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Dialysis Unit

I. Description

Describes infection prevention and control guidelines followed by health care personnel (HCP) in the Dialysis Unit

II. Rationale

Patients undergoing dialysis are at an increased risk of exposure to infectious diseases such as Hepatitis B (HBV) and Hepatitis C (HCV). Strict adherence to infection prevention guidelines can reduce the risk of transmission of bloodborne pathogens, as well as other pathogenic organisms.

III. Policy

A. Definition

Term	Definition
ALT	Alanine aminotransferase
Anti-HBcAg	Antibody to Hepatitis B core antigen
Anti-HBsAg	Antibody to Hepatitis B surface antigen
Anti-HCV	Antibody to Hepatitis C virus
CRRT	Continuous Renal Replacement Therapy
EIA	Enzyme immunoassay
EPA	U.S. Environmental Protection Agency
HCP	Health care personnel

HBV	Hepatitis B Virus
HBsAg	Hepatitis B surface antigen
HCV	Hepatitis C Virus
HDV	Hepatitis D Virus
HIV	Human Immunodeficiency Virus

B. Personnel

- HCP should adhere to all personnel guidelines in the Infection Prevention policies:
    - Exposure Control Plan for Bloodborne Pathogens
    - Hand Hygiene and Use of Antiseptics for Skin Preparation
    - Infection Control and Screening Program: Occupational Health Service
    - Infection Prevention Guidelines for Adult and Pediatric Inpatient Care
    - Isolation Precautions
    - Tuberculosis Control Plan

C. 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.
    b. A supply of clean gloves and trash receptacle 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 infections 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 spurting or spattering of blood might occur (e.g., during initiation and termination of dialysis, cleaning of used equipment, and centrifugation of blood). PPE should be changed if it becomes soiled with blood, body fluids, secretions, or excretions, and between patients.
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 nurses and nephrology licensed independent practitioners (LIP) only may access the catheter lumens 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. Cleanse the rubber diaphragm of medications vials with a sterile alcohol swab and allow to dry prior to entering. Intravenous medication vials labeled for single use (preservative free), including erythropoetin, are only punctured once. They are discarded immediately after use. Residual medication from two or more vials may not be pooled into a single vial.

    c. Multi-dose vials are used in accordance with the Patient Care policy: Medical Management: Use of Multi-dose Vials/Pens of Parenteral Medications in Acute Care and Ambulatory Care Environments.

    d. 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.

    e. Use commercially prepared, pre-filled flush solutions.

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 per manufacturer's instructions before being returned to a

common clean area or used for other patients.

c. 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 disinfectant.

b. The following guidelines should be followed for all patients with peritonitis:

i. Follow all routine infection prevention 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 Centers for Disease Control and Prevention (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.

D. 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, including containers associated with prime waste, are cleaned and disinfected according to manufacturer's instructions. 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.

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. 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 an EPA-registered disinfectant per manufacturer's instructions. At the end of each treatment day, prior to disinfection, the machine should be acid cleaned using vinegar, citric or acetic acid per manufacturer's instructions.

5. 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*).

6. Primed hemodialysis and CRRT (Continuous Renal Replacement Therapy) set-ups should be discarded after 12 hours if treatment has not been initiated.

7. Concentrate wands must be disinfected daily. See Attachment 1 - Disinfection of Concentrate Wands for disinfection guidelines.

E. General Isolation Precautions Guidelines

1. Patients presenting to the Dialysis Unit with clinical manifestations of potentially contagious diseases will be evaluated before dialysis occurs.

2. If a patient 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, environmental surfaces, and reusable equipment are cleaned in the same manner as specified in general cleaning responsibilities above.

3. 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 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 surgical mask when caring for the patient.

4. 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 Airborne Infection Isolation Room (AIIR) with negative air pressure. Room pressure is checked when in use using the tissue test and results documented in Epic.

F. 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 HCP staff. UNC HCP 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*)

G. Routine Serologic Testing for Chronic Hemodialysis Patients

1. All chronic hemodialysis patients should be routinely tested for HBV and HCV infection per LIP order.
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. Follow LIP order for Hepatitis B surface Antigen Standing Order for ordering labs. 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.

H. Hemodialysis Health Care Personnel

1. Testing HCP for HBV infection is not necessary. The risk of HBV infection among hemodialysis HCP is no greater than that for other HCP.
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.

I. Hepatitis B Vaccination

- Vaccine Schedule and Dose

    a. Hepatitis B vaccination is recommended for all susceptible chronic hemodialysis patients. Chronic hemodialysis patients should be vaccinated according to the most recent CDC/Advisory Committee on Immunizations Practices (ACIP) recommendations.

    b. Hepatitis B vaccine series is offered to all HCP with reasonably expected exposure to blood or other potentially infectious body fluid. HCP will receive the vaccine at the UNC Health's expense.

J. Prevention and Management of HBV Infection

1. HBV-Susceptible Patients
    - Vaccination of all susceptible patients per LIP order and per CDC recommendations.
2. HBsAg Seroconversions

    a. Notify Infection Prevention and 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 (Room W-1063 West Wing) or tubed to tube station 704.

    b. Investigate any additional cases and evaluate unit practices and procedures to identify potential sources of infection.

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 disinfected with an EPA-registered disinfectant 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. If staff members must care for both HBsAg-positive and seronegative patients during the same shift, they should change gowns between patients, perform hand hygiene, and change gloves to prevent cross-contamination.

d. A machine that has been used to treat a HBsAg-positive patient will be tagged and kept only for the same patient's treatment until their discharge from the hospital. When that patient is discharged, the hemodiaysis machine will have its internal pathways chemically disinfected with bleach per Fresenius Medical Care Policy and external surfaces will be cleaned using an EPA-registered disinfectant.

e. Dialyzers are not re-used in the Hospital Dialysis Unit.

4. HBV Immune Patients

    a. HBV immune patients can undergo dialysis in the same area as HBV-susceptible patients. HBsAg-positive patients are isolated.

    b. Staff members can be assigned to care for both infected and immune patients on the same shift.

K. Prevention and Management of HCV Infection

Strict adherence to standard infection prevention practices can prevent transmission of HCV within the dialysis environment. Although isolation of HCV-infected patients is not recommended, routine testing by LIP order is important for monitoring transmission within dialysis centers and ensuring that appropriate precautions are being properly and consistently used.

1. Anti-HCV Seroconversions

    a. Notify Infection Prevention and complete a Communicable Disease Report Form for HBsAg seroconversions. The form should be forwarded to Infection Prevention (Room W-1063 West Wing) or tubed to tube station 704.

    b. Investigate any additional cases and evaluate unit practices and procedures to identify potential sources of infection.

2. 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.

L. Prevention and Management of HDV Infection

- No routine testing is recommended but patients known to be infected with HDV should be isolated from all other dialysis patients, especially those who are HBsAg-positive.

M. Prevention and Management of HIV Infection

- Routine testing of hemodialysis patients for HIV infection for infection prevention purposes is not recommended.

N. Surveillance for Infection and Other Adverse Events

- UNCMC 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, notify Infection Prevention at 984-974-7500 or by paging the Infection Preventionist on-call through the hospital directory.

O. Training and Education

1. Staff

    a. The HCP 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 prevention and 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 prevention 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 related to infection prevention

    - 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 the Infection Prevention policy: Isolation Precautions). 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 Airborne Infection Isolation Room (AIIR) with negative air pressure. Check room pressure when in use using the tissue test and document results.

2. Toys/School Supplies – HCP should refer to the Infection Prevention policy: Diversional Supplies (e.g., toys and books) when choosing and cleaning toys for pediatric patients.

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 most up-to-date microbiological criteria for testing bacteria and endotoxins for dialysis water should be obtained from Fresenius Technical Policy and Procedure Manual. Refer to the Fresenius policy, "Microbiological Monitoring of Central Water and Concentrate Mixing and Delivery Systems" for minimum monitoring requirements of microbiological contaminant levels in treated

water. Refer to the Fresenius' Technical policy, "Microbiological Monitoring of Dialysate" for additional baseline sampling requirements for bicarb mixers and solution delivery systems.

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. Any visitor with signs and symptoms of infection should be excluded from the dialysis unit.

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.

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

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Fresenius Kidney Care Clinical Services Policy: Hemodialysis Machines: Acid Clean, Chemical Rinse, and Heat Disinfection.

Fresenius Kidney Care Clinical Services Procedure: Fresenius 2008K, K2, and T machine – Acid Clean and Heat Disinfection.

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V. Related Policies

Infection Prevention Policy: Diversional Supplies (e.g., toys and books)

Infection Prevention Policy: Environmental Services

Infection Prevention Policy: Exposure Control Plan for Bloodborne Pathogens

Infection Prevention Policy: Hand Hygiene and Use of Antiseptics for Skin Preparation

Infection Prevention Policy: Infection Control and Screening Program: Occupational Health Service

Infection Prevention Policy: Infection Prevention Guidelines for Adult and Pediatric Inpatient Care

Infection Prevention Policy: Isolation Precautions

Infection Prevention Policy: Tuberculosis Control Plan

Medication Management Policy: Medication Management: Use of Multi-Dose Vials/Pens of Injectable Medications and Vaccines in Acute Care and Ambulatory Care Environments

Nursing Policy: Central Venous Access Device (CVAD) Care and Maintenance

Patient Care Policy: Hospital Visitation

Attachments

1: Disinfection of Concentrate Wands

Approval Signatures

Step Description	Approver	Date
Policy Stat Administrator	Kimberly Novak-Jones: Nurse Educator	06/2022
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