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## Dialysis Unit

### I. Description

Describes infection control guidelines followed by personnel of the Dialysis Unit

### II. Rationale

Patients undergoing dialysis are at an increased risk of exposure to infectious diseases such as HBV and HCV. Strict adherence to infection control guidelines can reduce the risk of transmission of hepatitis viruses, as well as other pathogenic organisms.

### III. Policy

#### A. Personnel

1. Hand Hygiene
  - a. Hand hygiene must be performed in accordance with the Infection Control policy: [Hand Hygiene and Use of Antiseptics for Hand Preparation](#).
2. Dress Code
  - a. Healthcare personnel should adhere to all personnel guidelines in the Infection Control policy: [Infection Control Guidelines for Adult and Pediatric Inpatient Care](#).
  - b. Clean scrub clothes must be worn daily and will be changed when contaminated. Scrubs not contaminated with blood or other potentially infectious materials may be laundered at home.
  - c. Employee-owned clothing (e.g., scrubs) contaminated with blood or other potentially infectious materials will be processed by the employer in accordance with the [Exposure Control Plan for Bloodborne Pathogens](#).
3. Occupational Health
  - a. UNC Health Care personnel should adhere to guidelines established by the Occupational Health Service (OHS). See the policy: [Infection Control and Screening Program – OHS](#).
  - b. Personnel should be familiar with and follow policies outlined in the [Exposure Control Plan for Bloodborne Pathogens](#), the [Tuberculosis Control Plan](#), and [Isolation Precautions](#).

#### B. Infection Control Measures for All Patients

1. Standard Precautions in the Dialysis Setting
  - a. Gloves are required whenever caring for a patient or touching the patient's equipment during the process of hemodialysis. When a clean or sterile, disposable, cotton-tipped swab is used to touch the control buttons on the hemodialysis machine, gloves do not need to be worn. The swab should be disposed of immediately after use. If the buttons are touched with the hands, then gloves should be worn.
  - b. A supply of clean gloves and discard container should be available near each dialysis station. Gloves should be removed and hand hygiene performed between each patient or station. Hand hygiene is performed after glove removal, between patient contacts and after touching blood, body fluids, secretions, excretions, and contaminated items. An alcohol-based antiseptic hand rub may be used if hands are not visibly soiled.
  - c. Personal protective equipment (PPE) must be used with all patient care activities when there is a reasonable likelihood of exposure to blood or other potentially infectious body fluids. Staff should wear appropriate PPE (e.g., fluid-resistant gowns, face-shields, protective eyewear, masks) to protect themselves and prevent soiling of clothing when performing procedures during which spurring or spattering of blood might occur (e.g., during initiation and termination of dialysis, cleaning of used equipment, and centrifugation of blood). Such protective clothing or gear should be changed if it becomes soiled with blood, body fluids, secretions, or excretions and between patients.
  - d. Engineering controls should be used to minimize or eliminate the use of needles in accordance with the [Exposure Control Plan for Bloodborne Pathogens](#). Sharps will be disposed of in a designated sharps container.
2. Personnel Responsibilities for Vascular Access
  - a. Catheters, shunts, fistulas, femoral, subclavian, or other vascular access catheters will be cared for using meticulous aseptic technique.
  - b. The UNC Medical Center Dialysis policies found on PolicyStat via the intranet page describe in detail the procedures used to care for these devices.
  - c. Hemodialysis staff and nephrologists only may access the catheters used for hemodialysis. The only exception to this policy is in the event of an emergency. For further details, refer to [Dialysis policies on PolicyStat](#).
3. Medications
  - a. Unused medications or supplies (e.g., syringes, alcohol swabs) taken to the patients' station should not be returned to a common clean area or used on other patients.
  - b. Medications are managed through use of the Pyxis system. The top surface of the Pyxis should be wiped with an EPA registered hospital disinfectant (e.g., Sani-cloth or Metriguard) every shift.

- c. Intravenous medication vials labeled for single use (preservative free), including erythropoetin, are not punctured more than once. They are discarded immediately after use. Residual medication from two or more vials may not be pooled into a single vial.
  - d. Multi-dose vials are used in accordance with the [Medical Management: Use of Multi-dose Vials/Pens of Parenteral Medications in Acute Care and Ambulatory Care Environments](#) policy.
  - e. Medications are delivered separately to each patient. Common carts are not used within the patient treatment area to prepare or distribute medications. Medication vials, syringes, alcohol swabs, or supplies should not be carried in pockets. If trays are used to deliver medications to individual patients, they must be cleaned between patients.
  - f. Prepackaged single dose prefilled syringes of flush solution are used.
4. Patient records should not be placed on potentially contaminated surfaces (e.g., beds, dialysis machines).
5. Patient Care Supplies
- a. Clean and contaminated supplies are stored separately. The preparation and handling of clean, unused supplies occurs in clean areas clearly separated from contaminated areas (where used supplies or equipment are handled).
  - b. Items taken to a patient's dialysis station, including those placed on top of the dialysis machines, should be disposed of or dedicated for use only on a single patient. Reusable items or equipment should be cleaned and disinfected before being returned to a common clean area or used for other patients.
  - c. Nondisposable items that cannot be cleaned and disinfected (e.g., adhesive tape) should be dedicated for use only on a single patient.
  - d. Contaminated (i.e., used) supplies, equipment, blood samples, or biohazard containers are not handled or stored in areas where medications and clean (i.e., unused) equipment and supplies are handled.
  - e. When a common supply cart is used to store clean supplies in the patient treatment area, this cart should remain in a designated area at a sufficient distance from patient stations to avoid contamination with blood. Such carts should not be moved between stations to distribute supplies. Supply carts should be accessed with clean hands.
  - f. Thermometers with probe sheaths should not be kept on top of the dialysis machine.
6. Additional Guidelines for Peritoneal Dialysis
- a. Peritoneal dialysis machines are disinfected between patients with a 1:10 dilution of sodium hypochlorite or an EPA registered hospital disinfectant.
  - b. The following guidelines should be followed for all patients with peritonitis:
    - i. Follow all routine infection control procedures and precautions.
    - ii. Discard dialysis fluid by pouring down a hopper or toilet. Perform hand hygiene.
  - c. Disposal of Peritoneal Fluid
    - i. All dialysis fluid may be disposed of by emptying into a hopper or toilet. In critical care areas, the fluid may be emptied into the drain for hemodialysis. If the patient is in a private room, the drainage system may empty directly into the room toilet. The discard tube should be several inches from the fluid level of the toilet.
    - ii. If the patient is in a semi-private or wardroom, the peritoneal fluid must empty into a drainage bag or similar container. The drainage container is then emptied into a hopper or toilet by a Dialysis staff member and appropriately discarded.
  - d. There are currently no CDC recommendations for serological screening of peritoneal dialysis patients. Routine serological screening for these patients is not necessary for purposes of infection control.
7. Additional Guidelines for Hemodialysis on Acute Care/ICU/Stepdown units
- a. Ideally, hemodialysis will be performed in the dialysis unit. If hemodialysis must be performed in a patient room, the patient must be in a private room.
  - b. In patient rooms equipped with hemodialysis drains dialysis fluid must be disposed of into the drain for hemodialysis.
  - c. In patient rooms where no hemodialysis drain exists ideally the toilet will be used for drainage of dialysis fluid. If this is not feasible, due to the amount of fluid, an in-room sink may be utilized. During this time, the sink should not be used for other purposes such as hand hygiene.
    - i. For Enteric Contact Precautions: If the patient room has only one sink, and it is being utilized for dialysis drainage, staff should be advised to remove PPE before leaving the room, exit the room and go directly to the nearest sink to perform soap and water hand hygiene.
    - ii. When hemodialysis is complete the sink should be wiped with a 1:10 chlorine solution then 1 quart (32 ounces) of a 1:10 bleach solution should be poured around the inside of the sink and allowed to go down the drain.

### C. Responsibilities for the Cleaning, Disinfection, and Care of Equipment

1. General cleaning after each patient treatment: Environmental surfaces at the dialysis station, including the dialysis bed or chair, countertops, and external surfaces of the dialysis machine are cleaned and disinfected with an EPA registered hospital disinfectant or a 1:10 dilution of bleach and water (expires 30 days after being mixed). Cleaning is performed while no patient is at the station.
2. Surfaces that become contaminated with blood or other potentially infectious body fluids should be cleaned and disinfected immediately. These surfaces should also be cleaned daily.
3. Items shared between patients (e.g., stethoscopes, reusable blood pressure cuffs, clamps, medication administration pumps) are disinfected between patients and when visibly soiled.
4. Thermometers are cleaned as follows:
  - a. **Electronic thermometers.** A new plastic sheath is used for each temperature. The cord, probe, and unit should be thoroughly cleaned between patient uses with an EPA registered hospital disinfectant, or a 1:10 bleach solution. Rectal and oral temperatures should be taken with separate probes.
  - b. **Ear (tympanic membrane) thermometers** are equipped with a probe and disposable, plastic probe covers. A new plastic cover should be used for each temperature. The unit, including the end of the probe, should be wiped after each patient use and when visibly soiled with an EPA registered hospital disinfectant or a 1:10 bleach solution.
5. Hemodialysis machines are routinely cleaned and maintained by the hemodialysis unit staff. After each patient use, the exterior surfaces of the machine are

disinfected with 1:10 bleach solution or EPA registered hospital disinfectant. At the end of each treatment day, prior to disinfection, the machine should be acid cleaned using vinegar, citric or acetic acid.

6. At the end of the day, the internal fluid pathways of each machine are disinfected with heat or bleach per Fresenius policy (see References). Heat disinfection is accomplished by the water temperature in the heating vessel rising to 83° C and then passing through the internal fluid pathways for 20 minutes with rinse. This system eliminates microbial contamination without the hazards associated with chemicals. Sodium hypochlorite 5.255 – 6.0% (standard household bleach) is the approved chemical used on the internal fluid pathways of dialysis machines and should be used to disinfect the internal fluid pathways after treatment of a Hepatitis B Virus (HBV) positive or HBV status unknown patient (refer to section *I. Prevention and Management of HBV Infection*).
7. Primed hemodialysis and CRRT (Continuous Renal Replacement Therapy) set-ups should be discarded after 12 hours if treatment has not been initiated.
8. Concentrate wands must be disinfected daily. See Appendix 1 for disinfection guidelines.

## D. General Isolation Precautions Guidelines

1. The [Isolation Precautions Policy](#) will be followed for patients with communicable diseases. An Infection Control Preventionist may be consulted as needed, concerning the indications for isolation precautions.
2. When working with patients on isolation precautions, personnel will wear the appropriate attire and perform hand hygiene according to the [Isolation Precautions Policy](#).
3. Patients presenting to the Dialysis Unit with clinical manifestations of potentially contagious diseases will be evaluated before dialysis occurs.
4. If a patient colonized or infected with a multidrug-resistant organism (e.g., MRSA, VRE) on Contact Precautions must receive treatment in the Dialysis Unit, the patient should be placed in an isolation room if available. If there are more patients who require Contact Precautions than isolation rooms, a clear plexi-glass divider on wheels may be used between patient stations. After completion of treatment for all patients who require Contact Precautions, the exterior of the dialysis machine, surfaces that may have become contaminated, and any other reusable item must be disinfected with an EPA registered hospital disinfectant.
5. If a patient on Droplet Precautions receives dialysis, the patient should preferably be hemodialyzed in their rooms or placed in an isolation room in the Dialysis Unit. If patients must be treated in the Dialysis Unit, and there are no isolation rooms available, the patient should be dialyzed at the end of the shift, if possible. Patients must be a minimum of 6 feet away from other patients and wear a tightly fitting surgical mask during dialysis. A clear plexi-glass divider on wheels, plus disposable curtains, may be used between patient stations. Curtains should remain closed on either side of the patient, and staff should follow Droplet Precautions and wear a tightly fitting surgical mask when caring for the patient.
6. Inpatients on Airborne Precautions will preferably be hemodialyzed in their room. If patients must be treated in the Dialysis Unit, they must be placed in an Isolation Room with negative air pressure. Room pressure is checked when in use using the tissue test and results documented.
7. Outpatient centers that do not have negative pressure isolation rooms should refer patients requiring Airborne Precautions to the hospital to have their dialysis completed.

## E. General Guidelines for the Care of Patients Known or Suspected to be Infected with Bloodborne Pathogens

CDC recommendations for serologic surveillance for certain bloodborne pathogens pertain to staff and patients in chronic hemodialysis centers. The patient screening and vaccination recommendations that follow apply to chronic hemodialysis patients. Most patients receiving hemodialysis in the Inpatient Dialysis Unit are treated briefly, discharged and then resume treatment in a community hemodialysis center. The screening and vaccination guidelines below should be applied to in-house patients when feasible (e.g., patient with lengthy stay). The staff screening recommendations applies to all hemodialysis staff, whether they work in an acute or chronic hemodialysis center. UNC Health Care personnel will receive their screening through Occupational Health Service (OHS).

1. Patients who are positive for HIV or HCV do not need to be isolated from other patients either in separate rooms or by using dedicated machines.
2. Patients whose HBV status is unknown pending completion of serology studies will have their machines disinfected in the same manner as HBsAg positive patients.
3. Patients who are HBsAg-positive – (Refer to section *I. Prevention and Management of HBV Infection*)

## F. Routine Serologic Testing for Chronic Hemodialysis Patients

1. All chronic hemodialysis patients should be routinely tested for HBV and HCV infection. Results should be promptly reviewed, and patients should be managed appropriately based upon their testing results. Test results (positive and negative) should be communicated to other facilities, as appropriate, when patients are transferred for care.
2. Routine testing for HDV or HIV infection for purposes of infection control is not recommended.
3. The HBV serologic status (i.e., HBsAg, total anti-HBcAg, and anti-HBsAg) of all patients should ideally be known before treatment in the Hemodialysis Unit. For patients established at an outside dialysis center, serology results should be obtained by calling the outside facility prior to the patient's first in-house dialysis treatment. For new patients, blood for serology is drawn during the first dialysis treatment.
4. Routine HCV testing should include use of both an EIA to test for anti-HCV and supplemental or confirmatory testing.
5. If ALT levels are persistently abnormal in patients who are anti-HCV-negative in the absence of another etiology, testing for HCV RNA should be considered.

## G. Hemodialysis Staff Members

1. Testing staff members for HBV infection is not necessary. The risk of HBV infection among hemodialysis staff members is no greater than that for other healthcare personnel.
2. Routine testing for staff members is not recommended except when required to document the response to hepatitis B vaccination.
3. Routine testing of staff members for HCV, HDV or HIV infection is not recommended.
4. OHS will notify the NC Public Health Department and the Dialysis Director if a dialysis staff member becomes HBsAg-positive. In consultation with the Dialysis Director and the OHS, a decision will be made concerning the activities of the staff member.

## H. Hepatitis B Vaccination

1. Vaccine Schedule and Dose

- a. Hepatitis B vaccination is recommended for all susceptible chronic hemodialysis patients.
    - i. HBV vaccination is recommended for pre-end stage renal disease patients before they become dialysis dependent and for peritoneal and home dialysis patients because they might require in-center hemodialysis.
    - ii. If an adult patient begins the vaccine series with a standard dose before treatment, then moves to hemodialysis treatment prior to completing the series, complete the series using the higher dose recommended for hemodialysis patients. No specific recommendations have been made for higher doses for pediatric hemodialysis patients. If a lower than recommended vaccine dose is administered to either adults or children, the dose should be repeated.
    - iii. If the vaccination series is interrupted after the first dose, the second dose should be administered as soon as possible.
    - iv. For the 3 dose primary vaccine series, the second and third doses should be separated by an interval of at least 2 months. If <4 months separate the 2nd and 3rd dose, a final dose should be given 7 months after the 3rd dose.
    - v. If only the 3rd dose is delayed, that dose should be administered when convenient.
  - b. All staff must be offered the hepatitis B vaccine. Staff will receive the vaccine at the UNC Health Care's expense.
2. Post-Vaccination Testing and Revaccination of Non-Responders
- a. Test all patients for anti-HBsAg (quantitative test) 1-2 months after the last primary vaccine dose. Since most patients seen at the UNC Health Care Dialysis Unit have relatively short hospital stays, this is usually done by the outpatient dialysis center. (A protective level is considered  $\geq 10$  mIU/ml anti-HBsAg).
  - b. Patients and staff members who do not respond to the primary vaccine series should be revaccinated with three additional doses and retested for response (i.e., anti-HBs).
  - c. No additional doses are warranted for those who do not respond to the second series.
  - d. Staff members and patients who do not respond to revaccination are evaluated to determine if they are HBsAg-positive.
  - e. Persons who are HBsAg-positive should be counseled accordingly (e.g., need for medical evaluation, vaccination of sexual and household contacts).
  - f. Primary nonresponders to vaccination who are HBsAg negative should be considered susceptible to HBV infection and counseled regarding precautions to prevent HBV infection and the need to obtain post-exposure prophylaxis with hepatitis B immune globulin for any known or probable percutaneous or mucosal exposure to HBsAg-positive blood.
3. Follow-Up of Vaccine Responders
- a. Retest patients who respond to the vaccine annually for anti-HBs.
  - b. If anti-HBs declines to  $<10$  mIU/mL, administer a booster dose of hepatitis B vaccine and continue to retest annually. Retesting immediately after the booster doses of vaccine is not necessary.
  - c. For staff members who respond to the vaccine, booster doses of vaccine are not necessary and periodic serologic testing to monitor antibody concentrations is not recommended.
4. Patients with a History of Vaccination
- a. Routine childhood vaccination against hepatitis B has been recommended since 1991 and routine adolescent vaccination since 1995. Thus, many persons who develop end-stage renal failure should have a history of hepatitis B vaccination.
  - b. If patients with a history of vaccination have anti-HBs levels  $<10$  mIU/mL when they begin dialysis, they should be revaccinated with a complete primary series.
5. Treating patients with transient antigenemia, per Fresenius Medical Care Policy
- a. If a patient converts to hepatitis antigen positive and upon investigation it is determined that the patient received a vaccination injection within the last 18 days, the conversion may be transient antigenemia related to the vaccine.
  - b. Treat the patient as if they are HBsAg positive using separate equipment and separate personal protective equipment but DO NOT place the patient in the isolation area with or used for HBsAg positive patients nor use a machine dedicated to HBsAg positive patient for this unknown status patient. Buffer the unknown status patient with patients who are anti-HBS positive. Repeat the test after 18 days post vaccination.

## I. Prevention and Management of HBV Infection

- 1. HBV-Susceptible Patients
  - a. Vaccination of all susceptible patients as described above.
  - b. Test susceptible patients monthly for HBsAg, to include those who have (a) not yet received the vaccine; (b) are in the process of being vaccinated, or (c) have not adequately responded to vaccination.
- 2. HBsAg Seroconversions
  - a. Complete a Communicable Disease Report Form (may be found on the Infection Prevention Intranet site) for HBsAg seroconversions. The form should be forwarded to Infection Prevention and Epidemiology (Room W-1063 West Wing) or tubed to tube station 704.
  - b. When seroconversion occurs, review all patients' routine lab test results to identify additional cases. Perform additional tests as recommended by CDC guidelines.
  - c. Investigate potential sources for infection to determine if transmission might have occurred within the dialysis unit, including review of newly infected patients' recent medical history (e.g., blood transfusion, hospitalization), history of high-risk behavior, and unit practices and procedures.
  - d. In newly infected patients, repeat HBsAg testing and test for anti-HBcAg (including IgM anti-HBcAg) 1-2 months later.
  - e. Six months later, repeat HBsAg testing and test for anti-HBsAg to determine clinical outcome and need for counseling, medical evaluation, and vaccination of contacts.
  - f. Patients who become HBsAg-negative are no longer infectious and can be removed from isolation.
- 3. HBV Infected Patients
  - a. Room 10 is the Hep B dialysis room/dedicated machine and may be used for patients who are HBsAg positive or HBV PCR positive only. A disposable gown and gloves will be worn for every room entry. If there is more than 1 HBsAg or HBV PCR positive patient admitted at one time, a separate, dedicated machine

must be used for each patient (i.e., the machine may not be shared between multiple HBV positive patients).

- b. Glucometers and conductivity meters used in room 10 will be cleaned with an EPA registered disinfectant (e.g., Sani-Cloths, Metriguard) or a 1:10 bleach solution after each use. Concentrate wands used in room 10 will be cleaned using the process in Attachment 1: Disinfection of Concentration Wands. Equipment, instruments, supplies and medications used on an HBsAg positive or HBV PCR positive patient will not be used by HBV-susceptible patients.
  - c. Staff members who are caring for HBsAg-positive patients should not care for HBV susceptible patients at the same time, including during the period when dialysis is terminated on one patient and initiated on another. Staff members who are HBsAg-positive may be assigned preferentially to care for HBsAg-positive patients. If for some reason staff members must care for both HBsAg-positive and seronegative patients during the same shift, they should change gowns between patients, and change gloves and wash hands to prevent cross-contamination.
  - d. If a hemodialysis machine that has been used on an HBsAg-positive patient or HBV status unknown patient is needed for an HBV-susceptible patient AFTER the HBsAg-positive patient has been discharged, the internal pathways of the machine will be chemically disinfected with bleach per Fresenius Medical Care Policy and external surfaces will be cleaned using a EPA registered disinfectant or a 1:10 bleach and water solution.
  - e. Dialyzers are not re-used in the Hospital Dialysis Unit.
  - f. Chronically infected patients (i.e., those who are HBsAg-positive, total anti-HBcAg positive and IgM anti-HBcAg negative) are infectious and are at risk for chronic liver disease. They should be counseled by the physician regarding preventing transmission to others, their household and sexual partners should receive hepatitis B vaccine, and they should be evaluated (by consultation or referral, if appropriate) for the presence or development of chronic liver disease).
  - g. Persons with chronic liver disease should be vaccinated against hepatitis A, if susceptible.
  - h. Chronically infected patients do not require any routine follow-up testing for purposes of infection control.
    - i. Annual testing for HBsAg is reasonable to detect the small percentage of HBV-infected patients who might lose their HBsAg.
4. HBV Immune Patients
- a. Annual anti-HBs testing of patients who are positive for anti-HBs ( $\geq 10$  mIU/mL) and negative for anti-HBcAg determines the need for booster doses of vaccine to ensure that protective levels of antibody are maintained.
  - b. No routine follow-up testing is necessary for patients who are positive for both anti-HBsAg and anti-HBcAg.
  - c. HBV immune patients can undergo dialysis in the same area as HBV-susceptible patients. HBsAg-positive patients are isolated.
  - d. Staff members can be assigned to care for both infected and immune patients on the same shift.
5. IgM Anti-HBcAg Positive Patients
- a. Patients who test positive for isolated anti-HBcAg (i.e., those who are anti-HBcAg positive, HBsAg negative, and anti-HBsAg negative) should be retested on a separate serum sample for total anti-HBcAg, and if positive, for IgM anti-HBcAg.
  - b. If total anti-HBcAg is negative, consider patient susceptible and follow recommendations for vaccination.
  - c. If total anti-HBcAg is positive and IgM anti-HBcAg is negative, follow recommendations for vaccination.
  - d. If anti-HBs is  $< 10$  mIU/mL even after revaccination, test for HBV DNA.
  - e. If HBV DNA is negative, consider patient susceptible (i.e., the anti-HBcAg result is a false positive), and test monthly for HBsAg.
  - f. If HBV DNA is positive, consider patient as having past infection or "low-level" chronic infection (i.e., the anti-HBcAg result is a true positive); no further testing is necessary. Isolation is not necessary because HBsAg is not detectable.
  - g. If both total and IgM anti-HBcAg are positive, consider the patient recently infected and test for anti-HBs in 4-6 months. No further routine testing is necessary.
  - h. Isolation is not necessary because HBsAg is not detectable.

## J. Prevention and Management of HCV Infection

1. Patients who have their dialysis initiated in the Dialysis Unit will be screened for hepatitis C.
2. Although isolation of HCV-infected patients is not recommended, routine testing for ALT and anti-HCV is important for monitoring transmission within dialysis centers and ensuring that appropriate precautions are being properly and consistently used.
3. HCV-Negative Patients
  - a. Monthly ALT testing will facilitate timely detection of new infections and provide a pattern from which to determine when exposure or infection might have occurred.
  - b. In the absence of unexplained ALT elevations, testing for anti-HCV every 6 months should be sufficient to monitor the occurrence of new HCV infections.
  - c. If unexplained ALT elevations are observed in patients who are anti-HCV negative, repeat anti-HCV testing is warranted.
  - d. If unexplained ALT elevations persist in patients who repeatedly test anti-HCV negative, testing for HCV RNA should be considered.
4. Anti-HCV Seroconversions
  - a. Report anti-HCV-positive seroconversion to the Health Department in accordance with Communicable Disease Reporting requirements by physicians and labs
  - b. When a seroconversion occurs, review all other patients' routine lab test results to identify additional cases.
  - c. Perform additional testing as indicated below.
  - d. Investigate potential sources for infection to determine if transmission might have occurred within the dialysis unit, including review of newly infected patients' recent medical history (e.g., blood transfusion, hospitalization), history of high-risk behavior (e.g., injecting-drug use, sexual activity), and unit practices and procedures.
  - e. If  $\geq 1$  patient seroconverts from anti-HCV negative to positive during a 6-month period, more frequent (e.g., every 1-3 months) anti-HCV testing of HCV-negative patients could be warranted for a limited time (e.g., 3-6 months) to detect additional infections. If no additional newly infected patients are identified, resume semiannual testing.
  - f. If ongoing HCV transmission among patients is identified, implement control measures based on results of investigation of potential sources for transmission

and monitor their effectiveness (e.g., perform more frequent anti-HCV testing of HCV-negative patients for 6-12 months before resuming semiannual testing).

#### 5. HCV-Positive Patients

- a. Patients who are anti-HCV positive (or HCV RNA positive) do not have to be isolated from other patients or dialyzed separately on dedicated machines.
- b. They may participate in dialyzer re-use programs.
- c. HCV-positive persons should be evaluated (by consultation or referral as appropriate) for the presence or development of chronic liver disease.
- d. They should receive information from the physician concerning how they can prevent further harm to their liver and prevent transmitting HCV to others.
- e. Persons with chronic liver disease should be vaccinated against hepatitis A, if susceptible.

### K. Prevention and Management of HDV Infection

1. No routine testing is recommended.
2. If a patient is known to be infected with HDV, or if evidence exists of transmission of HDV in a dialysis center, screening for delta antibody is warranted.
3. Patients known infected with HDV should be isolated from all other dialysis patients, especially those who are HBsAg-positive.

### L. Prevention and Management of HIV Infection

1. Routine testing of hemodialysis patients for HIV infection for infection control purposes is not recommended.
2. Patients with risk factors for HIV infection should be tested so that, if infected, they can receive proper medical care and counseling regarding preventing transmission of the virus.

### M. Prevention and Management of Bacterial Infections

1. Additional precautions should be considered for treatment of patients who might be at increased risk for transmitting pathogenic bacteria. Such patients include those with (1) an infected skin wound with drainage that is not contained by dressings (the drainage does not have to be culture positive for any pathogen) and (2) fecal incontinence or diarrhea uncontrolled with personal hygiene measures. For such patients, consider using the following additional precautions:
  - a. Staff members treating the patient should wear a separate gown over their usual clothing and remove the gown when finished caring for the patient.
  - b. Dialyze the patient at a station in an isolation room or in an area with as few adjacent stations as possible (e.g., at the end or corner of the unit).

### N. Surveillance for Infection and Other Adverse Events

1. UNCHC Dialysis Unit
  - a. Records are maintained for each patient that include the location of the dialysis station and machine number used for each dialysis session and the names of staff members who connect and disconnect the patient to and from a machine.
  - b. If a cluster of infections is suspected, Infection Prevention (984-974-7500) should be notified.
2. Off-Site Dialysis Centers – The following information is included for reference and education of UNCHC physicians who may provide medical services for off-site dialysis centers.
  - a. Maintain a separate centralized record-keeping system (e.g., log book or electronic file) to record the results of patients' vaccination status, serologic testing results for viral hepatitis (including ALT), episodes of bacteremias or loss of the vascular access caused by infection (including date of onset, site of infection, genus and species of the infecting organism, and selected antimicrobial susceptibility results), and adverse events, (e.g., blood leaks and spills, dialysis machine malfunctions).
  - b. Designate a staff person to promptly review results of routine testing each time such testing is performed and periodically review recorded episodes of bacteremia or vascular access infections.
  - c. Specify a procedure for actions required when changes occur in test results or in the frequency of episodes of bacteremias or vascular access loss because of infection.
  - d. Maintain records for each patient that include the location of the dialysis station and machine number used for each dialysis session and the names of the staff members who connect and disconnect the patient to and from a machine.
  - e. Notify the Medical Director of the dialysis center if a cluster of infections is suspected. Infection Prevention may be consulted as needed.
  - f. Staff working in outpatient dialysis centers should be aware that HBsAg positive patients should not participate in dialyzer reuse program.

### O. Training and Education

1. Staff
  - a. The nurses, physicians, and paramedical personnel who work in the dialysis units should be familiar with the types of infections acquired in this patient population, the modes of transmission of such infections, and the methods of prevention.
  - b. Infection control education, including OSHA Bloodborne Pathogens and TB training, must be provided at employment and annually thereafter via LMS.
  - c. In addition to Standard Precautions, staff are educated about the guidelines recommended for hemodialysis units to include:
    - i. Proper handling and delivery of patient medications.
    - ii. Rationale for segregating HBsAg-positive patients with a separate room, machine, instruments, supplies, medications, and staff members.
    - iii. Proper infection control techniques for initiation, care and maintenance of access sites.
    - iv. Proper care and maintenance of Central Venous Access Devices per [Nursing Policy: Central Venous Access Device \(CVAD\) Care and Maintenance](#).
    - v. Proper methods to clean and disinfect equipment and environmental surfaces.
    - vi. Monitoring routine serologic testing results for HBV and HCV, hepatitis B vaccination status.

- vii. Record keeping for water and dialysate quality.
  - viii. Reporting clusters of infection to Infection Prevention.
2. Patient Education  
Education of new patients is initiated in the Hospital. Education includes the patient's responsibility for proper care of their vascular catheter and recognition of signs of infection.

## P. Guidelines for Pediatric Patients

1. Children who are exposed to varicella and are not immune will be considered potentially contagious. Dialysis will be performed utilizing Airborne Precautions until the period of risk has ended. Children with active varicella (skin vesicles present) will be cared for using both Airborne and Contact Precautions (see [Isolation Precautions Policy](#)). Inpatients on Airborne Precautions will preferably be hemodialyzed in their room. If patients must be treated in the Dialysis Unit, they must be placed in an Isolation Room with negative air pressure. Room pressure is checked when in use using the tissue test and results documented.
2. Outpatient dialysis centers that do not have negative pressure isolation rooms should refer patients requiring airborne precautions to the hospital to have their dialysis completed. Consultation with Infection Prevention is recommended to ensure appropriate management of the patient.
3. Toys/School Supplies – The following guidelines should be followed when children are provided with toys/school supplies during the dialysis treatment:
  - a. Toys/school supplies should be made of a cleanable material (e.g., plastic toys with a non-porous surface).
  - b. Used cleanable items should be disinfected with an EPA registered hospital disinfectant or 1:10 bleach solution, rinsed with tap water and allowed to dry after each patient use.
  - c. Non-cleanable toys/school supplies (e.g., plush toys, or toys with a porous surface) should be given to a patient for individual use and stored in a labeled clean container/plastic bag between uses by that individual patient.
  - d. Clean toys/school supplies should be stored in a designated clean area.

## Q. Hemodialysis Water

Water for the hemodialysis treatment is treated by a reverse osmosis water system before it is used. The membrane of this system removes bacteria, viruses, pyrogens, and spores. Microbiologic monitoring and endotoxin testing of water used as dialysate is performed monthly and results are kept on file in the dialysis unit. The RRI (Renal Research Institute) standard is defined as the microbial culture count, which is not to exceed 20 CFU/ml, and endotoxin levels are not to exceed 0.06 EU/ml. The maximum permissible level is not to exceed the levels shown in the table below:

Test	Sample Category	Action Level	Maximum Permissible Limit
Bacteria	R.O., D.I. Product and Distribution	20 CFU/ml	50 CFU/ml
	Dialysate	20 CFU/ml	200 CFU/ml
Endotoxin	R.O., D.I. Product and Distribution	0.06 EU/ml	1 EU/ml
	Dialysate	0.06 EU/ml	0.25 EU/ml

It is not Fresenius company's policy that if the RRI action level for endotoxins and bacteria are exceeded that no treatments are to be conducted, but rather to maintain a higher than the accepted standard as established by the AAMI guidelines under RD-52. The most up-to-date microbiological criteria for testing bacteria and endotoxins for dialysis water should be obtained from Fresenius' Technical Policy and Procedure Manual.

## R. Visitors

Family of patients treated in the inpatient dialysis unit will be allowed in the treatment area only at the request of the nursing staff. Family and visitors will not eat or drink in the treatment area and will use bathroom facilities other than those designated for patients and staff. Visitors will comply with all indicated isolation precautions. Visitors must be free of contagious illnesses (an infectious disease that can be transmitted person to person) when visiting within UNC Hospitals. Outpatient centers must follow the visitation policy established for their center. Any visitor with signs and symptoms of infection should be excluded.

Visitation of children to the treatment areas of the Dialysis Unit will be restricted to those greater than 12 years of age. Children will be screened for communicable diseases before being admitted to the unit as outlined in the Patient Care policy: [Hospital Visitation](#). Guidelines in this policy must also be followed if visitation by children < 12 years is considered. Outpatient dialysis centers should follow the visitation policy established for their facilities.

## S. Hemodialysis Environmental Services Policy – Daily Cleaning

Refer to the [Infection Prevention policy: Environmental Services](#) for further information on environmental services.

## T. Implementation

The implementation of this policy will be the responsibility of the Medical Director and Nurse Manager of the Inpatient Dialysis Centers.

## IV. References

Favero, Martin S., Alter, Miriam J., and Bland, Lee A., Dialysis-Associated Infections and Their Control; In: Bennett, John V. and Brachman, Philip S., Hospital Infections (third edition); Boston; Little, Brown and Company, 1992; pp. 375-402.

Centers for Disease Control and Prevention. Recommendations for Prevention and Control of Hepatitis C Virus (HCV) Infection and HCV-related Chronic Disease. MMWR 1998, 47, 19-21.

Centers for Disease Control and Prevention. Recommendation for Preventing Transmission of Infections Among Chronic Hemodialysis Patients, MMWR 4/27/01, Vol. 50, No. RR-5.

Fresenius Technical Policy and Procedure Manual, Section: 130-040-000, Rev. Date: April 22, 2013.

Fresenius Clinical Service Integrated Policy Manual. Bicarbonate Concentrate Container, Cap, and Suction Tube Assembly Disinfection Procedure. Issue Date: August 20, 2014.

Fresenius Kidney Care Clinical Services Policy: Hemodialysis Machines: Acid Clean, Chemical Rinse, and Heat Disinfection. FMS-CS-IC-II-140-410A, effective July 23, 2018.

Fresenius Kidney Care Clinical Services Procedure: Fresenius 2008K, K2, and T machine – Acid Clean and Heat Disinfection. FMS-CS-IC-II-140-410C1, IS-I-510-013C1.

Effective date Sept. 26, 2018

Fresenius Medical Care Clinical Services Hepatitis Policy. IS-I-500-075A. Effective Date Sept. 25, 2013.

Rutala, William A., Weber, David J., and the Healthcare Infection Control Practices Advisory Committee (HICPAC). Centers for Disease Control and Prevention. Guideline for Disinfection and Sterilization in Healthcare Facilities, 2008. [https://www.cdc.gov/hicpac/pdf/guidelines/Disinfection\\_Nov\\_2008.pdf](https://www.cdc.gov/hicpac/pdf/guidelines/Disinfection_Nov_2008.pdf)

## V. Related Policies

<a href="#">Infection Prevention Policy: Environmental Services</a>
<a href="#">Infection Prevention Policy: Exposure Control Plan for Bloodborne Pathogens</a>
<a href="#">Infection Prevention Policy: Hand Hygiene and Use of Antiseptics for Skin Preparation</a>
<a href="#">Infection Prevention Policy: Infection Control and Screening Program: Occupational Health Service</a>
<a href="#">Infection Prevention Policy: Infection Prevention Guidelines for Adult and Pediatric Inpatient Care</a>
<a href="#">Infection Prevention Policy: Isolation Precautions</a>
<a href="#">Infection Prevention Policy: Tuberculosis Control Plan</a>
<a href="#">Medication Management Policy: Medication Management: Use of Multi-Dose Vials/Pens of Injectable Medications and Vaccines in Acute Care and Ambulatory Care Environments</a>
<a href="#">Nursing Policy: Central Venous Access Device (CVAD) Care and Maintenance</a>
<a href="#">Patient Care Policy: Hospital Visitation</a>

## Attachments

- 1: Disinfection of Concentrate Wands

## Approval Signatures

Step Description	Approver	Date
Policy Stat Administrator	Patricia Ness: Clin Nurse Education Spec	01/2020
	Thomas Ivester: CMO/VP Medical Affairs	01/2020
	Emily Vavalle: Director, Epidemiology	01/2020
	Sherie Goldbach: Project Coordinator	01/2020

## Applicability

UNC Medical Center