) and [www.FEMA.gov](http://www.FEMA.gov), and many other sites on the Internet. Public libraries provide Internet services if it is not otherwise available.

## What if Something Happens Here?

The potential for a natural or man-made disaster or emergency is present at all times. The question becomes not "if" something could happen, but rather "when" something happens how will the renal community respond to the situation. The impact of a major emergency or disaster in the Northwest Renal Network area would likely cause disruptions in the provision of services to inpatient, acute, and outpatient hemodialysis, peritoneal dialysis, and kidney transplant patients. Even lower impact disaster events could cause disruptions in the provision of services. Effects on the dialysis community may include:

### Treatment Related

- Limited dialysis treatment availability (patients may miss treatments, and/or available dialysis treatments may have to be shortened or delayed.)
- Limited availability of supplies needed for dialysis
- Limited availability or unavailability of medications
- Disruption of essential services to the community (utilities, water, goods distribution, etc.)
- Increased risk of infection (such as PD catheter exit site)
- Increased risk of organ rejection for kidney transplant patients (due to medication availability)
- Destroyed or damaged dialysis centers and hospitals
- Limited availability of medical and nursing staff members
- Uncertainty regarding treatment locations

### Community Related

- Destroyed or damaged homes of patients, nurses, physicians, and other healthcare staff
- Destroyed or damaged hospitals, universities, dialysis centers, and nephrology offices
- Disruption of essential services to the community (utilities, water, goods distribution, etc.)
- Disruption of physicians' practices or research (The Renal Physicians Association (RPA) and other National Disaster Task Forces are examining and strategizing plans relating to this issue.)
- Death, injury, disease, or separation affecting loved ones

### Steps to Take

**First – Assess the situation.** Should a disaster affect the Northwest Renal Network geographical region, the first step is to assess the situation to determine how widespread the damage is and how many dialysis patients are affected. More information will be provided later in this guide as to how to know the status of open or closed dialysis facilities.

**Second – Put your emergency plans into action.** Hopefully, the plans are in place and have been tested through drills and brainstorming sessions well in advance of the emergency. Plans should be modified from lessons learned when responding to actual events and checked periodically to assure that contact information is current.

**Third – Maintain communication** with patients, staff, administration, Northwest Renal Network, and others.

## Emergency Plans

- Large dialysis corporations and regional independent corporations may have elaborate company-wide emergency plans in place for their facilities to implement to respond to disasters. Smaller dialysis organizations that are independently owned and/or hospital based may also have formalized response plans, but sometimes face special challenges during a crisis due to their autonomous structure.
- It is important that facility staff participates in disaster drills and understands their emergency response plan. Educating patients on emergency preparedness and response is a key part of the facility plan.
- It is important for all facilities to network with other dialysis providers pre -disaster to establish reciprocal agreements to provide dialysis services for patients should the facility be unable to perform treatments.
- Facilities will determine their open and closed status and communicate this to the Northwest Renal Network, who has access to the [www.dialysisunits.com](http://www.dialysisunits.com) website to post the open and closed status of facilities online. This site is dedicated to assisting the renal community in monitoring facility status.
- Resources to assist facilities in developing emergency plans may be found at: Facility Planning Guide by The National Kidney Foundation: [http://kidney.org/atoz/pdf/disaster\\_preparedness.pdf](http://kidney.org/atoz/pdf/disaster_preparedness.pdf)

**Emergency Preparedness for Dialysis Facilities**  
Publication # CMS 11025

**Tip:** Every dialysis facility must focus on:  
Adequate disaster planning, communication, and re-assessment of those plans!

## Northwest Renal Network

Northwest Renal Network (ESRD Network #16) is funded via a contract with the Centers for Medicare and Medicaid. Our region encompasses five states and we provide services in the areas of Quality Improvement; Technical Assistance; Education; Community Resources; Patient and Provider concerns, complaints and grievances; and data collection and management.

As of December 31, 2006, the Network's patient and provider population was as follows:

Alaska 325	Idaho 816	Oregon 2521	Montana 638	Washington 4873	Northwest Renal Network Total: 9,203
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At that time there were 8 transplant facilities, 138 dialysis facilities, and 3 veterans' administration or military dialysis facilities serving this patient population. In addition, 30 patients from surrounding states received care in this Network: California - 16, Nevada 6 and Wyoming 8.

Source: NW Renal Website. <http://www.nwrenalnetwork.org/modality/mode1206/all1206.htm#ALL1206s>

In preparation for an emergency Northwest Renal Network will:

- Encourage dialysis facilities to plan for emergency situations
- Provide technical assistance in the development of emergency plans
- Provide educational materials to the patient and provider community on topics related to emergency/disaster
- Develop an internal Network plan for preparedness and response, including arrangements with back up Networks if local operations are impaired

During an emergency response, and per HIPAA and CMS policy, the Northwest Renal Network will:

- Disseminate central contact numbers for dialysis providers in the affected area, to assist patients and providers in coordinating the provision of dialysis services
- Post information regarding open and closed status of facilities on the [www.dialysisunits.com](http://www.dialysisunits.com) website
- Assist patients in contacting dialysis providers to arrange treatment
- Assist family members in locating displaced patients
- Assist treating facilities to obtain necessary information to care for patients
- Work with the Centers for Medicare & Medicaid Services (CMS) or its contractor to maintain a database tracking system for patient whereabouts (dialysis centers and/or shelter locations)
- Host conference calls with CMS, providers, vendors, and other entities to coordinate care for the patients
- Enact back up Network arrangements if the operations of the Network office are compromised

Northwest Renal Network can be reached via telephone at 206-923-0714, fax at 206-923-0716, and through our website: [www.nwrenalnetwork.org](http://www.nwrenalnetwork.org) . Patients may use our toll-free number 1-800-262-1514.

**Tip:** If the Northwest Renal Network is affected by the disaster/emergency and is unable to provide assistance, you may contact the Forum of ESRD Networks office at 1-866-901- ESRD (1-866-901-3773) for assistance from another Network.

## Hospital Emergency Rooms and Acute Dialysis

Dialysis patients that normally dialyze in an outpatient facility may go to the local hospital emergency room for services should their home dialysis facility be unable to provide treatments or be inaccessible from the patient's home. It is the responsibility of the emergency room physician to evaluate the condition of the patient. Whether or not acute dialysis is ordered at that time depends on many factors including serum potassium levels, edema, symptoms, and other health factors. There are no guarantees that dialysis will be ordered by the emergency room physician or that the facility will have the capacity to provide acute dialysis. The possibility that large numbers of dialysis patients could present for treatment is a reality. If this occurs, please refer to the hospital policy and procedure relating to acute dialysis and how patients are to be evaluated.

This is a significant element to consider for pre-disaster planning at the individual hospital level as well as for the community at large. Awareness of which hospitals provide acute dialysis, as well as how to contact area outpatient dialysis providers and the Northwest Renal Network, should be considered in emergency preparedness planning. Consulting the website [www.nephron.com](http://www.nephron.com) regarding open and closed status of dialysis facilities may also be of help to hospitals/acute dialysis centers.

## Centers for Medicare & Medicaid Services

The Centers for Medicare & Medicaid Services (CMS), a division of Health and Human Services (HHS) within the United States government, plays an instrumental role in the coordination and impact of recovery and relief efforts. CMS assists dialysis and transplant centers by supporting the ESRD Networks activities, maintaining a patient database to track patient movement during a disaster, coordinating response efforts with provider organizations and other government agencies, and establishing processes that will expedite access to safe treatment for patients and recovery of facility operations.

## Utility Companies

It is very important to establish relationships and communication processes with the administrative and emergency response personnel at local power and water companies. Be sure they are aware of the unique needs of the vulnerable ESRD patient population, where your facility is located, its operating hours, and how many patients you serve. Also, utility companies have varying policies and practices on designation of persons with medical conditions for priority reinstatement of services. It is important to learn in advance if such prioritization is available and educate patients on how to complete any required documentation.

## Health Departments and Emergency Management Offices

The Health Department often is an underutilized partner in renal community emergency planning efforts. They have resource materials and the ability to communicate public assistance announcements to the general public. In emergency preparedness, the Health Department seeks to form community partnerships with the private sector to enhance the department's ability to respond to large-scale events.

Before a disaster occurs, get to know key individuals at your local Health Department. Tell them who you are and where your dialysis/transplant center is located. Educate them regarding how many patients you serve and discuss the implications of a disaster on the health of your unique renal community.

Similar outreach should be made to county and state emergency management personnel to increase awareness of the needs of ESRD patients and to have renal community representation in disaster planning coalitions.

## Patient Access to Dialysis Treatment

As a proactive measure, facility emergency response plans should include patient education on disaster preparedness and awareness of the facility plan to assist them in accessing dialysis treatments during an emergency situation. As referenced earlier, a resource guide for patients can be found at [www.medicare.gov/Publications](http://www.medicare.gov/Publications) : Publication number 10150 - Preparing for Emergencies: A Guide for People on Dialysis. A link to a publication on Preparing for Disaster for People with Disabilities and Other Special Needs can be found at the National Kidney Foundation website, <http://www.kidney.org/help/pdf/specialNeedsDisasterPreparation.pdf>.

If patients are able to dialyze at their usual dialysis facilities, they should continue to do so. Transportation challenges are significant during an emergency event and pre-planning with patients should include back up arrangements with friends or family to get to the facility. If a patient cannot dialyze at their usual facility, the patient should contact their dialysis provider for further directions or the Northwest Renal Network for assistance in reaching their provider. As part of facility planning, it is important to maintain current primary and secondary contact information for patients to facilitate your ability to contact patients regarding the treatment schedule and to find out their status if they have not come in to the unit for their treatment.

## What if a Patient is at a Shelter?

Patients that have been evacuated to a temporary shelter are encouraged to immediately identify themselves as dialysis or transplant patients to the officials coordinating the shelter and request evaluation for treatment. The patient will be triaged to determine if dialysis must be arranged immediately or if the patient is able to wait some length of time. Arrangements are then made to assist the patient in arranging for dialysis treatment. If the patient and shelter representative are unable to reach the dialysis provider, they may contact the Northwest Renal Network for assistance at 1-800-262-1514. Another challenge for shelter residents in accessing dialysis treatment is that they may be housed in more than one shelter during the evacuation process in a large-scale event, including evacuation to another state.

## What If Emergency Staff Are Needed?

This is one situation where the reciprocal care agreements between facilities may be helpful. Your back-up facility may be able to either send staff to your location or dialyze some or all of your patients. If your facility is part of a larger organization of facilities, contact the administrative office and advise them of your needs. During large-scale disasters, there are also dialysis teams that can mobilize to impacted areas. During recent emergencies, the American Nephrology Nurses Association (ANNA) was a clearinghouse for volunteers to contact them and acted as a liaison with the emergency teams. This will be available if needed in the future.

## Where Can I Get More Information?

- Kidney Community Emergency Response (KCER) Coalition, a national coalition of ESRD Networks, CMS and other government agencies, dialysis providers and medical personnel, patient associations, vendors, and other interested parties: [www.KCERCoalition.com](http://www.KCERCoalition.com).
- Open & Closed Status of Dialysis Facilities: [www.dialysisunits.com](http://www.dialysisunits.com)
- National Kidney Foundation Emergency Resources: [National Kidney Foundation](http://www.nationalkidney.org).
- American Nephrology Nurses Association (click on Practice button, then Disaster Preparedness) : <http://www.annanurse.org/>
- American Red Cross: [www.redcross.org](http://www.redcross.org)
- Federal Emergency Management website: <http://www.fema.gov/>
- Department of Homeland Security website: <http://www.dhs.gov/dhspublic/>
- National Disaster Medical System website: <http://www.oep-ndms.dhhs.gov/>
- US Disaster Medical Assistance Teams website: <http://www.dmat.org/>
- General Disaster Information for the renal community: <http://links.nephron.com/nephsites/disasters>

## Sources

- *Disaster Preparedness: What Have We Learned?* Power Point Presentation by Glenda M. Payne, RN, MS, CNN, Center for Medicare & Medicaid Dallas and Atlanta Regional Office.. Presented at the Fall ANNA meeting in Boston, MA.
- *Disaster Preparedness: Learning from Katrina.* Power Point Presentation by ESRD Network #13.
- Kopp J.B., Ball, L. K.,Cohen A.,Kenney R.J., Lempert K.D., Miller P.E., Mutner P., Quareshi N., Yelton S.A. (2006). *Dialysis patient care in disasters: Learning from the past and planning for the future.* *Clinical Journal of the American Society of Nephrology.* (Submitted for publication.)

**Refer to the following section for additional resource materials.**

**Tip:** This fact sheet could be given to Health Departments, city disaster planning committees, utility companies, etc. to educate lay people about dialysis

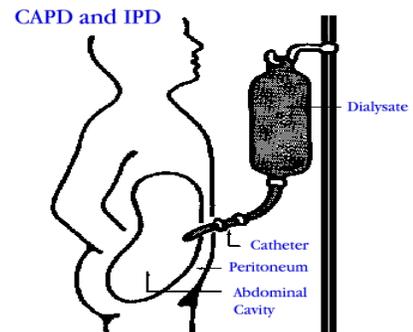
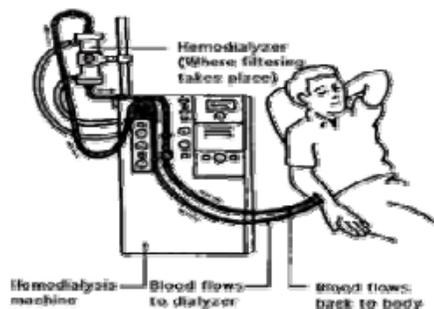
## Basic Facts About Kidney Disease And Treatment

Here are some basic facts about kidney disease, how it is treated, and what you may need to do to help individuals with kidney failure access life-saving/sustaining treatments, which require electricity, safe water, specialized equipment and specially trained personnel.

Kidneys perform crucial functions. When kidneys fail, the blood must be regularly cleansed of toxins and extra fluids by using either an artificial kidney (**hemodialysis**), by introducing a cleansing solution into the abdomen (**peritoneal dialysis**), or by using a healthy, donated kidney to replace the patient's failed kidney function (**kidney transplant**). If patients do not receive dialysis within 3 days they will become critically ill and may potentially die. Many patients suffer kidney failure due to either diabetes or high blood pressure (hypertension). Both of these conditions may also require special attention and have medications available that need to be taken regularly for the person to remain healthy.

**HEMODIALYSIS (HD):** This treatment involves cleaning the patient's blood of harmful toxins and excess fluids using an artificial kidney (dialyzer) and a hemodialysis machine. Treatment requires specially trained personnel, electricity, and safe water. Hemodialysis must be done at least three times a week, for about 3 to 4 hours each time. The public water supply can be used for dialysis, but the water must be specially treated with equipment that requires electricity, to remove substances (such as chlorine, aluminum, fluoride and bacteria) that would harm patients during dialysis. Most dialysis clinics do not have emergency generators, so restoring electricity will be critical. Those dialysis clinics with emergency generators would need a re-supply of fuel should the emergency situation last longer than one day. It takes more time and resources to set up temporary dialysis facilities than to restore existing facilities, if those facilities are not severely damaged. If dialysis cannot be provided in an outpatient setting, kidney patients will overload emergency rooms and hospitals that provide dialysis, impair access to patients needing hospital care and present a greater challenge for hospitals that do not routinely provide dialysis.

More patients each year choose to do their own treatments at home. Should a disaster affect a home dialysis patient's residence, making restoration of water and electricity services a high priority will restore the patient's ability to perform life-sustaining treatment. Home patients have been encouraged to notify their utility suppliers about their status as home dialysis patients. In emergencies of extended duration, these patients would need deliveries of dialysis supplies or may need to go to a dialysis facility for their treatments until they can resume home dialysis.



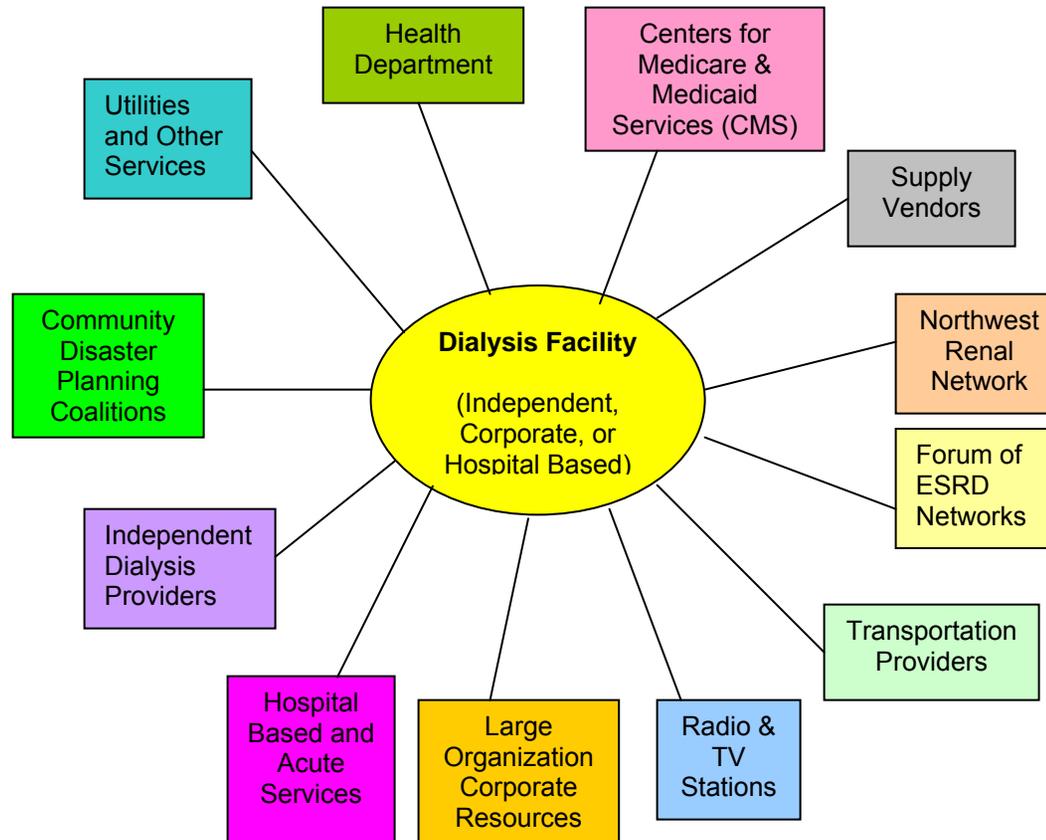
**PERITONEAL DIALYSIS (PD):** Peritoneal dialysis uses the patient's peritoneal membrane, which surrounds the intestines, to act as a filter. A tube (catheter) is placed into the peritoneal cavity and then a special solution (dialysate) flows through the catheter into the abdomen, where harmful toxins and excess fluids move from the blood to the dialysate. The solution is then drained out and discarded. Done at home, the treatments are continuous, with 4-6 exchanges of fluid being done daily. While some PD techniques use machines and electricity, in a disaster situation, these patients would use manual techniques that do not require electricity. They would need replenishment of supplies and an environment that protects them from infection. As with hemodialysis patients, not having treatment would lead to illness and death.

**TRANSPLANT:** Kidneys for transplant can come from either deceased or living donors. Patients who have received a transplant must have special drugs to prevent rejection of the kidney and avoid exposure to infections (i.e., those that could be spread by crowds in a shelter) since the drugs they take to prevent transplant rejection also diminish the body's ability to fight infections.

## Pre - Disaster/Emergency Planning

Adequate planning extends far beyond the walls of your dialysis facility!

Plan – Test – Re-Assess your Plan (Consider making plan A, B, and C)





## Kidney Community Emergency Response (KCER)

# Save A Life

## What You Need to Know About Emergency Preparedness for Individuals with Kidney Disease

Kidney failure, often called End Stage Renal Disease or “ESRD”, is a life threatening condition. There are nearly half a million individuals with kidney failure in the U.S. Individuals with kidney failure require either medications to prevent rejection of a transplanted kidney, or regular repeated dialysis treatments to clean the blood supply, as frequent as three to four times a week, if they have not had a transplant. Missing even a few treatments can result in severe illness or even death for an individual with kidney failure needing dialysis.

A Kidney Community Emergency Response Coalition has been formed that includes public and private partners representing kidney care medical professionals, dialysis and transplant facilities, vendors that supply services and medications, patient representative groups, ESRD Networks, and federal, state, and local emergency responders. The Coalition created tools and resources to help providers and federal, state, and local emergency responders develop plans to help meet the life saving medical care needs of individuals with kidney failure.

You can access information on Coalition activities, and available tools and resources at [www.KCERCoalition.com](http://www.KCERCoalition.com).

In the event of a disaster, call 1-888-33KIDNEY (1-888-335-4363) for information on how to obtain the service or assistance you need.

## Basic Requirements for Dialysis Treatment

- **Space** to do the treatment
- **Electrical Power** to run the equipment (if electricity is not available, one machine would require a 1.65KW size generator – an average facility has 16-20 machines and a water treatment system will require at least a 50KW generator)
- **Dialysis machines**
- **Potable water** for use in the treatment (each treatment requires a minimum of ~100 gallons of treated, pressurized water)
- **Water treatment equipment** (Carbon filtration & either reverse osmosis or deionization)
- **Supplies** (dialyzers, blood lines, saline, medications, etc.)
- **Personnel** qualified to perform dialysis
- **A physician's prescription** for dialysis and medical records to support the treatment
- **A hospital** or other similarly equipped system and a means to transport a patient if complications occur while providing dialysis

**DO YOUR PART – PLAN AHEAD**

While the national emergency response plan can assist state and local efforts, because medical care and emergency response occurs locally, it is essential that a coordinated state and local emergency response plan is in place to meet the critical health needs of individuals with kidney failure. Waiting for an emergency or disaster to occur is too late! Dialysis is dependent on the availability of power, gas, supplies, and water – commodities that, without proper planning, are difficult to access in the event of an emergency or disaster. Individuals with kidney failure need to know ahead of time what they can do to maintain their health during an emergency and disaster, such as minimizing fluid intake and restricting their salt and potassium intake, eating an “emergency diet”, and planning ahead so that they have the information they need and know how to find care. The following are a few suggestions and information on how to obtain more comprehensive information to assist in your planning.

## Individuals With Kidney Failure Need To:

- **Make an emergency supply kit.**
- **Keep an updated medicine / allergies list** with you at all times.
- **Create a personal evacuation plan** - plan to evacuate early when warranted.
- **Talk to the health care team** about the facility emergency care plan, including how to contact facility staff in the event of an emergency or disaster, where back-up care can be obtained, and how to get copies of vital medical records. Many facilities have toll free numbers to call for assistance.
- **Keep a record of your facility’s name** (make sure it is the official name because many facilities have similar names), physician name, and emergency contact information and keep them with all other important information.
- **Collect important personal information** and put it together in something water proof.
- **Give your kidney care team out-of-state contact** numbers (if available).
- **Get a copy of the emergency diet** and keep emergency supplies on-hand.
- **Plan for back-up transportation** to dialysis.
- **Get a list of dialysis facilities** in the area.
- **Follow your physician’s advice** regarding diet & fluid intake during a disaster, when possible.
- **Follow the same frequency for dialysis services when possible.** Services may be harder to find so don’t wait too long to start looking. Following the emergency diet can help if you can’t get to services for a day or two.

*For comprehensive planning information for individuals with kidney failure, visit:  
<<[Medicare.gov/Dialysis/Static/Publications.asp](http://www.Medicare.gov/Dialysis/Static/Publications.asp)>>.*

## Providers Need To:

- **Identify a leader**, and a back-up, who can head the facility’s emergency preparation and response activities
- **Make a plan** to secure and protect your equipment, supplies, and records
- **Create and keep up to date a list of emergency phone numbers** for your staff and patients
- **Have an emergency plan for your patients** (as example, provide them with a copy of their last “run” sheet, a list of their medications, an emergency diet, and facility or corporate phone number(s) in a sealable plastic bag).
- **In the event of a disaster, report your facility’s status to your ESRD Network:** if your facility is “open” (e.g., able to provide dialysis in a safe environment) or “closed.” If you are unable to reach your local ESRD Network, call 866-901-ESRD (3773) for information on who to call and what help is available.

*For comprehensive planning information for providers, visit:  
<<[www.cms.hhs.gov/ESRDNetworkOrganizations](http://www.cms.hhs.gov/ESRDNetworkOrganizations)>> or <<[www.KCERCoalition.com](http://www.KCERCoalition.com)>>*

## Federal, State, and Local Emergency Responders Need To:

- **Require State Emergency Management Associations** to include provisions for individuals with kidney failure in all plans, and involve ESRD Networks and dialysis facilities in all planning efforts.
- **List dialysis facilities as high priority locations for restoration of all services** such as power; water; and phone services.
- **Designate dialysis facilities as high priority for emergency services** such as generators; fuel; and tanker water.
- **Give priority to dialysis personnel** for limited supplies such as gasoline and housing.
- **Establish clear contacts** in each response area and make contact information known to ESRD Networks and dialysis facilities.
- **Encourage early evacuation** of individuals with kidney failure if they are on dialysis, with appropriate family members (where possible). Since services are needed on a frequent basis, the individual should be triaged, provided urgent care, and evacuated to a location where services can be provided repeatedly in a safe environment.
- **Facilitate delivery of supplies** to dialysis clinics.
- **Provide security assistance** to protect dialysis facility staff, emergency generators, and fuel used to run the dialysis equipment.
- **Allow patients and staff with appropriate identification to cross roadblocks and travel during curfews** to get to and from dialysis clinics.
- **Provide alternate sites for treatment** if dialysis clinic operations are impacted by the disaster - work with dialysis providers, state agencies and the End Stage Renal Disease Network organizations ([www.esrdnetworks.org](http://www.esrdnetworks.org)) to establish these locations.
- **Routinely screen for kidney failure** when individuals seek shelter in disasters. Add: “Do you require dialysis?” and “Do you have a transplanted organ?” to all screening tools.
- **Recognize that individuals with failed kidneys have unique medical needs** and will need to limit fluid intake and use caution in consuming foods high in salt and potassium (such as MREs) during periods of limited access to dialysis; as example, public service announcements may need to be edited to recognize these restrictions.
- **Ask shelters to group individuals needing dialysis** in a specific area of the shelter, and to consider arrangements for transportation to dialysis in transferring these individuals to another shelter.
- **Designate a few shelters** as the “go to” locations for dialysis patients to make transportation to dialysis treatment easier. These shelters can also be used for others.

## REMEMBER – PLAN AHEAD

**Being without dialysis as few as three or four days could result in illness or even death for individuals with kidney failure.**

## Technical Considerations when Bringing Hemodialysis Facilities' Water Systems Back on Line after Hurricane Katrina

These directions are for use if the building has not been flooded, and after utilities have been restored, the physical facility is in operational condition, and adequate water flow and pressure are available, although source water may be subject to a "boil water alert." If the facility was flooded, please see the CDC guidelines for recovery of a flooded building at <http://www.bt.cdc.gov/disasters/floods/>

### Water Treatment System

- Flush all pretreatment equipment to drain for at least 30 minutes to remove the stagnant water from the system.
- Test the level of free chlorine and chloramine in the building's source water (expect it to be higher than normal).
- Test chlorine and chloramine after the primary carbon tank to verify that the water is <0.5ppm free chlorine, or <0.1ppm chloramine.
- If chlorine or chloramines after the primary carbon tank  $\geq 0.5$  ppm or  $\geq 0.1$  ppm, respectively, promptly change the primary carbon tank, or for systems with a secondary carbon tank, test the levels after the secondary carbon tank.
- If chlorine and chloramine are below these levels (0.5 ppm or 0.1 ppm), turn on the reverse osmosis (RO) machine.
- Flush the distribution system (to drain if possible).
- Disinfect the RO and the distribution system and rinse. Test for residual disinfectant levels to ensure proper rinsing.
- Replace all cartridge filters.
- Compare the product water quality readings to your historical data. A significant difference could mean that the RO membranes are damaged, or the quality of the incoming water has drastically decreased. (see note below) If the total dissolved solids (TDS) are greater than 20% higher than the historical readings, consider using the deionization (DI) tanks as a polisher on the product water, followed by an ultrafilter to minimize microbial contamination.
- Increase frequency of monitoring:
  - Check chlorine/chloramine hourly
  - Verify hourly that the product water quality is acceptable.
  - Monitor water cultures and endotoxin at least weekly. If possible, test for endotoxin on site daily.
- Draw representative water cultures and endotoxin tests as soon as possible. If possible to test for endotoxin on site, do this before treating patients; report the results to the facility's Medical Director.
- Anticipate an increased level of particulate matter in the water. Monitor the pressure drop across pretreatment components and back-flush as necessary.
- Plan on re-bedding the carbon tanks as soon as possible.
- Send a sample of product water for an AAMI analysis as soon as is practical.
- Clean the RO membranes as soon as is practical.

### Dialysis Machines

- Chemically disinfect the dialysis machines and rinse. Test for residual disinfectant levels to ensure proper rinsing.
- Bring up the conductivity and "self test" the machines to verify proper working condition. If a machine fails the "self test," perform needed repairs prior to using that machine.

### Note

If the product water TDS is high and the percent rejection is in line with historical performance, then the RO membranes are most likely good, but the feed water may have a higher than usual level of contaminants. DI polishing will help cope with the extra burden in the feed water.

If the product water TDS is high and the percent rejection is lower than historical values, then the RO membranes are probably bad and should be replaced promptly. DI polishing may or may not be needed once the RO membranes are replaced.

This fact sheet was prepared in collaboration with the Food and Drug Administration and the Centers for Medicare and Medicaid Services.

### **Hemodialysis Water Treatment References**

Northwest Renal Network document Monitoring Your Dialysis Water Treatment System  
<http://www.nwrenalnetwork.org/watermanual.pdf>

Association for the Advancement of Medical Instrumentation, Recommended Practices for Dialysis Water Treatment Systems (RD 52 and RD 62)  
<http://aami.org/publications/standards/dialysis.html>

## Other Resources

Guidelines for Dialysis Care Providers on Boil Water Advisories  
[http://www.cdc.gov/ncidod/hip/dialysis/boilwater\\_advisory.htm](http://www.cdc.gov/ncidod/hip/dialysis/boilwater_advisory.htm)

Water Related Emergencies  
<http://www.bt.cdc.gov/disasters/watersystemrepair.asp>

Tips about Medical Devices and Hurricane Disasters  
<http://www.fda.gov/cdrh/emergency/hurricane.html>

Medical Devices that Have Been Exposed to Heat and Humidity  
<http://www.fda.gov/cdrh/emergency/heathumidity.html>

Medical Devices Requiring Refrigeration  
<http://www.fda.gov/cdrh/emergency/refrigeration.html>

Fact Sheet: Flood Cleanup - Avoiding Indoor Air Quality Problems  
<http://www.epa.gov/iaq/pubs/flood.html>

NIOSH Hurricane Katrina Response: Storm and Flood Cleanup  
<http://www.cdc.gov/niosh/topics/flood/>

OSHA Fact Sheet  
[http://www.osha.gov/OshDoc/data\\_Hurricane\\_Facts/Bulletin3.pdf](http://www.osha.gov/OshDoc/data_Hurricane_Facts/Bulletin3.pdf)

American Institute of Architects: Procedures for Cleaning Out a House or Building Following a Flood  
[http://www.aia.org/liv\\_disaster\\_floodproc](http://www.aia.org/liv_disaster_floodproc)

For more information, visit [www.bt.cdc.gov/disasters](http://www.bt.cdc.gov/disasters)  
or call CDC at 800-CDC-INFO (English and Spanish) or 888-232-6348 (TTY)