National Guideline for Infection Prevention and Control Practices in Hemodialysis Unit

وزارة الصحة
Ministry of Health

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Document Author	Asma Al.Ghammari, Eman Al.Bluoshi
Designation	Senior legal nurse (A)
Document Reviewer	Team of the Infection Prevention and Control Department
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Validated by		**Approved by**	
Name	Dr. Qamra Al Sariri	Name	Dr. Amal Al-Maani
Designation	Director General, Quality Assurance Center	Designation	Director General for Center Disease Control and Prevention
Signature		Signature	
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Dr Yacoub Maymani, Sr. Consultant of Nephrologist, Head of Dialysis unit Bowsher

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Acronyms

AAMI	Association for the Advancement of Medical Instrumentation
ALT	Alanine aminotransferase.
anti-HBc	antibody to Hepatitis B core antigen
anti-HBs	antibody to Hepatitis B surface antigen
anti-HCV	antibody to HCV
APIC	Association for Professionals in Infection Control and Epidemiology
BBVs	Blood borne viruses
CDC	Centers for Disease Control and Prevention
CFU	Colony forming unit
CPHL	Central Public Health Laboratories
HBsAg	Hepatitis B surface antigen
HBV	Hepatitis B virus
HCAI	Health care-associated infections
HCV	Hepatitis C virus
HCWs	Health Care Workers
HD	Hemodialysis
Hib	Hemophilus influenza type b
IPC	Infection Prevention and Control
KDIGO	Kidney Disease Improving Global Outcomes
MMR	Measles, Mumps and Rubella
MoH	Ministry of Health
PCR	Polymerase Chain Reaction
PCV13	Pneumococcal Conjugate Vaccine
PD	Peritoneal Dialysis
PPSV23	Pneumococcal Poly-Saccharide Vaccine
TB	Tuberculosis
T-dap	Tetanus, diphtheria, and pertussis
Td	Tetanus and diphtheria
TVC	Total viable count

Definitions

- **AV Fistula**: a surgical anastomosis between an artery and a vein that allows arterial blood to flow through the vein, causing the vein to distend and the vessel to thicken
- **Dialysis:** a process that replaces the kidney's normal function by removing toxins and excess fluids from the bloodstream. There are two types of dialysis: hemodialysis (HD) and peritoneal dialysis (PD).
- **Hemodialysis (HD):** a process that involves circulating the patient's blood outside the body through an extracorporeal circuit (ECC), separated from dialysis fluids by an artificial semi-permeable membrane.
- **Peritoneal dialysis (PD):** uses the patient's peritoneum, or the lining of the abdomen, to dialyze waste products from the patient's blood.
- **Dialysis station**: a station that includes the dialysis machine, a purified water connection, the dialysate concentrates container(s) or connections(s), and the treatment chair.
- **Patient zone:** used to refer to the surfaces which the patient can touch, or can touch the patient, including the chair, armrests, bedside tabletop/counter, drawer/cupboard handles and the HD machine.
- **Dialysate**: a balanced electrolyte solution which is introduced on one side of the semi-permeable dialyzer membrane (opposite to the patient's blood) to exchange solutes with blood during HD. In PD, this fluid infused and later removed from the peritoneal cavity.
- **Reverse osmosis (RO):** a process used to purify dialysis water by removing dissolved inorganic solutes as well as bacteria and their endotoxins.
- **High touch surfaces:** used to describe surfaces which are frequently touched by health care workers (HCWs). These include the same surfaces in the patient zone in addition to others such as computer screens, and keyboards.
- **Low-level disinfection:** disinfection that kills most bacteria and is accomplished by using general-purpose disinfectants.
- **Intermediate-level disinfection:** disinfection that kills most bacteria and most viruses e.g., 1:100 dilution of bleach.

Chapter One

Introduction

Hemodialysis units provide all the necessary services required for the management of patients with acute renal failure or end-stage kidney disease. The optimal treatment for end-stage kidney disease is a kidney transplant, due to the lack of available organs, most patients will rely on dialysis as a life-sustaining measure.

Patients undergoing hemodialysis (HD) are at higher risk of healthcare-associated infections (HCAIs) due to factors such as immunosuppression, exposure to invasive devices, lack of physical barriers in outpatient HD settings, and frequent contact with healthcare workers. This guideline outlines effective infection prevention and control (IPC) measures to reduce the risk of HCAIs in this population.

Purpose

The purpose of this guideline is to provide evidence-based recommendations for infection prevention and control in hemodialysis units, focusing on minimizing the risk of infection transmission among patients, healthcare providers, and the community.

Scope

This guideline is applicable to all personnel involved in patient care in hemodialysis units, including; physicians, nurses, and dialysis technicians, IPC staff, HSE, cleaning and environmental staff.

Structure

This is the second version of this guideline and consist many chapters. The chapter one is an overview of the what is this guideline about and whom it targets. In the chapter two, the key areas focus on IPC procedure in hemodialysis units include:

- Patient and HCWs education
- Patient and HCWs immunizations and screening
- Management of patients with positive results for BBV
- Vascular Access Care
- Dialysis Event Surveillance Protocol
- Healthcare Equipment in HD Units
- Water quality supply in Hemodialysis Unit
- Environmental cleaning/disinfection

The chapter three is highlight the responsibility of personal involve in implementing this guideline in the dialysis unit. Chapter four contain annexes that include related document, references and several templates use in the dialysis setting.

Chapter Two

2. Procedure

In hemodialysis units, IPC practices are crucial to prevent HAIs and ensure patient safety. The following IPC practices are designed to minimize infection risks during dialysis treatments, maintain a clean and safe environment, and protect both patients and HCWs

2.1 Patient and HCWs education

Patients and HCWs play vital roles in reducing the risk of infection during dialysis. To facilitate their involvement, they need a shared understanding of the IPC guidelines that address the expectations, priorities, and needs within the hemodialysis (HD) unit.

2.1.1. Patient education

Ensure that patients are actively involved and understand their role in the IPC program within the dialysis unit. Patients should be educated on the following:

- Hand hygiene, access site care, wound cleaning, and recognizing/reporting signs of infection.
- The importance of vaccination and screening.
- Visitors are not permitted in the clinical area during hemodialysis (HD) sessions.
- Not sharing food or personal belongings with other patients or staff.
- Patient permission is required for attendance, which can be granted by the treating physician.

2.1.2. HCW education

Dialysis facilities should have a comprehensive IPC education and training program, supervised by a certified IPC practitioner. The IPC team should conduct education and training sessions during new staff orientation, as part of annual ongoing training, and to assess staff competency.

- **Ongoing Training:** All HCWs should undergo regular training on IPC practices, including the use of PPE, hand hygiene techniques, and the proper handling of dialysis equipment.
- **Infection Prevention Updates:** Stay informed about the latest IPC guidelines, emerging infectious diseases, and local outbreaks to update protocols as necessary.

- **Staff Health:** Ensure that dialysis staff are healthy and do not work while ill, particularly when exhibiting symptoms of infectious diseases.

2.2 Patient immunizations

Immunization is an essential part of the care for dialysis patients. Vaccines reduce the risk of infections, which can lead to severe complications and hospitalizations. Regular screening for vaccine needs and ensuring timely administration of vaccines can improve outcomes and reduce the burden of infections in these high-risk individuals.

In **Annex (1)** an overview of recommended immunizations according to MoH guidelines for dialysis patients. However, below are key considerations for the hepatitis B vaccine in the context of hemodialysis patients:

- The HBV vaccine is recommended for all dialysis patients who are HbsAg-negative and anti-HB negative core-negative in the HD unit.
- The dosage and schedule will depend on the available formulation of a hepatitis B vaccine. Use high doses (40 mcg/ml) or two 1 ml 20 mcg doses given at one site.
- Test for anti-HBs 1–2 months after the last dose. If the anti-HBs titer falls below 10mIU/ml, the second series of HBV vaccine dose should be given. Repeat testing for anti-HBs one month after the second course. If the anti-HBs levels remain below 10mIu/ml, the patient will be labeled a non-responder.

Table 1. Hepatitis B vaccination recommendations

HbsAg	Anti-HB core	Anti-HBs	Interpretation	Action
Positive	Positive	-	HBV currently infected	**-HBV vaccine not indicated** -Test HBV full markers -Test HBV VL
Negative	Positive	Positive (any titer)	HBV-immune (past infection), at risk of reactivation if immunocompromised.	**-HBV vaccine not indicated** -No further testing
Negative	Negative	Any result	HBV-susceptible	**-HBV vaccination indicated** -Repeat anti-HBs post-vaccination 1-2 months, following vaccination

2.3 Patients screening

2.3.1 Serologic testing for dialysis patients

Blood-borne viruses (BBVs) such as Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), and Hepatitis C Virus (HCV) are major concerns for patients undergoing hemodialysis due to their increased risk of transmission through blood and the use of shared equipment.

Therefore, it is essential to screen all dialysis patients for these viruses before starting dialysis and periodically according to **Table (1)** during treatment. Below are the key guidelines and considerations for BBV screening:

- All dialysis patients must be treated as potentially infective until BBV status is known.
- All susceptible patients undergoing chronic HD treatment should be routinely screened for HIV, HBV and HCV *every six months*.
- Patients who are hepatitis B-vaccinated with anti-HBs ≥10 mIU/mL should be *annually* checked for anti-HBs titres.
- Non- responder patients with anti-HBs titres <10 mIU/mL in dialysis settings with a high HBV prevalence should be tested for HBsAg every *three months*.
- Care should be taken when testing for HBsAg as recent administration of HBV vaccine may result in positive HBsAg results for 7–30 days following vaccination.
- All patient should be test for ALT monthly as it facilitates timely detection of new infections and provide a pattern from which to determine when exposure or infection might have occurred.
- Patients coming from abroad are to be rescreened using sensitive dual HCV antibody/antigen (or, if not available, HCV RNA PCR testing should be done) and an HBsAg assay every 2 weeks for 3 months (enhanced surveillance), depending on the risk assessment of the country in which the patient was dialyzed **see Annex (2)**.
- All new and chronic HD patients returning from and coming from abroad shall be *dialyzed on a dedicated machine*, if available, until serology laboratory results are known.
- There is no need to rescreen patients who underwent dialysis for a short time in other units in Oman or in one of the Gulf countries that has similar regulations and infection control measures to Oman dialysis units

Table 2. Testing guidelines for patients in dialysis units

SN	Patient status	* On admission or within 6 weeks of first dialysis session	Monthly	Every 3 months	Every 6 months	Annual	Remarks
1	All patients	- **Hepatitis B**: (HBsAg, anti-HBc (total), anti-HBs) - **Hepatitis C:** (anti-HCV) together with baseline liver function tests (RFT) - **HIV**					HCV RNA testing if the patient has risk factors
2	HB-vaccinated patient with anti-HBs ≥10 mIU/mL				HBsAg	Anti-HBs	
3	HBV-susceptible AND **non-responders to HBV vaccine			HBsAg			
4	Anti-HCV-negative		ALT		Anti-HCV		In patients with identified risk factors like IV drug use, Acute deranged liver function test ***: PCR/nucleic acid amplification testing use
5	Anti-HCV-positive **AND** PCR-negative		ALT			HCV PCR	In patients with identified risk factors like IV drug use, Acute deranged liver function test***: PCR/nucleic acid amplification testing use
6	HIV serology-negative				HIV		

Note: this table is specific to patients with renal failure on HD and should not apply to other groups.

** Non-responders are defined as Those who still have anti-HBs levels below 10mIU/ml measured one to two month after two full HBV vaccination courses and who have no markers of current or past infection. *HBsAg, hepatitis B surface antigen; anti-HBc, antibody to hepatitis B core antigen; anti-HBs, antibody to hepatitis B surface antigen; anti-HCV, antibody to HCV; ALT, alanine aminotransferase.*

*** For patient with acute liver function test derangement, HCV RNA testing should be done immediately.

2.3.2 Patients screening for Tuberculosis (TB)

Tuberculosis (TB) is an infectious disease caused by the bacterium *Mycobacterium tuberculosis*. It is primarily transmitted from person to person through airborne droplets expelled when an infected individual coughs, sneezes, or speaks. While TB most commonly affects the lungs (pulmonary TB), it can also impact other parts of the body, including the lymph nodes, brain, kidneys, and spine (extrapulmonary TB).

Mycobacterium tuberculosis can exist in two forms within the human body:

1. **Active TB (TB Disease)**:
   - Symptomatic and often contagious.
   - TB tests are typically positive, and radiological image (e.g., chest X-ray) may show abnormalities.

2. **Latent TB Infection (LTBI)**:

   - The bacteria are dormant, with no symptoms, no evidence of radiographic changes consistent with active TB and negative microbiologic tests.
   - LTBI is not infectious but carries a 5–10% lifetime risk of progressing to active TB. This percentage increases significantly when additional risk factors exist, such as end-stage kidney disease, with cited relative risks ranging from 7 - 50 times the background incidence (Canadian TB Standards, 7th Edition, 2014). Effective treatment of LTBI reduces the risk of progression to active TB.

To reduce the incidence of active TB in end-stage renal disease patients, TB screening program recommended for identification and treatment of dialysis patients with latent TB. Treatment of patients with latent TB will reduce the number of active TB cases in the dialysis population, avoiding time and follow-up intensively of the contacts.

The TB screening program recommended for dialysis patients includes three components:
1. Risk assessment (see annex 3)
2. Chest radiography (x-ray)
3. Interferon Gamma Release Assays (IGRA)
4. Notify in e-notification system (Tarassud) * (see annex 4)

Tuberculin skin test (TST) is not recommended for dialysis patients, the possibility of false-negative results is high because of has high prevalence of anergy** in dialysis patients.

Screen the following patients for TB *within one month* of their first chronic hemodialysis run in unit:
1. All patients who start chronic dialysis
2. Chronic dialysis patients who came from other country.

For patients with a previous documented IGRA test (anytime in the past) but not as part of the current TB screening protocol outlined in this guideline do the following:

1. Perform risk assessment (use risk assessment form)
2. Request Chest radiography (x-ray)
3. Do not repeat the IGRA. Enter the date the previous IGRA. Patient need to be evaluated if a more recent IGRA is required.

In general, repeat, or serial IGRA testing is not recommended. In certain circumstances, it may be appropriate - most commonly following a known TB exposure.

* All patients screened with IGRA test should be notified in e-notification system (Tarassud) under TB screening section; choose High risk group screening then select Type Then Patient on renal dialysis then fill in the form.

** Anergy is the absence of skin reaction with delayed hypersensitivity, following injection of an antigen to which an individual is known to have developed a cell-mediated immune response

2.4 HCWs screening and immunization

HCWs screening and immunization program addresses staff health and work-related concerns that protect them against vaccine preventable protect them against vaccine-preventable diseases.

- Initial screening for blood-borne diseases to be done at the time of appointment time according to MoH policy.
- TB screening of HCWs should be performed in all HD facilities at the time of appointment and repeated according to risk assessment. (*for details see Manual for Screening and Immunization of Workers, Residents, Trainees and Students in Health Institutes)*

2.4.1. TB screening is required for the following groups:

1. Pre-employment of HCW
2. Students health sciences or medical residents before enrollments to an educational health institute or colleges.
3. Annually in high risk area, that is ICU, emergency department, bronchoscopy room and Laboratories staff working with TB culture specimens.
4. Post TB exposure

2.4.2. The following procedures are required for TB screening:

1. Fill in risk assessment form. (see annex 3).
2. TST or IGRA test
3. CXR, if positive TST/IGRA or Signs and symptoms of TB.

2.4.3. Fitness for work

- For HCWs with pulmonary TB, the treating physician must issue clearance permit for HCW to be non-infectious before returning to work.
- Extra pulmonary TB and LTBI do not pose a risk to other HCW or patients; they can reassume work and followed up accordingly for management.
- HCWS working in private health institute with positive results to BBV (regardless of viral load) or TB must obtain the clearance permit from NEAP.

2.5 HCWs immunization

It is mandatory for all dialysis HCWs to receive an immunization schedule as shown in Table 3.

Table 3. Immunization schedule for HCWs in HD units

Vaccine	No. of doses	Remarks
Flu	**1 dose**	**Flu vaccine to be given annually**
HBV	**3 doses**	**0, 1, 2 months**
T-dap **Td**	**1 dose**	**One time dose of T-dap, then Td booster every 10 years**
MMR	**2 doses**	
Varicella (chickenpox)	**2 doses**	**Pre-screening**
Meningococcal	**1 dose**	**Meningococcal to be given once only**

Remarks

- Pre-screening varicella and anti-HBs testing is recommended for all HCWs before vaccination.
- Post vaccine anti-HBs testing is recommended for all HCW within 1 to 2 months after the third dose of the series.
- Re-administer the HBV vaccines three series doses (1, 2, 3 months) to HCW in whom anti-HBs are below the protective level of 10 ml u/L.
- For HCW; in whom anti-HBs are below the protective level after the six doses, consider as non-responder.
- For laboratory technician (IPV vaccine, 3 doses at 0, 1 and 6 month) meningococcal vaccine a single dose to be given.
- T-dap: pregnant HCWs should be received 1 dose of T-dap as pregnant or as HCWs, no need to take double dose (repeat T-dap vaccination each pregnancy).
- If first MMR received at postpartum, give second MMR 4 weeks apart (avoid during

2.6 Management of patients with positive results for BBV

Blood-borne virus infection is known as a serious hazard for patients and HCWs in HD units, though the relative risk of HIV and HCV transmission is significantly less than that of HBV for both. The viral titer in the infected patients' blood and the virus' viability on environmental surfaces are much less compared with HBV, resulting in a much lower risk of infection.

Most of the international organization CDC, APIC and KDIG are not recommend isolating positive HCV or HIV patients nor dedicating specific HD machines for them; however, providing proper disinfection processes between patients during HD sessions is recommended.

Transmission of BBV to others can occur through people who are unaware of their infection, as most people with BBVs are, in fact, unaware. Standard precautions and specific procedures are important methods to prevent the incidence of BBV infection transmission within dialysis units

2.6.1 Management of HBV-positive patients

- Isolate HBsAg-positive patients in a designated or separate room for treatment from other patients with dedicated machines, equipment, instruments, supplies and medications.
- If there is no isolation room, HBsAg-positive patients should be dialyzed at a station away from adjacent stations (e.g., at the end or corner of the unit).
- Disinfect machines used on HBsAg-positive patients according to a protocol incorporating manufacturer instructions.
- Discard all disposable, single-use items such as external venous and pressure transducer filters/protectors following each patient. These items should not be reprocessed or reused.
- Disinfect/sterilize non-disposable items such as clamps and scissors appropriately before use on another patient.
- Use single-use medicine vials and avoid multi-use vials.
- If multiple-dose medication vials are used, doses should be prepared and labeled in a clean area away from the dialysis stations and delivered separately to each patient.
- HCWs caring for HBV patients must be HBV-immune.
- HCWs caring for HBsAg-positive patients should not care for susceptible patients at the same time, especially during the period when dialysis is terminated for one patient and initiated for another.
- HCWs should not attend for both HBsAg-positive and HBV-susceptible patients during the same shift.

2.6.2 Management of hepatitis C-positive patients:

- Isolation of patients who are active HCV-infection (HCV RNA detected) from other patients is not required, but if isolation facilities are available, the patient can be isolated.
- Dedicated machines are not necessary for HCV-positive patients; however, proper disinfection processes must be carried out between patients based on the protocol provided by manufacturers' instructions.
- HCWs must adhere to standard precautions when caring for both anti-HCV-positive and susceptible patients during the same shift.

2.6.3 Management of HIV patients:

- Patients with risk factors for HIV infection should be tested; if positive, they must be referred to an infectious diseases physician for assessment and management.
- No need to isolate HIV-positive patients from other patients, but if the isolation facilities are available, the patient can be isolated.
- No requirement for dialyzed HIV-positive patients separately on dedicated machines if disinfection processes are properly carried out between patients according to a protocol that incorporates the manufacturers' instructions.
- Disposable dialyzers should be used, and dialyzers should not be reprocessed.
- HCWs should wear goggles or a face shield to protect against the splash of blood that may occur when inserting needles into a patient.

2.6.4 Management of a new case of BBV infection in HD unit

- Inform the local infection control team, as any new BBV infection is considered an outbreak. Form an outbreak team that should include representatives from the infection control team, an expert virologist/microbiologist, dialysis unit staff, and public health.
- Refer the patient to a specialist for further evaluation and management.
- Isolate the patient, and if there is a new case of hepatitis B, segregate the dialysis machine Identify the contacts who shared dialysis sessions with the patient with new BBV infection since the last negative result for that patient.
- Isolate the exposed patients and start enhanced surveillance.

2.6.5 Management of the contacts of new HBV infection in HD unit

- Whenever a new case of HBV infection is identified, the unit should carry out enhanced surveillance on all contacts who are not adequately immune to HBV (anti-

HBs >100mIU/ml) within 6 months. This includes HBsAg testing *every two weeks for 3 months*. A booster dose should be given to those with an HBsAb titer (10–100 mIU/ml).

- Hepatitis B immunoglobulin should be considered for previous non-responders to hepatitis B vaccine (<10 m/IUml).
- Enhanced surveillance should be followed in all contacts with the new HCV infection. This should include HCV RNA PCR testing or nucleic acid amplification *testing every two weeks for three months*.
- All the contacts should undergo HIV antigen/antibody testing *every two weeks for three months* after the last exposure to the identified case.

2.7 Vascular Access Care

There are three main types of vascular access in order of preference: native arteriovenous fistula (AVF), arteriovenous graft, and central venous catheter (CVC)

2.7.1 Arteriovenous Fistula (AVF)

To reduce the number of central venous hemodialysis catheter and their complications, CKD patients should be ideally referred for assessment and creation of AVF when they reach stage four. This type of access is the preferred access for chronic hemodialysis.

Infection may result from breaches in infection prevention practices, including aseptic technique, bacterial seeding from another part of the body, or poor hygiene and care of the access arm.

Creation of the AV fistula in the upper arm is preferred over the thigh, and maturation of the surgical anastomosis for 1 to 4 months is necessary before use to reduce the risk of infection.

Sterile preparation of the skin over the fistula site (creation of sterile field, use of sterile barriers and sterile gloves) is not more effective in preventing infection than clean technique (clean barriers and clean gloves with strict attention to aseptic technique).

2.7.2 Arteriovenous (AV) graft

If an AV fistula cannot be established in a patient requiring chronic access, an AV graft is the next preferred: a biologic, semi-biologic, or prosthetic graft is implanted subcutaneously to form an anastomosis between an artery and a vein.
Causes of infection are the same as those of an internal AV fistula. However, complications resulting from infection may be more severe because of the risk of

disintegration of graft materials and subsequent hemorrhage. Thus the following instruction must be follow to prevent the associated risk:

- All patients should be taught to wash their access site with soap and water daily and before hemodialysis session.
- Patients should also be instructed to ensure that all staff accessing the access site are preparing the skin appropriately and in the proper way prior to cannulation plus wearing a mask for all access connections.
- 2% chlorhexidine gluconate (CHG) is the antiseptic of choice. If povidone iodine solution is used (apply for 2-3 minutes) and/or 70 percent alcohol (apply in rubbing motion for one minute in an outward circular motion to insertion site and allow it to dry before cannulation). The insertion site should not be palpated once the site has been prepared.
- Patients should be taught to recognize symptoms and signs of infection either at the access site or remote site (e.g., fever, chills, and pain, redness, or drainage around the access site).
- To prevent seeding of the access site by microorganisms, remote sites of infection also should be identified and effectively treated as quickly as possible.

2.7.3 Central Venous Catheter (CVC)

This type of vascular access is a temporary access device. There are two type of CVC; Non-tunneled and Tunneled central line. However, there are recommendation must to follow when the CVC is used to prevent the associated infection:

- For acute hemodialysis, where access for less than 3 weeks' duration is anticipated, vascular access may be obtained using a non-cuffed or cuffed catheter.
- If a catheter must be used for access for longer than 3 weeks, a tunneled, cuffed central venous catheter should be used (if possible, it should not be placed on the same side as a maturing AV access.
- The preferred insertion site is the right internal jugular.
- Subclavian access should be only used when jugular options are not available and in patients who are not anticipated to need permanent vascular access (with subclavian CVC, there is a greater incidence of central venous thrombosis and stenosis).
- Because of associated infection rates of femoral catheters, they should be only placed in bed-bound patients with good exit site care and left in place for no more than five days.
- Percutaneously inserted, non-cuffed CVC have been associated with the highest rates of bacteremia in the hemodialysis setting.

- It is recommended for the patient and staff members to wear masks for all access connections.

2.8 Dialysis Event Surveillance Protocol

A vascular access site is essential for HD patients and the requirement of frequent puncture impaired the immune system. It creates a potential risk for bloodstream infections and vascular access site infection. Thus, measuring and tracking rates of infection and device utilization data is an important part of prevention.

Surveillance of dialysis events helps to identify risk factors of infections and formulate systems to prevent infection and improve patient safety along with the quality of care. Therefore, all outpatient dialysis units must implement the following:

1. Conduct surveillance in all outpatient dialysis units.

2. Use standardized method and definition **(Annex 5)** for collecting data and analysis.

3. Integrate surveillance program into routine clinical activities and surveillance should be regularly conducted to identify events, bloodstream infections, intravenous antimicrobial starts, positive blood culture and pus, redness or increased swelling at the vascular access site.

4. Denominator data consist of the number of HD outpatients treated at the facility during the first 2 working days of each month **(Annex 5).**

5. Calculate dialysis event rates stratified by vascular access type (e.g., arteriovenous fistula, arteriovenous graft, or central venous catheter) and standardized infection ratios (comparing individual facility observed with predicted numbers of infections) for bloodstream infections.

6. Monitor the trend of infection in order to identify the risk factors and investigate the causative of existed infection to improve patient safety.

7. Periodically report the surveillance events rates and trends to the Department of Infection Prevention and Control, MoH.

2.9 Healthcare Equipment in HD Units

HD equipment includes HD machines, dialyzers, and instruments, including blood pressure cuffs, stethoscopes and clamps. HD equipment should have proper protocols for cleaning and disinfecting the equipment posted in the dialysis unit. This protocol should include appropriate mechanical cleaning before any disinfection process, chemical cleaning or disinfecting agents, and the manufacturer's instructions regarding appropriate dilution and contact time.

- Items taken into a dialysis station should be disposed of, dedicated for a single patient or cleaned and disinfected before using on other patients.
- Dialysis chairs, table, HD machines, etc., must be cleaned and disinfected.
- Clean areas should be clearly designated for handling and storage of medications, unused disposables, equipment and machines.
- External venous and arterial pressure transducers filter/protectors and internal transducers filter/protectors must be changed between each patient – should not be reused.
- Common carts should not be used to deliver medications or food to patients. If a common cart must be used, the cart must not be moved from one dialysis station to another and should remain in a designated area of sufficient distance from dialysis stations.
- Patient records should not be placed on potentially contaminated surfaces (e.g., beds, dialysis machines).

2.9.1 Hemodialysis machines

Cleaning and disinfection of HD machines between patients is a crucial part of reducing the risk of BBV transmission in the unit. It should be done routinely using the checklist of cleaning and disinfecting HD machines and stations **annex (6)**.

The biomedical staff should perform preventive maintenance of machines according to manufacturer's recommendations.

2.9.2 Disposal of PD effluent/dialysate and HD fluid

- All HCWs should properly handle these fluids with great caution to avoid splashing.
- PD and HD fluid should be disposed directly into a drain or carefully pouring into a sluice.
- Disposable gloves should be worn when handling any PD fluid, and the fluid should enter the sewer system so that no splashing occurs.

- The tubing from the PD bag should be placed below the drain or below the water's surface to prevent splashing while the bag drains.
- The sink, drain and any inadvertent spills or splashes should be disinfected with 1:10 dilution household bleach or an appropriately MoH-approved disinfectant.
- All contaminated material, including PD bags, should be placed in heavy, tightly sealed plastic bags for disposal.
- Waste PD fluid from HBsAg-positive patients can be disposed of into a sanitary sewer if handled with proper aseptic technique.

2.10 Water quality supply in Hemodialysis Unit:

Hemodialysis patient expose to more than 300litres of water per week. Failure to ensure adequate water quality may have serious consequences for patient health and safety. Patients undergoing hemodialysis may show signs and symptoms related to water contamination, which can lead to complications or death; ***Table (4)***.

Table (4) Hemodialysis risks associated with water contamination

Symptoms	Possible water contaminants
Anaemia	Aluminium, chloramine, copper, zinc
Bone disease	Aluminium, fluoride
Haemolysis	Copper, nitrates, chloramine
Hypertension	Calcium, sodium
Hypotension	Bacteria, endotoxin, nitrates
Metabolic acidosis	Low pH, sulphates
Muscle weakness	Calcium, magnesium
Neurological deterioration	Aluminium
Nausea and vomiting	Bacteria, calcium, copper, endotoxin, low pH, magnesium, nitrates, sulphates, zinc, microcystin
Visual disturbances	Microcystin
Liver failure	Microcystin
Death	Aluminium, fluoride, endotoxin, bacteria, chloramine, microcystin

Ref – Layman-Amato R, Curtis J, Payne GM. Water treatment for hemodialysis: an update.Nephrol Nurs J 2013;40(5):384–404,465.

Regular monitoring of water quality is an essential part of quality control in dialysis units, to avoid excesses of known or suspected harmful elements being carried in the water transmitted to the patient.

2.10.1 Water treatment systems Stages:

Dialysis water treatment systems should be designed to eliminate the anticipated chemical and biologic impurities found in the water. This system takes place in three phases as it shows in the ***figure (1).*** The stages of dialysis water treatment differ depending on the operating company.

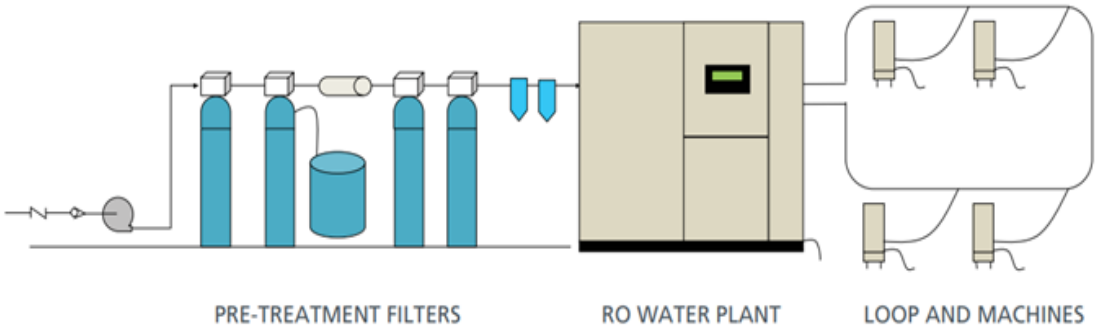
The first phase: The pre-treatment stage is called Pre-Treatment A stage consisting of several filters, which often includes the following filters:

1. Sand filter to remove impurities.
2. Carbon filter to remove chlorine.
3. Water Softer filter removes magnesium and calcium.

The second phase: The treatment stage is called the reverse osmosis (RO) stage: The reverse osmosis system uses a pump to push water through a semi-permeable membrane or filter that removes almost all contaminants, including bacteria and viruses.

Third phase: This is called the post-treatment or disinfection stage.

Figure 1: Water plant and distribution



2.10.2 Water quality monitoring used in hemodialysis:

Regular testing of product water quality and monitoring of any trend in the results shall be carried out. This will provide an analytical dataset allowing potential problems to be resolved early.
Samples should be tested for the presence of endotoxin, bacterial and chemical contamination. These serve as indicators of a breakdown in the quality of the water system within the units.

A. Bacterial and Endotoxin water test:

Contaminated water can lead to serious infections or sepsis in dialysis patients. Bacteriological testing helps detect microbial contamination, which can come from various sources, such as the water supply, the water treatment system, or storage tanks.

Frequency and location of Sampling

Once a water treatment plant is commissioned, it is necessary to test the water prior to commencement of any hemodialysis occurring for at least the ***first three months in weekly basis*** from multiple points throughout the system.

Bacterial and endotoxin examination are performed ***once a month routinely*** (use the form annex 7) It is preferable that samples be taken before performing the routine disinfection of the dialysis station. For example, if the routine disinfection process takes place once a month, then the samples are taken on the last day before the disinfection process.

The recommended point for water test for bacterial and endotoxin are:

- Post RO
- distribution loop points; first, end and random points.
- Post Dialysate machine

Samples are taken also from 10% of the dialysis machine every month, provided that a sample from each machine is examined at least once a year for bacteria and endotoxin, where regular testing is conducted on a different machine each month (machines are tested on a rotation).

However, there are some situation need to perform bacterial and endotoxin water test for example;

- During maintenance when the water distribution system or dialysate has any change occurs in the current system, test must be performed weekly for one month.
- In the event of an outbreak of diseases.
- As a part of the patient workup; if patient develops signs and symptoms of sepsis during the dialysis session, blood cultures and dialysate water test (from the patient's machine).

Action within the units

If bacterial count of post RO water exceeds 50 CFU/ml or endotoxin concentration exceeds 0.125EU/ml, urgent disinfection of the ring main will be ordered. This should be done as soon as possible without disrupting the standard hemodialysis schedule. This will continue as normal unless there is any evidence of a clinical problem.

In the event of a clinical problem (e.g. pyrogenic reactions) occurring in association with microbiological evidence of a failure in water quality, an urgent risk assessment of continuing hemodialysis treatment at the affected facility should be made.

During the normal working week, this should be possible within 24hours. At the weekend, this should be discussed between HD head unit, IPC, HSE and Mechanical engineering of RO plant. Given the risk of disruption of dialysis schedules to patients with end stage renal failure it is envisaged that it would be rarely necessary to suspend standard hemodialysis.

Table 5: Bacteriological testing requirements and interpretation of renal dialysis fluid and water used for the preparation of dialysis fluid

Water Test	Frequency of testing	Result	interpretation	Action
Bacterial Colony Counts (CFU)	✓ Routinely: Monthly ✓ New RO plant installation: weekly in three months' period ✓ During maintenance ✓ Event of an outbreak of diseases	0 ≤ 50 / ml	Satisfactory	No action; system under control
		≥ 50 ≤100/ ml	Borderline	Investigate cause and put corrective action in place
		≥ 100 / ml	Unsatisfactory	Take out of use until corrective action implemented
Endotoxin Levels(EU/ml)	✓ Part of the patient workup (if patient develops signs and symptoms of sepsis during the dialysis session, blood cultures and dialysate water test (from the patient's machine).	0 ≤ 0.125 EU/ml	Satisfactory	No action; system under control
		≥ 0.125 ≤ 0.25 EU/ml	Borderline	Investigate cause and put corrective action in place
		≥ 0.25 EU/ml	Unsatisfactory	Take out of use until corrective action implemented

B. Chemical water test:

Chemical testing of water used in hemodialysis is essential to ensure that the water is free from harmful contaminants that could compromise patient safety and the efficacy of the dialysis process. Routine testing for key parameters like pH, conductivity, chlorine, hardness, endotoxins, and trace metals is necessary to meet safety standards and maintain the integrity of dialysis treatment.

- ***Frequency and location of Sampling***

Chemical examination is carried out by examining two samples every three months; one from the source of water entering the station before treatment (raw water) and the other after treatment, directly after the osmotic membrane stage (use form provided in annex 7).

The frequency of the chemical examination shall be increased if any of the following cases occur:

a. If the results of the chemical analysis of the treated water show that the concentration of any one or more inorganic chemical pollutants exceeds the recommended concentration.
b. If there are changes in the water treatment system, such as replacement or maintenance

2.10.4 Disinfection of the Dialysis System:

The routine disinfection of isolated components of a dialysis system is usually inadequate (i.e., the complete dialysis system: water treatment system, distribution system and dialysis machine should be considered during the disinfection procedure).

A. Ultraviolet (UV) Irradiators

Ultraviolet Irradiators reduce microbial contamination though it does not remove endotoxin and it may be ineffective in killing some microbes if the radiant energy decreases below effective levels or the light cannot reach microorganisms.

UV irradiators should be monitored at the frequency recommended by the manufacturer. Since the radiant energy decreases with time, annual lamp replacement is typically required. Periodic cleaning of the quartz sleeve may also be required, depending on the water quality. A log sheet should be used to indicate that monitoring has been performed.

B. Hot Water Disinfection Systems

Hot water disinfection systems should be monitored for temperature and time of exposure to hot water as specified by the manufacturer. Hot water disinfection should be performed at least as often as recommended by the manufacturer.

The temperature of the water should be recorded at a point farthest from the water heater-that is, where the lowest water temperature is likely to occur. It is recommended that the water temperature be measured each time a disinfection cycle is performed. A record that verifies successful completion of the heat disinfection should be maintained. Successful completion is defined as meeting temperature and time requirements specified byte equipment manufacturer.

C. Chemical Disinfection

Chemical disinfection should be specified by the manufacturer to indicate the type of chemical used and frequency of disinfection. A record of all chemical disinfection should be maintained.

NB: Records of water quality sampling results, laboratory reports, and chemicals used for treatment must be available at all times and be retained for a period of at least five years.

For more details, refer to Standard Operating Procedure of Water Quality in Health Care Facilities

2.11 Environmental cleaning/disinfection

- Environmental cleaning in dialysis settings presents unique challenges and shall be performed by trained personnel.
- Sufficient time is needed between the completion of one patient's treatment and post-dialysis care and the initiation of the next patient's care to permit reliable and consistent cleaning and disinfection of the dialysis station.

Cleaning and disinfection of environmental surfaces

- Physical cleaning of environmental surfaces using detergent, water, and friction is the critical step required prior to surface disinfection.
- Cleaning and disinfection of surfaces (patient zone/high touch surfaces) should be performed between all patient treatments, including multidrug-resistant organisms and blood-borne pathogens.

- In case of blood and body fluid spillage, refer to policy https://www.moh.gov.om/documents/236878/4737288/Policy+Prevention+and+Management+of+blood+and+body+fluids+exposure+in+HCF.pdf/126ded6f-3da4–299b-ae84–991ee10a29d6.
- Non-critical surfaces (e.g., dialysis bed or chair, countertops, external surfaces of dialysis machines) should be disinfected with an MoH-approved disinfectant. For more details, refer to Guidelines for Environmental Cleaning program in Healthcare Facilities. https://www.moh.gov.om/documents/236878/4743006/Guidelines+for+Environmental+Cleaning+program+In+Healthcare+-+1.pdf/4bc08dc6-d1ab-c249–9e30-f318dd236b47

Chapter Three

Responsibility:

- **Renal Dialysis Unit Staff (Nurses, Technicians, Physicians):**
  - Adhere to hand hygiene, PPE usage, and disinfection protocols.
  - Monitor patients for infection signs and report immediately.
  - Educate patients on infection prevention, such as proper access care.

- **Infection Prevention and Control personnel**:
  - Oversee and update IPC policies.
  - Provide ongoing education and training for staff.
  - Conduct regular audits and ensure compliance with infection control protocols.
  - Reviewing and supervising the regular monitoring of treated water for hemodialysis (e.g., verifying the frequency of testing, testing methods, and implementing corrective measures for abnormal results)

- **Health and Safety and Environment Technicians:** (in coordination with HD staff):
  - Conducting initial and routine monthly sampling of treated water for hemodialysis after installation of a water treatment and distribution systems.
  - Reporting the results to hemodialysis responsible staff for proper documentation and identifying trends in these results; and, taking corrective measures when abnormal results are reported.

- **Cleaning and Support Staff:**
  - Ensure daily cleaning and disinfection of the dialysis unit.
  - Follow proper waste management and disposal protocols for medical waste.

- **Water Quality and Dialysis Equipment Monitoring:**
  - Ensure water quality meets safety standards and monitor dialysis machines for cleanliness and safety.
  - Regularly maintain and disinfect equipment to prevent contamination.

- **Patients and Visitors:**
- Practice proper hygiene and follow infection control practices (e.g., wearing masks).
- Report any signs of infection (e.g., fever, redness) immediately

Chapter Four

Document History and Version Control

Version	Description	Review Date
1	Initial Release	January 2023
2	Version two	September 2030

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Annexes:

Annex: 1: Guideline for Hemodialysis patient's vaccination

Infection is a major cause of morbidity and mortality in patients with chronic kidney disease (CKD), including those receiving maintenance dialysis or with a kidney transplant. Adequate humoral (antibody) and cellular (T cell-driven) immunity are required to minimize pathogen entry and promote pathogen clearance to enable infection control. Vaccination can generate cellular and humoral immunity against specific pathogens and is used to prevent many life-threatening infectious diseases.

It is an important component of preventative care due to their favorable safety profiles and the high rate of infection in these patients. This guideline explains the most important vaccine that should be received for the Hemodialysis patients such as hepatitis B, influenza, pneumococcal, Tdap, MMR, Varicella, Meningococcal, and Hib vaccines as follow:

Vaccines	No. of doses	Rote	Remark
Flu (influenza)	– 1 dose	Intramuscular/ deltoid regions	Annually
HBV: **≥20 years of age** **<20 years of age**	– 40 mcg /4 doses – 10 mcg /3 doses	Intramuscular	0, 1, 2 & 6 months 0, 1, & 6 months
Pneumococcal: PCV20	– 1 dose	Intramuscular/ deltoid regions	Once only , PCV20 may be given at the same time as other vaccines except for meningococcal vaccine
T-dap	– 1 dose	Intramuscular/ deltoid regions	Once only
MMR	– 2 doses	Subcutaneous/ deltoid regions	4 to 8 weeks apart
Varicella (chickenpox)	– 2 doses	Subcutaneous/ deltoid regions	4 to 8 weeks apart
Meningococcal	– 1 dose	Intramuscular/ deltoid regions	Single dose/ Booster dose every 5
Hib	– 1 dose	Intramuscular/ deltoid regions	Once only

Note:

- **Vaccination** can be started in the preparation stage before HD (Stage 4–5 renal failure).
- **Live vaccines:** are contraindicated in immunocompromised patients due to risk of vaccine-induced infections. Even though the limited number of studies in CKD patients has not shown any adverse reactions, these vaccines should be avoided, **with the exception of varicella and MMR vaccines**
- **Children, 0–6 years**, use the hexavalent vaccine as a combination vaccine containing (T-dap, IPV, Hib and HBV).
- **Hepatitis B Vaccine:** Previously completed primary 3 or 4 doses series: Booster dose should be given if anti-HBs titer falls below 10 mU/ml.
- Revaccination with full doses is recommended for persons who do not develop protective antibody titer after primary course.
- **Td booster** every 10 years after receiving T-dap
- **MMR Vaccine:** Two doses of MMR vaccine 4–8 weeks apart if not previously received or no evidence.
- **Varicella Vaccine:** Two doses of Varicella vaccine 4–8 weeks apart if not previously received or no evidence.
- **Pneumococcal Vaccine:** one dose PCV20 should be given

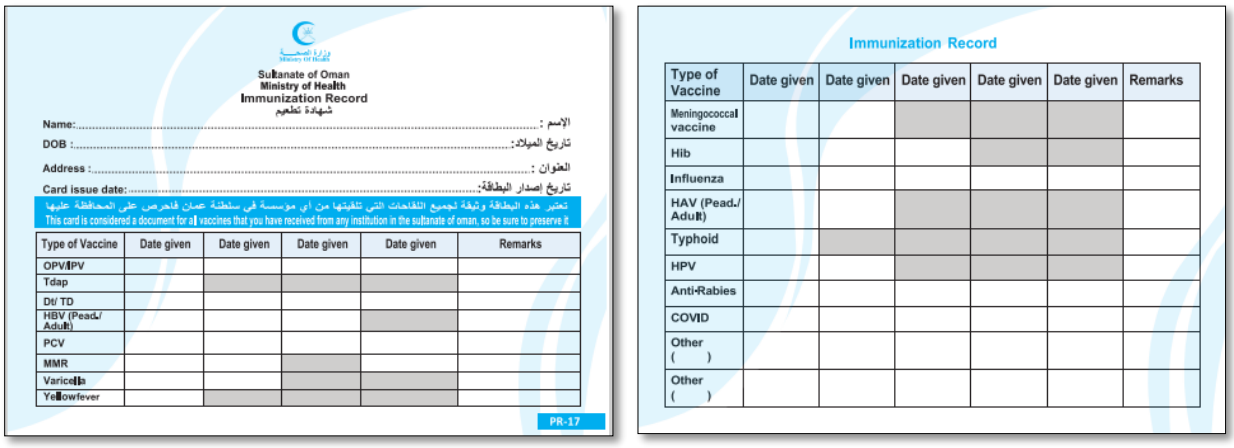
AEFI Monitoring system

Proper planning to reduce immunization error-related reactions, and to monitor and respond to AEFI can minimize adverse events and their effects. Additionally, careful planning will limit the potential for negative publicity from an AEFI. Any case with adverse reaction should be reported and notify in AEFI form and follow-up.

- All healthcare worker should be train and informed how to report AEFI
- All adverse cases of AEFI should be reported in Vigiflow system
- The adverse case should be manage and followed after reporting
- All investigations required for reported AEFI, need to be done at the earliest time
- Feedback should be sent from national level to the governorate through vigiflow system

Documentation

All vaccination details should be entering in Tarassud system. Immunization record card should be provided to the patient as evidence and for follow up (figure 1). All heath institutions should maintain patient's vaccination record and reporting to Regional immunization supervisor in the governorate.



Sultanate of Oman
Ministry of Health
Immunization Record
شهادة تطعيم

Name: ..... الإسم :
DOB : ..... تاريخ الميلاد:
Address : ..... العنوان :
Card issue date: ..... تاريخ إصدار البطاقة:

تعتبر هذه البطاقة وثيقة لجميع اللقاحات التي تلقيتها من اي موسسة في سلطنة عمان فاحرص على المحافظة عليها
This card is considered a document for all vaccines that you have received from any institution in the sultanate of oman, so be sure to preserve it

Type of Vaccine	Date given	Date given	Date given	Date given	Remarks
OPV/IPV					
Tdap					
Dt/ TD					
HBV (Pead./ Adult)					
PCV					
MMR					
Varicella					
Yellowfever					

PR-17

Immunization Record

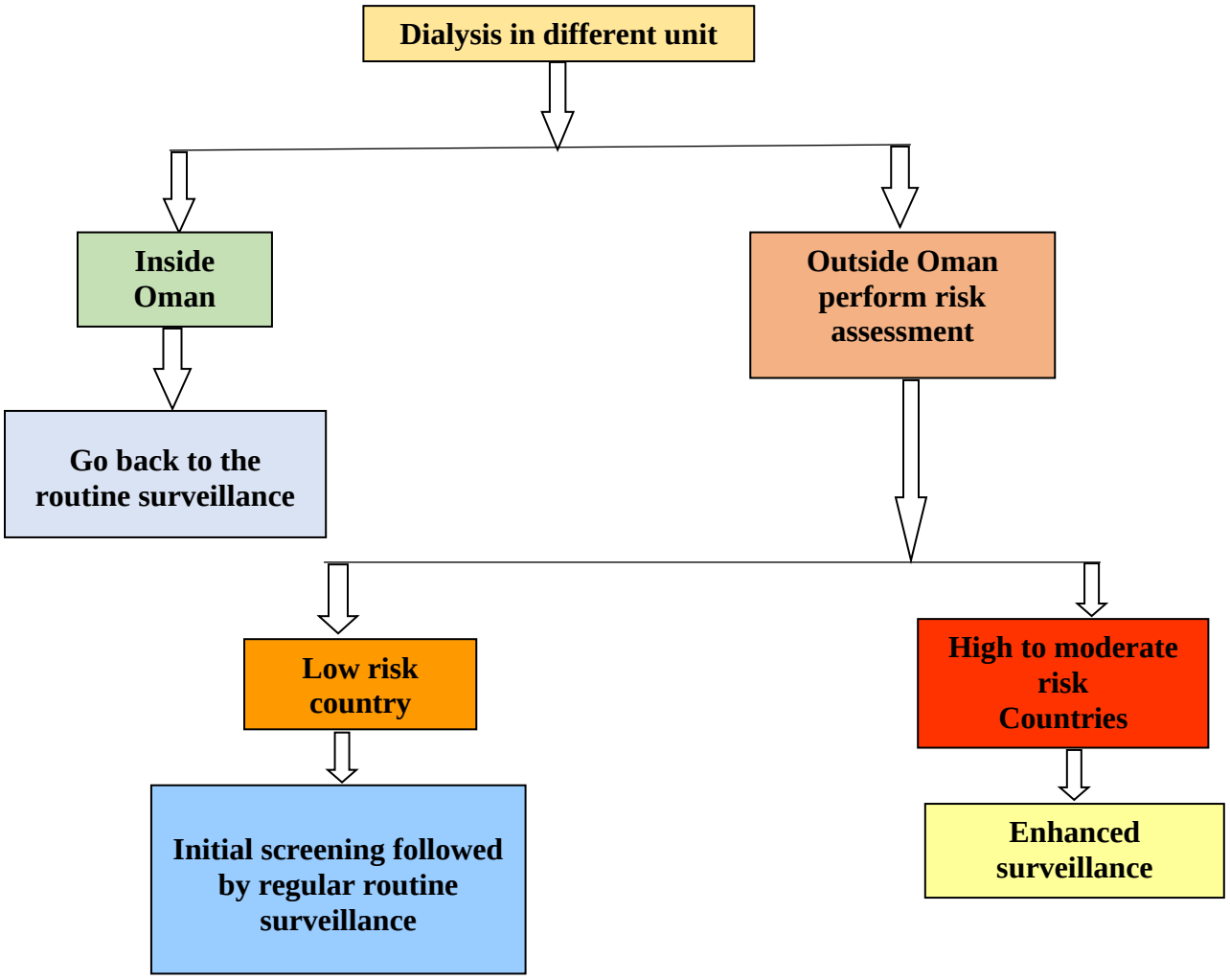
Type of Vaccine	Date given	Date given	Date given	Date given	Date given	Remarks
Meningococcal vaccine						
Hib						
Influenza						
HAV (Pead./ Adult)						
Typhoid						
HPV						
Anti-Rabies						
COVID						
Other ( )						
Other ( )						

Figure1: Immunization Record card

Supervision & Monitoring

Supervision and monitoring should be done by the infection control & immunization focal point and all statistic data should be available and maintained.

Annex (2): Enhanced Surveillance Screening for BBV



Annex (3): TB Risk Assessment Form

Previous History

Do you have any of the following?

- ☐ **BCG scar**
  - ☐ Present
  - ☐ Absent
- ☐ **History of previous TB**
- ☐ **Family history of TB**
- ☐ **Travel history within the last 2 years**
  - **Country: _____**
- ☐ **Previous treatment for Latent TB**
  - ☐ Yes
  - ☐ No
  - **Date: _____**
- ☐ **History of Hepatitis**
  - ☐ None
  - ☐ HBV
  - ☐ HCV
- ☐ **Medication allergy**
  - If yes, list: _____
- ☐ **Recent vaccination**
  - ☐ Yes
  - ☐ No
  - **Name of vaccine: _____**
  - **Date: _____**

Risk Factors

Do you have any of the following?

- ☐ Chronic renal disease / Dialysis
- ☐ Transplant
- ☐ Cancer
- ☐ Autoimmune disease or immunosuppressive condition
- ☐ Immunosuppression drugs
- ☐ HIV

- ☐ Substance use
- ☐ Smoking
- ☐ Diabetes Mellitus
- ☐ Alcohol use
- ☐ Chronic lung disease

Do you work in a health care institute?

- ☐ Yes
- ☐ No

Symptoms and Signs

Do you have any of the following?

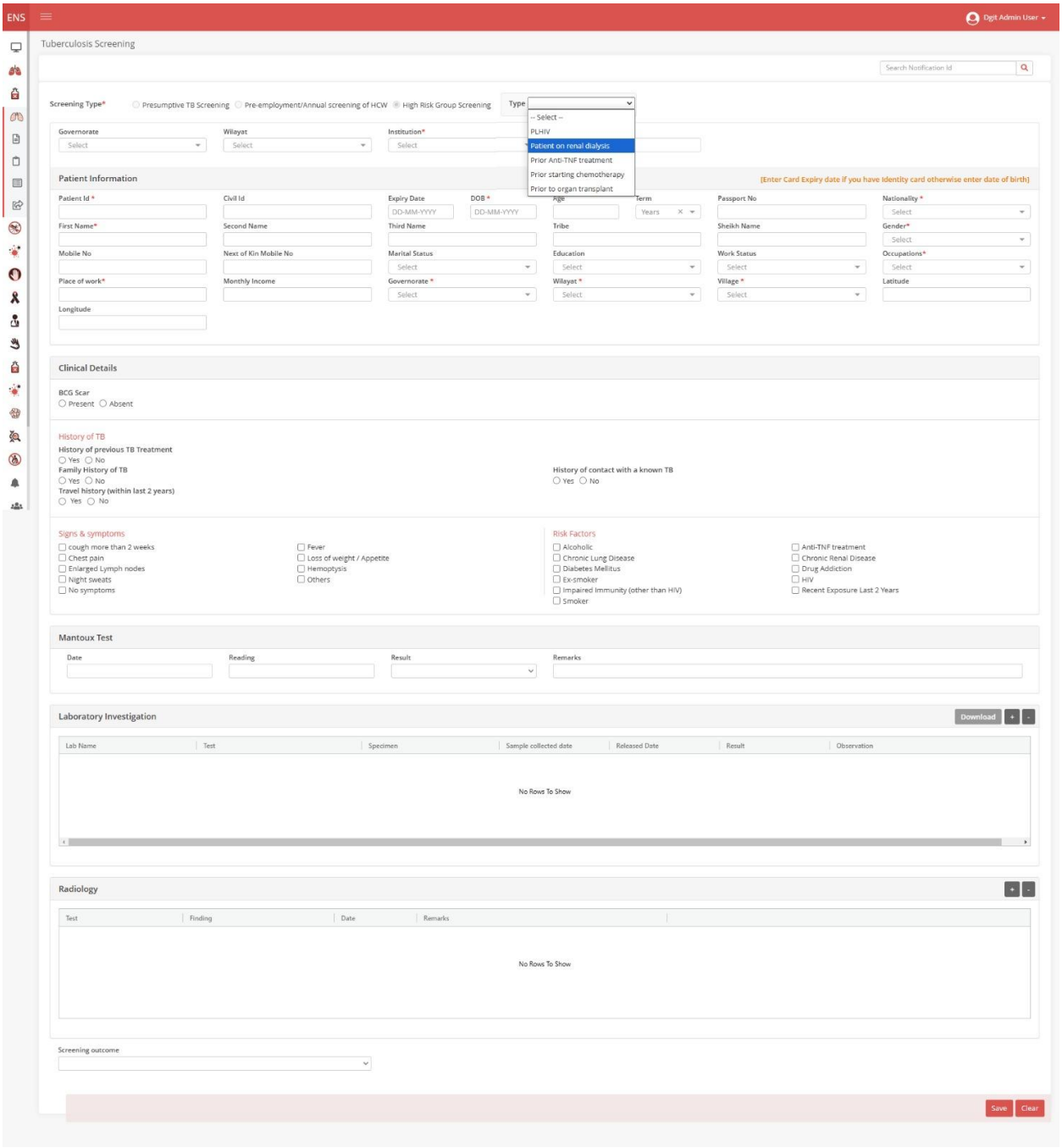
- ☐ Fever
- ☐ Cough > 2 weeks
- ☐ Chest pain
- ☐ Haemoptysis
- ☐ Loss of appetite
- ☐ Loss of weight
- ☐ Night sweats
- ☐ Enlarged lymph nodes
- ☐ None

Laboratory Test for Latent TB

Have you been tested for TB as part of?

- ☐ TB screening program
- ☐ Contact investigation

Annex 4: TB screening e-notification form in Tarassud



Annex (5): Dialysis Event- Surveillance Form

Ministry of Health, Sultanate of Oman
Directorate General for Disease Surveillance and Control
Department of Infection Prevention and Control

Dialysis Event (DE)

Infection Control Surveillance Form

SECTION I: PATIENT AND HOSPITAL INFORMATION

Patient ID: S # # # # # # # #

Date of birth: D D M M Y Y Y Y

Gender: ☐ Male ☐ Female

Surveillance plan date: M M Y Y

Facility ID: S # #

Location:

Transient Patient ☐ Yes ☐ No

SECTION II: VASCULAR ACCESS INFORMATION

Specify vascular access: (check all that apply)

☐ Arteriovenous fistulas ☐ Arteriovenous graft ☐ Permanent central line ☐ Temporary central line ☐ Port access device

SECTION III: EVENT INFORMATION

Specify DE Incident (may be more than one incident)

Note: When reporting multiple dialysis events together, the "date of event" is always the date that the first event occurred

DE date: D D M M Y Y

1- In-unit IV antimicrobial start ☐ Yes ☐ No

If yes, was it a continuation of an inpatient course? ☐ Yes ☐ No

If yes, was IV vancomycin started? ☐ Yes ☐ No

2-Positive blood culture ☐ Yes ☐ No ☐ Unknown ☐ Not done

If yes, suspected source of positive blood culture (check one): ☐ Vascular access ☐ A source other than the vascular access ☐ Contamination ☐ Uncertain

If yes, where it was collected ☐ Dialysis clinic ☐ Hospital or E.D. ☐ Other location

3-Pus, redness, or swelling at vascular access site ☐ Yes ☐ No

If applicable, circle the access with pus, redness, or increased swelling:
☐ AV fistula ☐ AV graft ☐ Permanent central line ☐ Temporary central line ☐ Port access device

SECTION IV: PROBLEMS

Specify problems (check one or more)

- ☐ Fever (≥37.8°C/100°F oral)
- ☐ Chills or rigors
- ☐ Drop in blood pressure
- ☐ Vascular access problem without infection (clotting, bleeding, etc.)
- ☐ Wound (NOT related to vascular access) with pus or increased redness
- ☐ Cellulitis (skin redness, heat, or pain without open wound)
- ☐ Urinary tract infection
- ☐ Pneumonia or respiratory infection
- ☐ Other, specify

Specify Outcomes:(check one or more)

Loss of vascular access	☐ Yes	☐ No	☐ Unknown
Hospitalization	☐ Yes	☐ No	☐ Unknown
Death	☐ Yes	☐ No	☐ Unknown

SECTION V: LABORATORY RECORD

Time of specimen collection: ---------:--------- AM / PM **Organism identified:** ☐ Yes, complete the back ☐ No

COMMENTS:

Date data collected D D M M Y Y **Collector ID**	Data entry stamp	**Date data entered** D D M M Y Y **Data entry ID**

*** To access the forms please click the link**

https://drive.google.com/file/d/1RenRLVmAdSUeebLNE5LshSxXCpKEqWot/view?usp=sharing

Annex (6): Checklist of Cleaning and Disinfecting Hemodialysis Machines and Stations

This list can be used if there is no visible soil on surfaces at the dialysis station. If visible blood or other soil is present, surfaces must be cleaned prior to disinfection. The proper steps for cleaning and disinfecting surfaces that have visible soil on them are not described herein. Additional or different steps might be warranted in an outbreak situation. Consider gathering necessary supplies1 prior to Part A.

Part A: Before Beginning Routine Disinfection of the Dialysis Station			
SN	**Steps**	**Met**	**Not Met**
1.	Gather necessary supplies including: • Personal protective equipment (PPE): eye goggles, gown and clean gloves • Properly diluted hospital disinfectant and wipes • Biohazard disposal container		
2.	Perform hand hygiene.		
3.	Don gown, eye goggles and clean gloves.		
4.	Disconnect and takedown used blood tubing and dialyzer from the dialysis machine.		
5.	Discard tubing and dialyzers in a leak-proof container.		
6.	Check that there is no visible soil or blood on surfaces.		
7.	Ensure that the priming bucket has been emptied		
8.	Ensure that the patient has left the dialysis station		
9.	Discard all single-use supplies. Move any reusable supplies to an area where they will be cleaned and disinfected before being stored or returned to a dialysis station		
10.	Remove gloves and perform hand hygiene.		

PART B: Routine Disinfection of the Dialysis Station – AFTER patient has left station

SN	Steps	Met	Not Met
1.	Wear clean gloves.		
2.	Apply disinfectant to all surfaces in the dialysis station using a wiping motion (with friction).		
3.	Ensure surfaces are visibly wet with disinfectant. Allow surfaces to air-dry		
4.	Disinfect all surfaces of the emptied priming bucket		
5.	Allow the bucket to air-dry before reconnection or reuse.		
6.	Keep used or potentially contaminated items away from the disinfected surfaces.		
7.	Remove gloves and perform hand hygiene.		

Important Notes:

1. Necessary supplies may include, but are not limited to: leak-proof disposal containers, gloves and other appropriate personal protective equipment (PPE), properly diluted Environmental Protection Agency (EPA)-registered hospital disinfectant, and wipes/clothes.
2. If used dialyzers and blood tubing are transported out of the station before being discarded, they should be transported in a manner that prevents any leakage.
3. Perform this step if machine is equipped with a bucket for prime waste. If waste-handling option (WHO) ports are used, separate steps for disinfection are required and are not described here (follow manufacturer's instructions).
4. Patients should not be removed from the station until they have completed treatment and are clinically stable. If a patient cannot be moved safely, routine disinfection of the dialysis station should be delayed until the station can be vacated in a safe manner. If patients are moved to a separate seating area prior to removing cannulation needles or while trying to achieve hemostasis, the chairs and armrests in those areas must be disinfected in between patients.
5. Disposal/removal of used supplies may occur before and/or after the patient has departed the station.
6. Follow the manufacturer's label instructions for proper dilution, preparation, and use of the disinfectant. 7 Surfaces to disinfect include but are not necessarily limited to: all surfaces in contact with the patient (e.g., dialysis chair, tray tables, blood pressure cuffs) and frequently contacted by healthcare personnel (e.g., control panel; top, front and sides of dialysis machine; touchscreens; countertops; computer keyboards).

7. Air-drying is recommended to allow for sufficient contact time with the disinfecting agent.

Annex (7): Water Samples Forms

1.Bacteriological Examination form of water samples

SULTANATE OF OMAN
MINISTRY OF HEALTH
Center for Disease Control and Prevention
Department of Central Public Health Laboratories
Food Borne-Illness and Food Poisoning Laboratory

Tel: 24560019
Fax: 24563121

سلطنة عمان
وزارة الصحة
مركز مراقبة الأمراض والوقاية منها
دائرة مختبرات الصحة العامة
مختبر الفاشيات الغذائية والتسمم الغذائي

هاتف: 24560019
فاكس: 24563121

التحليـــــل البكتريولـوجي لعينـــات مياه غسيل الكلى

Bacteriological Examination of Dialysis Water Samples

Name of Sender اسم المرسل	توقيع المرسل Sign. Sender	Date of Collection تأريخ أخذ العينة	Time الوقت	Tel:
				Fax:

Sender's Reference: *Number and description of sample* مكان أخذ العينة	Shifa No.		Lab. No. رقم المختبر	Laboratory Report *Aerobic Colony Count (CFU/ ml) at 22° C*

Reference Range	Interpretation
> 100 / ml	Unsatisfactory
> 50 – ≤ 100 / ml	Borderline
0 – ≤ 50 / ml	Satisfactory

* Above values are based on Public Health England guidelines, 2020

Please refer to the National Guidelines of Infection Prevention & Control Practices in Hemodialysis Units for any action needed.

Final Report: _____ **التقرير النهائي:**

Date Technician Medical Microbiologist

2.Chemical Examination form of water samples

Sultanate of Oman
Ministry of Health
Directorate General of Health Affairs
Dept. of Laboratories
Chemical Laboratory

سلطنة عُمان
وزارة الصحة
المديرية العامة للشؤون الصحية
دائرة المختبرات
المختبر الكيميائي

نتيجة تحليل عينة مياه الشرب

تاريخ الإستلام : ..... اسم المرسل ووظيفته : .....
رقم العينة : ..... نوع العينة : .....
تاريخ الإرسال : ..... إسم المحل : .....
مكان أخذ العينة : ..... المنطقة ..... الولاية : .....

الخواص الطبيعية للعينة

اللون : ..... الرائحة : .....
العكارة : ..... الطعم : .....
الرقم الهيدر وجيني : ..... التوصيل الكهربائي : ..... الكلور المتبقي : .....

التحليل الكيميائي للعينة

	جزء في المليون		جزء في المليون
١ – النشادر الحر	.....	١٠ – الكبريتات (كب ٤١)	.....
٢ – النيتريت (ن ٢١)	.....	١١ – الحديد الكلي (ح)	.....
٣ – النترات (ن ٣١)	.....	١٢ – المنحنيز (م)	.....
٤ – الأملاح الكلية الذائبة	.....	١٣ – الفلور (فل)	.....
٥ – الكلوريدات (كل)	.....	١٤ – البوتاسيوم (بو)	.....
٦ – القلوية الكلية (كاك ٣١)	.....	١٥ – الصوديوم (ص)	.....
٧ – العسر الكلي (كاك ٣١)	.....	١٦ – النحاس (نح)	.....
٨ – الكالسيوم (كا)	.....	١٧ – الرصاص (ر)	.....
٩ – المغنسيوم (ما)	.....	١٨ – الزرنيخ (ز)	.....
.....	.....	١٩ – إختبارات اخرى	.....
.....	.....	.....	.....

النتيجة :

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.....
.....

التاريخ : ..... / ..... / ..... م

رئيس المختبر الكيميائي

P.O. Box 393 - Postal Code 100 Muscat
Tel. : 24705740 - Fax : 24793899

Darsait دارسيت

ص . ب : ٣٩٣ – الرمز البريدي ١٠٠ مسقط
تليفون : ٢٤٧٠٥٧٤٠ - فاكس : ٢٤٧٩٣٨٩٩

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