

**GUIDELINES FOR
INFECTION PREVENTION
IN DIALYSIS UNITS**

FOREWORD

The Kenya Renal Association (KRA) is pleased to present this first edition of guidelines for the prevention of infections in dialysis. It provides the user with an insight on the appropriate infection prevention measures needed when managing dialysing patients or working in a dialysis unit. Recommendations on vaccination are also made.

In coming up with these guidelines, various international guidelines, articles in peer reviewed journals, nephrology texts as well as expert opinions were reviewed. The guideline development process involved extensive research and discussion by a guideline development working group of all aspects of the subject matter before arriving at consensus recommendations. These recommendations were then shared electronically with nephrologists countrywide; their input was then considered and adapted if found appropriate. The final document was then prepared.

These guidelines are deliberately simplified to make them easy to use. They are by no means exhaustive and the user must not hesitate to ask for help or consult more detailed nephrology texts if they encounter situations not envisioned or well captured in these guidelines. These guidelines will be reviewed periodically as and when significant changes to best practice recommendations occur.

I believe that these guidelines will prove educative and practical to the user and help improve the quality of care offered to the dialysis patient.

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ABBREVIATION AND ACRONYMS

Anti - HBs	-	Antibodies to hepatitis B surface antigen
BBV	-	Blood borne viruses
CRAB	-	Carbapenem resistant <i>Acinetobacter basmati</i>
CRBSI	-	Catheter- related blood stream infections
ESBL	-	Extended Spectrum β -lactamase
HBsAg -		Hepatitis B surface antigen
HBV	-	Hepatitis B virus
HCV	-	Hepatitis C virus
HD	-	Haemodialysis
MDR	-	Multi- drug resistant
PCV 13	-	13-Valent Pneumococcal Conjugate Vaccine
PPSV 23 Vaccine	-	23-Valent Pneumococcal Polysaccharide
VRE	-	Vancomycin resistant <i>Enterococci</i>

INTRODUCTION

Infections in dialysis units can occur directly or indirectly via contaminated devices, equipment and supplies, environmental surfaces, or contaminated hands. Several transmissible infections can occur in dialysis unit including hepatitis B virus (HBV), hepatitis C virus (HCV) and human immunodeficiency virus (HIV). Catheter related blood stream infections (CRBSI) including those caused by multi- drug resistant (MDR) organisms are common causes of morbidity and mortality in dialysis units. For these reasons, modalities for prevention of these infections are required. These include: -

Hand hygiene

- Hand hygiene includes hand washing with soap and water, and/or applying an alcohol-based hand rub.
- Staff should cover any cuts and abrasions with waterproof dressings. Staff who have extensive untreated cuts or chronic skin disease, such as eczema, should not work in dialysis units when skin lesions are active.
- Hands should be washed with soap and water when visibly dirty or contaminated with proteinaceous material (e.g., blood or other body fluids).
- Alcohol-based hand rubs are appropriate for rapid hand decontamination between patient contacts. They are not a substitute for hand washing if hands are soiled.
- To reduce the build-up of emollients on hands after repeated use of alcohol-based hand rubs, hands should be washed with soap and water after every five hand rubs.
- Hand hygiene should be performed before touching a patient, before clean/aseptic procedures, after body fluid exposure, after touching a patient, and after touching a patient's surroundings.
- Hand hygiene facilities should be located as close as possible to the point of contact with patients and dialysis equipment.
- Hand-washing products should be handled according to these guidelines: -
- Provide soap racks for bar soaps to ensure the bar stays dry, because microorganisms grow and multiply in standing water.

- Store liquid hand-washing products in closed, disposable containers. If reusable containers are used, clean thoroughly and dry them before refilling. Follow routine maintenance schedules and document them. Do not top off liquid-soap containers.
- Rotate the antimicrobial soaps that are used in order to prevent the development of resistant organisms.
- Alcohol-based hand rubs should be placed at the point of contact, for example: -
- Next to, or attached to the frame of dialysis bed or chair.
- At points of entry and exit of dialysis room.
- At staff stations or chart and medication trolleys.

Technique for hand washing

WASH HANDS WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB

1 Duration of the handwash (steps 2-7): 15-20 seconds
2 Duration of the entire procedure: 40-60 seconds

<p>0</p>  <p>Wet hands with water;</p>	<p>1</p>  <p>Apply enough soap to cover all hand surfaces;</p>	<p>2</p>  <p>Rub hands palm to palm;</p>
<p>3</p>  <p>Right palm over left dorsum with interlaced fingers and vice versa;</p>	<p>4</p>  <p>Palm to palm with fingers interlaced;</p>	<p>5</p>  <p>Backs of fingers to opposing palms with fingers interlocked;</p>
<p>6</p>  <p>Rotational rubbing of left thumb clasped in right palm and vice versa;</p>	<p>7</p>  <p>Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;</p>	<p>8</p>  <p>Rinse hands with water;</p>
<p>9</p>  <p>Dry hands thoroughly with a single use towel;</p>	<p>10</p>  <p>Use towel to turn off faucet;</p>	<p>11</p>  <p>Your hands are now safe.</p>

Technique for handrub

RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED

 Duration of the entire procedure: 20-30 seconds



Apply a palmful of the product in a cupped hand, covering all surfaces;



Rub hands palm to palm;



Right palm over left dorsum with interlaced fingers and vice versa;



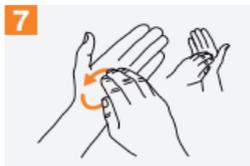
Palm to palm with fingers interlaced;



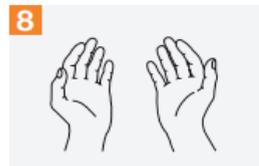
Backs of fingers to opposing palms with fingers interlocked;



Rotational rubbing of left thumb clasped in right palm and vice versa;



Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;



Once dry, your hands are safe.

Use of gloves

- Clean non-sterile gloves should be worn when contact with blood or body fluids is anticipated; this includes contact with patients and dialysis equipment.
- Gloves must be changed and hands cleaned between patients and/or stations.
- Gloves must also be changed and hands cleaned between different activities on the same patient (e.g., moving from a contaminated to a clean body site).
- Gloves should be worn for any cleaning activities.
- Hands should be decontaminated or washed after removing gloves.
- Gloves should not be washed or re-used.

Personal protection

- Face protection (eye-wear/goggles, masks) is required to protect the mucous membranes of the eyes, nose, and mouth when performing procedures that may generate splashes or sprays of blood or body fluids (e.g., during initiation and termination of dialysis, inserting haemodialysis catheters).
- Personal eyeglasses and contact lenses are not considered adequate eye protection.
- Plastic aprons are indicated to prevent contamination of clothing with blood, body fluids, and other potentially infectious material.
- A long-sleeved, fluid-barrier (impervious) gown should be worn if exposed areas of the body, for example, arms, body front, are likely to be contaminated by blood or body fluids.
- All personal protection equipment (with the exception of eyewear/goggles, unless soiled) must be changed and hands cleaned: -
 - Between attending different patients.
 - If it becomes splashed with blood or body fluids.
 - On leaving the work area.

Handling of equipment and Consumables

- Storage of equipment close to dialysis machines and patients should be minimized.
- Consumables taken to the patient's station should be used only for that patient and should not be returned to a common clean area or used on other patients.

Cleaning of dialysis machines and chairs/beds

- Dialysis machines should be internally disinfected, externally cleaned (and disinfected if indicated), and dried after each patient.
- The exterior of the machine should be effectively cleaned using manufacturer's protocols.
- Special attention should be given to cleaning control panels on the dialysis machines and other surfaces that are frequently touched and potentially contaminated with patients' blood.
- Cleaning of noncritical surfaces (e.g., dialysis bed or chair, counter-tops, external surfaces of dialysis machines and equipment) should be done with soap and warm water.

- The following procedure should be adopted for any surface/item that is visibly contaminated with blood or following dialysis of a patient infected with blood borne virus: -
 - Clean with soap and water, and then,
 - Disinfect with sodium hypochlorite 3.5%, 1:6 dilution
 - Remove chlorine residues from metallic surfaces with water, as sodium hypochlorite in high concentrations (>500 ppm) is corrosive to metals.
- The machine should be decommissioned if spillage occurs at inaccessible locations, such as behind the blood pump until proper cleaning and disinfection are done.
- The following practices should be avoided: -
 - Blood tubing draped or clipped to waste containers.
 - Use of attached waste containers during priming of dialyzers.
 - Placing items on top of machines for convenience (e.g., dialyzer caps and medication vials).
- It is recommended that due to the instability of chlorine compounds, all diluted solutions should be discarded according to manufacturer's instructions.

Disinfection of HD machines

- It is recommended that dialysis units follow the manufacturer's recommendations.
- Disinfection should include the following: -
 - Heat disinfection (100°C) after each dialysis for a duration recommended by manufacturer.
 - Citric acid disinfection as per the manufacturer's instructions.
 - Bleaching (3.5%, non-perfumed sodium hypochlorite) once a month.

Dialysate

- Bottles containing unused dialysate should be immediately capped and the exterior of the bottle wiped over with detergent and water as part of the overall procedure of cleaning the haemodialysis machine.
- The date and time of opening should be recorded on the bottle using an indelible pen.

- Unfinished bottles used for infected patients must be discarded immediately after the dialysis session.
- Use of liquid bicarbonate dialysate concentrate more than 24 hours after opening is not recommended since it supports rapid bacterial proliferation.

Medications

- It is recommended that medications (including multiple dose vials) or supplies (syringes, swabs, etc.) taken to the patient's station should be used only for that patient and should not be returned to a common clean area or used on other patients.
- It is recommended that multiple dose vials should be used for the same patient.
- It is recommended that bags or bottles of intravenous solution should not be used as a common source of supply for multiple patients.
- It is recommended that when multiple dose medication vials (e.g., heparin, vials containing diluents) or solution bags are used for multiple patients, individual patient doses should be prepared in a clean, centralized area away from dialysis stations and delivered separately to each patient.
- It is recommended that vials, syringes, swabs, or other supplies should not be carried in pockets.
- If trays are used to deliver medications to individual patients, they must be cleaned between patients.
- Do not handle and store medications or clean supplies in the same or an adjacent area to the place where used equipment or blood samples are handled.

Needle and sharps

- It is recommended that all needles and sharps must be disposed of into an approved closed, unbreakable container according to the biomedical waste management rules.
- Needles should not be manually recapped.
- Non-touch technique should be used to drop the needle into the container, as it is likely to have a contaminated surface.
- These containers should be located as close as possible to the point of generation either attached to a trolley or on a mobile stand.

- Containers should be large enough to accommodate the types of devices being used in the area.
- They should be closed and sealed when $\frac{3}{4}$ full and disposed in approved manner.

Blood spills

- For minor spills on surfaces (e.g., benches, counter tops), wiping up with paper towel soaked in undiluted 1% sodium hypochlorite and then washing with soap and water, then allowing it to dry is recommended.
- For major blood spills, it is recommended that the following are done: -
 - Slowly flood contaminated area with undiluted sodium hypochlorite 1%; leave it for 2 minutes then mop up the solution.
 - This should be followed by washing with soap and water.
- Common equipment including weighing scales should be cleaned after use with soap and water at least daily and when they become visibly soiled or come in contact with body fluids.

Blood borne viruses screening and management

- It is recommended that all patients should be tested for HBV, HCV, and HIV on admission to the dialysis unit including after transfer from another unit.
Infected patients should be started on appropriate treatment.
- It is recommended that HBV and HCV infections be tested using a nucleic acid-based method.
- All maintenance dialysis patients should be retested every 6 months for HBV, HCV, and HIV infection.
- All HBsAg-negative patients must be vaccinated against hepatitis B using approved protocol.
- It is suggested that anti-HBs titres should be checked 4 weeks after the last dose and at 6 monthly intervals thereafter.
- Non-responders (anti-HBs titres < 10 IU/ml) should receive revaccination.
- All staff members should be vaccinated against hepatitis B, have their anti-HBs titres tested and be aware of their serostatus, that is, whether or not they have titres >10 IU/ml.
- Testing of staff and carers for HCV or HIV is only recommended following a needle-stick injury or body fluid exposure.

- Patients infected with hepatitis B should be dialysed in a separate room.
- Patients infected with hepatitis C should be dialysed in a separate room.
- If a machine is inadvertently used for dialyzing infected patients, it can **only** be used for uninfected patients after a minimum of three cycles of chemical and heat disinfection.
- Dialysis staff members caring for infected patients should not care for susceptible patients at the same time (e.g., during the same shift or during patient change-over), but may change in different shifts.
- Close contacts of patients with hepatitis B should be tested for HBsAg and anti-HBs testing and if necessary, vaccinated.
- If a staff member or carer experiences a needle-stick injury or exposure to blood or potentially blood-contaminated secretions from an infected patient, specialist opinion should be sought for management.

Vaccinations

- It is recommended that patients should receive hepatitis B, pneumococcal and inactivated influenza vaccines, according to approved protocol.
- Hepatitis B Vaccination for patients with chronic kidney disease including those on dialysis should be administered according to the following guideline: -
 - Hepatitis B vaccination is universally provided as part of expanded programme on immunization. Unvaccinated persons should complete a 3-dose series.
 - Adults with ESRD including those on dialysis, should receive a Hep B vaccine series of 40 µg Recombivax HB at 0, 1, and 6 months or a 4-dose series of 40 µg Engerix-B at 0, 1, 2, and 6 months.
 - Testing should be performed 1-2 months after administration of the last dose of the vaccine series to determine the response. Persons found to have anti-HBs levels of <10 mIU/mL after receiving primary vaccine series should be revaccinated with full doses.
 - Persons who do not have a protective concentration of anti-HBs after revaccination should be tested for HBsAg. If the HBsAg test result is positive, the person should receive appropriate management, and any household, sex, or needle-sharing contacts should be identified and vaccinated. Persons who test negative for HBsAg should be

considered susceptible to HBV infection and should be counseled about precautions to prevent HBV infection and the need to obtain hepatitis B immunoglobulin post exposure prophylaxis for any known or likely parenteral exposure to HBsAg positive blood.

- For hemodialysis patients, the need for booster doses should be assessed by annual testing for antibody to hepatitis B surface antigen (anti-HBs). A booster dose should be administered when anti-HBs levels decline to <10 mIU/mL.
- PCV13 and PPSV23 vaccines for infants and children (ages 0-18 years) with chronic kidney disease including those receiving dialysis should be administered according to the following guidelines: -
 - Pneumococcal vaccines. (Minimum age: 6 weeks for PCV13, 2 years for PPSV23).
 - Routine vaccination with PCV13: Administer a 4-dose series of PCV13 at ages 2, 4, and 6 months and at age 12 through 15 months.
 - Administer 2 doses of PCV13 at least 8 weeks apart if unvaccinated or any incomplete schedule of fewer than 3 doses of PCV13 was received previously.
 - All recommended PCV13 doses should be administered prior to PPSV23 vaccination if possible.
 - For children with no history of PPSV23 vaccination, administer PPSV23 at least 8 weeks after the most recent dose of PCV13.
 - For children aged 6 through 18 years: If neither PCV13 nor PPSV23 has been received previously, administer 1 dose of PCV13 now and 1 dose of PPSV23 at least 8 weeks later.
- PCV13 and PPSV23 vaccines for adults (ages 19-64 years) with chronic kidney disease including those on haemodialysis should be administered according to the following guidelines: -
 - Pneumococcal vaccines should be given as soon as possible after diagnosis of CKD.
 - Adults aged 19 years or older should receive PCV13 and a dose of PPSV23 at least 8 weeks after PCV13, followed by a second dose of PPSV23 at least 5 years after the first dose of PPSV23.
 - If the most recent dose of PPSV23 was administered before age 65

years, at age 65 years or older, administer another dose of PPSV23 at least 8 weeks after PCV13 and at least 5 years after the most recent dose of PPSV23.

- Routine annual inactivated influenza vaccination is recommended for all persons with ESRD including those on dialysis. To permit time for production of protective antibody levels, vaccination should, optimally occur before onset of influenza activity in the community. Vaccination should be offered throughout the influenza season.

Multi-drug resistant (MDR) organism screening

- Multi- drug resistant (MDR) organisms are defined as bacteria that are resistant to one or more classes of antimicrobial agents. These include Methicillin Resistant *Staphylococcus aureus* (MRSA), Vancomycin Resistant *Enterococci* (VRE), Extended Spectrum β -lactamase (ESBL) producing *Klebsiella pneumonia* and Carbapenem- resistant *Acinetobacter baumannii* (CRAB). Antimicrobial use and direct contact transmission of resistant strains are the two main factors that have contributed to this significant increase.
 - It is recommended that dialysis units should institute the following measures to prevent transmission of MDR organisms: -
 - Access to good clinical microbiology laboratory to ensure prompt detection of MDRs including antimicrobial susceptibility.
 - Appropriate antimicrobial stewardship (optimal selection, dose, and duration of treatment).
 - Active surveillance cultures (screening) to identify patients colonized or infected with MDR organisms.

Management of patients infected or colonized with a MDR organisms

- Contact precautions are recommended for management of patients with the following: -
 - An infected/colonized wound that cannot be covered by a dressing.
 - Urinary incontinence.
 - Uncontrolled faecal incontinence or diarrhoea or enterostomies.
 - Exfoliative skin conditions (e.g., dermatitis, psoriasis) and burns.

- For isolation, the following precautions are recommended in the given order of preference: -
 - Dialyze MDR organisms-positive patients in a separate room designated only for MDR-positive patients; or,
 - In a separate area in the main unit; or,
 - The main unit with ≥ 1 -Meter separation between beds/chairs.
- Staff caring for these patients must wear a gown and clean nonsterile gloves for all interactions that occur with the patient or potentially contaminated areas in the patient’s environment.
- Patients with different MDR organisms should be managed separately.
- The room where MDR organism-positive patients have previously been dialyzed must only be used for negative patients after fumigation.
- Transport equipment (e.g., wheelchairs, trolleys) should be cleaned with soap and water or alcohol-impregnated wipes after use.

Prophylaxis for *Staphylococcus aureus* infection

- The prevalence of *S. aureus* nasal carriage in many dialysis patients is higher than the normal population (> 50%) and increases with duration of dialysis.
- Routine use of nasal mupirocin in dialysis patients to prevent *S. aureus* carriage is not recommended because of risk of developing resistance.
- There should be a prominent display at entry to the unit or reception requesting that patients and individuals accompanying the patient to promptly inform the staff if there are any symptoms of a respiratory infection (e.g., cough, flu-like illness); gastroenteritis (e.g., diarrhoea, nausea, vomiting); skin rash; or known exposure to an infectious disease (e.g., chickenpox, measles, pertussis).
- Implementation of source containment measures is recommended to prevent transmission of respiratory infections. Coughing patients should be asked to wear a surgical mask or cover their mouths with disposable paper towels when coughing.
- All patients should perform hand hygiene as part of basic personal hygiene, including the use of alcohol-based hand rubs.

Staff training

- It is recommended that all staff in dialysis units should be trained in infection prevention and control practices including: -
 - Proper hand hygiene technique.
 - Appropriate use of personal protection equipment (PPE).
 - Modes of transmission for blood borne viruses (BBV), pathogenic bacteria, and other microorganisms.
 - Infection control precautions for dialysis units.
 - Rationale for segregating patients.
 - Correct techniques for initiation, care, and maintenance of dialysis access sites.
- It is recommended that inexperienced staff should be supervised until they are considered competent to practice safely on their own.

Patient education

- Patients should be educated on personal hygiene and care of haemodialysis access.
- The patients should be educated to promptly inform the staff if there are any symptoms of a respiratory infection (e.g., cough, flu-like illness); gastroenteritis (e.g., diarrhoea, nausea, vomiting); skin rash; or known exposure to an infectious disease (e.g., chickenpox, measles, pertussis).

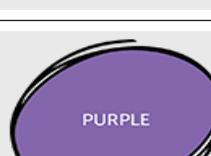
Surveillance

- It is recommended that all units should develop methods to monitor, review, and evaluate all infection data including: -
 - Rates of infection with blood borne viruses and bacterial infections, overall and individually.
 - Results of serological testing for blood borne viruses.
 - They should calculate incidence and conversion rates for blood borne viruses.
- Unit in-charge should regularly review adherence to infection control practice biannually and more frequently if there is significant staff turnover.

Waste management

- Waste generated in the HD facility should be segregated according to colour codes illustrated below to enable easy identification and safe disposal. These colour coded waste bins should be placed as close to the point of waste generation as possible.

Colour coding guide

 <p>BLACK</p>	<p>GENERAL WASTE:</p> <p>Waste paper, used food wrapping, used paper bags, pieces of wood, pruned leaves, used cartons</p>
 <p>RED</p>	<p>ANATOMICAL WASTE:</p> <p>Body parts, organs, blood bags, blood preserves</p>
 <p>YELLOW</p>	<p>CLINICAL WASTE:</p> <p>Used gloves, cotton wool, bandages, pads, branulars, intra- venous lines, any material that has been contaminated with body fluids</p>
 <p>BLUE</p>	<p>MEDICINAL WASTE:</p> <p>Tablets in containers, blister packs, unopened medicinal vials, liquids in bottles, inhaler cartridges.</p>
 <p>PURPLE</p>	<p>CYTOTOXI C WASTE:</p> <p>The by- products of cytotoxic drug therapy administered to patients. It includes all drug administrative equipment (needles, syringes, drip sets) as well as all gowns, and body fluids/waste from patients undergoing such treatment</p>

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