Infection Prevention in the Hemodialysis Setting

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HD Infection Prevention and Control Program

- Role of the IP
  - Oversight of infection prevention
  - Development of new and ongoing staff education
  - Facilitation of performance improvement projects
  - Periodic surveillance to assess risk
- Work closely with the entire HD team
- Each HD team member must be accountable
- In Hospital Dialysis
- Outpatient and Home Care settings

Epidemiology of Infections among Hemodialysis Patients

- December 31, 2006
  - 327,754 patients on maintenance HD
  - Most being treated in outpatient settings
    - These setting do not have ready access to infection preventionist (IP)
      - This IP can not provide the same level of services as a certified IP
- 1993-2006 hospitalization rates of HD patients for infections increased by 34%
  - Rate of vascular access infections more than doubled.
  - Pneumonia 7.3%
  - Bacteremia/septicemia 31%
  - Cellulitis 20.3%
- Infections are the 2nd leading cause of death
Reasons for Infection

• Depressed immune system
• High prevalence of diabetes
• Exposure to other patients in the HD facility
• Frequent hospitalization, invasiveness of the HD procedure

Infection Associated Risks

• *Staphylococcus aureus*
  - Temporary central venous catheters
  - Sepsis
  - Bacterial seeding
  - Increased morbidity
  - Removal/replacements of implants
  - Compression spine fractures
  - Antibiotic usage
• Pneumococcal pneumonia
  - Pneumovax
• Multidrug-resistant organisms (MDROs)
  - MRSA, VRE, KPC, ESBL, Ab
  - *Clostridium difficile*

Exposure to Bloodborne Pathogens

• Standard Precautions
  - Hepatitis B (HBV)
  - Hepatitis C (HCV)
  - Human Immunodeficiency virus (HIV)
• Decrease risk of acquiring HBV
  - Widespread use of HBV vaccine
  - Testing of blood transfusions for HBsAg
  - Reduced need for transfusions in CKD
Environmental Factors

- HBsAg positive patients
  - Virus can survive in the environment for >1 week in dried blood
  - HBV virions on environmental surfaces without visible blood.

Uniqueness of Outpatient HD Centers

- Treatment is in the same center for months or years
  - Not curative but life-sustaining
- Treated in 3-4 shifts per day
- Care is done by certified dialysis technicians
  - Under the supervision of dialysis trained registered nurse
- Staffing 1 nurse for 12 patients per shift
  - 1 patient care technician for every 4 patients
- Design plans
  - Open plan
  - Pods

Key Measures to Reduce the Risk of Infection

- Environmental and equipment cleaning/disinfection
  - EPA registered hospital disinfectants
    - Labeled tuberculocidal or with specific claims for HIV or HBV
    - Follow label instructions to decontaminate spills of blood and other body fluids
  - Standard cleaning and disinfection protocols and EPA-registered hospital disinfectants for confirmed or suspected MDROs
  - Friction, clean and disinfect high-touch surfaces
    - HD chairs
    - HD machines
    - Tables
    - Carts
    - Bedside commodes
Key Measures to Reduce the Risk of Infection

- Contact precautions
  - Use disposable patient-care items
    - Blood pressure cuffs
      - Minimizes the possibility for cross-contamination with MDROs
  - Items taken into the patient's station should be disposed of after use
    - Dedicated for use on a single patient and cleaned and disinfected before being taken to a common clean area or used on another patient
  - Non-disposable items that cannot be comprehensively cleaned and disinfected
    - Adhesive tape
    - Cloth-covered blood pressure cuffs
      - Should be dedicated for use on a single patient

Environmental and Equipment Cleaning/Disinfection

- Inactivating *C. difficile*
  - Use hypochlorite-based products
    - for disinfection of environmental surfaces
    - Patient-care areas where surveillance and epidemiology indicate ongoing transmission of *C. difficile*
  - Use microfiber cloths and mops if possible
    - More effective cleaning products than regular cotton cleaning cloths
  - External pressure transducer filters/protectors
    - Changed after each patient treatment
  - Items taken into each patient station should be dedicated as single use or cleaned and disinfected before taken to a common clean area or to another patient

Cleaning and Disinfection of Environmental Surfaces

- Physical cleaning of surfaces
  - Soap and water
    - Friction
  - Combined cleaning and disinfecting remove and kill vegetative microorganisms on surfaces
  - Disinfection is not effective in the presence of dirt, blood or other bioburden
  - Goal of cleaning is to remove bioburden and the majority of pathogens
  - Non-critical surfaces dialysis bed or chair, countertops, external surfaces of dialysis machines should be disinfected with an EPA registered disinfectant
  - If there is visible blood an EPA registered tuberculocidal agent with specific label claims for HBV and HIV should be used
Environmental and Equipment Cleaning/Disinfection

- External venous and arterial pressure transducer filters/protectors should be changed after each patient treatment and should not be reused.
  - Internal filters do not need to be changed routinely between patients
- Internal HD machine dialysate pathway should be subjected to heat disinfection at the end of each treatment day
- Blood leak
  - Disinfection of the internal HD machine pathway must be performed prior to on a successive patient

Reprocessing and Reuse of Hemodialyzer

- Follow the FDA
  - "Guidance for Hemodialyzer Reuse Labeling" Oct. 6, 1995
  - Following manufacturer recommendations for cleaning, rinsing, disinfecting and testing the dialyzer
  - Percentage of centers practicing reuse declined after 1997 to 63% in 2002
    - 2005 - 61% of patients were being treated with single-use dialyzers
  - Reuse and Reprocessing must follow all applicable AAMI standards to receive CMS reimbursement

Hand Hygiene

- Alcohol-based hand rub
  - Entrance to the patient’s room or at the bedside
  - Pocket containers
- Perform hand hygiene
  - Before and after contact with patient or patient environment
  - After removing gloves
- If hands are visibly soiled use soap and water
- No artificial fingernails or extenders for direct care staff
Immunizations and Tuberculosis

- Vaccine status of all patients
  - Vaccine for HBV, tetanus, pneumococcal disease, and influenza
- CDC recommends
  - One-time baseline screening of HD patients for TB
    - Plus anytime an exposure is suspected
  - Employees must receive immunization for measles, mumps, rubella, pertussis, diphtheria, tetanus MMR, be offered HBV and influenza immunization
    - Screened for TB per local regulations (usually annually)

Medication/Infection Safety

- Single-dose vials
  - One patient and should not be re-entered
- Parenteral medications should be prepared in a designated clean area away from patient treatment stations
- Do not use medication carts to transport medications to patient stations
- Scrub the hub of intravenous tubing and medication vials prior to accessing
- Use aseptic technique when preparing/handling parenteral medication/fluids
- Never use infusion supplies such as needles, syringes, flush solutions, administration sets, or IV fluids on more than one patient.

Pre and Postsurgical Infection Prevention

- Hair removal – clippers not razor
- Antiseptic impregnated postoperative dressings for fistulas/grafts
- Active surveillance testing for MRSA and decolonization should be performed as indicated (preop)
- Preoperative antiseptic bathing/showering
Standard/Transmission Based Precautions

- Respiratory etiquette
- Standard Precautions
- Patient with possible airborne disease
  - Masked immediately
  - Geographically separated from other patient (single room)
- HBV isolation for all patients known to be HBsAg positive
- Contact precautions for all patients with known or suspected MDRO

Vascular Access

- Move from temporary CVC to permanent AV fistula or AV graft when possible
- Full barrier precautions and skin antisepsis with chlorhexidine (CHG) prior to insertions of HD CVC
- Routine use of CHG impregnated bathing cloths
- CHG impregnated insertion site dressing for HD central catheters
- Prophylactic use of antimicrobial catheter locking solution
- Soak the hub of HD catheters in povidone-iodine solution or wrap with gauze saturated with povidone-iodine solution for 5 minutes prior to removing the cap
- Application of povidone-iodine or triple antibiotic ointment for HD catheter exit site dressings after dialysis session.

Water Treatment

- Association for Advancement of Medical Instrumentation (AAMI) standards
  - Quality assurance performance of devices and equipment used to
    - treat
    - store
    - distribute water in HD centers
    - Preparation of concentrates and dialysate
  - Conduct microbiological testing specific to water in dialysis setting
  - Disinfect water distribution systems in dialysis settings on a regular schedule
Safe Injection Practice Video

- One Patient
- One Syringe
- One Needle
- One Time