

Hemodialysis: Disaster and Emergency Preparedness

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Learning Objectives

The learner will ...

- Identify examples of internal and external disasters
- Summarize UMass Memorial Medical Center's [UMMMC] internal phases during a disaster
- Summarize the evacuation and relocation of patients in the department when there is an imminent threat
- Describe how to activate the department's disaster plan
- Describe how to discontinue hemodialysis during a power failure

The learner will ...

- Summarize the information necessary to obtain from an incoming call during a disaster
- Describe the role of the Medical Director, Nurse Manager, Senior Director, and Division Chief during a disaster

Purpose of eLearning

- The purpose of this learning module is to provide education to the clinical staff working in the Hemodialysis Department on emergency and disaster preparedness, including:
 - Review of the organization's emergency procedures
 - Give guidance on what to do, where to go, and whom to contact in the event of an emergency
 - Discuss how to inform patients on what to do, where to go, and whom to contact (alternate contacts), and how to perform emergency disconnect

Internal Disaster

- An internal disaster is when patients, employees, and/or the physical hospital are negatively affected:
 - Failure of electricity, heating, ventilation, or plumbing
 - Fire
 - Explosion
 - Flooding
 - Structural failure
 - Significant reduction of staff
 - Interruption of water

External Disaster

- An external disaster is an unexpected natural or man-made event originating outside of the hospital that may result in illness or injury in the community:
 - Tornado
 - Hurricane
 - Earthquake
 - Blizzard
 - Bio-terrorism
 - Pandemic

Phases of a Disaster:

Phase 1

Phase 1

- Department is placed on **alert status**
- Personnel will report to their designated department and remain on duty until event is assessed
- If applicable, a designee from the department will report to the hospital Command Center (Medical Director or Nurse Manager)

Role of Resource Nurse

- When the Nurse Manager is present, they will report to the Command Center
- If the Nurse Manager is not available, Resource will report to the Command Center
- Resource will work with the Attending Nephrologists to triage needs of the dialysis patients

Phases of a Disaster:

Phase 2

Phase 2

- Situation or number of patients exceeds immediate resources
- Available staff should remain on duty to await further instruction from the Nurse Manager
- Renal attendings in conjunction with the Nurse Manager will prioritize the patient's Hemodialysis needs

Role of Resource Nurse

- Provide a list of patients that require Hemodialysis for the current calendar day
- Assist with making phone calls to staff

Phases of a Disaster:

Phase 3

Phase 3

- When triage is complete, and the situation or number of patients continues to exceed available resources
- Staff will remain on duty until released and the department's Call Tree will be activated
- Staff available to assist during a phase 3 should arrive to UMMMC with their hospital issued ID and report to the Command Center or follow reporting instructions if location changes.

Role of Resource Nurse

- Assist the Nurse Manager with Call Tree activation
- Report available staff to the Command Center

Disaster Plan Activation

In the event of an internal or external disaster that could compromise patient safety the Resource Nurse will notify the Nurse Manager

The activation of the Internal Hemodialysis Disaster Plan and determination of the phase of the emergency will include the:

- Medical Director
- Nurse Manager
- Chief of Nephrology
- Senior Administrator on call
- Chief Nursing Officer

During Hemodialysis Disaster Plan Activation:

A Coordination Center specific to the Hemodialysis Department will be initiated at both the University and Memorial Campus

A conference line will be established, and call times scheduled for periodic briefings and updates

- Calls should include at a minimum the Medical Director, Nurse Manager, and the Senior Director

The role of the Hemodialysis Coordination Centers include:

- Phase determination
- Critical asset review
 - Review necessary equipment and resources available
- Patient “wellness” phone calls (outpatients)
- Discussion with transportation agencies
- Triage of patients

Reduction or Temporary Discontinuation of Hemodialysis Services

- Reduction or temporary discontinuation of Hemodialysis services due to an emergency will require agreement among the Chief of Nephrology, Medical Director, Nurse Manager, and Senior Director.
- Initiation of the transfer agreement for outpatient census:
 - Centers for Medicare and Medicaid Services requires all licensed End Stage Renal Dialysis facilities to have a transfer agreement with another facility
 - Creation of a contingency plan for each patient on the inpatient census, consider:
 - Accelerated Veno-Venous Hemofiltration
 - Continuous Veno-Venous Hemofiltration

Incoming Calls Related to Disaster

- If a call is received during a disaster or related to a local disaster, the call should be transferred to management when appropriate
- The receiver will make all efforts to obtain the following information:
 - Name and role of caller
 - Caller's contact information
 - Description of emergency/needs
 - Location
 - Number of individuals affected
 - Mode of transportation available
- The above information will be given to the Nurse Manager or designee



ONLY when there is an immediate threat to safety should patients and employees evacuate and relocate



Employees will discontinue dialysis and utilize the “clamp and cap” method for all patients

Patient’s blood will not be reinfused



Relocate in a vertical and/or horizontal pattern

Relocation is dependent on location of threat



Relocate patients in the following order:
ambulatory, non-ambulatory, critically ill

Meeting location should be pre-determined by Nurse Manager or designee



Unnecessary removal of patients from the building is not desirable unless there is imminent danger to life and or safety (i.e. fire in suite)

Evacuation and Relocation of Patients: Imminent Threat

Discontinuation of Hemodialysis During a Power Failure

Emergency power is supplied to the hospital directly from the power plant, however, in the event of a sustained power interruption the patient's blood will need to be returned via the hand crank and lever located on the blood pump module

The clinical staff should check the functionality of the blood pump hand crank lever and presence of a hand crank on the back of each machine EVERY treatment

Ensure the venous line is removed from the venous clamp prior to reinfusion

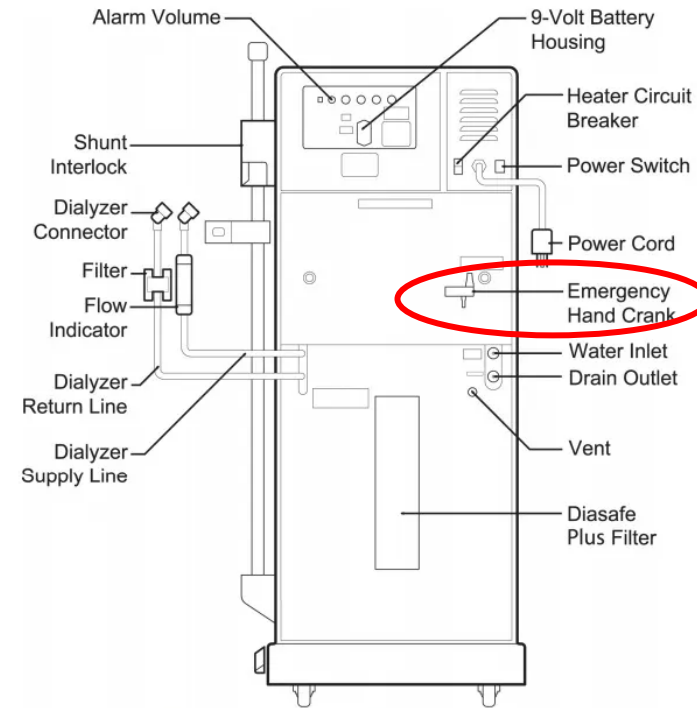
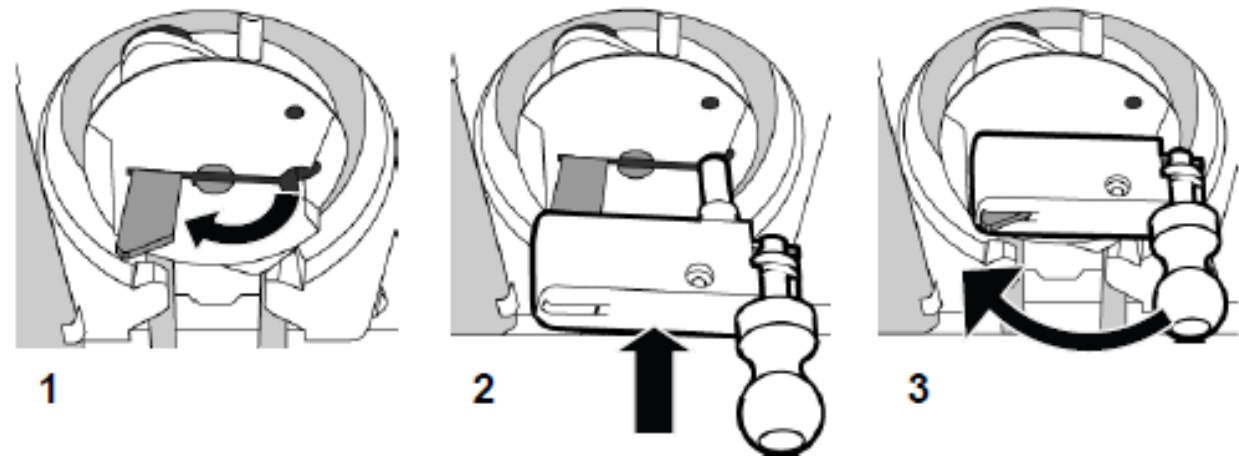


Figure 2 – 2008K² Hemodialysis Machine—Rear View



Blood Return via Hand Crank

Please navigate to the Hub and review the following procedure:

- Discontinuation of Dialysis During Power Failure : [discontinuation-of-dialysis-during-power-failure-procedure \(umassmemorialhub.org\)](https://umassmemorialhub.org/discontinuation-of-dialysis-during-power-failure-procedure)

Education for Outpatients

1

Patients will be educated on disaster and emergency preparedness:

- Within 30 days of admission
- Annually
- During impending emergencies

2

At a minimum, education will include:

- Emergency take off - "clamp and cap" technique
- Emergency diet plan (Refer to Patient Handbook and following slide)
- Emergency contact list (Refer to Patient Handbook)

3

Education will be documented in a nursing note in the electronic medical record or equivalent

MY-EOP Application

The mission of the UMass Memorial Medical Center (UMMMC) Emergency Operations Plan (EOP) is to establish a process for the effective management of an emergency.

The EOP accomplishes addressing six critical areas of emergency management, including: Communication, Resources and Assets, Safety and Security, Staff Responsibilities, Utilities Management, Patient Clinical and Support Activities.

All Emergency Preparedness procedures are now located on the Resource phone in the "My-EOP" application in addition to the HUB.

**My-EOP™**

UMass Memorial Medical Center - All Staff

Instructions to download the My-EOP™ mobile application:

If you already have My-EOP downloaded, skip to step 4.

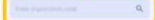
- Search "My-EOP" (or myeop) in the "App Store" (Apple iOS) or the "Play Store" (Android devices).



Note for iPad users: Select "iPhone Only" as a search limit in the App Store.

Apple:
<https://itunes.apple.com/us/app/my-eop/id818004891?mt=8>

Android:
<https://play.google.com/store/apps/details?id=com.gcckc.myeop>
- Install My-EOP on your device.
 - Accept app permissions.
- Open My-EOP.
 - Accept the terms and conditions.
- Enter the search term into the **search bar**.



To navigate to the "Find a Plan" screen, click on the **magnifying glass** from the floating menu.


- Enter your search term:
- Once your plan is displayed, click on the plan to download.
- To gain access to the download, you'll be asked for your password. Your password is (CASE SENSITIVE)

Once the file is downloaded, you may enter the plan. From that point forward, when you open My-EOP, you will see that plan on your available plan list.

ESRD Emergency Hub Application for Smart Phones

The ESRD Emergency Hub is a great resource to share with patients allowing them tools and education at the tips of their fingers for planning in the event of an emergency!



Download the app
or watch a video
to learn more.

Visit esrdemergencyhub.ipro.org.

Or use the camera on your
smartphone or tablet
to scan this code.



INTRODUCING... The ESRD Emergency Hub

- ✓ FREE resources and tools help you easily create, store, and find your treatment information, emergency resources, and needed phone numbers.
- ✓ During an emergency, receive critical alerts in real time, based on your location.
- ✓ Always at your fingertips on your smartphone or tablet.

Start creating your emergency plan today.

The ESRD Emergency Hub mobile app was developed under a grant from the SC Lowcountry Healthcare Coalition and is managed by the IPRO ESRD Network Program.

v.12 8/23/2022

Additional Resources that can be utilized on a Workstation on Wheels while completing admission and/or annual education with patients

Please click on each link to learn more about Emergency and Disaster Preparedness:

- 1) The following video outlines an emergency diet plan for patients. This video will require a speaker and is 2 minutes and 15 seconds in length.

<https://www.youtube.com/watch?v=iA-MDBwZd7o>

- 2) The following link is for the Kidney Community Response Coalition website for providers.

<https://www.kcercoalition.com/en/professionals/>

- 3) Emergency preparedness video for dialysis patients. This video will require a speaker and is 8 minutes and 17 seconds in length.

<https://www.youtube.com/watch?v=UIB9cHDSUno>

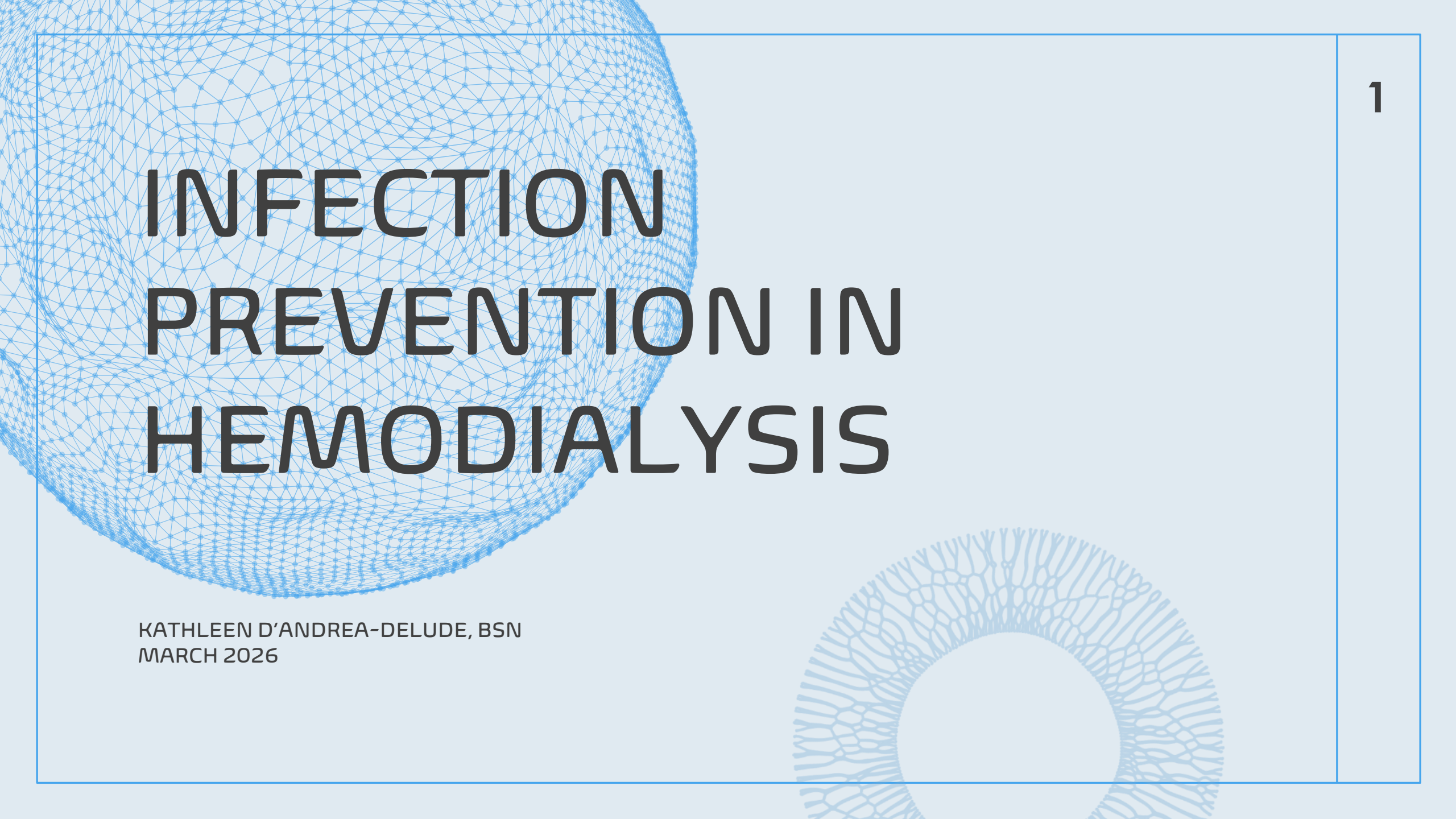
References

UMMMC. (2022). Emergency Management Planning. UMass Memorial Medical Center Policy and associated documents.

Kidney Community Emergency Response. (2022).
www.KCERcoalition.com

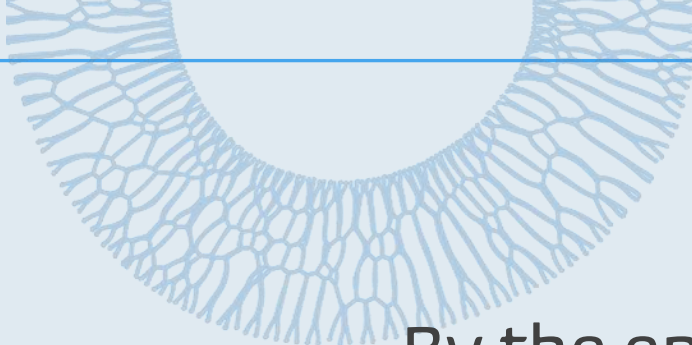
UMMMC. (2024). Discontinuation of Hemodialysis During a Power Failure.

IPRO End-Stage Renal Disease Network Program.(2023)
[ESRD Emergency Hub – IPRO ESRD Network](#)



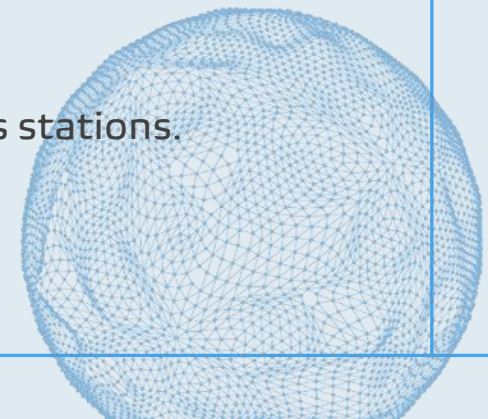
INFECTION PREVENTION IN HEMODIALYSIS

KATHLEEN D'ANDREA-DELUDE, BSN
MARCH 2026



OBJECTIVES:

By the end of this module, learner will be able to:

- Identify isolation precautions and explain protocols needed for each (i.e. standard, droplet, contact, airborne).
 - Understand correct use of personal protective equipment (PPE) for each type of precaution during hemodialysis treatment.
 - Integrate infection prevention standards into daily clinical practice to reduce the risk of bloodborne pathogen transmission in hemodialysis patients.
 - Describe appropriate patient placement and equipment management when caring for patients on isolation precautions in the dialysis unit.
 - Explain the importance of environmental cleaning and disinfection of dialysis stations.
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WHY IS THIS IMPORTANT?

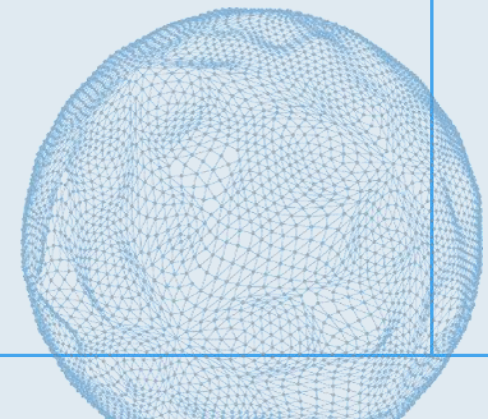
Patients receiving hemodialysis have a significantly higher risk of bloodstream infections compared to the general population.

Infection prevention, in the dialysis setting, requires strict adherence to the Infection Precautions and policies and procedures that are in place.





GENERAL INFECTION CONTROL GUIDELINES

- Staff will adhere to Standard Precautions and applicable infection control policies.
 - Personal Protective Equipment (PPE) will be consistent with the OSHA Regulations on Bloodborne Pathogens 5033 Occupational Exposure to Bloodborne Pathogens Exposure Control Plan
 - All blood and bodily fluid exposures to a staff member will be reported timely and managed by the Employee Health Services Department during business hours or the Emergency Department outside of business hours.
- 

GENERAL INFECTION CONTROL CONSIDERATIONS

5

Hand Hygiene and Gloves:

- Staff must perform hand hygiene before and after entering a patients bay and contact with patients and equipment
- Staff must don gloves prior to providing care to a patient on hemodialysis
- Staff must doff gloves and perform hand hygiene when moving from the patient to the equipment and vice versa
- Gloves should not be worn when using the WOW, WOWs are considered clean

Miscellaneous:

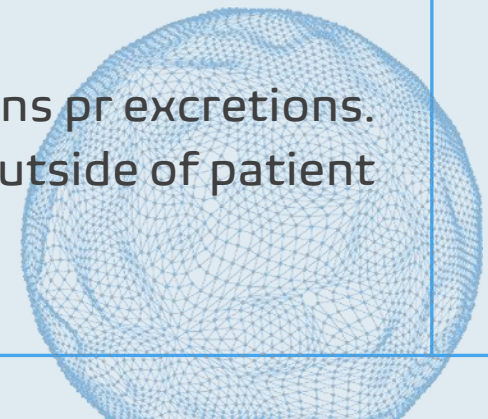
- Staff are not allowed to chew items in the treatment area (e.g. candy, gum, lozenges, etc.).
- Staff should not have items in their pockets. (e.g. pens, cell phone, tissues, etc.)
- Items should not be brought into the bay that cannot be disinfected (e.g. ticket to ride).



GENERAL INFECTION CONTROL CONSIDERATIONS

6

PERSONAL PROTECTIVE EQUIPMENT (PPE):

- In the Hemodialysis Department, this includes gown, gloves and eye protection
 - Staff should wear PPE appropriate to the anticipated potential exposure, including but not limited to:
 1. Initiation and termination of treatment
 2. Manipulation of access needles or catheter
 3. Administration of medications through the extracorporeal circuit by subcutaneous injection
 4. Cleaning and disinfection of patient care supplies and equipment
 - PPE must be changed if it becomes soiled with blood, bodily fluids, secretions or excretions.
 - PPE is always considered dirty and should not be worn in clean areas (e.g. outside of patient bays or used on WOWs).
 - Any area outside of the bay is considered clean other than the doorway.
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GENERAL INFECTION CONTROL CONSIDERATIONS

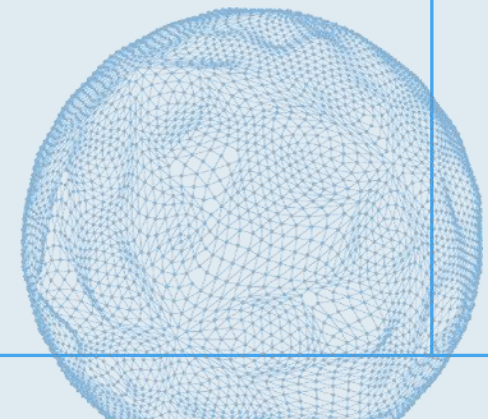
7

Hemodialysis Machine Station and Disinfection:

- At minimum, hemodialysis machines will be heat disinfected every business day, and bleach disinfected weekly when in service and documented when completed on the disinfection log attached to the machine.
- Staff will follow the manufacturer's instructions for use for the hemodialysis machine.
- Disinfection of the equipment and station may not begin until the patient has left the station.

Food Restrictions:

- Consumption of food should be limited in the Hemodialysis Department due to risk of needle dislodgement/infiltration, hypotension, aspiration, bloodline disconnection and cross contamination.
 1. This does not apply to dietary supplements ordered by the Provider.
- Patient should be encouraged and supported to eat their meals prior to and/or after hemodialysis
- Food restrictions do not apply if the patient is hypoglycemic and requires intervention.



ENHANCED PRECAUTIONS

Enhanced Dialysis Precautions are followed in addition to Standard Precautions with patients that have a reactive Hepatitis B Surface Antigen.

- These precautions include:
 1. A private room with a door.
 2. Sign (as shown) will be posted outside of the door.
 3. A gown and gloves must be donned prior to entry.
 4. Door must be closed during initiation and termination of treatment.
 5. Private room requires daily terminal cleaning.
 6. Dedicated equipment that will not leave the room while patient(s) are on the census.



Enhanced Dialysis Precautions

(In addition to Standard Precautions)



Visitors Must Check-in at the Nurse Station

-  Private room with door
-  Hand hygiene prior to entry and exiting the room
-  Gown and gloves prior to entry
(Removal must take place in room prior to exiting)
-  Mask for initiation and termination of Dialysis
-  Door must be closed during initiation and termination of Dialysis
-  Perform all procedures in room
-  Terminal clean daily

Umass Memorial Health IC 1/18/2024

ENHANCED PRECAUTIONS CONT.

- The dialysis machine must be dedicated for use only on the Hepatitis B Virus (HBV) infected patient(s).
- All equipment including the blood glucose monitoring device and pH/conductivity testing equipment must be dedicated to the HBV infected patient(s) and bleached after each treatment.
- The dialysis machine will be bleached internally and externally after each use.
- Staff assigned to the HBV infected patient must only be assigned to other HBV infected patients or patients that are immune.
- When possible, staff caring for HBV infected patients should be HBV immune.
- Patients who are receiving dialysis treatment at the same time as the HBV infected patient **and** located adjacent to the HBV infected patient must be HBV immune.

University Campus: use isolation station or private inpatient room.

North Pavilion and Memorial Campuses: use private inpatient room.

ENHANCED PRECAUTIONS: SPECIAL CONSIDERATIONS AND EXCEPTIONS

For patients whose HBV status is “unknown”

1. All efforts will be made to obtain HBV status from the patient’s clinic in the community.
2. All efforts will be made to separate an HBV “unknown” patient at least one station width apart from another patient
3. The staff member assigned to this patient may only be assigned to a second HBV “unknown” patient or HBV immune patient
4. The dialysis machine will be chemically disinfected internally and externally (i.e., bleach) at the end of each treatment.
5. Documentation of disinfection will be completed on the machine disinfection log attached to the machine.

Patients who have received a liver transplant from a donor that was HBV positive or if the patient was HBV positive prior to the transplant and they are on viral suppression therapy should be tested for HBV (HBsAg) monthly.

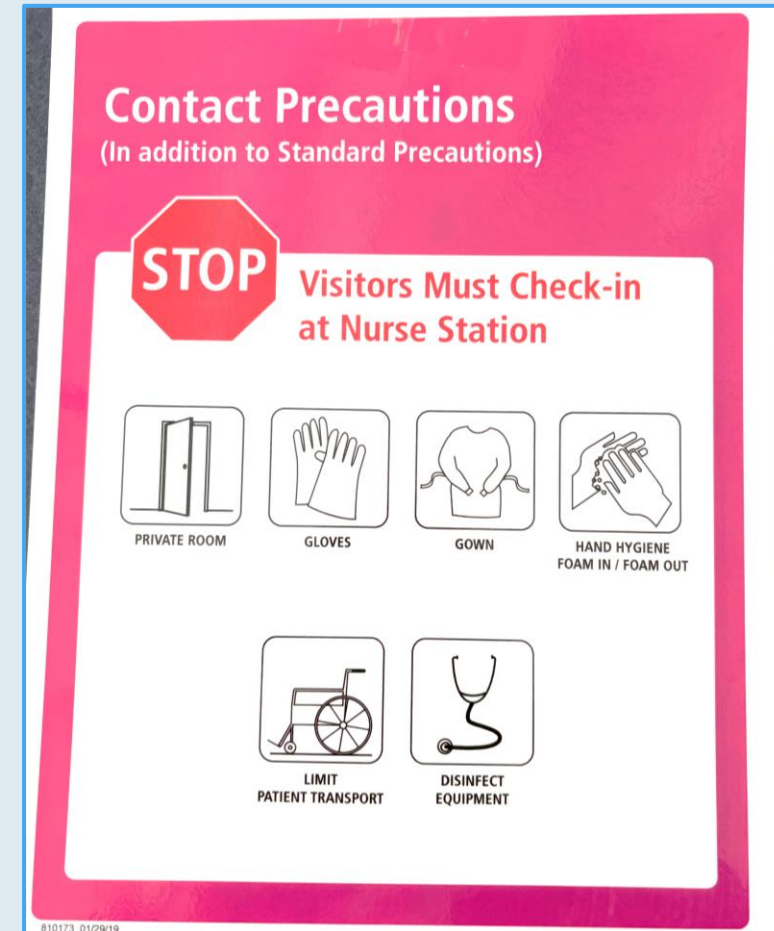
1. The hemodialysis machine should be chemically disinfected (i.e. bleach) internally and externally following each treatment
2. Documentation of disinfection will be completed on the machine disinfection log attached to the machine.
3. The patient does NOT require Enhanced Precautions.

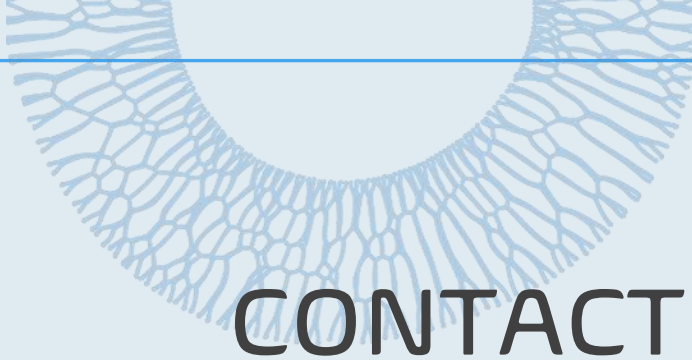
CONTACT PRECAUTIONS

Contact Precautions (in addition to Standard Precautions) include gowns and gloves to enter the room

These precautions are followed for patients diagnosed with:

1. Cystic fibrosis, Scabies, Lice
 2. Carbapenem Resistant Organisms: carbapenem-resistant Enterobacterales (CRE), Carbapenem-resistant *Acinetobacter baumannii* (CRAB), *Klebsiella pneumoniae* carbapenemase (KPC), Carbapenem-Resistant *Pseudomonas aeruginosa* (CRPA)
- Cohort patients and staff according to the type of organism when possible.
 - Clean all reusable equipment and notify housekeeping to complete a terminal clean once the patient has left the station.



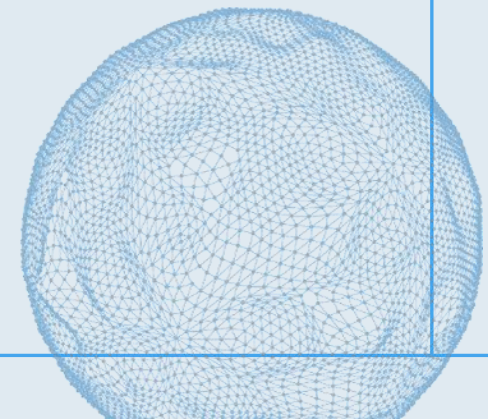


CONTACT PRECAUTIONS CONT.

University Campus: Use isolation station or private inpatient room whenever possible.

North Pavilion Campus: Use private inpatient room.

Memorial Campus: Use station at the end of the row (Bay 4) to decrease number of adjacent stations whenever possible.

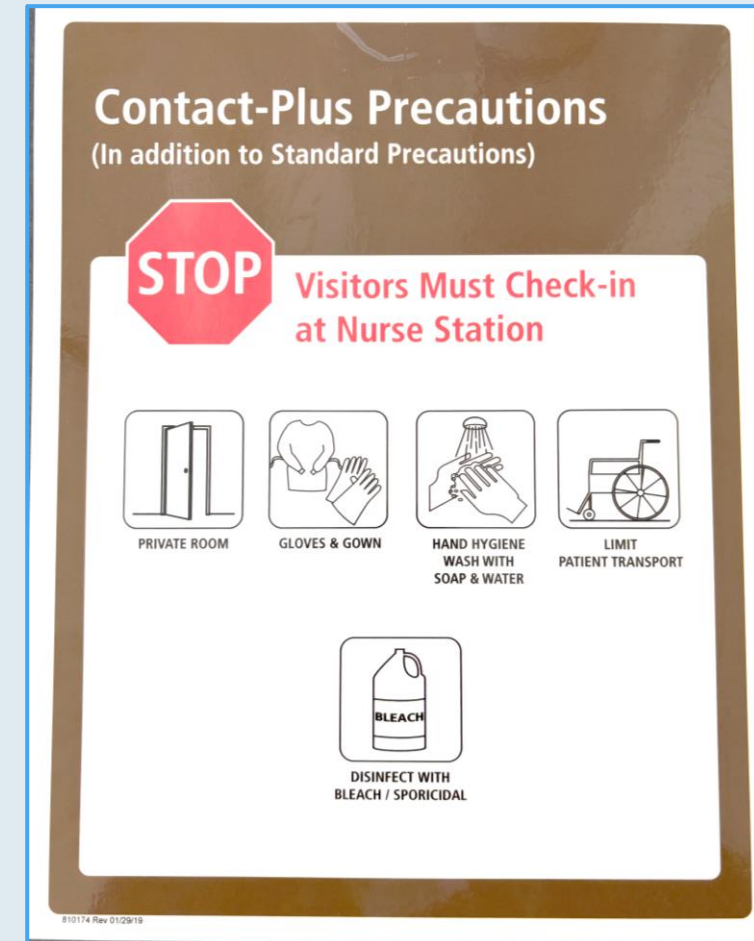


CONTACT-PLUS PRECAUTIONS

Contact Plus Precautions (in addition to Standard Precautions) include gown and gloves to enter the room as well as washing hands with soap and water.

These precautions are followed for patients diagnosed with:

1. Candida auris
 2. All patients from Bear Mountain Health Care Center
 3. Diarrhea not able to be contained/soiling the environment
 4. C. diff/viral gastroenteritis/Norovirus
- Cohort patients and staff according to the type of organism when possible.
 - Clean all reusable equipment with bleach and notify housekeeping to complete a terminal clean once the patient has left the station.
 - Station will also need to be sprayed by trained housekeeping staff after terminal clean is completed.



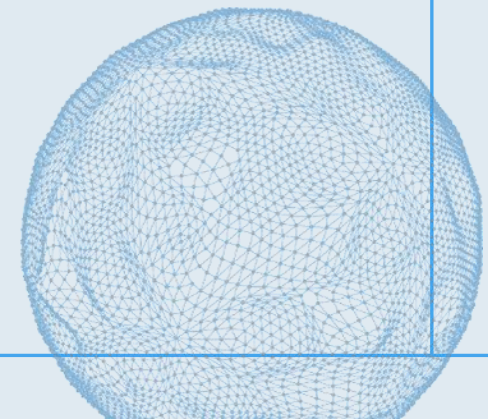


CONTACT-PLUS PRECAUTIONS CONTINUED

University Campus: Use isolation station or private inpatient room whenever possible.

North Pavilion Campus: Use private inpatient room.

Memorial Campus: Use station at the end of the row (Bay 4) to decrease number of adjacent stations whenever possible.



CONTACT AND DROPLET PRECAUTIONS

Contact and Droplet Precautions (in addition to Standard Precautions) include gown, gloves, mask and eye protection to enter the room

These precautions are followed for patients diagnosed with:

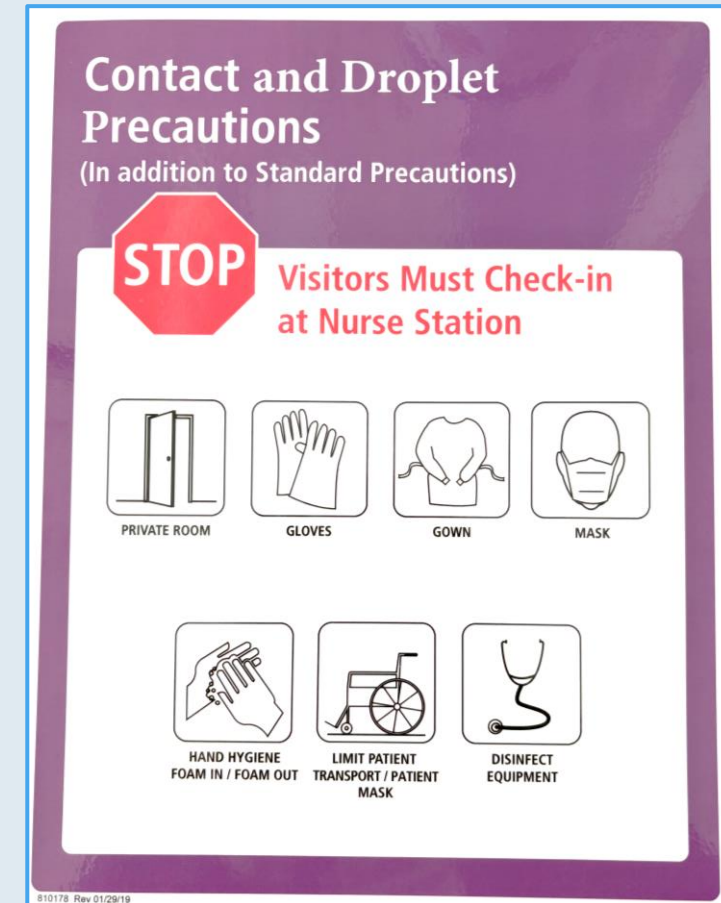
1. Human Parainfluenza
 2. Metapneumovirus, Respiratory syncytial virus (RSV), Adenovirus
 3. R/O Respiratory virus
- Clean all reusable equipment and notify housekeeping to complete a terminal clean once the patient has left the station.
 - Station will also need to be sprayed by trained housekeeping staff after terminal clean is completed.

University Campus: all efforts will be made to place the patient in an isolation station.

1. If isolation station is not available, utilize the curtain to separate the adjacent stations and maintain a distance of 3-6 feet from other patients.

Memorial Campus: use station at the end of the row (Bay 4) to decrease number of adjacent stations whenever possible.

North Pavilion Campus: use private inpatient room.



DROPLET PRECAUTIONS

Droplet Precautions (in addition to Standard Precautions) include mask and eye protection to enter the room

These precautions are followed for patients diagnosed with:

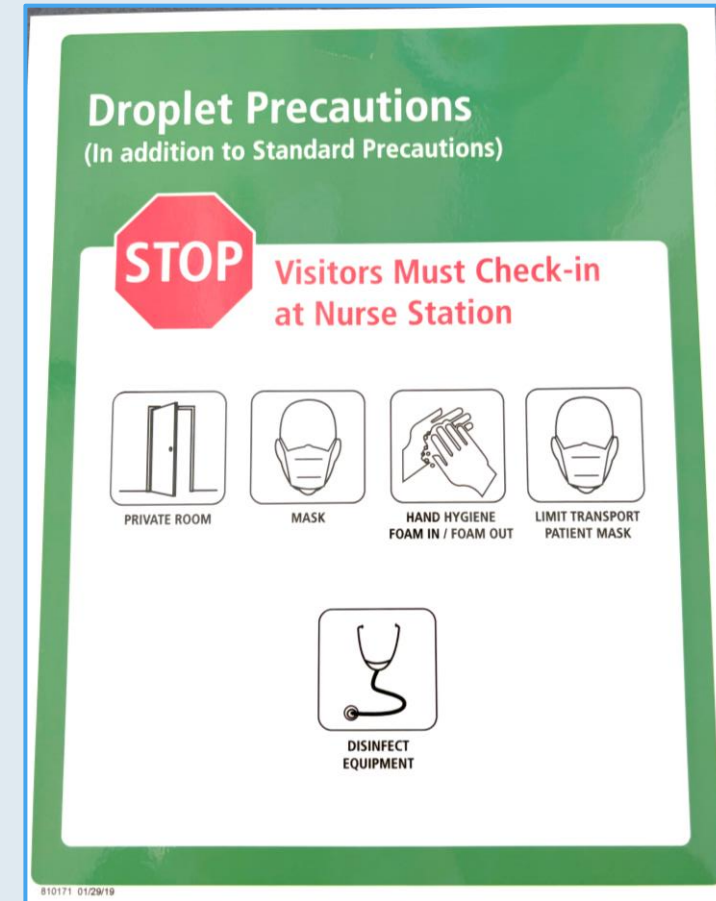
1. Influenza, Covid-19 infection, Rhinovirus, Adenovirus
 2. Meningitis, Pertussis, Mumps
- Clean all reusable equipment and notify housekeeping to complete a terminal clean once the patient has left the station.
 - Station will also need to be sprayed by trained housekeeping staff after terminal clean is completed.

University Campus: all efforts will be made to place the patient in an isolation station.

1. If isolation station is not available, utilize the curtain to separate the adjacent stations and maintain a distance of 3-6 feet from other patients.

Memorial Campus: use station at the end of the row (Bay 4) to decrease number of adjacent stations whenever possible.

North Pavilion Campus: use private inpatient room.



AIRBORNE PRECAUTIONS

17

Airborne precautions (in addition to Standard Precautions) include N95 or PAPR (gown only required with contact with lesions for VZV) to enter the room.

These precautions are followed for patients diagnosed with:

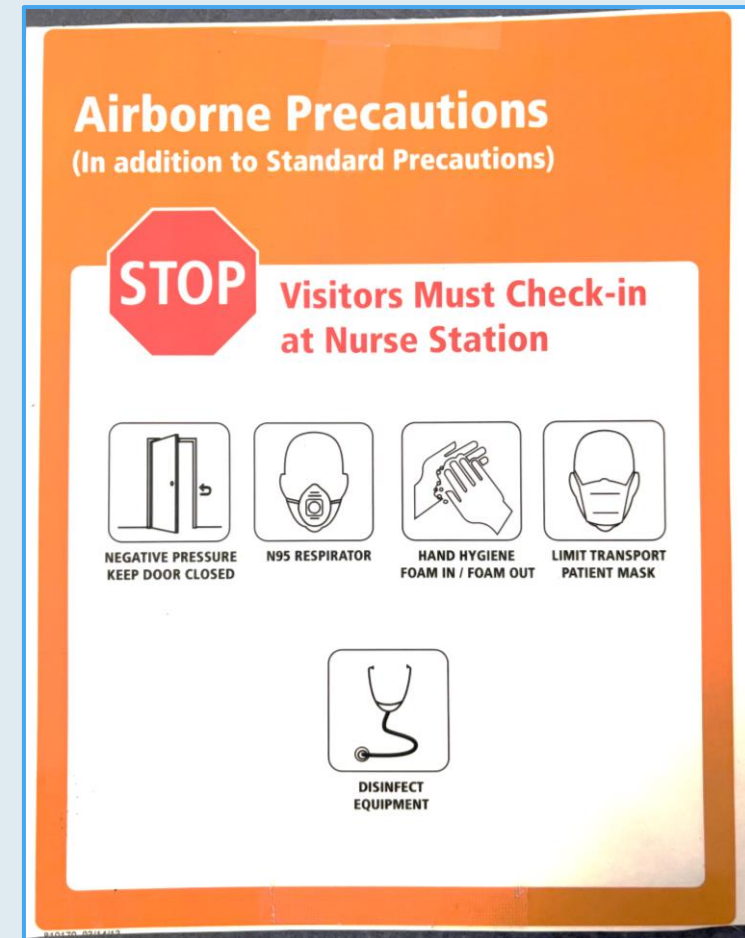
1. Tuberculosis, Measles
2. Varicella

I. Herpes zoster:

1. disseminated (>1 noncontiguous dermatomes) zoster in ANY patient
2. OR localized disease in immunosuppressed patient (potential for dissemination)

II. Chicken pox

- Patients that are inpatient status will receive dialysis bedside in a private negative pressure room at all campuses.





AIRBORNE PRECAUTIONS CONTINUED

- Patients that are outpatient status and require ongoing hemodialysis while being treated for tuberculosis will adhere to the following:
 - The patient will receive hemodialysis at the University Campus in an isolation room.
 - All efforts will be made to schedule the patient at the end of the day to minimize exposure.
 - A HEPA filter will be placed in the room and turned on one hour prior to the patient's scheduled appointment.
 - The dialysis staff and housekeeping will disinfect and clean the Bay no sooner than one hour after the patient has been discharged.
 - The isolation room will be dedicated to the patient for the duration of treatment.
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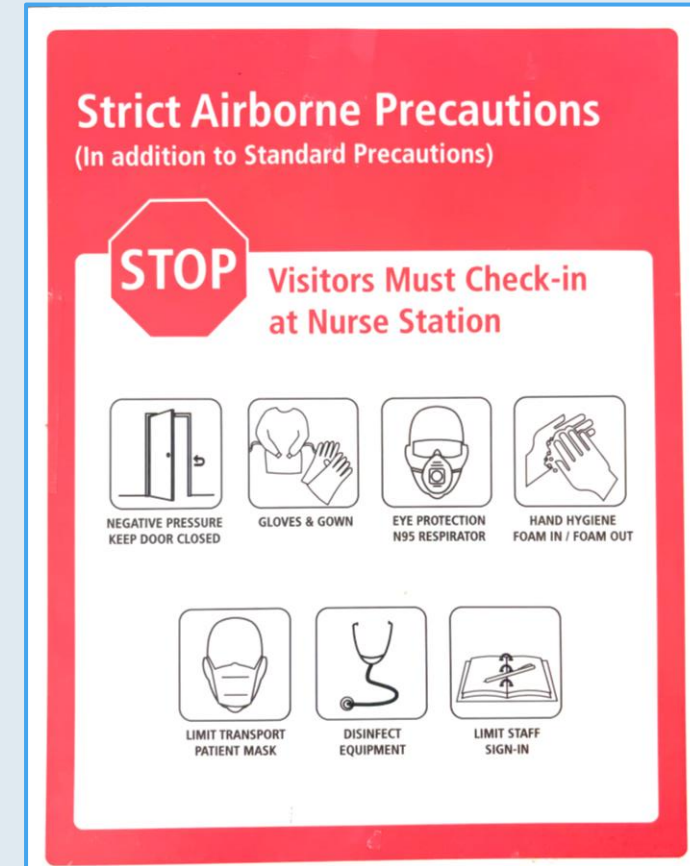
STRICT AIRBORNE PRECAUTIONS

Strict Airborne Precautions (in addition to Standard Precautions) include gown, gloves, N95 with eye protection or PAPR to enter the room

There will be limited staff allowed and sign-in log sheet that needs to be completed.

These precautions are followed for patients diagnosed with:

1. MPOX (previously known as Monkey Pox)
 2. Middle East Respiratory Syndrome (MERS), Severe Acute Respiratory Syndrome (SARS), and other emerging pathogens
- Patients that are inpatient status will receive dialysis in their private negative pressure inpatient room at all campuses.
 - All non-disposable equipment, including dialysis machine and portable reverse osmosis cart will need to be externally cleaned with bleach both inside and outside of the patient's room after treatment is completed.



EQIP CONTACT AND DROPLET PRECAUTIONS

EQIP Contact and Droplet Precautions (in addition to Standard Precautions) include gown, gloves and eye protection to enter the room

- These precautions are followed for patients exposed to RSV
- Clean all reusable equipment and notify housekeeping to complete a terminal clean once the patient has left the station.
- Station will also need to be sprayed by trained housekeeping staff after terminal clean is completed.

University Campus: all efforts will be made to place the patient in an isolation station.

1. If isolation station is not available, utilize the curtain to separate the adjacent stations and maintain a distance of 3-6 feet from other patients.

Memorial Campus: use station at the end of the row (Bay 4) to decrease number of adjacent stations whenever possible.

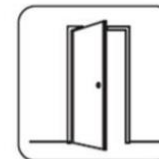
North Pavilion Campus: use private inpatient room.

Contact and Droplet Precautions **EQIP**

(In addition to Standard Precautions)



**Visitors Must Check-in
at Nurse Station**



PRIVATE ROOM



GLOVES



GOWN



MASK &
EYE PROTECTION



HAND HYGIENE
FOAM IN / FOAM OUT



LIMIT PATIENT
TRANSPORT/ PATIENT
MASK



DISINFECT
EQUIPMENT

EQIP DROPLET PRECAUTIONS

EQIP Droplet Precautions (in addition to Standard Precautions) include mask and eye protection to enter the room

- These precautions are followed for patients exposed to Covid-19 and Flu.
- Clean all reusable equipment and notify housekeeping to complete a terminal clean once the patient has left the station.
- Station will also need to be sprayed by trained housekeeping staff after terminal clean is completed.

University Campus: all efforts will be made to place the patient in an isolation station.

1. If isolation station is not available, utilize the curtain to separate the adjacent stations and maintain a distance of 3-6 feet from other patients.

Memorial Campus: use station at the end of the row (Bay 4) to decrease number of adjacent stations whenever possible.

North Pavilion Campus: use private inpatient room.

Droplet

Precautions **EQIP**

(In addition to Standard Precautions)



**Visitors Must Check-in
at Nurse Station**



PRIVATE ROOM



MASK &
EYE PROTECTION



HAND HYGIENE
FOAM IN / FOAM OUT



LIMIT TRANSPORT
PATIENT MASK



DISINFECT
EQUIPMENT

SPECIAL PRECAUTIONS

Special Precautions (in addition to Standard Precautions) include mask for direct patient contact

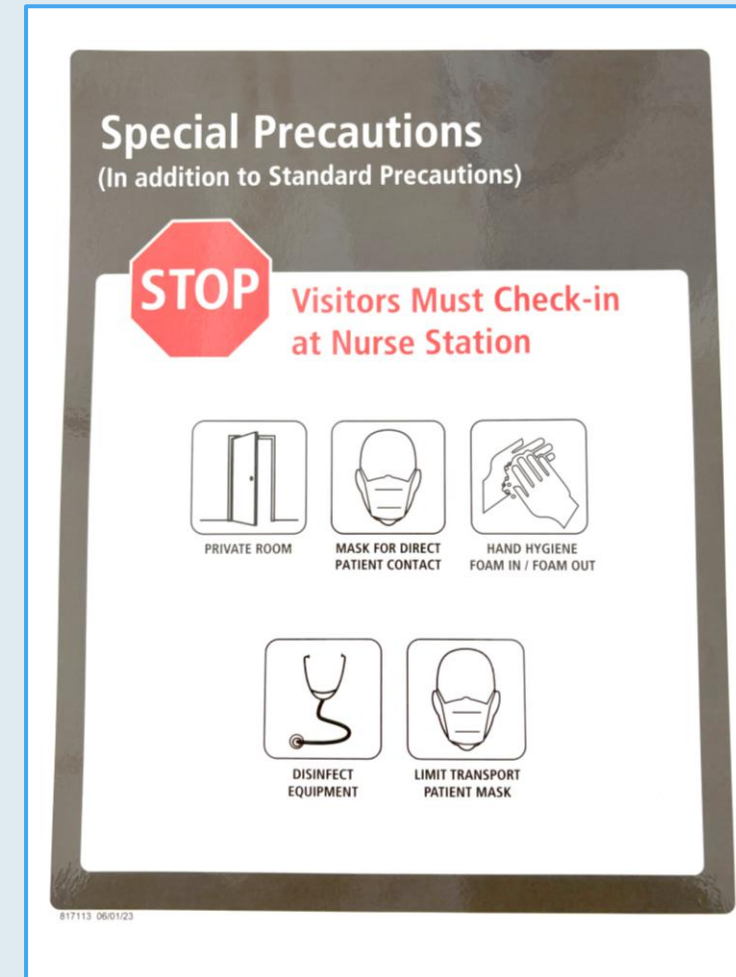
- These precautions are followed for patients who have had their transplant less than or equal to 1 year.
- Clean all reusable equipment and notify housekeeping to complete a terminal clean once the patient has left the station.

University Campus: all efforts will be made to place the patient in an isolation station.

1. If isolation station is not available, utilize the curtain to separate the adjacent stations and maintain a distance of 3-6 feet from other patients.

Memorial Campus: use station at the end of the row (Bay 4) to decrease number of adjacent stations whenever possible.

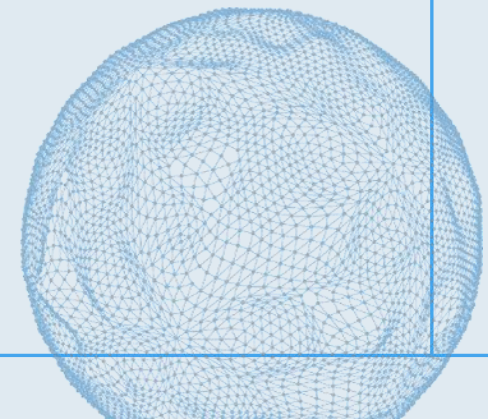
North Pavilion Campus: use private inpatient room.





HEPATITIS C VIRUS (HCV) POSITIVE PATIENTS

- Patients who are HCV positive do not need to be isolated from other patients or dialyzed on segregated hemodialysis equipment.
- Standard precautions are to be maintained for patients who are HCV positive.
- The hemodialysis machine should be externally disinfected and internally heat disinfected after each treatment.
- HCV testing should be done on admission then every six months.



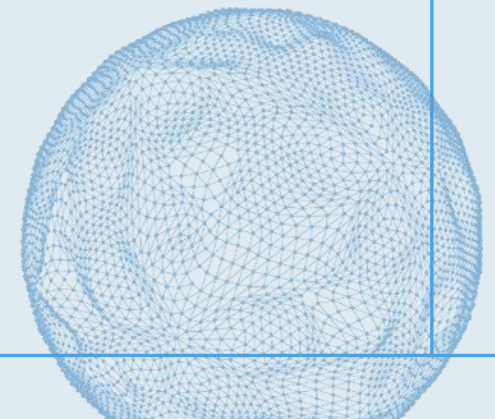
HEPATITIS C VIRUS (HCV) TESTING

University Campus Outpatient(s):

- Testing for HCV should be done upon admission/enrollment to dialysis unit and after any significant gaps in treatment (e.g. hospitalization).
- Testing should include:
 - HCV antibody with reflex and ALT testing
- After initial testing, HCV serologic testing should be done every six months, and ALT testing should be done monthly.

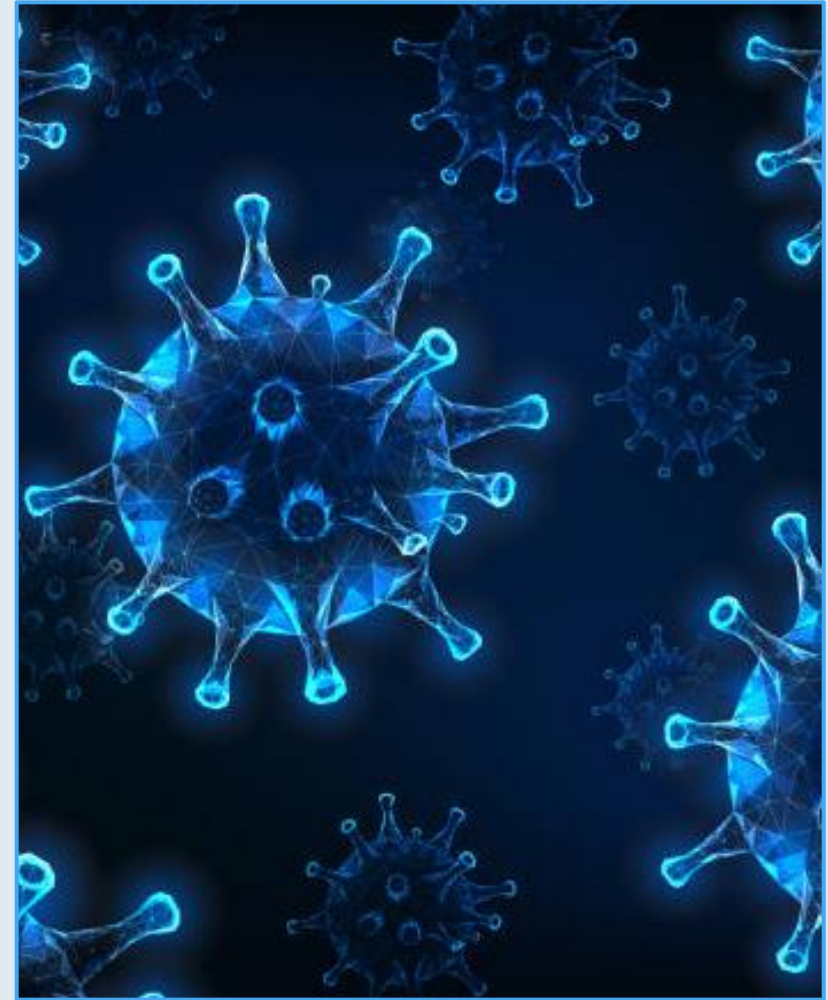
University, Memorial and North Pavilion Campuses Inpatients:

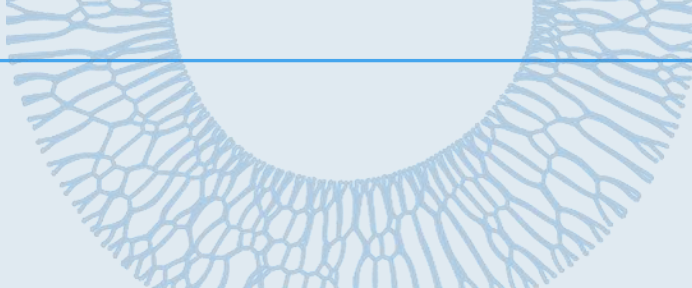
- Testing for HCV for new and established dialysis patients should be done upon each admission and include:
 - HCV antibody with reflex
- After initial testing, HCV serologic testing should be done every six months if patient remains on the census.



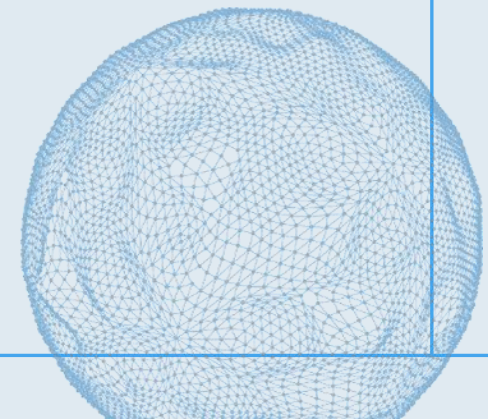
HUMAN IMMUNODEFICIENCY VIRUS (HIV) POSITIVE PATIENTS

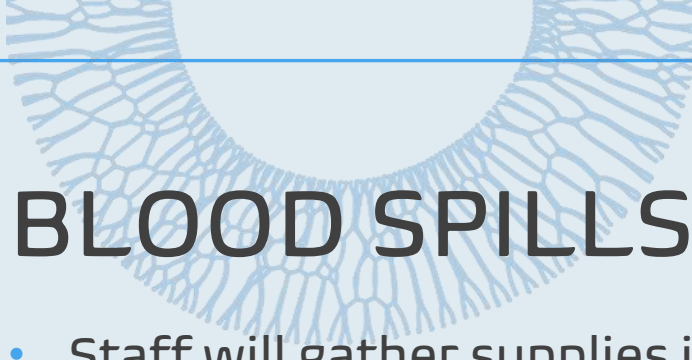
- Patients who are HIV positive are not isolated from other patients and do not require segregated equipment.
- Standard precautions are to be maintained for patients with HIV.
- No specific patient laboratory tests are required.



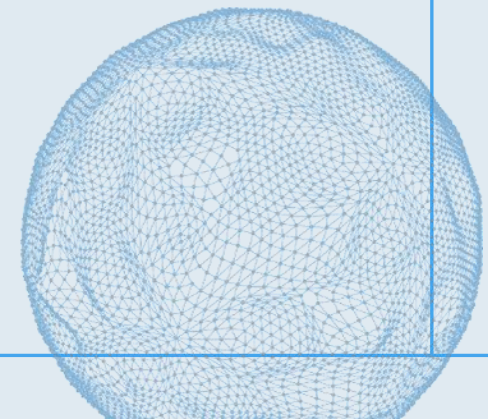


INVASIVE EXAMS, TREATMENTS AND WOUND DRESSINGS

- Due to the potential for cross-contamination of bloodborne pathogens, invasive physical examination/treatments are not allowed in the Hemodialysis Department.
 - All wound and external devices should be properly secured prior to hemodialysis.
 - Central line dressing changes and dressings that require immediate attention (non-intact) are permitted.
 - All other scheduled care should be completed after the hemodialysis procedure has completed.
- 



BLOOD SPILLS

- Staff will gather supplies including towel or blood spill kit, bleach wipes, and PPE.
 - PPE required to clean blood spills include:
 - Small spill: gloves only
 - Large spill: full PPE (gloves, gown and eye protection)
 - Staff will use the towel or spill kit to absorb the blood then disinfect the area with bleach wipes.
 - Saturated towels will be placed into red Biohazard bag and/or into designated Biohazard bin.
 - Staff must perform hand hygiene with soap and water following cleaning of a blood spill.
 - Housekeeping must complete a final clean of the area affected by the blood spill once the patient has discharged.
- 

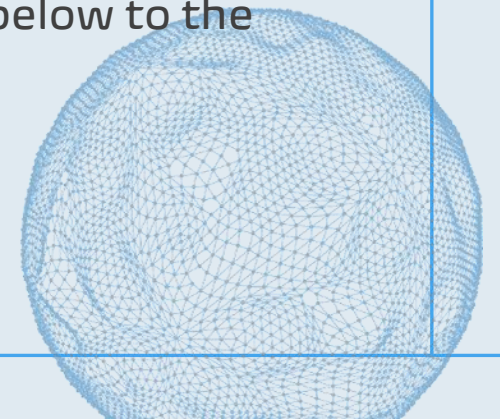
MEDICATION PREPARATION AND ADMINISTRATION

28

- Medications and dialysate additives should be prepared in a clean, uncluttered, and functionally separate area for product preparation (e.g. Medication Room).
- Only one patient's medications are prepared at a time in patient care areas, immediately prior to administration.
- Medications must be labeled after adding medication to dilutants/syringes/containers.
- Full PPE must be worn when administering medications via the extracorporeal circuit.

For more detailed instructions on medication administration, please click on the link below to the Medication and Solution Preparation and Labeling Policy.

[Medication and Solution Preparation and Labeling](#)



MAINTENANCE OF TRANSDUCER PROTECTORS DURING HEMODIALYSIS

- Transducer protectors should be used between transducers and each pressure monitor line of the extracorporeal system to prevent the transducers from getting wet.
- Wet transducer protectors must be replaced, as they will cause inaccurate pressure readings.
- If the external transducer becomes wet, it must be changed and assessed for strikethrough (blood breaking through the transducer protector).
- If strikethrough is present, the internal transducer of the hemodialysis machine could be contaminated, and the following steps should be taken:
 1. At the completion of the patient's treatment, the hemodialysis machine will be tagged "out of service"
 2. Clinical Engineering will be notified by RN or PCT

For the full procedure on changing the transducer protector, please click on this link:

[maintenance-transducer-protectors-hemodialysis](#)

TUBERCULOSIS SCREENING

- All outpatients who are admitted to the Hemodialysis Department require Tuberculosis screening on admission and annually.
- If the result is indeterminate or positive, the staff will notify the Nephrologist and complete the Tuberculosis Latent-Active Infection reporting form.

Tuberculosis Reporting Form

PATIENT INFORMATION

Latent or Active TB? ☐ Latent Tuberculosis ☐ Active Tuberculosis

Last Name * First Name * Middle Name

Phone () - Cell Phone () -

State * Address * City * Zip *

Date of Birth * MM/DD/YYYY

Race * ☐ American Indian/Alaskan Native ☐ Asian ☐ African-American/Black
☐ Middle Eastern or North African ☐ Native Hawaiian/Pacific Islander ☐ White
☐ Multiracial ☐ Unknown ☐ Other

Hispanic * ☐ Hispanic/Latino ☐ Non-Hispanic/Non-Latino ☐ Unknown

Please select the gender identity that best describes the patient as reported by the patient. (Check one, regardless of sex assigned at birth.)
☐ Male; man; boy
☐ Female; woman; girl
☐ Nonbinary or Genderqueer or not exclusively male or female
☐ I am questioning/not sure of my gender identity
☐ I don't understand what this question is asking
☐ I prefer not to answer

Assigned Sex at Birth ☐ Male ☐ Female ☐ Refused ☐ Did not ask

Patient's intersex status ☐ Yes ☐ No ☐ Patient is not sure ☐ Patient does not understand the question ☐ Patient prefers not to answer

Transgender Experience ☐ Yes ☐ No ☐ I am not sure ☐ I don't understand what this question is asking ☐ Prefer not to answer ☐ Unable to collect

Sexual Orientation ☐ Bisexual and/or Pansexual ☐ Lesbian or Gay ☐ Straight or heterosexual ☐ Something else/Other not listed above (e.g. queer, asexual) ☐ Don't know

Country of Birth ☐ U.S. ☐ Other

Unique Address Condition ☐ Incarcerated ☐ Homeless ☐ Long Term Care Facility

RISK & TREATMENT INFORMATION

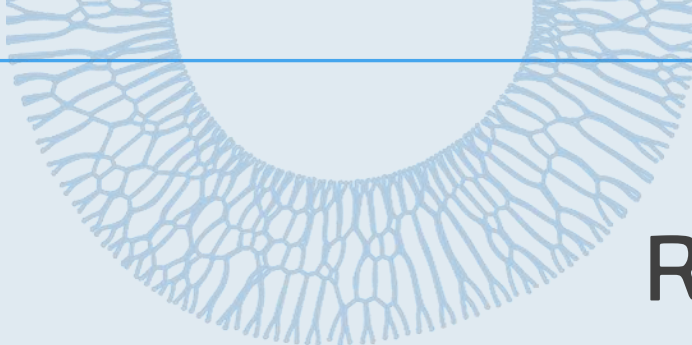
Risk Factors (check all that apply)
☐ Close Contact to a person with active TB disease within the past 2 years
☐ Has patient lived outside of the US for more than 2 months uninterrupted?
☐ Health care worker
☐ **Medical risks for progressing to active TB disease

Do you require a confirmation email upon submission?
☐ Yes ☐ No

*Denotes required field

Please fax any additional information pertinent to this case to the Massachusetts Department of Public Health (617) 887-8789. Thank you!

Submit



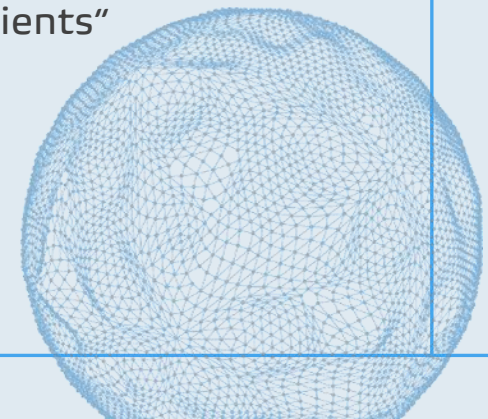
REFERENCES:

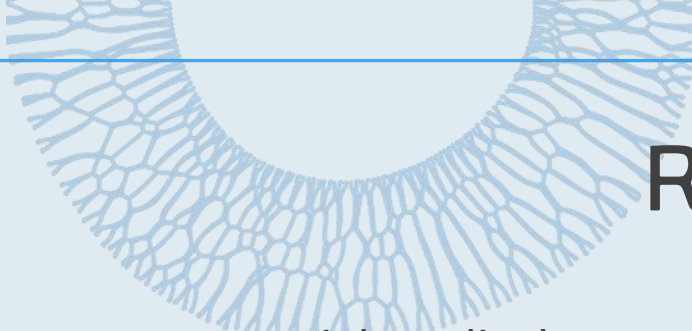
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Centers for Disease Control and Prevention. (2021). Recommendations for Preventing Transmission of Infections Among Chronic Hemodialysis Patients. [RR5005 front cover-Cont Ed-web.p65](#)

Garcia-Houchins, Sylvia. Dialysis. In Boston K.M., et al, eds. APIC Text. 2014 Available at
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U.S. Department of Health and Human Services, Centers for Disease Control and Prevention (CDC).
“Recommendations for preventing transmission of infections among chronic hemodialysis patients”
Morbidity and Mortality Weekly Report, April 27, 2001/Vol.50/(RR05);1-43
<https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5005a1.htm>





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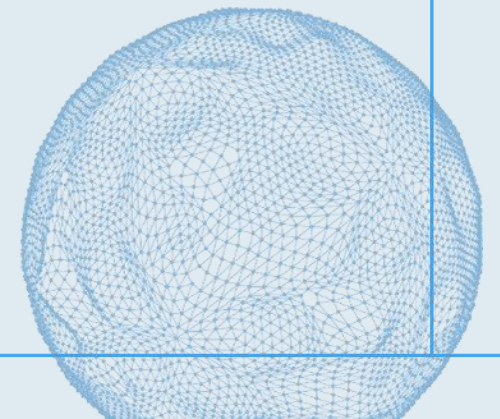
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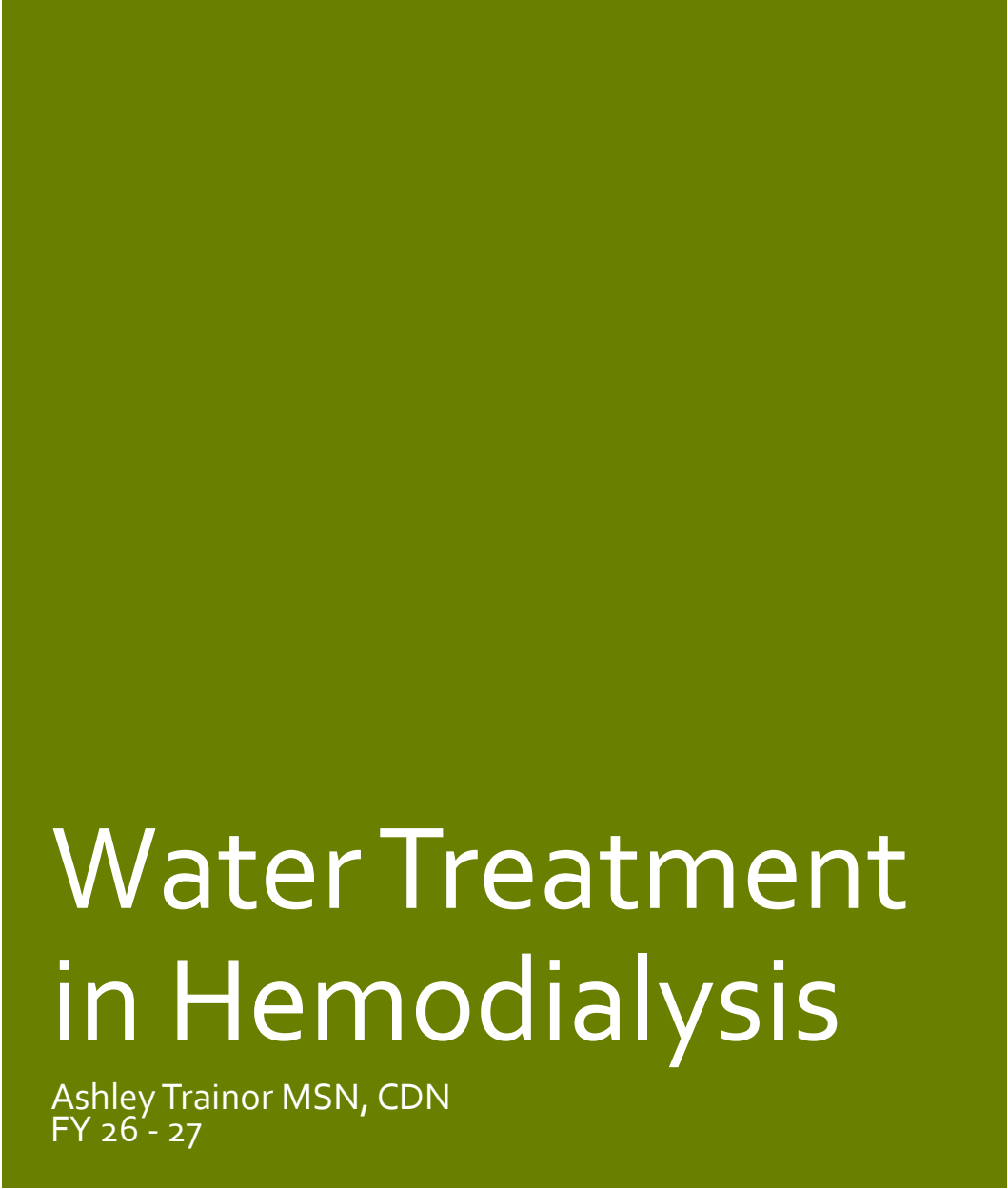
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UMass Memorial Medical Center. (2024). Medication and Solution Preparation and Labeling. Retrieved from: [Medication and Solution Preparation and Labeling](#)

UMass Memorial Medical Center. (2025). Isolation Highlights. Retrieved from: [Isolation highlights 12.15.2025.docx](#)

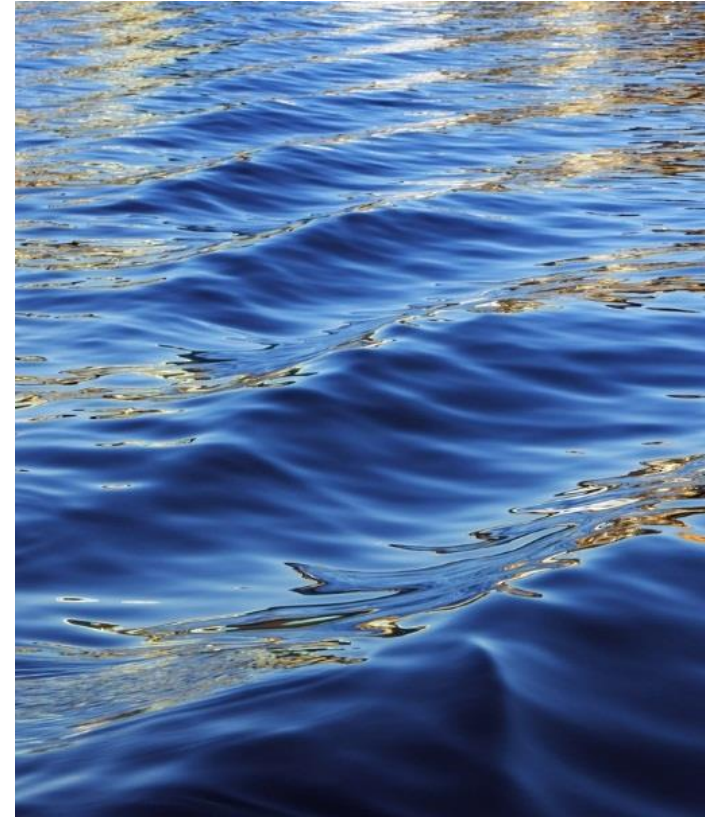
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Water Treatment in Hemodialysis

Ashley Trainor MSN, CDN
FY 26 - 27



Objectives

Explain

Explain the rationale/purpose for water treatment for hemodialysis patients

Identify

Identify components of the water treatment system

Describe

Describe functions of each water treatment component

Describe

Describe the role of the interdisciplinary team in water treatment

Education Requirement

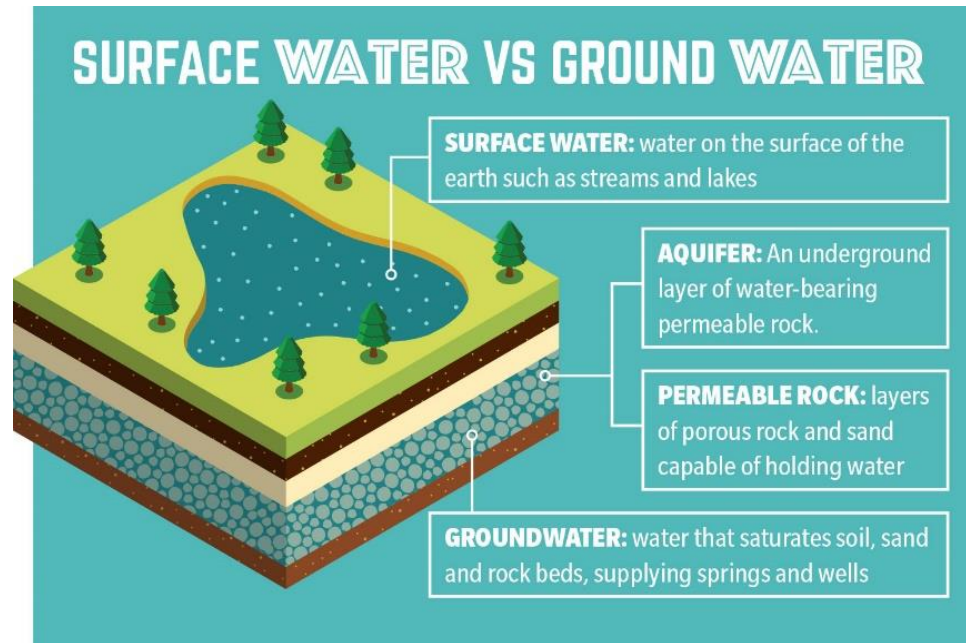
Per the Centers for Medicare and Medicaid Services End Stage Renal Disease Conditions for Coverage – water treatment training is required annually for all employees

Municipal Water

- Cities and towns treat water so that it is safe to drink
 - Low levels of bacteria are acceptable for drinking water
- The Environmental Protection Agency (EPA) sets limits for drinking water
 - Up to 500 colony forming units are allowed = safe to drink, not safe for Dialysis
 - Refer to slide 9 for allowable limits for Dialysis



Drinking Water and Safety



- Where does municipal water come from?
 - Ground water – wells, springs
 - Surface water – lakes, rivers
- Both sources contain organic (bacteria, viruses, algae) and inorganic material (salts, minerals, metals, gases)
- Municipal water:
 - Contaminated with wastes, fertilizers, pesticides, and sewage
 - Chemicals added include chlorine for disinfection, aluminum for clarity, fluoride to prevent dental caries, and phosphates to prevent pipe corrosion

Water Exposure in Hemodialysis

An average healthy adult consumes 10 – 12 liters of water per week

- Drinking water is ingested through the GI tract, and the liver and well-functioning kidneys remove any contaminants that may be present

Dialysate is 97% WATER

Dialysis patients are exposed to 350 – 400 liters of water per week

- Due to the volume of water exposure, even trace contamination can be harmful to a patient as kidneys cannot filter toxins present in water
- Potential exposure of contaminants is made through a thin, semipermeable membrane
- Filtration is dependent upon size of particle
 - Breaks in membrane = larger exposure

Risks of Exposure to Contaminants

- Immediate risks:
 - Anemia
 - Hemolysis
 - Neurological deterioration
 - Methemoglobinemia
 - Metabolic acidosis
 - Sepsis
 - Pyrogenic reaction
 - Death
- Long term risk = Chronic Inflammatory Disease
 - Resistance to erythropoietin
 - Malnutrition
 - Decreased transferrin level
 - Carpal tunnel syndrome
 - Accelerated atherosclerosis
 - Cardiovascular disease
 - Mortality

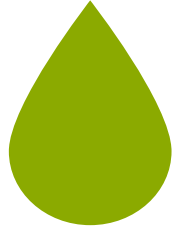
Sign/Symptom	Possible Cause
Anemia	Aluminum, Chloramines, Copper, Zinc
Bone disease	Aluminum, Fluoride
Hemolysis	Chloramines, Copper, Nitrates
Hypertension	Calcium, Sodium
Hypotension	Bacteria, Endotoxins, Nitrates
Metabolic Acidosis	Low pH, Sulfates
Muscle weakness	Calcium, Magnesium
Nausea, Vomiting	Bacteria, Calcium, Copper, Endotoxin, low pH, Magnesium, Nitrates, Sulphates, Zinc
Encephalopathy	Aluminum

Association for the Advancement of Medical Instrumentation (AAMI)

Recommendations for Dialysis Water Quality				
Contaminant	AAMI Max Level	AAMI Action Level	RD 52 Max Level	RD 52 Action Level
Total viable bacteria count	< 100 CFU / mL	50 CFU / mL	<200 CFU / mL	50 CFU / mL
Endotoxin	< 0.25 EU / mL	0.125 EU / mL	< 2 EU / mL	1 EU / mL
Recommendations for Dialysis Fluid Quality				
Total viable bacteria count	< 100 CFU / mL	50 CFU / mL	<200 CFU / mL	50 CFU / mL
Endotoxin	< 0.5 EU / mL	0.25 EU / mL	< 2 EU / mL	1 EU / mL

- AAMI sets standards for medical devices and products
- The Centers for Medicare and Medicaid (CMS) adopted a specific AAMI standard for water and dialysate as a quality regulation when the Conditions for Coverage were updated in 2008

Water Treatment System Components



Basic components:

- Two carbon tanks
- Reverse osmosis (RO) system
- Quality monitor
- Deionization (back-up only)



Optional components:

- Used to increase efficiency and efficacy of the water treatment system
- Chosen based upon analysis of the source water to adequately pretreat the water to protect the RO and remove contaminants

Water treatment systems are built based from the source water which they are treating – the following slides will detail the elements of the water treatment system at UMass Memorial Health

Backflow preventer

- Prevents treated water and disinfectants in the Dialysis center water system from flowing back into the city water
- Required by municipality and is inspected annually
- Present on the MAIN RO at UMass Memorial Health, required by the City of Worcester
- Not required by AAMI



Tempering valve

- Blends the hot and cold water going to the water treatment equipment
 - Optimal temperature for water treatment = 72 to 77 degrees Fahrenheit
 - Max water temperature is 90 degrees Fahrenheit
 - Not required by AAMI



Booster pump

- Increase the incoming water pressure to ensure sufficient water volume will go through the cascade of water treatment components and adequately supply the system
- Not required by AAMI



Sediment filters (Multimedia tanks)

- Although a single filtration medium may be used, multimedia filters are more commonly used (i.e. coal, sand, & garnet)
- Tanks are placed early in the water treatment cascade to remove particulate matter greater than 10 microns
- Generally used when source water has a high sediment rate
- Filters are periodically cleaned utilizing a backwash
- Not required by AAMI



Water Softener (Brine tank)

- Softeners remove Calcium and Magnesium to protect the RO from scale (hardness) which would decrease membrane permeability and function
- The tank is filled with salt pellets that exchange Sodium for Calcium and Magnesium
 - Water hardness must be less than 10 parts per million (PPM)
 - Water hardness is characterized by high mineral content
 - Testing should be completed using “dip and read test strips”
 - Staff are required to decipher between colors (blue, purple, & red)

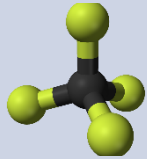


Carbon Adsorption Tanks

- Removes Chlorine/Chloramines from water:
 - Chlorine and Chloramines are added by the city to disinfect the water supply.
 - Chlorine/Chloramines in water that is used for dialysis can lead to adverse outcomes such as hemolysis and death.
 - Advantage of Chloramines for the city water supply is that they last longer, therefore controlling bacteria



Carbon adsorption tanks



Principal mode of removal is absorption:
The chlorine/chloramine adheres to the carbon



Empty bed contact time (EBCT): Is the length of time water must be in contact with the medium, for the purpose of dialysis the medium is Carbon, and the time must be greater than 10 minutes as required by AAMI



Department is required to “re-bed” carbon tanks with new carbon absorption media on a regular schedule

Reverse Osmosis System (RO)

- Removes particulates to produce purified water using pressurized water that is forced through the semi-permeable membrane leaving contaminants behind
- Membrane will reject 95% to 99% of charged particles
- Contaminants with no charge (inorganic salts, bacteria, viruses, endotoxin) will be removed by sieving through the membrane
 - Example of sieving is use of a strainer to strain pulp from orange juice
- Minimum percent rejection for safe patient use is 90%
- Water validation is required annually and if the rejection rate falls below 90%
 - Product water AAMI Chemical Water Analysis



Considerations: Memorial Campus

- In 2022, the main RO at the Memorial Campus was decommissioned and it is no longer operational.
- The Dialysis program at the Memorial Campus utilizes portable RO equipment for all procedures, at the bedside and in the Dialysis Department.
- The Memorial Campus only utilizes Ultra-Low Total Chlorine Test Strips for chlorine testing, this must be completed prior to EVERY patient treatment while the equipment is connected where the procedure will be completed, then at least every four hours while in use.

Deionization Systems (DI System)

- Utilized as a backup system when the main RO system is unusable
- DI tanks contain resin beads to remove positively and negatively charged ions from the water in exchange for hydroxyl and hydrogen = pure water when combined
- DI system has a limited capacity for use
 - Once exhausted, it will dump mass quantities of retained ions back into the product water
 - Requires separate log when in use and more frequent checks by clinical staff
- DI tanks are stored in the water treatment room and are swapped out by the vendor at specified intervals



Distribution Systems

Water distribution systems should be on a continuous loop where water is returned to the RO or storage tank to minimize biofilm formation

Required to be made of inert materials as purified water is “aggressive” and will leach chemicals from the materials such as copper, brass, aluminum, lead, and zinc

No dead ends may exist in the system

Rough joint should be avoided

Disinfection in addition to bacterial and endotoxin testing should be completed at a minimum of monthly from the first and last outlets of the water distribution loop

pH and Conductivity

pH and Conductivity **MUST** be measured with an independent meter:

1. Prior to each treatment, **AND**
 2. When acid or bicarbonate is changed during treatment
- Acceptable pH range: 6.9 – 7.6 on machine
 - Meter (actual) must be +/- 0.7 from machine
 - Theoretical must be +/- 0.4 from machine

Refer to Departmental procedure for additional information “**Calibration and Testing with the Myron Meter and Hydrion Paper for Dialysis**”



Chlorine and Chloramine Testing: Main RO University Campus only

- Testing must be completed every four hours
 - From the Main RO, sample is taken post worker carbon tank [SP₃]
 - Maximum allowable limit is 0.1ppm
- Chlorine test results should be documented in the central water treatment system log.
- If result is equal to or greater than 0.1ppm, sample should be checked after polisher carbon tank [SP 4]
- Testing is performed using the Ultra-Low Total Chlorine Test Strips
 - Manufacturer's instructions must be followed for use

Refer to Department Policy for additional information "**Chlorine Testing for Hemodialysis**"



Chlorine Testing: Portable RO

- Chlorine testing must be completed prior to each patient treatment while the equipment is connected to the source water that will be used for dialysis and if the treatment duration is greater than four hours
- Chlorine testing must be completed from the spigot shown in the picture attached
- Chlorine test results should be documented in the medical record.
- If the reading is equal to or greater than 0.1ppm, please remove the portable RO from use, tag the equipment as “out of service”, and retrieve another one for use



Chlorine and Chloramine Testing: Ultra-Low Total Chlorine Test Strips

- Allow the Main RO (University Campus only) or the portable RO system to run for a minimum of 15 minutes prior to taking sample.
- Sample should be taken from the correct sample port and in a standard sample cup (as shown in Figure 1), rinse designated sample cup three times then fill sample cup with 100 ml of RO water for testing.
- Immerse test pad into sample and move in a vigorous back/forth motion for 60 seconds (Figure 1)
- Remove test strip, briskly shake once to remove excess water.
- Fold white plastic handle under the test pad (Figure 2)
- Wait a full 20 seconds, then complete the color matching on the bottle
 - Result should be less than 0.1 ppm
 - If results greater than 0.1 ppm, do not use the portable RO

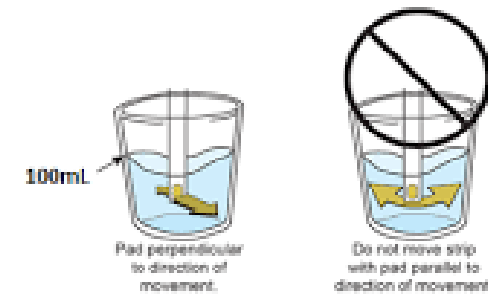


Figure 1

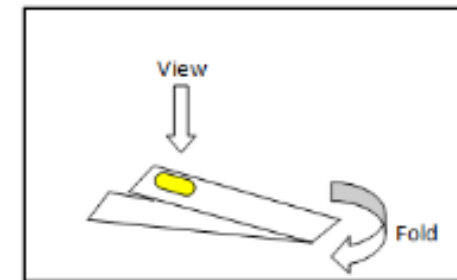


Figure 2

Chlorine “Breakthrough”: Main RO

- Any result equal to or greater than 0.1ppm is considered Chlorine breakthrough
- If the Chlorine result is equal to or greater than 0.1ppm after the worker carbon tank [SP 3], a sample should be completed from the polisher carbon tank [SP 4]
 - [SP 4] is circled in the picture attached



Chlorine “Breakthrough”: Main RO

Less than 0.1 PPM @ Polisher Tank [SP 4]

- The hemodialysis treatment/s can continue
- Notify the Nurse Manager immediately

Greater than 0.1 PPM @ Polisher Tank [SP 4]

- **ALL** hemodialysis treatments within the dialysis unit must be discontinued immediately
 - Notify the Nurse Manager, Clinical Engineering, and Medical Director
 - Complete a Patient Safety Event / Occurrence Report

Water Treatment Roles and Responsibilities

- Biomedical Technicians and the Facilities Department are responsible for testing and maintenance of the water treatment equipment
 - Water testing must be completed daily prior to beginning patient treatments
 - The resource nurse must review the documentation and confirm completion prior to initiating patient treatments in the renal dialysis unit

Water Treatment Roles and Responsibilities

- Chlorine/Chloramine testing is completed prior to the beginning of each patient shift
 - Ultimately the responsibility of the licensed RN but can be delegated to a PCT or another delegate that is properly trained
 - Must be completed prior to patient initiation in the renal dialysis unit EACH shift
- Completion of Chlorine/Chloramine testing is ultimately the responsibility of the resource nurse as the licensed staff member

Water Treatment Roles and Responsibilities

All results outside of normal range must be reported immediately through the chain of command

PCA, Resource Nurse, Nurse Manager, Medical Director



The Medical Director is ultimately responsible for oversight of the water treatment components and test results

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UMass Memorial Medical Center

Department of Nursing

PROCEDURE

Procedure Name: Assessment, Preparation, and Cannulation of a Fistula or Graft for Hemodialysis

**Approved: June 2024
Effective: June 2024**

I. PURPOSE:

To ensure safe cannulation of a fistula or graft prior to hemodialysis using aseptic technique.

II. SCOPE:

Nurses who are educated in performing the intermittent hemodialysis procedure.

III. RELATED DOCUMENTS:

N/A

IV. PROCEDURE:

Prior to hemodialysis:

- a. Prior to the procedure gather all necessary supplies:
 - i. Fistula needles per Nephrologist order (2)
 - ii. Pre-filled 10 mL 0.9% Sodium Chloride flushes (2) if performing a wet cannulation, or 10 mL syringes (2) if performing a dry cannulation
 - iii. Absorbent disposable pad (1)
 - iv. Hospital approved agent for site preparation:
 1. Chlorhexidine applicator (1)
 2. Iodine Swab, alternative if CHG sensitivity or allergy (3)
 - v. Tourniquet, required for arteriovenous fistula (1)
 - vi. Topical anesthetic spray, only if ordered by Nephrologist
 - vii. Antiseptic soap towelette (1)
 - viii. Polyethylene film gown (1)
 - ix. Face shield (1)
 - x. Nitrile exam gloves (10 pairs)
 - xi. Sterile gloves, if necessary (1 pair)
 - xii. Tape (1)
 - xiii. Gauze (4)
- b. Verify patient per policy 2018 Patient Identification and explain the procedure

Perform physical assessment of the access:

- a. Review the patient's medical record to confirm type of access
- b. Perform hand hygiene and don gloves
- c. Complete an assessment of the access utilizing the look, listen, and feel method

Procedure: Assessment, Preparation and Cannulation of a fistula or graft for hemodialysis

Page 2 of 6

- i. Confirm presence of a bruit through auscultation
- ii. Confirm the presence of a thrill through palpation
- iii. Confirm the direction of the blood flow
- iv. Assess for signs and symptoms of infection (redness, warmth, pain, drainage, swelling, rash, hematoma)
- d. Doff gloves and perform hand hygiene

Prepare the access for cannulation:

- a. Perform hand hygiene and don gown, face shield, and gloves
- b. Place absorbent pad under the patient's access arm and prepare supplies
- c. Position the access arm to aid in cannulation
- d. Doff gloves, perform hand hygiene, and don clean gloves
- e. Clean the access with the antiseptic soap towelette
- f. Choose needles sites prior to disinfection:
 - a. Sites should be rotated every treatment using the ladder method to avoid damage to the access including integrity, aneurysm formation, and stenosis
 - b. Sites should be 1.5 to 2 inches apart and at least 1.5 inches from the anastomosis
- g. If requested by the patient and ordered by the Nephrologist, topical anesthetic spray should be applied per the manufacturer's instructions for use, prior to disinfection
- h. Disinfect the access and surrounding skin with a Chlorhexidine applicator per manufacturer's instructions for use for a minimum of thirty seconds, allow the Chlorhexidine to dry for a minimum of thirty seconds
 - a. If the patient has a Chlorhexidine sensitivity or allergy, disinfect the access and surrounding skin with three Iodine swabs utilizing a circular motion for ten seconds per swab, allow Iodine to dry completely
- i. Do not contact the area after disinfection
 - a. Disinfection should be repeated if there is contact with the access prior to cannulation
 - b. If it is necessary to palpate the access after disinfection to aide in cannulation, the nurse must doff gloves, perform hand hygiene, and don sterile gloves prior to palpation
- j. A tourniquet must be used to engorge the vessel of an arteriovenous fistula and should be used for the minimum time necessary for cannulation
 - a. A tourniquet should never be used for a patient with an arteriovenous graft

Cannulation of the access for hemodialysis:

- a. The National Kidney Foundation (NKF) KDOQI guidelines recommend the use of wet needles for cannulation, however, dry needles are also acceptable:
 - a. For wet needles, use 8 mL of a pre-filled 10 mL 0.9% Sodium Chloride flush to prime each fistula needle
 - b. Do not prime the fistula needle until immediately prior to use

- b. For cannulation, the three-point method (figure 1) provides accuracy and may assist with limiting pain:
 - a. With the non-cannulation hand, place the thumb and forefinger on either side of the vessel paying close attention not to contaminate the site
 - b. With the cannulation hand, place the pinky or ring finger to pull the skin taut



Figure 1

- c. For an AV Fistula:
 - i. Grasp the fistula needle by the wings, ensure the needle bevel is facing upward, insert the needle at a 25-degree angle through the skin of the access
 - ii. The arterial needle can be inserted in the direction of blood flow (antegrade) or against the direction of blood flow (retrograde)
 - iii. The venous needle must always be inserted in the same direction as the blood flow
 - iv. Blood flashback signals entry into the vessel
 - v. Release the tourniquet on the limb
- d. For an AV Graft:
 - i. Grasp the fistula needle by the wings, ensure the needle is bevel facing upward, and insert the needle at a 45- degree angle through the skin of the access
 - ii. The arterial needle is inserted in the direction of blood flow into the graft
 - iii. The venous needle is inserted in the direction of blood flow out of the graft
 - iv. For a loop graft, carefully, occlude the loop for a moment and pulsation will indicate the arterial side of the graft
 - v. Blood flashback signals entry into the vessel
- e. Utilizing a 10 mL syringe attached to the fistula needle, aspirate 5 mL of blood
- f. Flush the fistula needle and close the pinch clamp
- g. The needle must flush and aspirate easily
- h. There should be no signs or symptoms of infiltration

- i. If signs or symptoms of infiltration are present, the needle should be removed and pressure applied
 - ii. There should be no more than two attempts per site per clinician, and no more than a maximum of four attempts per site in 24 hours
- i. Secure the fistula needle with tape following the insertion of each needle (figure 2):
 - i. Place the first piece of tape over the fistula wings, do not cover the needle site
 - ii. Place the second piece of tape sticky side up and then cross over the ends of the chevron
 - iii. Place the third piece of tape with gauze over the needle insertion site



Figure 2

- j. Draw laboratory specimens as ordered by the independent practitioner or advanced practice provider (IP/APP)
- k. Aseptically connect the bloodlines and fistula needles, ensure arterial needle is connected to the arterial bloodline and vice versa
- l. Open the white pinch clamps on the bloodlines and the fistula needles
- m. Doff gloves, perform hand hygiene, and don clean gloves prior to starting the hemodialysis procedure
- n. Document assessment and cannulation of the access in the medical record

Special Consideration – Cannulation of the access utilizing pre-existing Buttonhole sites:

- o. Disinfect the access and surrounding skin with a Chlorhexidine applicator per manufacturer's instructions for use for a minimum of thirty seconds, allow the Chlorhexidine to dry for a minimum of thirty seconds

- i. If the patient has a Chlorhexidine sensitivity or allergy, disinfect the access and surrounding skin with three Iodine swabs utilizing a circular motion for ten seconds per swab, allow Iodine to dry completely
- p. Remove the buttonhole scabs using a separate sterile device for each buttonhole
 - i. Moistening the scabs may aide in the removal process and decrease pain; to moisten the scab, cover the scab with an alcohol prep pad for five minutes
 - ii. Take care not to traumatize the buttonhole sites
 - iii. Take care not to fragment the scab
- q. After the scabs are removed, repeat step O
- r. Continue with the cannulation of the access using aseptic technique
 - i. The site tunnel and entrance must be aligned
 - ii. If the tunnel and entrance are not aligned:
 - 1. Realign the tunnel by positioning the blunt needle up to the point of resistance
 - 2. Lift the tunnel up slightly until the opening is found for patients with fluid overload or tip the tunnel down if the patient is dehydrated
 - 3. If realignment does not work, the needle should be removed, and a sharp needle should be utilized taking care to avoid a minimum of 3/4 inches in front of each buttonhole site, a sharp needle should never be used in a buttonhole site

Infiltration of the access:

- a. If an infiltrate occurs prior to heparinization, remove the needle and apply pressure
- b. If an infiltrate occurs after heparinization, leave the needle in place, secure with tape, and remove the needle at the completion of hemodialysis; unless the patient complains of pain or the infiltrate continues to worsen, then the needle should be removed immediately
- c. After an infiltrate, apply cold therapy to the affected area and care for the patient
- d. Notify the Nephrologist
- e. If possible, rest the fistula for at least one treatment or cannulate the access above the infiltration
- f. Document the infiltration in the patient's medical record and complete a safety incident report

V. RECISSION:

This rescinds Assessment, Preparation, and Cannulation of an Arterio-venous (AV) Fistula/Graft for Dialysis, July 2021

VI. REFERENCE:

1. Counts, S. (2020). Core Curriculum for Nephrology Nursing. (7th ed.). American Nephrology Nurses Association, Inc. Pitman, NJ.

VII. MONITORING:

The Nursing Policy Committee is responsible for monitoring this procedure

Keywords: Hemodialysis, Dialysis, Fistula, Graft

Developed By: Ashley Trainor MSN, CDN May 15th, 2024
Individual/Committee Date

Approved By: Linda Scoble MS RN NPD-BC June 18, 2024
Authorized Signature Chair, Nursing Policy Committee Date

Approved By: Michelle O'Rourke June 20, 2024
Authorized Signature Chief Nursing Officer Date

UMass Memorial Medical Center

Department of Nursing

PROCEDURE

**Procedure Name: Connection and Disconnection
from Hemodialysis via a Central Venous Catheter**

**Approved: June 2024
Effective: June 2024**

I. PURPOSE:

To provide guidance and ensure proper aseptic technique is maintained during connection and disconnection from the hemodialysis via a central venous catheter.

II. SCOPE:

Nurses who are educated in providing intermittent hemodialysis.

III. RELATED DOCUMENTS:

[2510 Insertion, Care, and Maintenance of all Intravascular Catheters](#)

IV. PROCEDURE:

1. Needle Free Connector Application or Change (i.e., Tego, Quest 3150): (to be changed every 7 days and as needed at the beginning of treatment):
 - a. Gather supplies:
 - i. Hospital approved needle free connectors (2)
 - ii. Alcohol impregnated caps (2)
 - iii. Polylined sterile field (1)
 - iv. Alcohol prep pads 70% isopropyl alcohol (2)
 - v. Sterile gloves (1)
 - vi. Polyethylene film gown (1)
 - vii. Face mask (minimum of 2)
 - viii. Nitrile exam gloves
 - b. Verify correct patient per policy 2018 and explain procedure
 - c. Perform hand hygiene
 - d. Don personal protective equipment including gown, mask, face shield, and gloves
 - e. Apply face mask to patient covering all airways (nose, mouth, tracheostomy)
 - f. Doff gloves, perform hand hygiene, and don gloves
 - g. Place sterile barrier under catheter lumens and drop supplies aseptically onto the sterile field
 - h. Doff gloves, perform hand hygiene, and don sterile gloves
 - i. Ensure catheter lumens are clamped
 - j. Complete the remaining steps while maintaining aseptic technique and ensuring the lumens do not touch inanimate objects while open to air

Procedure: Connection and Disconnection from hemodialysis via a central venous catheter

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- k. Remove hospital approved alcohol impregnated caps (i.e. Curoc)
 - l. If applicable, remove existing needle free connector
 - m. Scrub arterial/access (red) catheter hub thoroughly using friction for 15 seconds with alcohol prep pad, allow to dry for 15 seconds
 - n. Apply new needle free connector to the hub
 - o. Apply hospital approved alcohol impregnated cap to the needle free connector
 - p. Scrub venous/return (blue) catheter hub thoroughly using friction for 15 seconds with alcohol prep pad, allow to dry for 15 seconds
 - q. Apply new needle free connector to the hub
 - r. Apply hospital approved alcohol impregnated cap to needle free connector or continue to connection
 - s. Document in the medical record
2. Hemodialysis Connection via a Central Venous Catheter:
- a. Confirm catheter placement and Nephrologist order to use catheter
 - b. Gather supplies:
 - i. Polylined sterile field (1)
 - ii. Alcohol prep pads 70% isopropyl alcohol (6)
 - iii. Sterile gloves (1)
 - iv. Polyethylene film gown (1)
 - v. Face mask (minimum of 2)
 - vi. Face shield (1)
 - vii. Nitrile exam gloves
 - viii. Pre-filled 10 mL 0.9% Sodium Chloride flushes (2)
 - ix. 5mL syringe (2)
 - c. Verify correct patient per policy 2018 and explain the procedure
 - d. Perform hand hygiene
 - e. Don personal protective equipment including gown, mask, face shield, and gloves
 - f. Apply face mask to patient covering all airways (nose, mouth, tracheostomy)
 - g. Place the patient in a comfortable position that facilitates optimal blood flow through vascular access
 - h. Doff gloves, perform hand hygiene, and don gloves
 - i. Place sterile barrier under catheter lumens and drop supplies aseptically onto the sterile field
 - j. Doff gloves, perform hand hygiene, and don sterile gloves
 - k. Assess the vascular access site for signs and symptoms of infection
 - l. Ensure catheter lumens are clamped
 - m. Complete the remaining steps while maintaining aseptic technique and ensuring the lumens do not touch inanimate objects while open to air
 - n. Remove alcohol impregnated caps
 - o. Scrub arterial/access (red) connector thoroughly using friction for 15 seconds with alcohol prep pad, allow to dry for 15 seconds
 - p. Scrub venous/return (blue) connector thoroughly using friction for 15 seconds with alcohol prep pad, allow to dry for 15 seconds
 - q. Attach 5mL syringe to each lumen and aspirate 5mL of blood

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- r. Determine the patency of the vascular access catheter and the ability to aspirate blood easily from both lumens
 - i. If unable to aspirate blood from the catheter, notify the Nephrologist for further intervention and document in the medical record
 - s. Close clamp, remove syringe, and discard in a specified area
 - t. Scrub arterial/access (red) connector thoroughly using friction for 15 seconds with alcohol prep pad, allow to dry for 15 seconds
 - u. Scrub venous/return (blue) connector thoroughly using friction for 15 seconds with alcohol prep pad, allow to dry for 15 seconds
 - v. Attach pre-filled 10 mL 0.9% Sodium Chloride flush to arterial and venous lumen, flush each lumen
 - w. Close clamp, remove syringe, and discard in a specified area
 - x. Scrub arterial/access (red) connector thoroughly using friction for 15 seconds with alcohol prep pad, allow to dry for 15 seconds
 - y. Scrub venous/return (blue) connector thoroughly using friction for 15 seconds with alcohol prep pad, allow to dry for 15 seconds
 - z. Connect arterial and venous lumens to blood lines
 - aa. Doff gloves, perform hand hygiene, and don clean gloves prior to initiating hemodialysis
 - bb. Document assessment of the central venous catheter in the medical record
3. Disconnection of Hemodialysis via a Central Venous Catheter:
- a. Gather supplies:
 - i. Polylined sterile field (1)
 - ii. Alcohol prep pads 70% isopropyl alcohol (6)
 - iii. Sterile gloves (1)
 - iv. Polyethylene film gown (1)
 - v. Face mask (minimum of 2)
 - vi. Face Shield (1)
 - vii. Nitrile exam gloves
 - viii. Pre-filled 10 mL 0.9% Sodium Chloride flushes (2)
 - ix. 5 mL syringe (2)
 - x. Alcohol impregnated caps (2)
 - b. Perform hand hygiene
 - c. Don personal protective equipment including gown, mask, face shield, and gloves
 - d. Apply face mask to patient covering all airways (nose, mouth, tracheostomy)
 - e. Perform hand hygiene and don gloves
 - f. Place sterile barrier under catheter lumens and prepare supplies
 - g. Doff gloves, perform hand hygiene, and don sterile gloves
 - h. Complete the remaining steps while maintaining aseptic technique and ensuring the lumens do not touch inanimate objects while open to air
 - i. Ensure catheter lumens are clamped
 - j. Remove machine lines from lumens and place dead end caps on each line
 - k. Scrub arterial/access (red) connector thoroughly using friction for 15 seconds with alcohol prep pad, allow to dry for 15 seconds

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- l. Scrub venous/return (blue) connector thoroughly using friction for 15 seconds with alcohol prep pad, allow to dry for 15 seconds
 - m. Attach pre-filled 10 mL 0.9% Sodium Chloride flush to arterial and venous lumen, flush each lumen
 - n. Remove each syringe and discard in a specified area
 - o. Applicable only if dwell is ordered by Nephrologist:
 - i. Scrub arterial/access (red) connector thoroughly using friction for 15 seconds with alcohol prep pad, allow to dry for 15 seconds
 - ii. Scrub venous/return (blue) connector thoroughly using friction for 15 seconds with alcohol prep pad, allow to dry for 15 seconds
 - iii. Administer dwell to each lumen and close clamps
 - iv. Place completed medication label on each lumen (name of medication, date, time, and initials)
 - v. Remove each syringe and discard in a specified area
 - p. Apply alcohol impregnated cap to each lumen
 4. Special Considerations – Post Treatment Laboratory Specimen
 - a. Confirm treatment clock has reached zero
 - b. Perform hand hygiene and don gloves
 - c. Select the “Tx Clock” button and then press “CONFIRM” to stop the treatment
 - d. Reduce the blood pump speed to 100 mL/min
 - e. Doff gloves and perform hand hygiene
 - f. Don gown, face shield, and gloves
 - g. Scrub the arterial bloodline injection site port with an alcohol prep pad for 15 seconds
 - h. Allow the alcohol to dry for 15 seconds
 - i. Stop the blood pump
 - j. Doff gloves and perform hand hygiene
 - k. Don gloves
 - l. Obtain the blood sample approximately 15 seconds after stopping the blood pump
 - m. Increase the blood pump to 150 mL/min
 - n. Start the blood pump to continue reinfusion
 - o. Doff gloves and perform hand hygiene

V. RECISSION:

This rescinds the procedure Connection and Disconnection from Hemodialysis via a Central Venous Catheter, July 2021

VI. REFERENCE:

1. Counts, S. (2020). Core Curriculum for Nephrology Nursing. (7th ed.). American Nephrology Nurses Association, Inc. Pitman, NJ.
2. Centers for Disease Control. (2023). [Hemodialysis Central Venous Catheter Scrub-the-Hub Protocol \(cdc.gov\)](https://www.cdc.gov/hemodialysis/hub/)

VII. MONITORING:

The Nursing Policy Committee is responsible for monitoring this procedure

Keywords: Hemodialysis, CVC, Dialysis

Developed By: Ashley Trainor MSN, CDN May 15th, 2024
Individual/Committee Date

Approved By: Linda Scoble MS RN NPD-BC June 18, 2024
Authorized Signature Chair, Nursing Policy Committee Date

Approved By: Michelle O'Rourke June 21, 2024
Authorized Signature Chief Nursing Officer Date



Policy

Policy 0001 & Title: Infection Prevention in Hemodialysis

Effective Date: August 25th, 2025

Policy Owner: Hemodialysis Quality Assurance Performance Improvement Committee

Rescission: Supersedes policy dated: August 2021

Approved by: Kenneth Ralto, MD, FASN
Clinical Chief, Division of Renal Medicine
UMass Memorial Healthcare

Applicability: All personnel who work with patients, equipment, and the environment where hemodialysis is being performed.

Keywords: hemodialysis, dialysis, infection control, infection prevention, hepatitis

Policy

To provide consistent guidelines for the prevention of infection in patients receiving hemodialysis. Patients undergoing hemodialysis are at high risk for infection. Hemodialysis increases the risk of infection due to routine access to the patient's vascular system. Staff can reduce the risk of infection by adhering to strict hand hygiene practices, maintaining aseptic technique, and providing infection control education to patients.

Definitions

Not applicable.

General Procedure

1. General Infection Control Guidelines:

a. Personnel:

- i. Staff will adhere to standard precautions and applicable infection control policies.
- ii. Personal protective equipment (PPE) will be consistent with the OSHA regulations on Bloodborne Pathogens [5033 Occupational Exposure to Bloodborne Pathogens Exposure Control Plan](#).
- iii. All blood and body fluid exposures to a staff member will be reported timely and managed by the Employee Health Services Department during business hours or the Emergency Department during non-business hours.

- iv. All blood and body fluid exposures to a patient by another patient or staff member will be managed following the [5025 Employee Health Services Infection Control Practices for Workforce Members](#) policy.
 - v. Staff must comply with mandatory infection control education.
 - vi. Nurse Managers and designees will conduct random practice audits to monitor for compliance with policy/procedure, infection control practices, and water testing, at a minimum of annually.
 - 1. Audits will be conducted more frequently based on trends and/or determination of need.
- b. Visitors:
- i. Non-dialysis personnel and visitors should remain in the designated waiting area during the initiation and termination of hemodialysis unless PPE is donned.
 - ii. All visitors must perform hand hygiene upon entering and leaving the patient bay.
 - iii. Visitors with symptoms of communicable diseases or open wounds are discouraged from entering the hemodialysis department.

2. **General Infection Control Considerations:**

- a. Hand Hygiene and Gloves:
- i. Staff must perform hand hygiene before and after contact with patients and equipment.
 - ii. Staff must don gloves prior to providing care to a patient on hemodialysis.
 - iii. Staff must doff gloves and perform hand hygiene when moving between the patient and the equipment and vice versa.
- b. Personal Protective Equipment (PPE):
- i. Staff should wear PPE appropriate to the anticipated potential exposure, including but not limited to:
 - 1. Initiation and termination of treatment
 - 2. Manipulation of access needles or catheter
 - 3. Administration of medications through the extracorporeal circuit or by subcutaneous injection
 - 4. Cleaning and disinfection of patient care supplies and equipment
 - ii. PPE must be changed if it becomes soiled with blood, body fluids, secretions, or excretions.
 - iii. If a patient's clothing becomes soiled with blood, provide the patient with hospital garments, bag the soiled clothing, and educate the patient to launder at home.
- c. Hemodialysis Machine and Station Disinfection:
- i. At a minimum, hemodialysis machines will be heat disinfected every business day and bleach disinfected weekly when in service.
 - ii. Staff will follow the manufacturer's instructions for use for the hemodialysis machine.
 - iii. Disinfection of the equipment and station may not begin until the patient has left the station.



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Housekeeping Refer

- d. Food Restrictions:
- i. Consumption of food should be limited in the Hemodialysis Department due to risk of needle dislodgement/infiltration, hypotension, aspiration, bloodline disconnection, and cross contamination.

1. This does not apply to dietary supplements ordered by an Independent Practitioner or an Advanced Practice Provider (IP/APP).
- ii. Patient should be encouraged and supported to eat their meals prior to and/or after hemodialysis.
- iii. Food restrictions do not apply if the patient is hypoglycemic and requires intervention.

3. **Isolation Precautions and Prevention of Cross-Contamination of Bloodborne Pathogens:**

- a. Invasive Exams, Treatments, and Wound Dressings:
 - i. Due to the potential for cross-contamination of bloodborne pathogens, invasive physical examination/treatments are not allowed in the Hemodialysis Department.
 - ii. All wound and external devices should be properly secured prior to hemodialysis.
 - iii. Central line dressing changes and dressings that require immediate attention (non-intact) are permitted.
 - iv. All other scheduled care should be completed after the hemodialysis procedure has completed.
- b. Blood Spills:
 - i. Staff will gather supplies including towel or blood spill kit, bleach wipes, and PPE.
 - ii. For small blood spills only gloves are required and for large spills full PPE is required.
 - iii. Staff will use the towel or spill kit to absorb the blood then disinfect the area with bleach wipes.
 - iv. Staff must perform hand hygiene with soap and water following cleaning of a blood spill.
 - v. Housekeeping must complete a final clean of the area affected by the blood spill once the patient has been discharged.
- c. Hepatitis B Virus (HBV):
 - i. The HBV status of every patient should be known on admission to the Hemodialysis Department, including:
 1. Hepatitis B Surface Antigen (HBsAg)
 2. Hepatitis B Surface Antibody (anti-HBs)
 3. Hepatitis B Core Antibody (anti-HBc)
 - ii. HBV results that were drawn within the last thirty days may be used.
 - iii. If a patient's Hepatitis Surface B Antigen results as "REACTIVE", all efforts should be made to obtain recent vaccination records, and the IP/APP should order the following:
 1. Hepatitis B Quantitative PCR
 2. Hepatitis B Core Antibody, Total
 3. Hepatitis B Surface Antibody, Total

Hep B PCR	Anti-HBc, Total	Anti-HBs	Interpretation	Infectious	Enhanced Dialysis Precautions
Positive	Positive	Either	Active infection	Yes	Yes
Negative	Positive	Positive	Past infection, immune	No	No
Negative	Positive	Negative	Past infection, not immune	Unlikely	Discuss with ID

Negative	Negative	Positive	Immune	No	No
Negative	Negative	Negative	Susceptible	No	No

- iv. If a patient's HBV status is not available prior to hemodialysis, treat the patient as an "unknown" and obtain provider orders to complete HBV testing as soon as possible.
- v. For new patients whose HBV status is "unknown":
 1. All efforts will be made to obtain HBV status from the patient's hemodialysis clinic in the community.
 2. All efforts will be made to separate an HBV "unknown" patient at least one station width apart from another patient.
 3. The staff member assigned to an HBV "unknown" patient may only be assigned to a second patient with HBV "unknown" status or a patient that is HBV immune at the same time, including change of shift.
 4. The hemodialysis machine will be chemically disinfected internally and externally (i.e. bleach) at the end of each treatment.
- vi. Patient's who have received a liver transplant from a donor that was HBV positive or if the patient was HBV positive prior to the transplant and they are on viral suppression therapy should be tested for HBV (HBsAg) monthly.
 1. The hemodialysis machine should be chemically disinfected (i.e. bleach) internally and externally following each treatment.
 2. The patient does not require Enhanced Dialysis Precautions.
- d. Hepatitis B Virus Vaccination:
 - i. Patients who are susceptible to HBV will be offered the Hepatitis B vaccine prior to or upon admission.
- e. Hepatitis B Virus and Staff Assignments:
 - i. Staff assigned to HBV positive patients should be HBV immune when possible.
 - ii. Lack of immunity does not preclude a staff member from being assigned an HBV positive patient.
- f. Hepatitis C Virus (HCV):
 - i. Patients who are HCV positive do not need to be isolated from other patients or dialyzed on segregated hemodialysis equipment.
 - ii. Standard precautions are to be maintained for patients who HCV positive.
 - iii. The hemodialysis machine should be externally disinfected and internally heat disinfected after each treatment.
- g. Schedule for Routine Testing for Hepatitis B and Hepatitis C Virus:

Patient Status	On Admission	Monthly	Semi-Annual	Annual
New patient	HBsAg, anti-HBc, anti-HBs, HVC, ALT			
Established patient	HBsAg, HCV			
HBV susceptible, including non-responders		HBsAg		
Anti-HBs greater than 10				Anti-HBs

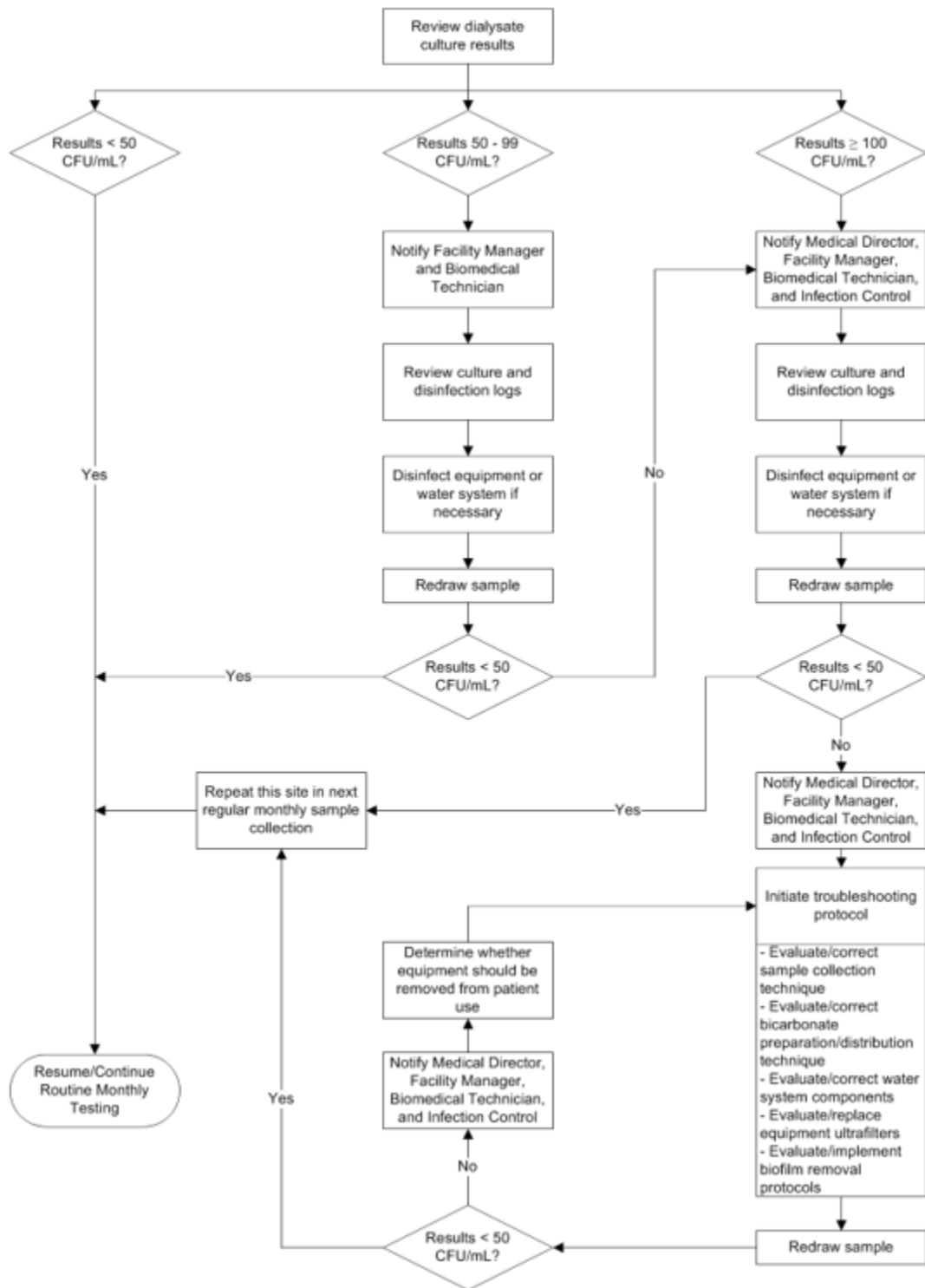
mIU/ml, anti-HBc negative				
Anti-HBs and Anti-HBc positive		None	None	None
Anti-HCV		ALT	Anti-HCV	

- h. Human Immunodeficiency Virus (HIV):
 - i. Patients are HIV positive are not isolated from other patients and do not require segregated equipment.
 - ii. Standard precautions are to be maintained for patients with HIV.
- i. Clostridium Difficile, Candida Auris, and other Multiple Drug-Resistant Micro-organisms:
 - i. Contact or Contact-Plus precautions are required depending on the type of organism.
 - ii. Cohort patients and staff according to the type of organism when possible.
 - iii. University Campus: use isolation station or private inpatient room whenever possible.
 - iv. North Pavilion Campus: use private inpatient room.
 - v. Memorial Campus: use station at the end of the row (Bay 4) to decrease number of adjacent stations whenever possible.
 - vi. Clean all reusable equipment and notify housekeeping to complete a terminal clean once the patient has left the station.
- j. Enhanced Dialysis Precautions:
 - i. Patients that have a reactive Hepatitis B Surface Antigen require Enhanced Dialysis Precautions, including:
 - 1. A private room with a door
 - 2. A gown and gloves prior must be donned prior to entry
 - 3. Door must be closed during initiation and termination of treatment
 - 4. Private room requires daily terminal cleaning
- k. Airborne Precautions:
 - i. Patients that are inpatient status will be receive dialysis in a negative pressure room.
 - ii. Patients that are outpatient status and require ongoing hemodialysis while being treated for Tuberculosis will adhere to the following:
 - 1. The patient will receive hemodialysis at the University Campus in an isolation room.
 - 2. All efforts will be made to schedule the patient at the end of the day to minimize exposure.
 - 3. A HEPA filter will be placed in the room and turned on one hour prior to the patient's scheduled appointment.
 - 4. The HEPA filter will continue to run for one hour following the patient's discharge.
 - 5. The Dialysis staff and Housekeeping will disinfect and clean the bay no sooner than one hour after the patient has been discharged.
 - 6. The isolation room will be dedicated to the patient for duration of treatment.
- l. Strict Airborne Precautions:
 - i. Patient's that are inpatient status will receive dialysis in their private inpatient room.
- m. Droplet Precautions:
 - i. All efforts will be made to place the patient in an isolation station.

1. If an isolation station is not available, utilize the curtain to separate the adjacent stations and maintain a distance of 3 – 6 feet from other patients.
 - n. Tuberculosis Screening:
 - i. All outpatients who are admitted to the Hemodialysis Department require Tuberculosis screening on admission and annually.
 - ii. If the result is indeterminate or positive, the staff will notify the Nephrologist and complete the [Tuberculosis Latent-Active Infection](#) reporting form.
 - o. Influenza, Pneumococcal, and COVID 19 Vaccination:
 - i. All outpatients who are admitted to the Hemodialysis Department are eligible and should be offered vaccination.
4. **Water Quality Control:**
- a. General:
 - i. Water quality testing is completed per Association for the Advancement of Medical Instrumentation (AAMI) standards.
 - b. Hemodialysis Machines:
 - i. Samples for heterotrophic plate counts (HPC) will be obtained prior to disinfection at a minimum of monthly.
 - ii. Samples for heterotrophic plate counts (HPC) will be obtained for testing if there is any clinical indication of pyrogenic or septicemic incidences.
 - iii. All results will be reported timely by the vendor.
 - iv. All results will be tracked and reviewed monthly by the Quality Assurance and Performance Improvement Committee.
 - c. Portable Reverse Osmosis:
 - i. Samples for heterotrophic plate counts (HPC) will be obtained prior to disinfection at a minimum of monthly.
 - ii. Samples for heterotrophic plate counts (HPC) will be obtained for testing if there is any clinical indication of pyrogenic or septicemic incidences.
 - iii. All results will be reported timely by the vendor.
 - iv. All results will be tracked and reviewed monthly by the Quality Assurance and Performance Improvement Committee.
 - d. Main Reverse Osmosis System:
 - i. Samples for heterotrophic plate counts (HPC) will be obtained prior to disinfection, pre and post loop, at a minimum of monthly.
 - ii. Samples for heterotrophic plate counts (HPC) will be obtained following disinfection, pre and post loop, at a minimum of monthly.
 - iii. Samples for bacterial endotoxin testing (LAL) will be obtained at a minimum of monthly.
 - iv. All results will be tracked and reviewed monthly by the Quality Assurance and Performance Improvement Committee.
 - e. Action Levels and Notification:
 - i. Results (LAL) that are less than 0.125 EU/ml are below action level, results will be sent by email.
 - ii. Results (LAL) that are greater than or equal to 0.125 EU/ml are above action level and will be called to the Nurse Manager or designee in addition to being sent by email.
 1. The Nurse Manager or designee will notify the Medical Director and Biomedical Engineer.

2. Water samples for endotoxin testing (LAL) will be repeated and the Main Reverse Osmosis System may remain in patient use.
 3. Complete a Safety Event report.
- iii. Results (LAL) that are greater than or equal to 0.25 EU/ml require corrective action and will be called to the Nurse Manager or designee in addition to being sent by email.
 1. The Nurse Manager or designee will notify the Medical Director and Biomedical Engineer.
 2. Interdisciplinary team will discuss best course of action for remediation.
 3. Complete a Safety Event report.
- iv. Results (HPC) that are less than 50 CFU/ml are below action level, results will be sent by email.
- v. Results (HPC) that are between 50 – 99 CFU/ml are above action level and will be called to the Nurse Manager or designee in addition to being sent by email.
 1. The Nurse Manager or designee will notify the Medical Director and Biomedical Engineer.
 2. Water samples for endotoxin testing (LAL) will be repeated and the Main Reverse Osmosis System may remain in patient use.
 3. Complete a Safety Event report.
- vi. Results (HPC) that are greater than or equal to 100 CFU/ml require corrective action and will be called to the Nurse Manager or designee in addition to being sent by email.
 1. The Nurse Manager or designee will notify the Medical Director and Biomedical Engineer.
 2. Interdisciplinary team will discuss best course of action for remediation.
 3. Complete a Safety Event report.

Addendum E: AAMI Decision Tree for Water Testing Results



No changes to this policy may be made in isolation or independently.

Clinical/Department Specific Procedures

[Care of the Hemodialysis patient with a Suspected Febrile Pyrogenic Reaction Procedure](#)
[Cleaning and Disinfection of the Hemodialysis Machine Procedure](#)

Supplemental Materials

[End-Stage Renal Disease Facilities | CMS](#)

References

U.S. Department of Health and Human Services, Centers for Disease Control and Prevention (CDC). “Recommendations for preventing transmission of infections among chronic hemodialysis patients”

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UMass Memorial Medical Center

Department of Nursing

PROCEDURE

Procedure Name: Discontinuation of Hemodialysis During a Power Failure

Approved: Nov 2024
Effective: Nov 2024

I. PURPOSE:

To provide direction to staff in the event of a power failure to safely discontinue the hemodialysis procedure and return the patient's blood.

II. SCOPE:

Nurses caring for patient's receiving hemodialysis on the Fresenius 2008T machine.

III. RELATED DOCUMENTS:

[Connection and Disconnection from Hemodialysis via a Central Venous Catheter Procedure](#)

[Termination of Hemodialysis with An AV Fistula Graft Procedure](#)

IV. PROCEDURE:

- a. In the event of a power failure, the blood pump stops and the venous line clamp closes:
 - i. The dialysate flow pump, heater, and blood leak detector are non-functional.
 - ii. All function lights are non-operational.
 - iii. A steady, audible alarm will sound for seven minutes and cannot be silenced by the "Mute" key.
 1. The operator can silence the alarm manually by removing the 9-volt battery from the back of the machine.
- b. Perform hand hygiene.
- c. Don gloves.
- d. Replace the 0.9% Sodium Chloride 1 Liter bag if there is less than 500 mL.
- e. Remove the venous bloodline from the venous line clamp (refer to diagram A).
- f. Place the scissor clamp on the arterial bloodline directly above the saline "T".
- g. Open the two small white clamps on the saline line and reinfuse the arterial blood by gravity.
- h. When the blood in the arterial line has been returned to the patient, clamp the two small white clamps on the saline line.
- i. Remove the scissor clamp from above the saline "T" and place the scissor clamp below the saline "T".
- j. Open the blood pump door and flip the rotator latch outward (refer to diagram B,

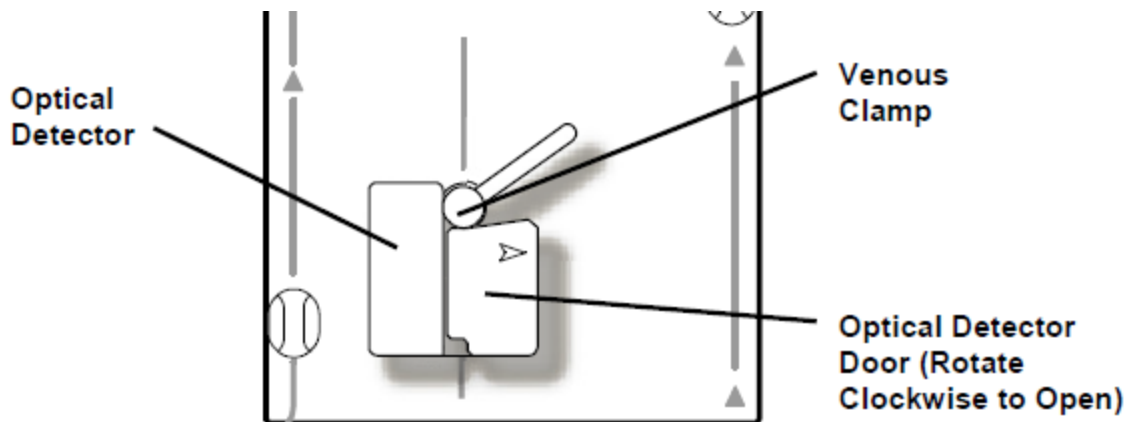
Procedure: Discontinuation of Hemodialysis During a Power Failure

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Step 1)

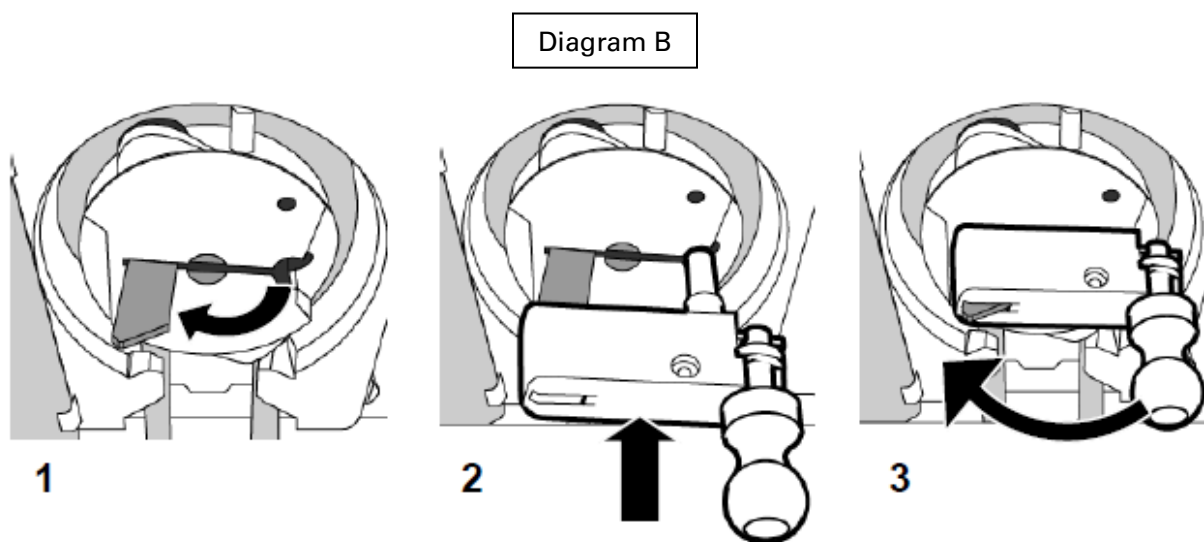
- k. Remove the crank handle from the back of the machine.
- l. Align the slot and the spindle on the crank handle with the rotor latch door and hole on the blood pump (refer to diagram B, Step 2).
- m. Slide the crank handle in towards the machine as far as it will go (refer to diagram B, Step 3).
- n. Open the two small white clamps on the saline line.
- o. Rotate the crank clockwise returning the venous blood with saline under continuous observation:
 - i. It is important to observe closely for the presence of air in the venous bloodline as the air detector is disarmed.
 - ii. If air is present, do not continue reinfusing the patient's blood and clamp access lines immediately.
- p. Clamp the arterial and venous bloodlines.
- q. Clamp the arterial and venous access lines.
- r. Perform access care per department procedure:
 - i. Termination of Hemodialysis with an AV Fistula/Graft.
 - ii. Connection and Disconnection from Hemodialysis via a Central Venous Catheter.
- s. Notify the Clinical Engineering and Facilities Department of the power failure.
- t. Notify the Nurse Manager and the Nephrologist.
- u. Complete an occurrence report.

Diagram A



Procedure: Discontinuation of Hemodialysis During a Power Failure

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V. RECISSION:

Discontinuation of Hemodialysis During a Power Failure, Nov 2021

VI. REFERENCE:

- 1) Fresenius Medical Care. (2024). 2008T Hemodialysis Machine Operators Manual (Rev AB). Waltham, MA: Fresenius USA, Inc.

2) MONITORING:

The Nursing Policy Committee is responsible for monitoring this procedure

Keywords: Dialysis, Power Failure

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