

# Infection Prevention and Control in HD

## Authors :

Morteza Nazari<sup>1</sup> – Fatemeh Rahimi<sup>2</sup> –Robabeh Haghverdi<sup>3</sup> –Bahman Lak<sup>4</sup> –Ensiyeh keshavarz mehrzad<sup>5</sup>

- 1- PhD of Health Services , Hospital Management, Shahid Rajaei Hospital, Alborz University of Medical Sciences, Karaj,Iran.
- 2- Student Critical Care Nursing, School of Nursing and Midwifery, Shaheed University, Tehran, Iran.
- 3- Master of Science in Medical-Surgical in Nursing ,Alborz University of Medical Sciences, Karaj,Iran.
- 4- Environmental Health Expert, shahid Rajaei hospital Alborz University of Medical Sciences, Karaj,Iran.
- 5- Nursing - shahid Rajaei hospital Alborz University of Medical Sciences, Karaj,Iran

## Background:

Infection is the most common cause of hospitalization and the second most common cause of mortality among hemodialysis (HD) patients, after cardiovascular disease. HD patients as well as the dialysis staff are vulnerable to contracting health-care-associated infections (HAIs) due to frequent and prolonged exposure to many possible contaminants in the dialysis environment. The extracorporeal nature of the therapy, the associated common environmental conditions and the immune compromised status of HD patients are major predisposing factors. The evident increased potential for transmission of infections in the HD settings led to the creation and implementation of specific and stricter infection prevention and control measures in addition to the usual standard precautions. Different international organizations have generated guidelines and recommendations on infection prevention and control for implementation in the HD settings. These include the Centers for Disease Control and Prevention (CDC), the Association of Professionals in Infection Control (APIC), the Kidney Disease Outcomes Quality Initiative (K/DOQI), the European Best Practice Guidelines/European Renal Best Practice (EBPG/ERBP) and the Kidney Disease: Improving Global Outcomes (KDIGO). However, these guidelines are extensive and sometimes vary among different guideline-producing bodies. Our aim in this article is to facilitate the access, increase the awareness and encourage implementation among dialysis providers by reviewing, extracting and comparing the essential elements of guidelines and recommendations on infection prevention and control in HD units. Unlike the conditions in general hospital wards, the typical lay-out and associated conditions in most HD units, wherein multiple patients receive extracorporeal treatment with prolonged blood exposures in the same area and usually with one health-care worker (HCW) caring for more than one patient at the same time, are potential factors that may increase the transmission of infections. The recommendations contained in this article were developed by reviewing available published literature and consulting with specialists in the field. There are references provided for each section. Some of the published documents that were reviewed to develop this Guide are listed as follows, in the order published:

1. Recommendations for Control of Hepatitis B in Dialysis

2. Recommendations for preventing transmission of infections among chronic hemodialysis patients.
3. Centers for Medicare and Medicaid Services (CMS). 2008 Conditions for Coverage

The infection prevention strategies in this Article include basic measures that have strong evidence and regulatory requirements to support them

**Category IA.** Strongly recommended for implementation and strongly supported by well-designed experimental, clinical, or epidemiologic studies.

**Category IB.** Strongly recommended for implementation and supported by some experimental, clinical, or epidemiologic studies, and a strong theoretical rationale.

**Category IC.** Required by state or federal regulations, rules, or standards.

In addition, measures or best practices are also included even though evidence may be lacking or less than Category I.

### **HD Infection Prevention and Control Program**

An effective infection prevention and control program for HD units is comprised of multiple interventions which are designed to reduce the risk of infection based on the unique characteristics of the HD patient population and environment.

The role of the IP, or the individual with this accountability if there is no dedicated IP in a hemodialysis unit/facility, includes oversight of infection prevention efforts in addition to development of new and ongoing staff training program, facilitation of performance improvement projects, and periodic surveillance to assess risk and guide these projects. It is important that the IP or individual with this accountability communicates and networks with all members of the HD team including nurses, technicians, physicians, environmental services professionals, and the patient/family. The success of an infection prevention and control program requires that all members of the HD team understand their role. Each team member must be held accountable for compliance with infection prevention, control strategies, and interventions. Typically, only inpatient or hospital-based dialysis units will have a resident IP. In hospitals where inpatient HD services are provided, patients are cared for by regular nursing staff between dialysis sessions. It is important that these staff nurses receive training regarding their role, scope, and limitations related to HD, as well as who to contact for any dialysis associated issues. Similarly, in outpatient dialysis units and in Home Care services, most often there is not a dedicated IP. In these arenas, someone else should be given this role and accountability. These individuals must also receive comprehensive training. In all medical settings, the medical director is ultimately responsible for ensuring that this role is filled and performed adequately.

Hemodialysis places patients at high risk for infection because of patient comorbidities and numerous human, environmental, and procedural factors. Establishing an infection prevention and control program

which includes a bundle of strategies and interventions that are consistently performed will reduce the infection risk for both employees and patients

### 1. **Environmental and equipment cleaning/disinfection**

Use U.S. Environmental Protection Agency (EPA)-registered hospital disinfectants labeled tuberculocidal or with specific label claims for HIV or HBV in accordance with label instructions to decontaminate spills of blood and other body fluids. • Use standard cleaning and disinfection protocols and EPA-registered hospital disinfectants for confirmed or suspected antibiotic-resistant Gram-positive cocci (e.g., MRSA, vancomycin intermediate-resistant *S. aureus*, or vancomycin-resistant *Enterococcus* [VRE]). • Using friction, clean and disinfect high-touch surfaces in patient-care areas (e.g., HD chairs, HD machines, tables, carts, bedside commodes). • When contact precautions are indicated for patient care, use disposable patient-care items (e.g., blood pressure cuffs) whenever possible to minimize cross-contamination with multiple-resistant microorganisms. • Items taken into a patient station should be disposed of after use, dedicated for use on a single patient, or cleaned and disinfected before being taken to a common clean area or used on another patient. Nondisposable items that cannot be comprehensively cleaned and disinfected (e.g., adhesive tape, cloth-covered blood pressure cuffs) should be dedicated for use on a single patient. External pressure transducer filters/protectors should be changed after each patient treatment. Items taken into an individual HD patient station should be disposed of after use, dedicated for use on a single patient, or cleaned and disinfected before being taken to a common clean area or used on another patient. External venous and arterial pressure transducer filters/protectors should be changed after each patient treatment and should not be reused. Internal transducer filters do not need to be changed routinely between patients. The internal HD machine dialysate pathway should be subjected to heat disinfection at the end of each treatment day. In the event of a blood leak, disinfection of the internal HD machine pathway must be performed prior to on a successive patient.

### 2. **Hand hygiene**

To improve hand hygiene adherence among personnel who work in areas in which high workloads and high intensity of patient care are anticipated, make an alcohol-based hand rub available at the entrance to the patient's room or at the bedside, in other convenient locations, and in individual pocket-sized containers to be carried by healthcare workers (HCWs). Perform hand hygiene before and after contact with patient or patient environment. Remove gloves after caring for a patient. Do not wear the same pair of gloves for the care of more than one patient, and do not wash gloves between uses with different patients. Perform hand hygiene after glove removal. If hands are not visibly soiled, use an alcohol-based hand rub for routinely cleaning hands instead of soap and water. Do not wear artificial fingernails or extenders when having direct contact with patients.

### 3. **Immunizations and tuberculosis (TB) screening**

Vaccine status of all patients should be assessed at the start of dialysis. Eligible HD patients should be immunized against HBV, tetanus, pneumococcal disease, and influenza. CDC recommends one-time baseline screening of HD patients for TB (plus anytime an exposure is suspected). Employees in HD settings must receive immunization for measles, mumps, rubella, pertussis, diphtheria, tetanus, MMR (measles, mumps, rubella), be offered HBV and influenza immunization, and be screened for TB per local regulations (usually annual).

#### **4. Medication/injection safety:**

Single-dose vials should be dedicated to one patient only 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 (IV) tubing and medication vials prior to accessing. Use aseptic technique when preparing/handling parenteral medications/fluid. Never use infusion supplies such as needles, syringes, flush solutions, administration sets, or IV fluids on more than one patient.

#### **5. Pre- and postsurgical infection prevention**

Presurgical hair removal should be performed with clippers instead of a razor. 6. Standard/transmission based precautions. Respiratory etiquette should be employed routinely. Standard Precautions should be practiced routinely. Patient identified with a suspected airborne disease should be masked immediately and geographically separated from other patients, preferably in a single room. HBV isolation should be employed routinely on all patients known to be HBsAg positive.

#### **7. Vascular Access:**

Support transition from temporary (e.g., CVC) to permanent (e.g., arteriovenous fistula [AVF] or graft [AVG]) vascular access whenever possible. Full barrier precautions and skin antisepsis with chlorhexidine (CHG) alcohol prep prior to insertion of HD CVC

#### **8. Water treatment**

Adhere to current Association for Advancement of Medical Instrumentation (AAMI) standards for quality assurance performance of devices and equipment used to treat, store, and distribute water in HD centers and for the preparation of concentrates and dialysate. Conduct microbiological testing specific to water in dialysis settings. Disinfect water distribution systems in dialysis settings on a regular schedule. Patients who undergo dialysis treatment have an increased risk for getting an infection. Hemodialysis patients are at a high risk for infection because the process of hemodialysis requires frequent use of catheters or insertion of needles to access the bloodstream. Hemodialysis patients have weakened immune systems, which increase their risk for infection, and they require frequent hospitalizations and surgery where they might acquire an infection. Bloodstream infections are a dangerous complication of dialysis. In the U.S., there are about 370,000 people relying on hemodialysis care. These patients are at risk of getting serious infections. About 75,000 people receive

hemodialysis through a central line. Central lines have a higher risk of infection than a fistula or graft. The CDC estimates that 37,000 central line-associated bloodstream infections may have occurred in U.S. hemodialysis patients in 2008. It's important for physicians, nurses, dialysis technicians, and all healthcare workers to understand and follow proper infection control procedures. The resources on this article are designed to help dialysis clinicians understand the basics of infection control. *Staphylococcus aureus* is a leading cause of bloodstream and other invasive infections in the United States. *S. aureus* has become increasingly resistant to first-line antimicrobial agents in health-care settings. Dialysis patients are especially vulnerable to infections, frequently those caused by antimicrobial-resistant organisms, including methicillin-resistant *Staphylococcus aureus* (MRSA). To assess the incidence of invasive MRSA infection among dialysis patients in the United States during 2005, surveillance data were analyzed from the Active Bacterial Core surveillance (ABCs) system. This report summarizes the results of that analysis, which estimated that, in 2005, the incidence of invasive MRSA infection among dialysis patients was 45.2 cases per 1,000 population. Persons receiving dialysis are at high risk for infection with invasive MRSA compared with the general population, in which rates of invasive MRSA have ranged from 0.2 to 0.4 infections per 1,000 population. The findings in this report underscore the need for continued surveillance and infection-control strategies aimed at reducing infection rates and preventing additional antimicrobial resistance among persons receiving dialysis.