





# DIALYSIS MANUAL



## Annual Documents adequacy & Change Requirements Review

Sr.No	SOP /Doc No	Documents Name	Issue. No	Rev.No	Review Date	Change	Rev No	Revision Date	Reason for Change	Amendment
1	SDH/DIA/01	Organization of Dialysis Services	1	1	20-Nov-22	No Any change review completed	1	20-Nov-23	No Any change review completed	No Any Amendment History
2	SDH/DIA/02	Role and Responsibilities of Dialysis Staff	1	1	20-Nov-22		1	20-Nov-23		
3	SDH/DIA/03	Water Management	1	1	20-Nov-22		1	20-Nov-23		
4	SDH/DIA/04	Overview of Dialysis Machines	1	1	20-Nov-22		1	20-Nov-23		
5	SDH/DIA/05	Dialyser Membranes	1	1	20-Nov-22		1	20-Nov-23		
6	SDH/DIA/06	Dialysate Management	1	1	20-Nov-22		1	20-Nov-23		
7	SDH/DIA/07	Maintenance And Disinfection of Dialysis Machines	1	1	20-Nov-22		1	20-Nov-23		
8	SDH/DIA/08	Disinfection and Surviellance Of Dialysis Unit Environment	1	1	20-Nov-22		1	20-Nov-23		
9	SDH/DIA/09	Reprocessing Of Dialysis	1	1	20-Nov-22		1	20-Nov-23		







		Original Date	Effective Date	Next date of revision	Issue NO		
		<u>05 March 21</u>	<u>20 November 2023</u>	<u>20 November 2024</u>	1		
<b>Reviewed &amp; Prepared By</b>		<b>Recommended By</b>		<b>Approved By</b>			
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Chief Medical Administartor	Quality Co-ordinator	Chief Medical Administartor		Chairman & Managing Director			
							



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1	SDH/DIA/01	Organization of Dialysis Services	1	1	05-Mar-21	FBV Monitoring Form added	1	20-Nov-22	As per NABH NC	New Form Added
2	SDH/DIA/02	Role and Responsibilities of Dialysis Staff	1	1	05-Mar-21		1	20-Nov-22		
3	SDH/DIA/03	Water Management	1	1	05-Mar-21		1	20-Nov-22		
4	SDH/DIA/04	Overview of Dialysis Machines	1	1	05-Mar-21		1	20-Nov-22		
5	SDH/DIA/05	Dialyser Membranes	1	1	05-Mar-21		1	20-Nov-22		
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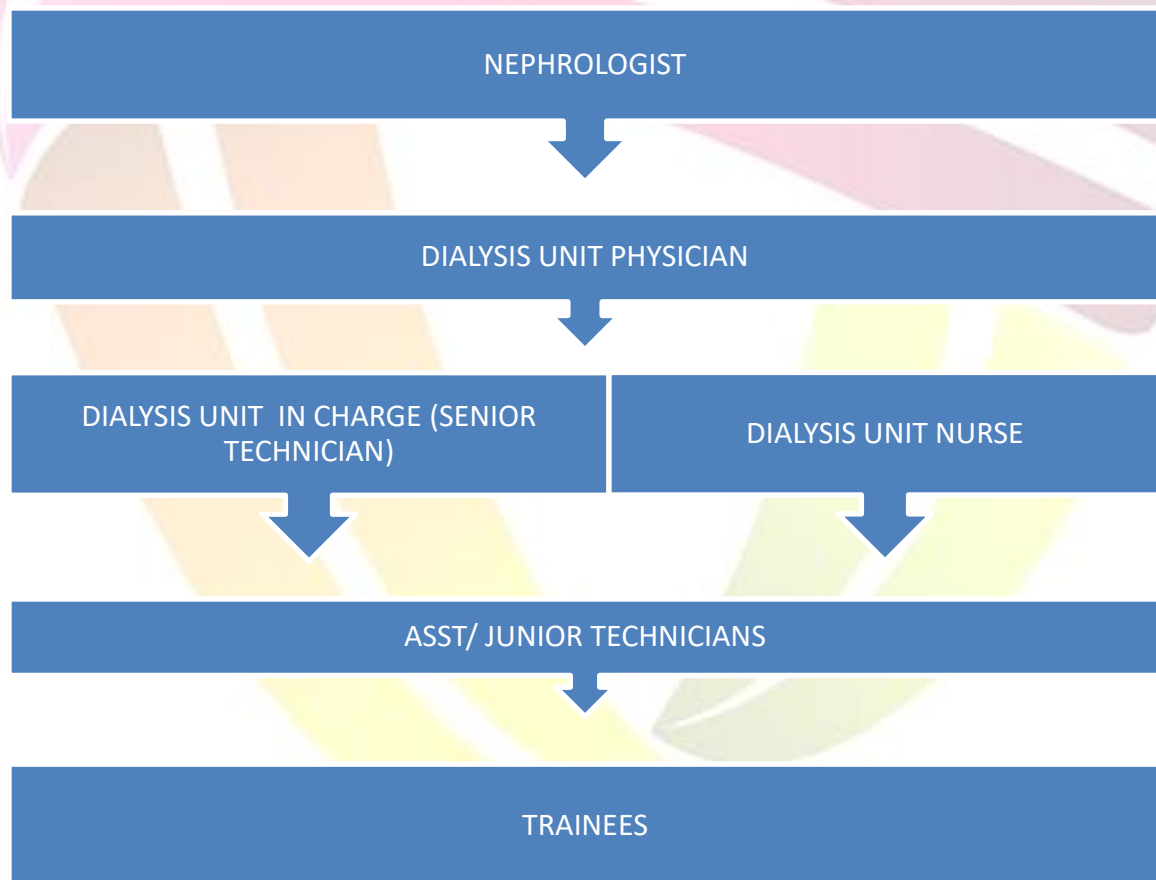
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Document Title : Organization of the Dialysis Services

**PURPOSE AND SCOPE**

The purpose of this policy is to guide the hospital staff in managing the process of dialysis services at various units of the hospital.

**ORGANISATION CHART**



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**RESPONSIBILITIES**

**Medical Director**

The overall responsibility of implementing the policy rests with the MD of the hospital.

**HOD –Nephrology/Critical Care Unit**

Is responsible to ensure that the policies pertaining to dialysis services are implemented.

**DIALYSIS UNIT PHYSICIAN**

- is responsible for clinically assessing the patients when they present to the HD unit.
- Decides necessity of certain drugs which are mentioned on the standing orders viz. Inj Avil, Inj. Hydrocortisone. and prescribes them.
- Reports any change in clinical condition of the patient to nephrologist.
- Manages any emergency that may occur during the dialysis.

**DIALYSIS UNIT IN CHARGE (SENIOR TECHNICIAN):**

Staff duty roster,  
Documentation,  
Training all staff,  
Stock maintenance.


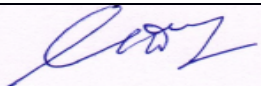
**DIALYSIS UNIT NURSE:**

Assist the dialysis unit RMO.  
Administers drugs ordered by the consultant and RMO.  
Dressing and cleaning of the cannula/catheter  
Monitors vitals of the patients before, during and after dialysis

**Dialysis Technician:** Saideep Hospital has three dialysis technicians.  
The technicians perform patient preparation and the dialysis process.  
They also look after the machine maintenance.

**POLICIES**

**Dialysis Unit**

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The hospital operates the dialysis unit on the 2<sup>nd</sup> floor;


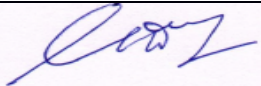
It has total four hemodialysis machines.

Also ICUs on 2<sup>nd</sup> and 3<sup>rd</sup> floors have the facility of RO water supply and dialysis machines.

**REFERENCES**

Standards

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Document Title : Roles and Competencies for Dialysis Staff

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and specifies the key roles and objectives of the dialysis staff
<b>DISTRIBUTION</b>	To all relevant departments, units and wards through the Hospital Manual

### **PURPOSE AND SCOPE**

The purpose of this procedure is to specify the roles and objectives of various staff involved in the functioning of the dialysis services unit

### **RESPONSIBILITIES**

#### **Medical Director**

The overall responsibility of implementing the policy rests with the MD of the hospital.


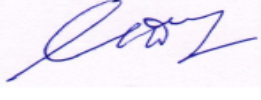
#### **HOD – Nephrology**

Responsible for staff management and formulating the staff roles and responsibilities.

### **PROCEDURES**

#### **General Working Principles for Staff**

1. All official messages and instructions are to be carried over by team leaders e.g. senior staff nurses.
2. People are not allowed to enter the unit without cap and mask.
3. Daily UV disinfection of the unit is to be done after third shift.
4. Every Saturday night, fumigation is done; all emergency items and two dialysis machines are kept in isolation room / annex room.
5. Two staff members are posted for emergency calls on Sunday.
6. All out patients on maintenance HD, in case of any emergency (other than HD schedule time) have to

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go to casualty for management and shall be treated as IPD cases.

7. Every Wednesday 2.00 to 3.00 pm there is a seminar. All staff should attend the session.

8. All staff and students shall obey and follow the instructions given by team leaders.


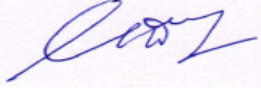
9. Permission for leave has to be obtained and submission of leave applications have to be done before going on planned leave.

10. It is the responsibility of the staff to arrange for coverage of day if he/she is going on leave.

11. The staff shall take permission from the team leader if he/she is going to be late for duty or wants to leave early.

### Orientation & Induction Process for New Unit Staff

- **Orientation and induction process shall be the responsibility of team leaders.**
- Introducing to all staff & patients.
- Observation of all procedures Weight checking, priming, starting, closing, washing etc.
- Monitoring of vitals.
- Checking of weights of the patients & its importance.
- What is dialysis? Indications of dialysis.
- General idea of hemodialysis machines (Monitors & Alarms)
- Monitoring in HD unit.
- Study of parts of extra corporeal circuit.
- Familiarizing with all records used in HD unit.
- Access to blood stream (Catheters, AV fistula) & its care.
- Principles of hemodialysis.
- Parts of HD machine with operation.
- Aseptic techniques during HD.

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- Functions of kidneys.
- Anatomy & physiology of kidney.
- Brief account of various types of kidney diseases.
- Acute renal failure, chronic renal failure & treatment.
- Preparation of bicarbonate dialysate.
- Anticoagulation during HD.
- Water treatment for dialysis & its importance.
- Maintenance of water treatment and (regeneration, formalinisation & general operation)
- Dialyzer reuse.
- Diet in renal failure.
- Fluid removal during HD.
- Familiarizing with all disposables used in HD unit & their place of storage.
- Types of dialyzers.
- Complications during HD & Management.
- Importance of interpersonal relationship with dialysis patients.

### Key Procedures


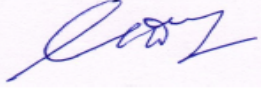
Priming of dialyzer.

Starting & closing of dialysis using catheters.

Starting & closing using AV fistula

Cannulation

### Processes in Dialysis Unit

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- Assisting catheterization & Kidney biopsy.
- CRRT
- Working in different ICUs
- Sending samples to lab
- OPD management
- Use of crash cart
- Use of ventilator
- Fumigation / fogging
- Pipeline formalinisation
- Receiving/sending linen-housekeeping.

**Job Assignments**

1st month: Observation & helping; patient assignment



Beginning of 2nd month: Priming & setting up dialysis circuit.

Beginning of 3rd month: Starting & closing HD through catheters.

Beginning of 4th Month: Cannulating AV Fistula.

**REFERENCES**

Standards

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Document Title : Water Management

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides guidelines for treatment, monitoring and quality control for water used as a key input in the hemodialysis process
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

### PURPOSE AND SCOPE

The procedures detail the treatment protocols, water quality standards and maintenance of the water treatment system used in the unit

### RESPONSIBILITIES

#### Medical Director

The overall responsibility of implementing the policy rests with the MD of the hospital.

#### HOD – Nephrology

Responsible for developing and implementing the procedure for water management


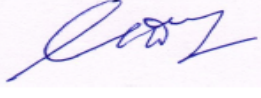
#### Senior Technicians.

Responsible for ensuring that the procedures are followed and results documented as per protocol

### PROCEDURES

#### A. Introduction

The quality of water used to prepare dialysate should be pure. Patients on hemodialysis can have nausea, vomiting, fever, dialysis related bone disease, encephalopathy, seizures, coma and even death, if inadequately treated water for dialysis is used.

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Tap water which may be of potable quality cannot be used in the dialysis procedure directly. The following chart compares the differences between drinking water and water for dialysis.

FACTORS	DRINKING WATER	WATER FOR DIALYSIS
Quantity	2 liters/day	150 liters/day
Route of entry of toxins	GI tract prevents entry of toxins	Dialyzer membranes are not selectively permeable.
Removal of absorbed toxin	Functioning kidney removes excess of toxins, if present in high levels.	Damaged kidney cannot remove toxins.
Bacterial Contamination	Entry into the blood is prevented by GI tract.	Can lead to fever and chills in dialysis patients.

**Impurities in Untreated Water**

Sediments	Sand, mud, Algae
Organic Chemicals	Organic - Chlorine, Chloramines, Pesticides, Herbicides, Dissolved gases
Sulphates	a) Salt & other chemicals Magnesites nitrates b) Metals & heavy metals
Inorganic Chemicals	Aluminum, Copper, Zinc, tin, cadmium lead, Mercury, silver
Micro-organisms & their products	Bacteria, Endotoxins, Viruses, Fungi

**Water Impurities and Side Effects**

Sl.No.	Contaminants	Acute Symptoms	Chronic Effects
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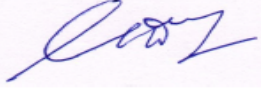


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1	Aluminum	Neurological Symptoms	Dialysis dementia, osteomalacia, aplastic bone disease, abnormal myocardial function, anemia
2	Arsenic	Neurological Symptoms	Uremic symptoms and neurological damage
3	Barium	Neurological Symptoms	Uremic symptoms and neurological damage
4	Cadmium	Neurological Symptoms	Anemia
5	Calcium	Hard water syndrome, nausea, hypertension, headache, confusion seizures, memory loss	Weak progressive lethargy, weakness.
6	Chloramines	Hemolysis, methemoglobinemia	Vomiting, hypotension, lethargy, death
7	Chlorine	Oxidative damage	Carcinogenic effect
8	Copper	Hemolysis, fever	Metallic taste, gastrointestinal discomfort, refractory hypotension liver damage.
9	Chromium	Hemolysis, fever	Metallic taste, gastrointestinal discomfort, refractory hypotension, liver damage.
10	Fluoride	Ventilatory defect, cardiac arrest, hypocalcaemia, hyperkalemia, acidosis	Osteomalacia, Osteoporosis
11	Formaldehyde	Hemolysis	Osteomalacia, Osteoporosis
12	Iron	Hemolysis	Osteomalacia, Osteoporosis
13	Lead	Colic, constipation, vomiting, nervous system disorders	Nervous system disorders, anemia
14	Magnesium	Hard water syndrome	Burning sensation over the skin
15	Nitrate, Nitrite	Hemolysis methemoglobinemia	Burning sensation over the skin
16	Potassium	Hyperkalemia: bradyarrhythmia Hypokalemia: tachyarrhythmia	Muscle weakness, paralysis

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17	Sodium	Hypertatremia: thirst, hypertension Hyponatremia: hypotension	Hypertension, weight gain Hypotension
18	Sulfate	Nausea, vomiting	Neurotoxicity
19	Zinc	Hemolysis	Anemia

**B. Water Quality In Hemodialysis**

There are some chemical and microbiological standards for water used for the preparation of Dialysis fluid.

**AAMI (Association for the advancement of Medical Instrumentation)**

It is one of the official health care organization in U.S.A. to set upper limits for chemical and microbial contamination in dialysis water.

**AAMI standards for water used for the preparation of dialysis fluid:**

Contaminant	Maximum Concentration (mg/l)
Calcium	2
Magnesium	4
Potassium	8
Sodium	70
Arsenic	0.005
Barium	0.01
Cadmium	0.001
Chromium	0.014
Lead	0.005
Mercury	0.0002
Selenium	0.09
Silver	0.05
Aluminum	0.01
Chloramines	0.1
Free chlorine	0.5

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Copper	0.1
Fluoride	0.2
Nitrate	2
Sulphates	100
Zinc	0.1

### **C. Microbiological Tests for Water Quality**

1. Water culture:

Viable counts in R.O. water less than 200 CFU (Colony Forming Unit) / ml.  
in dialysate less than 2000 CFU/ ml.

2. Limulus Amoebocyte Lysate (LAL) assays test:


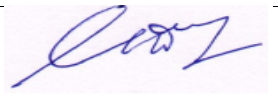
Specific for endotoxins (proteins produced by bacteria)

According to AAMI, bacterial endotoxin level less than 2IU/ml is recommended in R.O.

water

### **D. Components Of Water Treatment Unit In Our Dialysis Unit**

Sl.No.	Component	Principle	Function	Materials Used
1	Sand Filter	Filtration	Remove sand particles Sand, mud, algae	Sites
2	Activated Carbon Filter (ACF)	Adsorption (attract and hold)	Remove organic materials Chlorine, Chloramines	Charcoal (5c- 60 "mesh "size (particle size)
3	Softener	Ion exchange	Removes hardness of water exchange (Na 1 for Ca <sup>2+</sup> and Mg 2+)	Polystyrene sodium resins
4	Post Filter	Filtration	To trap carbon particles	Polyurethane (Fore size I micro metro)

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5	RO System	Reverse osmosis Solvent particle move from a region of higher solute cone to a region of lower solute cone. As a result of hydrostatic pressure, applied by a carbon pump.	Nano filtration Reject 90. 98% monovalent, 95-99% divalent ions, organic materials (>200 Alton's)	Polyamides membrane (Pore size 1mm)
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**Other Components that can be used**

Sl.No	Component	Principle	Function	Materials Used
1	De ionizer	Ion exchange	Exchange OH-for anions & H+ for cations H+ + OH - H2O (natural water)	A mixture of cationic and anionic resins
2	Ultra-filter	Ultra-filtration	Remove microbiologic, endotoxin contaminants	Ultra-filtration membrane
3	Radiation	Sterilization	Inactivate microbes and reduce endotoxins	HV light

**E. Maintenance of Water Treatment Unit**

**Maintenance Pattern**

Daily	Weekly	Monthly	Yearly
- Back wash and rinse for carbon filter and sand filter (20 minutes back wash and 20 minutes rinse)	- Salt regeneration for softener - E4 I on Wednesday - E4 H on Saturday - Check presence of scaling by using Silt Density Index (SDI)	- Formalinisation of water treatment plant. - Sample taken for culture from a) Storage tank b) Permeate Line c) Water connection for	- When activated charcoal or resin capacity is exhausted, it should be replaced with new charcoal/resin. - Mechanical cleaning of the RO membrane once

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<p>for both).</p> <ul style="list-style-type: none"> <li>-Ten minutes rinse to softener             <ul style="list-style-type: none"> <li>- Observe &amp; Log                 <ul style="list-style-type: none"> <li>a. Permeate flow</li> <li>b. Concentrate flow</li> <li>c. Primary Pressure</li> <li>d. Pre filter Pressure</li> <li>e. Post filter pressure</li> <li>f. Final pressure of RQ water</li> <li>g. Conductivity</li> </ul> </li> <li>- Check pH and hardness of soft water</li> <li>- Check anti scale solution and equipment.</li> </ul> </li> </ul>	<p>System.</p> <ul style="list-style-type: none"> <li>- Check the electrolyte (Na+, K+, Ca 2+, Mg 2+, Mg2+, Cl) level of RO water.</li> </ul>	<p>HD machine</p> <ul style="list-style-type: none"> <li>- Change 5 micron filter cartridge.</li> <li>- Once in three month citric acid cleaning given to the RO membrane</li> </ul>	<p>in 3 months. Life span of RO membrane is 2-3 years.</p>
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**Daily Maintenance Protocols – Back Wash**

**1. Sand Filter Backwash**

1. Switch off booster pump. Close 1 and 2 valves of booster pump water changing multiport valve (change the multiport valve in clock is direction)
2. Turn the valve to backwash mode
3. Open the valve I and 2 of the booster pump. Switch on booster pump (allow the water to flow for 20 minutes. After 20 minutes repeat first step, then change valve to rinse mode for 20 minutes)
4. After the rinse repeat step I and change the valve to filtration made and then repeat Step 3.

**II. Carbon filter backwash**

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Repeat the above steps

**III.Softener**

Backwash is not needed

Give rinse for 10 minutes

After the rinse check the hardness and pH of the out water.

**Weekly Salt Regeneration Protocols**

**Salt regeneration**

E4 I Wednesdays

E4 II Saturday

**Preparation**

- Switch off E4 machine main power
- Weigh out 10 kg of common salt crystal (not iodinated) into a plastic bucket.
- Wash the salt twice to remove dirt and solid particles.
- Take 40 liters RO water into a plastic bucket and add washed salt crystals.

**Salt Injection**

Switch off booster pump. Close the valves of the pump and turn the multiport valve to the regeneration mode. Place the bucket near the softener and dip the sucking rod into the bucket, open the valves of booster pump and switch on the pump. After sucking switch off booster pump, close the valves of the pump. Then change the multiport valve to the rinse mode. Open booster valves again and switch on the pump and give a rinse for one hour. Before and after salt regeneration, check pH and hardness of soft water. Measure the output of softener after regeneration. If pH and hardness of water are in the acceptable range (pH: 6.5-7.5, hardness 0) change the valve to service mode.

**Citric acid cleaning for membrane Protocols**

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Chief Medical Administrator		Chairman & Managing Director	



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Document Title : Water Management

- Record reading of RO machine before citric acid cleaning.
- Switch off RO machine.
- Remove post filter.
- Close permeate valve.
- Disconnect disinfection line, concentrate line and permeate line.
- Dip all three lines into a container which contain citric acid solution (10 L water plus 500 gm citric acid).
- Switch on Ro machine and booster pump which is connected to the disinfection line.
- Increase the concentrate flow in the machine.
- Allow to circulate the solution through the machine (RO membrane) for 15-20 minutes. Then give rest for 5-10 minutes. Repeat the processes in order to achieve a good permeate flow.
- Rinse for 30-60 minutes.
- Check readings after procedure pH and hardness.
- If all values are in acceptable range (pH: 6.5-7.5, Hardness:0), connect RO machine with supply tank.

**Process To check total hardness of water**

- Take 50 ml of water which is to be tested in the conical flask.
- Add two drops of reagent B.
- Then add two drops of reagent I.
- The sample will turn purple if hardness of the water is present.
- There after use reagent H for checking raw water or reagent S for soft water.



**Process For raw water testing**

Add reagent II drop by drop till the sample turn from purple to blue.

Hardness = 25 X no. of drops.

H = Each drop denotes 25 PPM.

**Process For soft water testing**

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Add reagent S drop by drop till the sample turns from purple to blue.

Hardness = 1 X no. of drops.

S = Each drop denotes 1 PPM

**Process to Check Silt Density Index Kit (SDI KIT)**

**Aim:**

To check presence of sealing in soft water.

**Procedure:** (Placed on the soft water line)

- ◆ Open the needle valve for a minute to flush out any debris in the line.
- ◆ Connect the SDI kit with quick release coupling.
- ◆ Close the valve and unscrew the disc holder.
- ◆ Place the filter paper on the support disc.
- ◆ Open the needle valve slowly and allow the water to fill until it reaches the top and all the air expelled out.
- ◆ Adjust the valve till the pressure gauge shows 2 kg per sq.cm.
- ◆ Place the 500 ml beaker below the holder.
- ◆ Note time (To) seconds for filling 500 ml empty beaker.
- ◆ Let water pass through the filter paper for 15 minutes.
- ◆ Note time (T15) seconds for filling 500 ml beaker for a second time.
- ◆  $SDI = \left[ \frac{1 - T_0}{T_{15}} \right] \times 100$



15

Value above Four indicates the presence of scale.

**REFERENCES**

Standards

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Document Title : Overview of Dialysis Machine

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides overview of the various types and models of the dialysis machines used in the manual
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

**PURPOSE AND SCOPE**

The purpose of this procedure is to describe the details the models of machines used by the hospital and their key features.

**RESPONSIBILITIES**

**Medical Director**

The overall responsibility of implementing the policy rests with the MD of the hospital.

**HOD – Nephrology**

Responsible for developing and implementing the procedure for usage of dialysis machines.

**Senior Technicians.**

Responsible for ensuring that the procedures are followed and results documented as per protocol and formulating the staff roles and responsibilities.


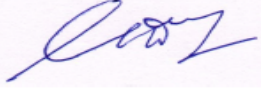
**PROCEDURES**

As extracted and reference from HD machine operating manuals.  
Currently Saideep is using Fresenius 4008S NG machines.

**REFERENCES**

Standards

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Document Title : Dialyzer Membranes

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides overview on selection and use of dialyzer membranes in the dialysis units
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

**PURPOSE AND SCOPE**

The purpose of this procedure is to elaborate on policies of selection and usage of various types of dialysers in unit

**RESPONSIBILITIES**

**Medical Director**

The overall responsibility of implementing the policy rests with the MD of the hospital.

**HOD – Nephrology**

Responsible for developing and implementing the policies and procedures related to dialyser usage

**Senior Technicians.**

Responsible for ensuring that the procedures are followed and results documented as per protocol

**PROCEDURES**

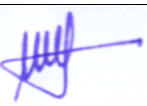
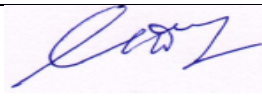
**Selection of Usage**

**Re-Use policy**

A. Overview

There are four types of membranes:

1. Cellulose
2. Substituted cellulose
3. Cellulose synthetic

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4. Synthetic

**CELLULOSE (eg: Cuprophan)**

- ◆ Obtained from processed cotton
- ◆ Basic structure is linear chains of glycogen rings with free OH group.
- ◆ No. of hydroxyl groups determines the degree of compliment activation.
- ◆ Decreased biocompatibility because the chemical composition of the surface is similar to that of the cell wall of bacteria.
- ◆ Not expensive.

**SUBSTITUTED CELLULOSE (eg: Cellulose acetate)**

- ◆ Free hydroxyl group of the cellulose membrane is substituted by acetate molecule.
- ◆ Increased biocompatibility than cellulose membrane.

**CELLULOSE SYNTHETIC (eg: Hemophan)**

- ◆ Free hydroxyl group of cellulose membrane is substituted with synthetic materials.
- ◆ Increased biocompatibility.

**SYNTHETIC (eg: Polysulphone, Polyamide, Polycrylonitrate)**

- ◆ Synthetic Polymer (Thermoplastic)
- ◆ Hydrophobic
- ◆ Increased middle molecular clearance
- ◆ Highly biocompatible
- ◆ Automatic ultra filtration control is required due to high water permeability.
- ◆ Backfiltration possible.
- ◆ Expensive

**Dialyzers used in our hospital**

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TYPES OF DIALYZER	PRIMING VOL	KUF MM/MMHG/HR	EFFECTIVE SURFACE AREA	DIALYZER MEMBRANE MATERIAL
<b>Fresenius</b>				
F3	28 ml	1.7	0.4m <sup>2</sup>	
F4	42ml	5.5	0.7m <sup>2</sup>	Polysulphon
F5	63ml	4	1.0m <sup>2</sup>	
F6	82ml	5.5	1.3m <sup>2</sup>	
F7	98ml	6.4	1.6 m <sup>2</sup>	
F8	110ml	7.5	1.8m <sup>2</sup>	

**DIALYZER REUSE POLICY:**

In our hospital we practice reprocessing of dialyzers. The objective of reprocessing is cost saving .Tubing, end caps, O rings and dialyzer headers are also reused. Venous and arterial transducer protectors are not reused. We use automated reprocessing machines in addition to visual impression to decide whether or not to continue dialyzer reuse. Automated reprocessing machine not only eliminates human errors but also makes the process more reproducible. It also provides an accurate estimation of **fiber bundle volume**, pressure leak testing and in-vitro estimation of ultra-filtration co-efficient. Performance testing is done for all reused dialyzers.

Separate reprocessing areas are used for dialyzers of patients infected with HIV and Hepatitis C. The dialyzers of patients infected with Hepatitis B are not reused. After using dialyzer and A-V tubing for that time next dialyzer session to be planned (20-24hrs) of time of dialyzer session formalin /Surveillance or disinfectant for Dialyzer/AV tubing needs 20-24 hrs of contact time in dialyzer /AV tubing. So next dialyzer wear to be done 20-24hrs apart as standards guidelines.

After using dialyzer and A-V tubing for first time next dialyzer session to be planned at least (20-24 hrs) of finishing time of last dialyzer session or formalin/ Surveillance are as disinfectants for dialyzer/ AV tubing needs 20-24 hours of contact time in dialyzer. AV tubing so next dialyzer near to be done 20-

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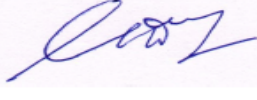
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24 hours apart as per standard guidelines.

**Estimation of fibre bundle volume of dialyzers**

1. After the termination of hemodialysis give a good water rinse to remove the clots in the blood compartment. Give a rinse to dialysate compartment too.
2. Fill the dialysate compartment with 1% hydrogen peroxide solution and it is kept for 5-10 minutes to facilitate cleaning.
3. Remove the caps from the header, give a water flush to both the blood and dialysate compartments to remove clots and check the O rings.
4. If clots remain in the blood compartment give a pressurized rinse to blood compartment using Hansen's connector.
5. Connect the Hansen's connector to both the dialysate port and open the water up (15-20psi pressure for 15 minutes) until the effluent is clear.
6. Before checking FBV, the dialyzer must be flushed until its effluent is clear and the brown or pink tint disappears.
7. Fill the blood compartment with R.O water and remove the air completely tapping the dialyzer gently.
8. Close the arterial end of the blood compartment with thumb, wait for 30 seconds, then close the tap and disconnect the water connector from the venous and the blood compartment.
9. Connect a 20cc syringe to venous end on the blood compartment remove the thumb from arterial end and aspirate the water slowly and measure the volume. Do not aspirate the water fast.
10. Continue this till the whole amount of fluid aspirates out. Make sure that the fluid comes out from the blood compartment. (While aspirating the water should be released from the arterial end and after aspiration thumb should be placed on the arterial end.)
11. Discard the dialyzer if FBV is less than 60% of the priming volume.
12. Calculate the FBV using the formula:

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Measured volume of water X 100

Priming column of dialyzer


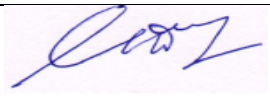
13. Priming Volume of Dialyzers is mentioned below.

TYPES OF DIALYZER	PRIMING VOL	KUF/MM/MMHG/HR	EFFECTIVE SURFACE AREA	DIALYZER MEMBRANE MATERIAL
NIPRO				
FB-110	65ml	4.7	1.1m2	Cellulose
FB-130	75ml	5.6	1.3m2	acetate
FB-90	55ml	3.9	0.9m2	
Fb-150	90	6.4	1.5	
BAXTER				
CA-110	70ml 4.7	1.1m2	Cellulose	
CA-130	80 ml	5.6	1.3 m2	acetate
FRESENIUS				
F3	28ml	1.7	0.4m2	
F4	42ml	5.5	0.7m2	
F5	63ml	4	1.0m2	
F6	82ml	5.5	4.3m2	
F7	98ml 6.4	6.4	1.6m2	
F8	110ml	7.5	1.8m2	

**REFERENCES**

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Document Title : Dialysate Management

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides overview on selection and use of dialysate in the unit
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

**PURPOSE AND SCOPE**

The purpose of this procedure is to elaborate on policies of selection and usage of various types of dialysates by the unit

**RESPONSIBILITIES**

**Medical Director**

The overall responsibility of implementing the policy rests with the MD of the hospital.

**HOD – Nephrology**

Responsible for developing and implementing the policies and procedures related to dialysate use

**Senior Technicians.**

Responsible for ensuring that the procedures are followed and results documented as per protocol

**PROCEDURES**

The two components of dialysate circuit are

- ◆ Dialysate concentrate
- ◆ Dialysate delivery system

**A Dialysate concentrate**

Two types of concentrates are used

1. **Acetate Concentrate** Available in 10liter cans

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Composition in mEq/L.

Sodium	138mEq/L
Potassium	2mEq/L
Calcium	3mEq/L
Magnesium	0.75mEq/L
Chloride	108mEq/L
Acetate	35mEq/L
Dextrose	100mg/dl

**2. Bicarbonate concentrate**

Indications for bicarbonate dialysate:

1. Very severe metabolic acidosis
2. Liver dysfunction
3. Poor cardiac function.

This dialysate concentrate is made of two parts.

Part A Acid concentrate

Part B It contains NaHCO<sub>3</sub> and NaCl. Appropriate proportion of A& B are pumped into proportionate system where they are mixed to produce final dialysate concentration.


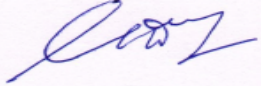
**A) Composition of Acid solution (5.1 Container)**

**B) Composition of HCO<sub>3</sub> Solution**

NaCl	82mEq/L	(NaHCO <sub>3</sub> 600 gm: NaCL 235 grams)
KI	2.0mEq/L	Na H 5 4mEq/L
CaH	3.0mEq/L	HCO <sub>3</sub> 35mEq/L
Mg	0.75mEq/L	CL- 19mEq/L
AceticAcid	4.0mEq/L	
Cl-	88.0mEq/L	

Acid, bicarbonate and water are mixed in the ratio of 1:34:1.83 (acid) (Water) (HCO solution)

**Advantages of acetate dialysate**

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1. Machine maintenance is easy.
2. Storage of concentrate is easy.
3. Easy to use
4. Less chance of bacterial contamination
5. Cheaper than bicarbonate dialysate
6. Less machine breakdown

**Disadvantages of acetate dialysate**

1. Decreases peripheral vascular resistance by direct vasodilatation.
2. Worsens metabolic acidosis as a result of HCO<sub>3</sub> loss through the dialyzer.
3. Depresses myocardium.
4. Hypotension as well as nausea, vomiting and post dialysis fatigue may occur in some patients.
5. The acetate level may exceed the amount than the liver can metabolize.

**Advantages of Bicarbonate dialysate**


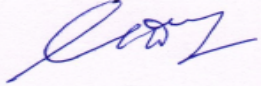
1. Less chance of hypotension.
2. Corrects acidosis faster.
3. Doesn't depress myocardium
- 4.

**Disadvantages of Bicarbonate dialysate**

1. Conductivity fluctuations are more common.
2. Machine maintenance is not easy.
3. It is more susceptible to bacterial contamination
4. Expensive.
5. Causes more machine break down.

**B) Dialysate delivery system**

It can be divided into four major components.

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**1. Water preparation system**

Treated water is delivered to the machine, where it is heated to an appropriate temperature (34-36C) by a heater and then de-aerated. Water is then delivered to the proportioning system.

**2. Proportioning System**

Here Part A and Part B of dialysate concentrate are mixed with treated water to form final A and B dialysate. These in turn are mixed to produce the final dialysate which is pumped to the dialyzer. Electrical conductivity is used to monitor the appropriate proportioning of the concentrate and water.

**3. UF Controller**

Two common types of UF Controller designs are available (i) a balancing chamber (ii) a gear system. In the former, a diaphragm is present, a fluctuation of which quantifies the UF volume. There is a separate dialysate inflow and outflow. The gear system designs include free wheels with gears through which the inflow and outflow of dialysate are passed. The Integral part of UF Controller is the dialysate pressure controller. The machine changes and controls the dialysate pressure appropriately, thus controlling UF rate.

**Monitors and Detectors**

**1. Conductivity monitors**

The appropriate mixing of concentrate with H<sub>2</sub>O is monitored by conductivity.

- a) In B-Braun Dialog, conductivity ranges from 12-17 mS/cm
- b) In 'Fresenius' conductivity ranges from 12.8 - 15.6 mS/cm

**2. Temperature monitor**

Patients need to be dialyzed with dialysate at 36-42°C. Dialysate temperature >42°C is associated with severe hemolysis & cardiopulmonary arrest. Dialysate temperature < 36°C is associated with feeling of cold and is uncomfortable. Dialysate temperature is monitored and a thermostat controls the heater. In B-Braun Dialog dialysate Temperature ranges from 33- 40c. In Fresenius dialysate Temperature ranges

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from 35-39C.

3. Blood leak detector

It is placed on this dialysate outflow line.

4. pH Sensors

It is generally used to prevent any mistake in connecting the appropriate concentrate to the machine.


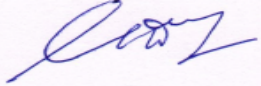
5. Dialysis water

A large volume (>120 l/treatment) is used to prepare dialysate. The bacterial colony count in the H<sub>2</sub>O should be < 200 cfu/ l. Normal dialysate flow rate: 100 - 800ml/minute.

**REFERENCES**

Standards

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Document Title : Maintenance & Disinfection of Dialysis Machines

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides overview of procedures for maintenance and disinfection of dialysis machines
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

**PURPOSE AND SCOPE**

The purpose of this procedure is details the maintenance-daily and preventive of dialysis machines and disinfection system for the same.

**RESPONSIBILITIES**

**Medical Director**

The overall responsibility of implementing the policy rests with the MD of the hospital.

**HOD – Nephrology**

Responsible for developing and implementing the procedure for dialysis machine maintenance and disinfection

**Senior Technicians.**

Responsible for ensuring that the procedures are followed and results documented as per protocol and formulating the staff roles and responsibilities.

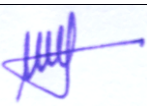
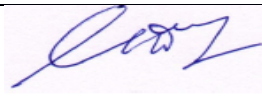
**PROCEDURES**

**Disinfection**

The machines should be properly disinfected and maintained. Types of disinfection.

**1. Chemical disinfection**

Chemical Disinfection is done by

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Using chemicals like

- ◆ Citric acid (50%)
- ◆ Formaldehyde (37%)
- ◆ Sodium Hypochlorite (10%)
- ◆ Renalin (1%)
- ◆ Glutaraldehyde (0.76%)

Short duration: 17 Minutes

Long duration: 27 minutes

## 2. Thermal Disinfection

- ◆ Thermal disinfection is not very effective in killing microbes.
- ◆ Temp.rises to 80-90 C
- ◆ Duration is 36 minutes.



## Daily maintenance of HD Machine

- ◆ After finishing all the dialysis, all the HD machines are wiped with Chloroxyleol (Dettol) solution.
- ◆ All the Fresenius machines are disinfected with citrosteril solution every day after all sessions of HD are over.

### In between two dialysis, all the machines are given hot rinse with citric acid (15 minutes)

After switching on the formalinised machine, rinse is to be given for 30 minutes after dwell period. After using the machine for a patient whose ELISA reports (HBsAg, HIV and HCV yet not know, or for a patient who has been dialyzed outside. The machine is formalinised and given a dwell time of 4 hrs.

After using it for an Elisa +ve patients dwell time of 8 hrs with formalin is given.

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Document Title : Maintenance & Disinfection of Dialysis Machines



**HD machine servicing;**

Preventive maintenance of all (H) machines are done yearly.

**REFERENCES**

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Document Title : Disinfection and Surveillance of Dialysis Unit Environment

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides overview of procedures for disinfection and surveillance of the dialysis unit environment
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

**PURPOSE AND SCOPE**

The purpose of this procedure is to details the protocol for disinfection of the dialysis unit environment and surveillance system.

**RESPONSIBILITIES**

**Medical Director**

The overall responsibility of implementing the policy rests with the MD of the hospital.

**HOD – Nephrology**

Responsible for developing and implementing the procedure for dialysis unit disinfection and surveillance

**Senior Technicians.**



Responsible for ensuring that the procedures are followed and results documented as per protocol.

**PROCEDURES**

**Disinfection**

- Fumigation is done with fogging machine with HIC approved agent.

**Surveillance**

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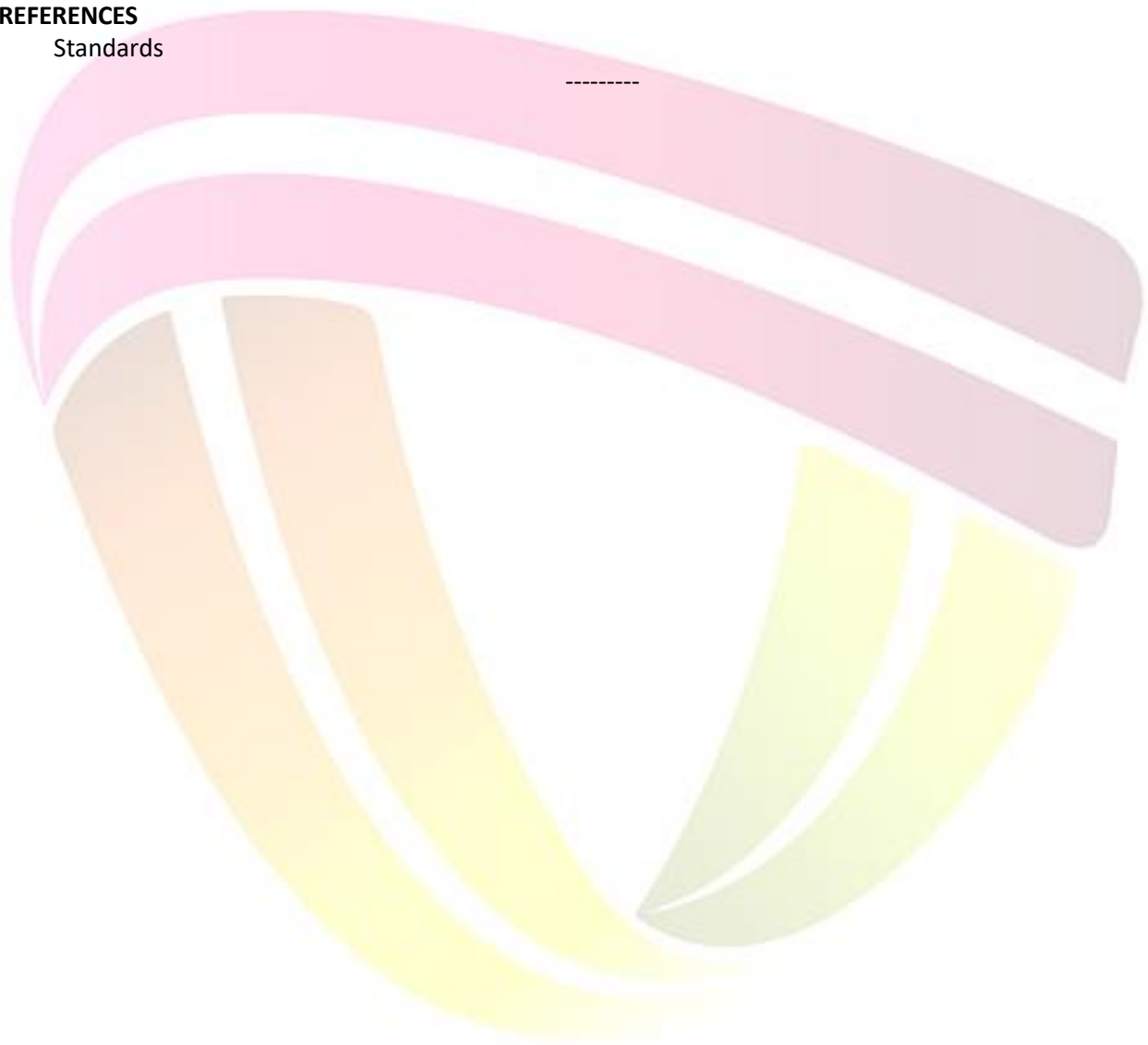
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- Performed only when indicated and as per guidance of Hospital Infection Control Officer.
- Surveillance method and protocol as indicated by the Hospital Infection Control Officer

**REFERENCES**

Standards

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Document Title : Reprocessing of Dialysis Consumables

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides overview of the process for reprocessing of various dialysis consumables
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

**PURPOSE AND SCOPE**

The purpose of this procedure is to detail the policies and procedures of reprocessing of consumables (Single Use Devices) used in dialysis process like dialysers and tubings for the purpose of cost optimization.

**RESPONSIBILITIES**

**Medical Director**

The overall responsibility of implementing the policy rests with the MD of the hospital.

**HOD – Nephrology**

Responsible for developing and implementing the procedure for reprocessing of dialysis consumables

**Senior Technicians.**

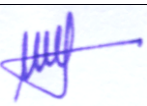
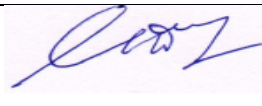
Responsible for ensuring that the procedures are followed and results documented as per protocol

**PROCEDURES**

Different types of equipment are used in our dialysis unit. They are reprocessed in different ways.

**Dialyzers and Blood Tubings:**

Dialyzers and blood tubings are washed in a separate room called wash room (re-use room) After a dialyzer is used it is to be rinsed free of blood, chemically cleaned, disinfected and stored.

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### Dialyzer Reprocessing Technique

#### Procedure of reprocessing (Manual Rinse Sequence)

**1. Returning of Blood at the end of dialysis. –**

is done using the machines blood pump and 0.9% N. Saline. Air should not be allowed to enter the blood tubings or the dialyser. Our machines display a message that blood is no longer detected in the extracorporeal circuit. If not, around 200 ml of Saline will generally suffice to return most of the blood from the circuit. It is advisable to then add around 1000 units to the saline bottle and further fill the circuit after disconnecting it completely from the patient. Following this step the arterial and venous tubings are joined with a universal connector and heparinised saline is circulated in the extracorporeal circuit for about 5 minutes. The pressure leak test described below is performed at this time.

**2. Pre Rinsing –**

The dialyser and tubings are removed from the machine and carried to the reprocessing area in a covered tray to avoid blood spills. The tubings are disconnected and the blood compartment of the dialyser is connected to the water source. The blood compartment is rinsed with water till the effluent is clear.

**3. Cleaning –**

This step is optional, however 1% Hypochlorite is instilled into the blood compartment till it is completely filled and allowed to act for not more than 2 minutes. Immediate rinse out of the cleaning agent from the blood compartment is recommended. Hydrogen peroxide is used, it is to be instilled in the dialysate compartment and backwashing or reverse ultrafiltration started after 1 – 2 minutes. Peracetic acid based agents containing hydrogen peroxide are also instilled in the dialysate compartment.

**4. Visual inspection –**

At this point the dialyzer is inspected for a large no of discolored fibres ( > 20%), large clots in the header, generalized blackening , change in color or aesthetically unpleasing appearance. If the clots in the headers appear small and friable the header may be removed from the dialyser to be cleaned separately.

*If the header is removed special care is taken to check the O ring and replace it properly. Improper placement of the O ring or failure to replace it results in a blood leak when the dialyzer is next used.*

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A better examination of the fibers is possible when the headers are removed. The headers and the O rings are placed in glutaraldehyde while the dialyzer is being reprocessed. If the dialyzer or the header cannot be made free of clots or too many fibres appear blackened it is discarded.

**5. Rinsing –**

The cleaning agents are rinsed out of the dialyzer with water.

**6. Backwashing or Reverse Ultra-filtration –**

1 end of the blood compartment is connected to the water supply, which is turned off, while the other end is left open. 1 end of the dialysate compartment is capped, while the other is connected to a water supply with a pressure of 1 to 1.3 bar through a Hansens connector. The water should enter the dialysate compartment and exit through the blood compartment. This step is the most critical and is carried out for at least 15 minutes with periodic 1 – 2 minute rinsing of the blood compartment. The direction of flow should be reversed at 5 minute intervals.

**7. Tests of Performance –**

The blood and dialysate compartment are both filled with water and both openings of the dialysate compartment are capped. The dialyzer is placed over a scientific measuring cylinder and the water from the blood compartment expelled into the cylinder with a sphygmomanometer bulb or a large syringe. This is the total cell volume (TCV), or the fiber bundle volume (FBV) of the dialyzer. The dialyzer is discarded if the TCV is < 80% of its initial value.

This implies that all dialyzers are tested before the 1st use and over reliance not placed on the stated values.

**8. Pressure leak testing –**

This can be performed at the time of priming the dialyzer using the dialysis monitor or by using a vacuum gauge. The venous bubble trap is filled with saline upto 2/3 of its volume and connected to the venous pressure transducer. The venous outflow line is clamped and the blood pump run at a speed of 100 to 150 ml/min, until the venous pressure rises to 400 mm of Hg. The blood pump is then turned off. The pressure should decrease slowly by around 1 mm/sec. If the pressure drops abruptly, there is likely to be a leak due to rupture of some of the fibres and the dialyzer is discarded.

**In our hospital, automated techniques are being followed the above tests as also measurement of the the UF coefficient are measured by the machine and a report is generated.**

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**9. Filling with disinfectant –**

The air from the blood compartment is once again rinsed out with water, and the dialyzer filled with the disinfectant from below, allowing the disinfectant to displace water. Care is taken that both the blood and the dialysate compartment are completely filled with the disinfectant.

**10. Labelling & Storage –**

The patients name, the TCV, the reuse number and the date should be marked in indelible ink and affixed to the dialyzer. The dialyzer should be placed in a sealed transparent plastic boxes and stored in a rack with separate compartments for each dialyzer. The minimum period of storage at ambient temperature is 24 hours, for complete action of the disinfectant. If the dialyzer is stored for 7 days prior to the subsequent use, it is refilled with disinfectant at this point in time. Verification of the name on the label is confirmed by both the dialysis personnel and also the patient prior to the start of the subsequent dialysis.

**10. Priming and checking for residual disinfectant -**

The dialyzer should be primed with at least 2000 ml of 0.9% Normal saline using the dialysis machine blood pump at a speed of 150 ml/min. The dialysate lines should be connected and the dialysate compartment filled with dialysate flowing at 500 ml/min prior to starting the priming procedure. Failure to “dialyze” the disinfectant out may result in inadequate removal and reactions after starting dialysis. The pressure leak test may also be performed at this time. After 2000 ml of saline priming the effluent from the venous line is checked for the presence of residual disinfectant.

Prior to priming, the patient and the technician or the dialysis nurse verify the identity of the patient and the label on the dialyzer.

Automated reprocessing techniques usually follow the same sequence of steps or a slightly modified cycle.

**Blood Tubing:- (Manual Method)**

Clots in the arterial and venous tips are removed during washing.

Blood tubing must be correctly labeled with patient's name.

After disconnecting from the machine, tubing are thoroughly rinsed with tap water (raw water). Make sure that all the blood clots are washed away. Check whether there are any clots in the Arterial chamber, Venous chamber, Monitoring lines, infusion line, heparin line.

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Fill the tubing with bleach (2%). Then keep for 15 minutes.

Then wash with tap water for 10-15 minutes.

Make sure all bleach is washed out and check whether there is any blood stain / clot in the blood tubing. Then fill with Renalin and keep in the labeled rack.



For HIV and HCV Positive patients:

Dialyzer and blood tubing are washed separately in separate washing area and kept in separate racks in the isolation room. They are properly labeled as "ISOLATION"

**REFERENCES**

Standards

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Document Title : Aseptic Procedures in Dialysis Units

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides overview of aseptic procedures to be followed for infection control in the unit
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

**PURPOSE AND SCOPE**

The purpose of this procedure is to detail the aseptic procedures to be followed in the unit for ensuring infection control.

**RESPONSIBILITIES**

**Medical Director**

The overall responsibility of implementing the policy rests with the MD of the hospital.

**HOD - Nephrology**

Responsible for developing and implementing the procedure for aseptic management


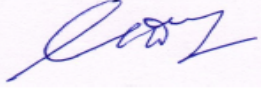
**Senior Technicians.**

Responsible for ensuring that the procedures are followed and results documented as per protocol

**PROCEDURES**

**Asepsis can be maintained by**

- A. Following universal precautions.
- B. Controlling micro organisms with hand washing.
- C. Sterilizing dialysis equipment.
- D. Disinfecting dialysis equipment.
- E. Using aseptic technique during procedures.
- F. Proper disposal of infected wastes.

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**A. FOLLOWING UNIVERSAL PRECAUTIONS**

- Protective barriers: use of gloves, mask – cap, protective eye wear, boots and gowns.
- Washing hands. Hands should be washed after removing jewelry and other personal clothing, immediately after contact with blood or other potentially infectious material and upon leaving the work area.
- Avoid needle injury, do not bend, break, and recap the needle. Carefully discard the needle and sharp items immediately after use into the puncture resistant containers.
- Collecting blood samples carefully.
- Disposing infections wastes properly.
- Disposing of blood and body fluid properly.
- Clean the surface thoroughly with an approved hospital disinfectant (1% Bleach or Sodium Hypochlorite) should be used to decontaminate surface after a spill of blood or other body fluids before decontaminating. visible blood should be removed.
- Handling soiled linens as little as possible.

**B. Controlling micro-organisms with washing and antiseptics**

- Hand washing is the single most important measure everyone can take to prevent the spread of infections.
- For health care personnel the U.S. Centre for Disease Control (CDC) recommends that hand washing must be done.
  - Before performing invasive procedures.
  - Before and after contact with wounds, and with invasive device (like fistula needles, HD catheters etc.
  - After contact with anybody’s secretions or mucous membrane.
  - Before and after removing gloves.
  - Before and after touching patients.
- Using antiseptics before invasive procedure to prevent the skin surface from being pulled beneath the skin.

Eg:- Povidone iodine, ethyl alcohol, chlorhexidine etc. for surface painting

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### C. Sterilizing Dialysis equipment

Portable equipment in the dialysis unit can be sterilized to eliminate microorganisms in a variety of ways including:

- Exposure to steam under pressure
- Exposure to ethylene oxide gas .
- Exposure to chemical sterilants.

The equipment and instruments sterilization follows procedures as per Hospital Infection Control Manual and CSSD Manual

### D. Disinfecting Dialysis equipment

Commonly used disinfectants for dialysis equipment includes.

- Sodium Hypochlorite (Bleach): Dilute household bleach (1:10) is effective against spores and viruses.
- Renalin or Actril (1%): - Mixtures of H<sub>2</sub>O<sub>2</sub> and per acetic acid is an effective disinfectant.

### E. Aseptic Technique

- Aseptic technique is to be used while doing procedures.
- Hand washing using the standard six steps before starting any procedure.
- Pre packed sterile trays should be opened only when needed.
- Before handling a sterile package, wash hands and wear sterile gloves to avoid transferring microorganisms to the items.
- If you are not sure whether an item is sterile, consider it as contaminated and re-sterilize it.
- Before using a multi use vial, scrub the rubber stopper with disinfectant like alcohol.
- All fistula needles, syringes and needles used to administer medications or draw blood must be discarded. Never reuse needles.

### F. Disposal of infected wastes

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- Proper disposal of sharps and soiled linen.
- Warning labels are affixed to container of regulated wastes and other containers which are used to store and transport blood or other potentially infected materials.
- Needles should be disposed in leak proof, puncture resistant containers.
- Sharp containers should be labeled and precautions taken to prevent over filling.
- Laundry contaminated with blood or other infectious materials must be placed in labeled, colour coded, leak proof bags.

**REFERENCES**

Standards

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Document Title : Instruction to Patients & Family			

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides overview of instructions to be provided to patients and family members
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

### PURPOSE AND SCOPE

The purpose of this procedure is to detail the instructions to be provided to patients and family members / accompanying persons with reference to unit specific functioning and care aspects

### RESPONSIBILITIES

#### Medical Director

The overall responsibility of implementing the policy rests with the MD of the hospital.

#### HOD - Nephrology

Responsible for developing and implementing the procedure for patient and family instructions



#### Senior Technicians.


Responsible for ensuring that the procedures are followed and results documented as per protocol

### PROCEDURES



#### INSTRUCTIONS TO PATIENTS & ACCOMPANYING FAMILY / PERSON(S)


1. Patients coming for dialysis have to be accompanied by a responsible relative on all days. The accompanying person should be available till the end of dialysis to accompany the patient back.
2. They should reach unit and contact dialysis coordinator on time without any fail.
3. They should inform the dialysis coordinator about their arrival and wait for their turn before entering the dialysis Unit.

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4. A change in appointment time may not be possible, if the patient wants a change of appointment, they should request the Chief Dialysis Therapist and confirm the date and time before coming for dialysis.
5. If the patients are not coming for dialysis at the scheduled time, they should inform the dialysis unit as early as possible.
6. The dialysis record book and tourniquets have to be brought every time.
7. AV fistula hand must be washed before starting dialysis.
8. Patient should sign the consent before every dialysis (before starting the HD).
9. If the patient had any discomfort at home (Example:- Fever, cough, breathing difficulty etc.) this should be informed to dialysis staff and HOD/nephrologist.
10. The bill (Dialysis charges) needs to be paid before starting the HD for OPD patients.
11. If the patient has undergone dialysis elsewhere, they should bring the details of the dialysis at the other centre.
12. If the patient has had an allergy to any medicine, should inform the dialysis staff before starting dialysis.
13. Patient should take the medicines prescribed by the doctors.
14. The patient and the relatives must be aware of the care of permanent and temporary vascular access, cleanliness of the vascular access, and regular exercises for the fistula hand. Doubts need to be cleared by the dialysis staff.
15. Patients should be aware of their diet and fluid intake. Doctor's orders need to be followed. The intake of salt and fluids need to be restricted, as advised. Dietician is available for help and clarification.
16. Certain blood investigations need to be done every month (first week of every month) and some blood investigations every three months. These tests are needed for a proper assessment by doctors; these tests have to be done without fail.
17. Patient should take the Hepatitis B vaccination to prevent Hepatitis B infection Anti HBsAg Titer is

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to be checked every six months. Inj Erythropoietin / Inj Iron / Blood transfusions may have to be used (According to patient's condition).

18. If the patient and relatives have any doubts about the treatment, they should ask the Medical Social Worker/Dialysis Coordinator. For any personal problems or inconveniences, Medical Social Worker may be contacted, Dialysis Coordinator is also available for any help.
19. If the patient or relatives have any suggestion or complaints about the treatment, dialysis unit or the staff, they should inform the Head of the department through Medical Social Worker.

#### REFERENCES

Standards

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Document Title : Care of Vascular Access

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides overview of procedure for care of vascular access
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

**PURPOSE AND SCOPE**

The purpose of this procedure is to detail the procedure to ensure proper care of the vascular access

**RESPONSIBILITIES**

**Medical Director**

The overall responsibility of implementing the policy rests with the MD of the hospital.

**HOD – Nephrology**

Responsible for developing and implementing the procedure for vascular access management.

**Senior Technicians.**

Responsible for ensuring that the procedures are followed and results documented as per protocol

**PROCEDURES**

**CARE OF DOUBLE LUMEN CATHETER**

- When patient comes for dialysis with a venous double lumen catheter, we should position the patient appropriately (Supine position if it is a femoral catheter).
- Provide a mask to the patient if the catheter is in Jugular vein; mask is to be provided before dressing is removed.
- Remove the dressing carefully.

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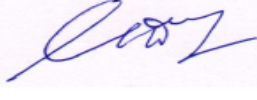


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- Observe for any redness, swelling or pus discharge at the catheter site.
- Check the patient's temperature. Inform doctor if patient is febrile.
- Make sure the stitches are in position.
- Wear mask, cap, scrub suit or gown and gloves during the procedure.
- The procedure should be done under strict aseptic techniques.
- The cleaning should be done first with povidone iodine in a circular motion (from center to periphery)
- Internal Jugular Catheter (IJC): Clean from chin to nipple line. Femoral Catheter (FC); clean from below umbilicus to mid-thigh.
- Allow povidone iodine solution to remain for 2 minutes.
- Clean with 70% ethanol and wipe off Povidone iodine.
- Allow 70% ethanol to dry and apply Povidone iodine ointment at the catheter site.
- Position the drapes properly.
- After that remove heparin filled in the catheter by drawing out 2 ml of blood.
- Flush the catheter thoroughly with heparinized normal saline.
- Make sure that the flow is adequate: if not, adjust the catheter to get adequate flow.
- Connect the blood tubing and start dialysis.
- Apply plaster to the catheter site.
- Throughout the procedure, make sure that the catheter position is not disturbed and that the adhesive plasters are correctly placed.
- After connecting the blood tubing to the catheter, cover the connected area with gauze soaked in Betadine solution.
- When disconnecting the patient (While closing) proper cleaning of the catheter site using povidone iodine solution and 70% ethanol should be done.
- Fill undiluted heparin (5000 units per ml) in both the lumens of the catheter.
- Proper dressing should be done so that the exit site is not exposed.

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- Advise the patient not to wet the dressing and to keep the area clean.
- Patients with FC should avoid sitting for long continuously to avoid kinking of the catheter.

### **CARE OF A.V. FISTULA**


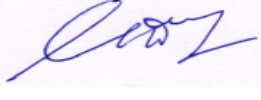
Maturation time for fistula is usually about 6 - 8 weeks. Cannulation should be started only when the AVF is mature.

Throughout this period, extreme care should be taken as follows.

- Palpate for thrill and auscultate regularly for bruit.
- Check whether any swelling or infection is present at AVF incision line.
- I.V. Injections should be avoided on this hand.
- B.P. Cuff should not be tied on the fistula hand.
- Do not apply any pressure on the fistula hand.
- Avoid taking heavy weights (more than 10 kg) with the fistula hand.
- Patients should avoid sleeping on the side by placing the fistula hand beneath their head.
- For new fistulas stop the heparin infusion half an hour before closing HD.
- After maturation, first three cannulation should be done using 17 G needle and blood flow should be limited to 150 ml/min.

### **A.V. FISTULA CANNULATION PROCEDURE**

- Cannulation of A.V. fistula is done using aseptic techniques. The steps are as follows.
- Scrub the whole limb with Povidone Iodine, let it act for 2 minutes.
- Clean the whole limb using 70% ethanol.
- Clean the whole limb up to the finger tips, clean from the site of cannulation to periphery

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Document Title : Care of Vascular Access


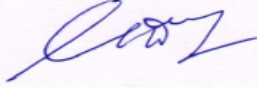
(centre to periphery).

- Apply sterile drapes.
- Choose a site as far away from the anastomotic site as possible where the vein segment is straight in its course, and palpable with a good thrill and bruit.
- Give local anesthesia to the puncture site.
- Direct the arterial needle towards the anastomosis of AVF and venous needle towards the heart.
- The arterial needle should be placed 3-4 cm away from the anastomosis and the two needles should be placed 5-8 cm apart.
- Apply adhesive plasters properly.
- During the procedure, take care to prevent any movement of fistula arm.
- While closing a new fistula, apply compression for 10-15 minutes to stop bleeding completely. Then micropore plaster should be applied.
- For an old fistula, tourniquet can be applied without much pressure.
- Advice the patient to remove the tourniquet after 6 hours.
- Care of AV graft is the same as AV Fistula.

**REFERENCES**

Standards

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Recommended By	Signature	Approved By	Signature
Dr.Hrishikesh kalgaonkar		Dr.S.S.Deepak	
Chief Medical Administrator		Chairman & Managing Director	



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Document Title : Dialysis Process – Pre-Dialysis Assessment of Patients

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides overview of pre-dialysis assessment of the patients
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

### PURPOSE AND SCOPE

The purpose of this procedure is to detail pre-assessment process for the patient prior to starting dialysis process

### RESPONSIBILITIES

#### Medical Director

The overall responsibility of implementing the policy rests with the MD of the hospital.

#### HOD – Nephrology


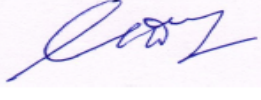
Responsible for developing and implementing the procedure for pre-dialysis assessment of patients.

#### Senior Technicians.

Responsible for ensuring that the procedures are followed and results documented as per protocol

### PROCEDURES

- As soon as the patient arrives, receive the patient by greeting him/her warmly.
- Check the pre-dialysis weight of the patient accurately.
- Record the weight in the file and also the time patient enters the unit.
- Calculate the patient's inter dialytic weight gain/loss
- Record consent of the patient for dialysis.
- Check the patient's file for any pre-dialysis investigations, medications or any other orders.

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Chief Medical Administrator		Chairman & Managing Director	


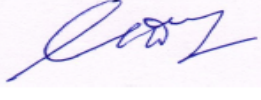


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Document Title : Dialysis Process – Pre-Dialysis Assessment of Patients

- Check the patient's previous day's hemodialysis record.
- Show the patient to his/her allotted chair and machine and give a drape to him or her.
- If an inpatient, ask whether any procedure has been done the previous day or whether he / she has been posted for any procedure on that day or the day after so that necessary precautions can be taken during dialysis.
- If a new patient arrives.
  - a) Take informed consent
  - b) Check whether Viral Serology is negative.
  - c) If catheterization has to be done, check whether the groins and neck are prepared.
  - d) Make a new file for the patient
- Check the vitals viz. pulse rate, BP, temperature, respiratory rate of the patient.
- If the patient has a temporary catheter as vascular access:
  - a) Give a mask and cap, if the patient has an internal jugular catheter.
  - b) Remove the plaster covering the catheter.
  - c) Check the catheter exit site for any pus/clots.
  - d) If pus is observed at the exit site, a swab should be taken prior to giving a Povidone Iodine scrub.
- If the patient has an AVF as a vascular access:
  - a) Ask the patient if he or she has washed his or her fistula hand with soap just before entering the dialysis unit.

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b) Check for bruit at the anastomosis.

- Keep everything ready for starting hemodialysis.
- Throughout this time create a good rapport with the patient.

**REFERENCES**

Standards

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Document Title : Dialysis Process – Patient Preparation

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides steps for preparing patient for dialysis
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

**PURPOSE AND SCOPE**

The purpose of this procedure is to detail patient preparation process for dialysis

**RESPONSIBILITIES**

**Medical Director**

The overall responsibility of implementing the policy rests with the MD of the hospital.

**HOD – Nephrology**


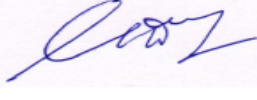
Responsible for developing and implementing the procedure for patient preparation

**Senior Technicians.**

Responsible for ensuring that the procedures are followed and results documented as per protocol

**PROCEDURES**

- Confirm the serological status of the patient. If the Patient is serology negative, we can take the patient on any machine.
- OP patients are given a definite appointment (it may be 1st, 2nd, or 3rd shift).
- Patient coming as OP is to be received at the time of the appointment. The patient should be accompanied by a bystander.
- OP patients who have AVF should wash the hands (on which AVF is located) with soap and water.
- OP patients are given a towel for wiping the hand after washing.
- Pre HD weight should be taken.
- Every OP patient should sign the consent form, which includes the date, name and signature.

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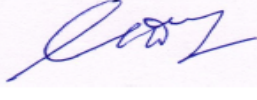
Document Title : Dialysis Process – Patient Preparation

- One staff would be assigned for one patient. The staff member should check the Vital signs such as pulse rate, NIBP, respirator rate, temperature.
- OP patient should be given a drape and should be made to sit on the dialysis chair / bed.
- The HD set, normal Saline 1L, IV set, Povidone Iodine solution, Spirit, Syringes ( 5cc, 10cc and 20cc). Heparin, Xylocaine 2% are to be arranged.
- The patient's fistula hand is to be cleaned with Povidone Iodine solution.
- After cleaning with Povidone iodine solution, wait for 2 minute for its action, then only clean with spirit. During those 2 minutes we can load heparin and local anesthetic Xylocaine.
- Put the sterile drape on the hand rest of the dialysis chair.
- Place the patient's fistula hand on the sterile drape.
- Heparin and Xylocaine should be loaded.
- Flush the fistula needles and keep it ready for inserting.
- Seek the help of an assistant to hold the fistula hand tightly.
- Select the sites for cannulation.
- Give local anesthesia (Xylocaine) at the selected sites.
- Cannulate the Venous needle fist, directing it towards the heart.
- Make sure that the needle is properly placed in the vein and apply adhesive plaster and flush the fistula needle using Normal Saline.
- After Cannulation of AV fistula ask the patient for any pain. Also look for any bulge or hardness after cannulation.
- Cannulate the arterial needle towards the arteriovenous anastomosis of the fistula and make sure that proper flow is there before connecting the patient to machine.
- After Cannulation, blood samples need to be taken for investigations as per the unit protocol (to be done regularly) and as per doctor's orders. Please check the investigations protocol of the Dialysis unit.

**REFERENCES**

Standards

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Document Title : Dialysis Process – Starting of Haemodialysis

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides steps to be followed for starting of patient dialysis
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

**PURPOSE AND SCOPE**

The purpose of this procedure is to detail process of starting of hemodialysis for a patient

**RESPONSIBILITIES**

**Medical Director**

The overall responsibility of implementing the policy rests with the MD of the hospital.

**HOD - Nephrology**


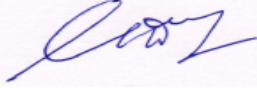
Responsible for developing and implementing the procedure for dialysis process.

**Senior Technicians.**

Responsible for ensuring that the procedures are followed and results documented as per protocol

**PROCEDURES**

- The condition of the patient, the need for HD and the possible complications are explained to the patient and bystander.
- The patients with AVF are asked to wash hands before entering HD unit. After washing hands they should wipe hands using a clean towel.
- Pre HD weight is to be checked carefully; if weight gain is different from previous three visits (difference of more than 1 kg), get the weight checked again on another scale.
- All patients are placed in comfortable chairs or beds depending on their condition

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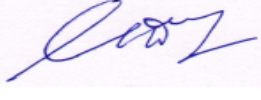
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Document Title : Dialysis Process – Starting of Haemodialysis

- For inpatientson venous catheters,IP files are to be properly checked for investigations, output, medications, procedures
- Consent for HD is taken for all patients
- One dialysis staff initiates priming of dialyzer and blood tubing’s using normal saline.
- The dialysis blood tubing’s and dialyzers are thoroughly rinsed using 1.5 to 2 liters normal saline. All blood lines are properly washed, letting out all the air in the fibers.
- After priming, the HD machine is made ready after all self-tests are passed.
- All things like HD set, povidone iodine solution, spirit, syringes, IV set are to be arranged near the patient.

**For AV Fistula**

- The patient's fistula hand is painted with povidone iodine solution after selecting the site of cannulation.
- Cleaning should be done from centre to periphery.
- After painting, the iodine solution is allowed to dry for 2 minutes.
- Meanwhile heparin, xylocaine, saline are loaded. Fistula needles are properly flushed with heparinised saline.
- The fistula hand is cleaned using spirit.
- After cleaning, the hand is placed on the sterile drape.
- An assistant is asked to hold the fistula hand tightly.
- Proper cannulation site is inspected and xylocaine is injected at the site.
- Needles are put in arterial and venous sites and the needles are properly fixed with adhesive plaster.
- Arterial needle is directed towards the fistula and it carries blood from the fistula to the machine.

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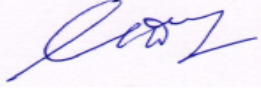
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- Venous needle is directed towards the heart and it carries purified blood from the hollow fibre dialyzer to the patient’s body.
- After cannulation the needles are flushed and proper placement and flow are ensured.
- Blood samples are collected and labeled.
- The patient is then connected to HD machine with the help of an assistant.
- Proper heparinisation is ensured. Heparin is used for anti coagulating the blood in the extra corporeal circuit. It is prescribed by the physician according to the patient's body weight.
- The patient data are set on the HD machine according to the physician's orders.

**REFERENCES**

Standards

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Document Title : Dialysis Process – Care & Monitoring of Patients in Hemodialysis

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides guidance for care and monitoring of patients undergoing hemodialysis.
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

### PURPOSE AND SCOPE

The purpose of this procedure is to detail process of caring and monitoring of haemodialysis patients including patients with complications.

### RESPONSIBILITIES

#### Medical Director

The overall responsibility of implementing the policy rests with the MD of the hospital.

#### HOD – Nephrology

Responsible for developing and implementing the procedure for care and monitoring of patient undergoing hemodialysis.


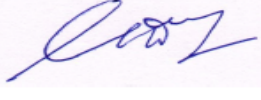
#### Senior Dialysis Technicians

Responsible for ensuring that the procedures are followed and results documented as per protocol

### PROCEDURES

#### Care Of Patient During Hemodialysis (Hd)

- Talk to the patient and be a good listener. Bring out the problems and complaints of the patient and help him to try to find out a solution.
- Monitor the vital parameters throughout the HD.
- Monitor the blood flow, venous pressure, arterial pressure, TMP.

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Document Title : Dialysis Process – Care & Monitoring of Patients in Hemodialysis

- Check the vascular access throughout the HD. Check the fistula needle site. If it is a catheter as a vascular access, place the patient in a comfortable position with adequate flow.
- Carry out the physician's order and administer medications properly.
- Carry out investigations according to the order of the doctor.
- Check the investigation reports and inform the doctor if there is any abnormality.
- If there is any bleeding tendency for the patient or history of bleeding, heparinization should be decided as per doctor's advice.
- Be conscious about the complications that can arise during HD and keep ready emergency medications.
- Give special attention to patients, who are prone to get problems during HD Hypotension, vomiting, muscle cramps are the common problems that can arise during HD.

**For Hypotension**

- If the patient develops hypotension, turn to minimum ultra filtration, place the patient in a Trendelenberg position and decrease the blood flow rate.
- Watch the BP continuously.
- If hypotension persists, give normal saline 100 ml IV fast.
- Inform doctor and administer medications as per doctor's order.

**For Muscle Cramps**

- Turn to minimum ultra filtration.
- Apply pressure to the muscles.
- In case of severe muscle cramps, administer 50% dextrose (as a hypertonic solution) 50 ml.
- Meet the needs of the patient throughout the HD.
- Check the blood tubing's and dialyzer. (eg. Kinking of tubes; leakage of dialyzer etc).
- Be aware of the machine alarms and check the reason for the alarm.
- In case of blood leak alarm, clean the sensor of the machine with spirit.

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- If there is blood leak from the dialyzer, change the dialyzer.
- Give the correct appointment for next HD and write your name.
- Advise the patient on medications and diet to be followed at home.
- Tell the patient about any investigation or blood transfusions to be done on next HD.
- Advise the patient on the importance of fluid restriction.



**Care Of A Patient Who Develops Seizures During Haemodialysis**


- Stop dialysis.
- Protect vascular access.
- Maintenance of airway patency.
- Drawing blood for glucose, calcium and other electrolytes.
- If suspect hypoglycemia, administer IV glucose. For hypocalcaemia, administer IV calcium.
- Administration of IV anticonvulsants.
- Treatment of metabolic disturbance, if present.

**REFERENCES**

Standards

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Recommended By	Signature	Approved By	Signature
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Document Title : Anticoagulation for Heamodialysis				

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides guidance anticoagulation therapy to prevent clotting of blood lines.
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

### PURPOSE AND SCOPE

The purpose of this procedure for guidance of anticoagulation therapy to prevent clotting of blood in the extracorporeal blood lines on the membrane of dialyzers

### RESPONSIBILITIES

#### Medical Director

The overall responsibility of implementing the policy rests with the MD of the hospital.

#### HOD – Nephrology

Responsible for developing and implementing the procedure for anticoagulation for HD.

#### Senior Dialysis Technicians



Responsible for ensuring that the procedures are followed and results documented as per protocol


### PROCEDURES

#### Relative Contra-Indications for Heparin Administration

Patients with

- Pericarditis
- excessive bleeding on removal of AVF Needles
- Any recent surgery or bleeding complications.
- Vascular and cardiac surgery.
- Thrombocytopenia

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- Intracranial hemorrhage
- Any active bleeding (Haematuria, menstrual bleeding, gum bleeding, epistaxis).

### Methods of Anticoagulation when there is risk of bleeding

**Regional Heparinisation** (ie, infusing heparin continuously into the inlet line of the dialysis while simultaneously neutralizing it with an infusion of Protamine Sulphate into the outlet line before the Blood returns to the patient)

Protamine sulphate 1 ampoule contains 50 mgs in 5 ml, and 1 mg of Protamine will neutralize 100 IU of heparin.

Protamine Sulphate is administered after diluting in 5 ml saline and then connecting to Venous infusion line.



Heparin free dialysis is indicated in case of severe bleeding, in patients with prolonged PT and APTT values.


In heparin free dialysis, extracorporeal circuit is rinsed with saline containing 3000 IU of heparin and this fluid is drained out before connecting to patient. Subsequently normal saline boluses (15 ml) are infused into the arterial lines before the dialyzer every 15 minutes (this dilutes the blood and prevents clotting). The same volume of fluid needs to be removed by ultra filtration. The blood flow rate is increased to 300-400 ml per minute.

In Heparin free dialysis, closely monitor the VP, TMP, and the dialyser and venous and arterial drip chamber for the presence of clots. If clots are formed on the headers, immediately remove it after returning the blood to the patient. Tight heparinisation can also be given for a patient who has a bleeding tendency.

### Anti coagulation therapy in plasmapheresis

- A bolus dose of 75-100 IU/KG body weight and a continuous infusion rate of 40-50 IU/Kg body weight is used hourly.
- Anti coagulation therapy in CRRT
- A priming dose of 3000 IU and a continuous infusion rate of 500 IU/hr is used. Then dose is

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adjusted according to APTT values and physician's order. APTT values are checked at '0' hr, 4th hr, 8th hr and 12th hr and the value is kept in between 5-60 sec (Patient value) by adjusting dose of heparin.

**REFERENCES**

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Document Title : Complications During Haemodialysis

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides guidance for managing complications during haemodialysis
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

### PURPOSE AND SCOPE

The purpose of this document is to provide guidance for management of complications during hemodialysis.

### RESPONSIBILITIES

#### Medical Director

The overall responsibility of implementing the policy rests with the MD of the hospital.

#### HOD - Nephrology

Responsible for developing and implementing the procedure for managing complications during dialysis.

#### Senior Dialysis Technicians


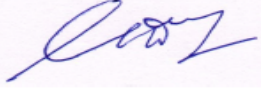
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### PROCEDURES

The most common complication during haemodialysis are hypo/hypertension, cramps, nausea vomiting; Less common complications are headache, chest pain, back pain, itching, fever and chills, blood leak, air in blood tubing's and breakage of blood tubing's during HD.

#### Hypotension

Causes of hypotension during dialysis:

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Related to excessive decrease in blood volume

- High ultra filtrations rate.
- Target dry weight set too low.
- Dialysis solution Sodium level too low.

Related to lack of vasoconstriction.

- Acetate containing dialysis solution.
- Dialysis solution too warm.
- Autonomic neuropathy.
- Antihypertensive medication.

Related to cardiac factors


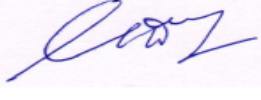
- Failure to increase cardiac rate.
- Ingestion of B-blockers.
- Poor LV function.
- Uremic autonomic neuropathy.
- Cardiac tamponade.
- Myocardial infarction.

Other causes of hypotension

- Dialyzer reaction
- Hemolysis
- Air embolism

**Prevention of hypotension during dialysis**

- a) Use a dialysis machine with volumetric ultra filtration.
- b) Avoid reducing, weight below patient's dry weight.
- c) Keep Sodium level in dialysate at or above the plasma level or use Sodium profiling during dialysis.
- d) Give the daily dose of antihypertensive medications after or two hours before dialysis in patients who develop hypotension.

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Chief Medical Administrator		Chairman & Managing Director	





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- e) Use bicarbonate - containing dialysis solution.
- f) In selected patient, try lowering the dialysis fluid temp: to 35 O - 36o c.
- g) Do not give food during dialysis to hypotension prone patients.
- h) Consider use of a blood volume monitor.
- i) In case of massive weight gain try UF profiling along with sodium profiling.

### Management of Hypotension


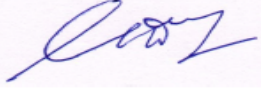
- I. Use an Ultra filtration Controller: When an ultra filtration control device is not used, the fluid removal rate can fluctuate considerably as the pressure of the dialyzer membrane varies.
- II. Avoid large inter dialytic weight gain or short treatment. To avoid the necessity for rapid ultra filtration rate, patient should be counseled to limit their salt intake and hence their inter dialysis weight gain.
- III. Avoid excessive ultra filtration below the patient's dry weight.  
When excessive fluid is removed from patient, hypotension occurs both during and after dialysis, associated with cramps, dizziness, malaise and a washed out feeling.
- IV. Use an appropriate dialysis solution sodium level.
- V. Lower dialysate temperature to 35-36oC.

### Other modalities to be used are:

- The patient should be placed in the Trendelenburg position.
- A bolus of 100 ml 0.9% of saline should be rapidly administered through the venous blood line.
- The ultra filtration rate should be reduced to Zero.
- The patient should be observed carefully.
- Nasal Oxygen administration may also be of benefit during hypotensive episodes by helping to improve or maintain myocardial performance.
- Slow the blood flow rate to 100-150 ml/minute

### Muscle cramps:

Most common causes are hypotension, use of low Sodium dialysis solution and dehydration.

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**Management**

- Hypotension and muscle cramps are treated with 0.9% saline.
- Blood vessels in muscles can be dilated by hypertonic solution.
- Administration of hypertonic saline of glucose is very effective in the acute management of muscle cramps.
- Hypertonic glucose administration is preferred for treatment of cramps in non diabetic patients.

**Nausea and vomiting**

1. Nausea and vomiting are non specific symptoms that may be manifestations of uremia or due to fluid and electrolyte changes during the dialysis.
2. Prior to the initiation of dialysis, patient may complain of nausea and vomiting. These symptoms usually disappear with dialysis and removal of uremic toxins.
3. During the dialysis treatment, nausea & vomiting are usually associated with hypotension.
4. Hypotension may be due to rapid fluid removal in patients with large interdialytic weight gain or due to the presence of acetate when its metabolism is compromised during a treatment using acetate bath.

**Management**


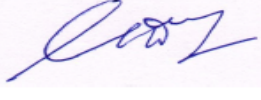
- Administer antiemetic as per order of the physician.
- Put the machine in minimum ultra filtration.
- Evaluate the patient for hypotension.
- Check the dialysate used.
- Check any chance for dialysate contamination.

**Headache**

- Headache may be due to Hypertension.

**Prevention**

- Give antihypertensive on time.
- Set the correct dry weight (Not too low)

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**Chest pain:**

- Angina as well as other potential causes of chest pain can occur during HD

**Treatment**

- Inform doctor. Use sublingual nitrate.

**Itching (Pruritis)**

- It may be a manifestation of low grade hypersensitivity to dialyzer or blood circuit components.
- In acute stage, topical, Capsaicin cream can be applied.
- General moisturizing Lotions and lubrication of the skin using Emollients is recommended.
- Ultraviolet light therapy may be useful.
- Antihistamines can be useful.

**To control Phosphate levels**

- Give Phosphate binders
- Give adequate Dialysis
- Control Diet

**Less common complications during dialysis**

These include

- DISEQUILIBRIUM SYNDROME
- HYPERSENSITIVITY REACTIONS

**1. DISEQUILIBRIUM SYNDROME :**

Early manifestations include nausea, vomiting, restlessness and headache.

**Causes:-**

- It is related to an increase in brain water content.
- When the plasma solute level is rapidly lowered during dialysis, the plasma become hypo tonic with respect to the brain cells and water shifts from the plasma into brain tissue.
- Acute changes in the pH of the cerebrospinal fluid during dialysis also contribute to this

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disorder.

**Management:**

- Blood flow rate should be reduced to decrease the efficiency of solute removal and pH change.
- Hypertonic sodium chloride or glucose solution can be administered as for treatment of muscle cramps.
- If seizures, obtundation or coma occurs in the course of a dialysis session, dialysis should be stopped.
- The airway should be controlled and the patient ventilated if necessary.

**Prevention:**

- Use low sodium dialysis fluid.
- In hyponatremic patients, one should not attempt to correct the plasma sodium concentration and the uremia the same time.
- The incidence of disequilibrium syndrome can be minimized by the use of a dialysis solution Sodium of 140 mEq/L.
- Short duration treatment (2 hrs. for first two HD and 2 hrs. for third HD).
- Keep a blood flow of 15 ml/min during the first three sessions.
- Administer 50% Dextrose 100 ml at the end of HD for the first two HD.
- Add inj. Human Actrapid Insulin 6 units to dextrose infusion if patient is diabetic.
- Co-current flow.


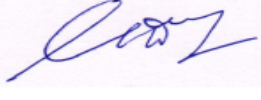
**DIALYZER REACTIONS**

**Anaphylactic type (Type -4)**

- Symptoms are dyspnea, a sense of impending doom, and a feeling of warmth at the fistula site or throughout the body.
- Milder cases may present with itching, urticaria, cough, sneezing, watery eyes. GI manifestations, such as abdominal cramping or diarrhea may also occur.

**Causes:**

I. Ethylene of Oxide (First use syndrome)

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Ethylene oxide is used to sterilize almost all hollow fibre dialyzers. It tends to accumulate in the potting compound used to anchor the hollow fibers.

This reaction is observed exclusively during first use of dialyzer (often after less than adequate rinsing).

II. Contaminated dialysis solution

Anaphylactic reactions have occurred when high-flux dialyzers have been used with bicarbonate containing dialysis solution.

- More frequent cleaning and sterilization of dialysis machines between uses reduces dialysis solution bacterial colony counts.

III. Reuse

- The problem can be linked to bacterial or endotoxin contamination of the water utilized in the reuse procedure.

IV. Heparin

- Heparin has occasionally been associated with allergic reaction, nasal congestion, wheezing. In these patients, use citrate anticoagulation or heparin free dialysis.


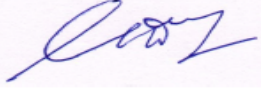
**Management**

- It is safest to stop dialysis immediately, Clamp the blood lines.
- Discard the dialyzer and blood lines without returning the contained blood. Immediate cardio respiratory support may be required.
- According to severity of reaction treatment with parenteral Hydrocortisone, antihistamines and epinephrine can be given.
- Administer Oxygen.

**Prevention**

- Proper rinsing of dialyzers prior to use
- It is important to eliminate residual ethylene oxide and other putative allergens.
- In patients with a history of type A reaction, further use of dialyzers sterilized with this agent should be avoided.

**Rare complications are:-**

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- Breakage of blood tubing's.
- Blood leak.
- Air in blood tubing's.
- Cardiac arrhythmias

**I .Breakage of blood tubing's**

- It may happen at any time during HD. The breakage is usually in the pump segment.

**Prevention:**

- While priming, the blood tubing should be properly fixed in the blood pump to avoid kinking of the blood tubing head.

**Management**

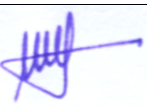
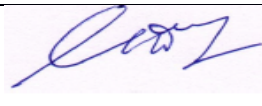
- Return the blood with Normal Saline.
- Another person should prime a new blood tubing set with N.S.
- After the air in the blood tubing is removed, we can connect the patient with new blood tubing.

**II. Blood Leak**

- Blood leak detector is situated at the effluent dialysate line.
- False alarm may be due to hyperbilirubinemia.
- Machine will show visual and audible alarm.
- If it is a true alarm, it means that the dialyzer membrane has ruptured and blood has leaked from blood compartment to dialysate compartment of dialyzer.

**Prevention**

- Blood leak value should be set according to AAMI standard.
- Blood leak sensor should be cleaned properly and regular checkup of the value should be done.
- Avoid air and dust entering to the blood leak sensor through dialysate compartment.
- Give adequate disinfection to dialysis machine.
- Dialyzer should be properly washed using 1% hydrogen peroxide.
- While priming, check any leak from the dialyser.

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- Do not skip the self test. Blood side pressure sensor test (Test blood system) should pass during, priming.

### III. Air in the blood tubing's

- It may happen While we are giving Normal Saline and blood products to patient and forget to clamp the infusion line.
- If the connection of the blood tubing's and fistula needle are not properly fixed.
- If the machine SAD (Safety Air Detector) is not working.
- Breakage in tubing's.
- If dialyzer headers are not tightened.

#### Prevention

- During priming, make sure that the normal saline bottle is not empty.
- During priming, remove all the air from the dialyzer by tapping the dialyzer.
- Check the breaking of blood tubing's especially pump segment.
- Check any clamps that are unnecessarily opened.
- Ensure adequate blood flow from vascular access.
- Check for any leak from the blood tubing's connections.
- Check whether dialyzer headers are tightened.
- Check whether the Safety air detector (SAD) is functioning.

#### Management

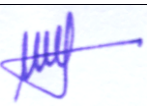
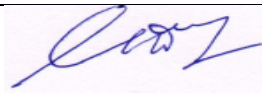
- Return the blood with Normal Saline.
- Another person should prime a new tubing's set with N.S. After the air in the blood tubing is removed, we can connect the patient with new blood tubing.
- If we are not aware about this, the air may enter into the patient and it can cause death (air embolism)

### IV Cardiac Arrhythmias

Common arrhythmias seen during (HD are Ectopic (Supraventricular / Ventricular)

Atrial fibrillation

Ventricular tachycardia (Non-sustained)

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**Contributory factors for arrhythmias during HD**

1. Electrolyte abnormalities:

- i Hypocalcaemia
- ii Hypo/hyperkalemia
- iii Hypomagnesaemia

2. Coexistent Coronary artery disease.

3. Medications Eg:- Digoxin

4. Pericarditis.

**Prevention:**

- Avoidance of low potassium and calcium dialysates.
- Avoiding hypotension during HD.
- Monitoring S. Digoxin levels.
- Optimize anti anginal medications
- Maintenance of adequate Hb level.

**Treatment:**

- If arrhythmias leads to hypotension, terminate HD and return the blood.
- If sustained VT/hemodynamic collapse occurs, electrical (DC) cardio version.

**HD may be continued if**

- Ventricular/ supraventricular ectopics.
- Non sustained VT
- Spontaneously terminating AT
- Digitalis dose has to be adjusted as per levels.
- Any electrolyte abnormality has to be corrected.
- Optimize management of ischemic heart disease (Add beta blockers or antiplatelets).
- Anti arrhythmic medication to be considered in case of recurrent symptomatic arrhythmias.

**REFERENCES**

Standards

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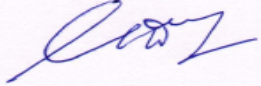
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Document Title : Termination of Haemodialysis

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides protocols to be followed for termination of a dialysis session
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

### PURPOSE AND SCOPE

The purpose of this document is to provide procedure for termination of dialysis session.

### RESPONSIBILITIES

#### Medical Director

The overall responsibility of implementing the policy rests with the MD of the hospital.

#### HOD - Nephrology

Responsible for developing and implementing the procedure for managing termination of haemodialysis session.

#### Senior Dialysis Technicians

Responsible for ensuring that the procedures are followed and results documented as per protocol



### PROCEDURES

#### Termination of Dialysis

- Terminate the dialysis at the right time.
- Follow the following aseptic procedure for termination.

#### For patient double lumen catheter

- Clean the catheter insertion site and catheter using Iodine solution in a circular motion starting

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from centre to periphery.



- Wait for 2 minutes from it to dry on the skin. After the wipe the area using 70% ethanol in a circular motion.
- Apply povidone iodine ointment to the catheter site using a gauze and set up a sterile field using sterile drapes.
- Stop the blood pump and clamp the arterial line and disconnect the arterial line. Connect it to normal saline and return the blood into the patient's body.
- Flush the catheter lumen and fill heparin appropriately (as specified on the catheter)
- Apply proper sterile dressing and advise the patient not to wet the dressing.

**For Patient with AV Fistula**

- Clean the cannulation sites and the connection point of the blood tubing and fistula needle using 70% ethanol.
- Disconnect the patient from the machine. Return the blood.
- Remove the fistula needles.
- Give good compression to the cannulated site.
- Check for any oozing from the cannulated site.
- Apply tourniquet to the site with appropriate pressure

**For a new Fistula**

1. Heparin should be stopped 30 minutes before closing.
2. Do not apply too much pressure on the fistula.
3. Apply adhesive plasters to the site after ensuring that there is no oozing from the site.
4. Educate the patient as how to manage, if bleeding occurs from the cannulated site.

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**To be checked after dialysis is terminated**

- After termination of dialysis ensure that the vitals are stable.
- Before removing the venous needle ensure whether any investigations have to be sent or any medications have to be given.
- Check the post dialysis weight of the patient.
- Check standing BP to exclude postural hypotension

**REFERENCES**

Standards

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Document Title : Protocol for Investigations for ESRD Patents on Maintenance

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides protocols to be followed for investigations for ESRD patients on maintenance
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

**PURPOSE AND SCOPE**

The purpose of this document is to provide guidance for investigations to be done for ESRD patients on maintenance

**RESPONSIBILITIES**

**Medical Director**

The overall responsibility of implementing the policy rests with the MD of the hospital.

**HOD - Nephrology**

Responsible for developing and implementing the procedure for investigations for ESRD patients on maintenance

**Senior Dialysis Technicians**

Responsible for ensuring that the procedures are followed and results documented as per protocol

**PROCEDURES**

**HEMODIALYSIS**

**Investigations to be done every month**

Serum creatinine, Blood Urea, Serum Potassium, Serum Sodium, Serum Calcium, Serum Phosphorous, CBC, ESR, ALT,AST, ALP, Blood Sugar Random ( F/PP in Diabetics),uric acid and Total Proteins with Serum

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Document Title : Protocol for Investigations for ESRD Patents on Maintenance

Albumin, OPD visit to Physician/ Nephrologist, Dietary recall.

**Investigations to be done every three months.**

HBsAg, Anti HCV, HIV, Serum Iron, TIBC, Serum Ferritin (as per the protocol of parenteral iron therapy), Serum PTH.

Nephrology OP visit.

**Yearly Evaluation:**

ECG, Echocardiogram, X ray chest, Fasting Lipid Profile, Cardiology consultation if indicated, Anti HBsAg titre, for diabetic patients, cardiac, ophthalmic and peripheral neuropathy screening.

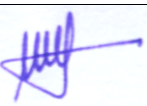
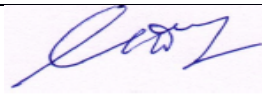
**ANAMEIA CORRECTION IN ESRD PATINETS ON MAINTENANCE HEMODIALYSIS**

- To keep Hb above 10gm/dl for all ESRD patients on hemodialysis.
- To keep HB above 11 gms/dl for all ESRD patients on maintenance hemodialysis with cardiac disease.
- To start injection ERYTHROPOEHN (100 IU/kg per week in 2 or 3 doses) for affordable and prospective transplant patients.
- To start Iron therapy as per the protocol if patient is taking EPO.
- To give blood transfusions if the Hb is less than the required level for patients who cannot afford Erythropoietin.

**REFERENCES**

Standards

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Document Title : Dialysis for Patients With Positive Serology

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides protocols to be followed for dialysis for patients with positive serology status
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

**PURPOSE AND SCOPE**

The purpose of this document is to provide guidance for providing dialysis for patients with positive serology status.

**Currently Saideep Healthcare & Research Pvt Ltd does not provide Hemodialysis service to sero-positive patients of HIV, HBsAg and HCV. The procedure described below shall be implemented if and when the decision to offer HD services to the sero-positive patients is taken by the management.**

**RESPONSIBILITIES**

**Medical Director**

The overall responsibility of implementing the policy rests with the MD of the hospital.

**HOD - Nephrology**

Responsible for developing and implementing the procedure for dialysis of patients with positive serology

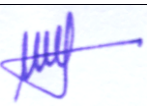
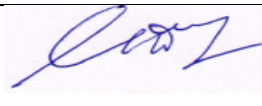
**Senior Dialysis Technicians**

Responsible for ensuring that the procedures are followed and results documented as per protocol

**PROCEDURES**

Indications:

→ HIV positive Patients.

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Document Title : Dialysis for Patients With Postive Serology

—————> HbsAg, HCV positive Patients.

**Points to remember, when an Isolation Dialysis is being done:-**



1. Patient should be in isolation room.
2. We should give psychological support to the patient.
3. The dialysis personnel should take universal precautions such as wearing gown, mask and gloves.
4. All the staff in the dialysis unit should have had Hepatitis B vaccination and should check Anti HBsAg titres yearly.
5. Separate dialysis machine, starting sets and closing sets are to be used to dialyze the isolation patients.
6. The staff, who gives care to isolation patients, should not come in contact with other patients.
7. The staff should change their scrub suit daily.
8. Blood spilling on the floor is to be avoided.
9. Patient gown, bed sheets and sets should be washed separately and labeled "isolation".
10. After dialysis clean the chairs, tables, machine with disinfectants.
11. Disinfect the machine with formalin and citrothermal disinfection.
12. After dialysis, wash the dialyzer and blood tubings separately and keep in a separate rack.

The room has to be fumigated once in a week and U.V. lights are to be switched on daily.

**REFERENCES**

Standards

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### DIALYSIS SERVICES MANUAL

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Document Title : Communication with the patient

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides protocols to be followed for Communication with the patients
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

#### PURPOSE AND SCOPE

The purpose of this document is to provide guidance for Communication with the patient

#### RESPONSIBILITIES

##### Medical Director

The overall responsibility of implementing the policy rests with the MD of the hospital.

##### HOD - Nephrology

Responsible for developing and implementing the procedure for dialysis of patients with positive serology

##### Senior Dialysis Technicians

Responsible for ensuring that the procedures are followed and results documented as per protocol

#### PROCEDURES

##### 1. PSA (Psycho Social Assessment)



To understand the patient as a person, the family relations, the financial position and about the support systems

##### 2. Family Intervention

To understand the effect of illness on family, understand the attitude of the family towards treatment, and facilitate a better understanding and to have a realistic expectation

##### 3. Discussion with team

(Dialysis nurses dialysis therapists and doctors) Treatment should be a team work. It helps to understand the present position of the patient and also provide the needed information to doctors and other related staff (feed - back)

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**4. Medical Social Worker Rounds and Rapport building.**

It helps to understand the patient in detail and the regular visits help the patient to open and convey his or her problems.

**5. Psycho-Social Diagnosis**

Illness has its impact on psycho-social needs based on that a diagnosis is made

**6. MSW Treatment Plan**

According to the diagnosis, a treatment plan is to be made

**7. MSW detailed Intervention**

The required counseling psychological support, patient education, case work and family intervention is done

**8. Discussion with Patient**

Discuss in detail about treatment plan as this helps the patients to reduce stress and also to have a positive attitude towards treatment

**9. Discussion with patient and family**

Helps to resolve the family problems, have a better understanding between them and ensure the compliance etc. It also helps to reduce stress in both parties

**10. Liaison with Dialysis Coordinator, Dietician, Physiotherapist, Physician assistants and doctors**

In order to provide the needed intervention


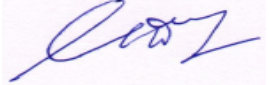
**11. Follow Up:-**

Regular follow up is very essential.

**REFERENCES**

Standards

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Document Title : Dialysis for Pregnant Patients

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides protocols to be followed for dialysis for patients with pregnancy
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

**PURPOSE AND SCOPE**

The purpose of this document is to provide guidance for providing dialysis for patients with pregnancy.

**RESPONSIBILITIES**

**Medical Director**

The overall responsibility of implementing the policy rests with the MD of the hospital.

**HOD - Nephrology**

Responsible for developing and implementing the procedure for dialysis of patients with pregnancy

**Senior Dialysis Technicians**

Responsible for ensuring that the procedures are followed and results documented as per protocol

**PROCEDURES**


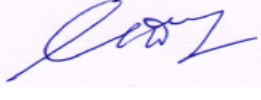
**Dialysis in Pregnant women**

**1. Management of Hypertension**

The major maternal risk associated with pregnancy in dialysis patients is severe hypertension. 80% of pregnant dialysis patients have hypertension.

**a. Control of volume**

The first step toward B.P. Control is to make sure that the women is normo-volemic. In early pregnancy

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the change in dry weight should be carefully done. Recommended weight gain between second and third trimester is between 0.3 and 0.5 kg / week. The women should have a careful weekly examination to look for signs of fluid overload with daily dialysis. Volume related hypertension would be controlled and if then, any increase in B.P. particularly during dialysis, the patient should be evaluated for pre-eclampsia.

### **b. Anti-hypertensives**

First line drugs which are safe in pregnancy when patient is euvolemic are alpha methyl dopa and labetalol. Calcium channel blockers can also be used. Other safe ones are beta blockers, clonidine, alpha blockers and hydralazine. Contraindicated antihypertensive are Angiotensin converting enzyme inhibitors and Angiotensin receptor blockers

### **2. Dialysis regimen**

Recent studies reported that higher success rates in the outcome of pregnancy is achieved in HD than in PD. It may be easier to start HD in a pregnant patient than PD. The survival of infant will be increased if the patient is dialysed at least 20 hours per week Daily dialysis.

- Decreases the fluid removal at each treatment.
- Decreases the risk of hypotension.
- Allows the patient to eat a high protein diet.

### **PD**

Increasing the intensity of dialysis is difficult. Late in pregnancy, women have difficulty with severe abdominal distension and exchange volume has to be decreased and also the frequency of exchanges have to be increased to maintain the same level of dialysis.

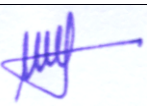
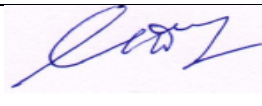
### **Dialysis solution**

To reduce the risk of soft tissue calcification 2.5 mEq/L calcium containing dialysis solution is used. In addition to this, the calcium sources in pregnant dialysis patients are

- Calcium containing phosphate binders (safe in pregnancy)
- Oral supplementation of calcium 2g/day.
- Normal serum sodium (135 mmol/L) should be maintained.

### **3. Heparinisation**

It is not necessary to lower heparin dose (as heparin does not cross the placenta) unless there is Vaginal

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bleeding.

**4. Anemia**

A higher dose of Erythropoietin is needed in pregnancy. Iron supplementation also should be increased (700-1150 mg of iron). Folate supplementation should be doubled.

**5. Correction of hypotension during HD**

Use Plasma or albumin and not saline.



**Precautions to be taken during HD in a pregnant lady**

1. Avoid hypotension. Use plasma or albumin for correction.
2. Avoid hypoglycemia use glucose containing dialysate.
3. Avoid ACE & ARB
4. Administer medications only after getting the order of the concerned doctor.
5. Control hypertension.
6. Avoid metabolic alkalosis.
7. Maintain good nutrition.

**REFERENCES:**

Standards

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Document Title : Dialysis for Children

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides protocols to be followed for dialysis of children
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

**PURPOSE AND SCOPE:** The purpose of this document is to provide guidance for providing dialysis for children

**RESPONSIBILITIES**

**Medical Director**

The overall responsibility of implementing the policy rests with the MD of the hospital.

**HOD - Nephrology**

Responsible for developing and implementing the procedure for dialysis of children

**Senior Dialysis Technicians**

Responsible for ensuring that the procedures are followed and results documented as per protocol

**PROCEDURES**



**PERITONEAL DIALYSIS**

Peritoneal Dialysis (PD) is preferred in small children because

1. PD does not require sophisticated equipment or technical expertise.
2. Need for vascular access, anti coagulation can be avoided.
3. Hemodynamic instability is uncommon.

**HEMODIALYSIS**

Usually done in children weighing > 15 kg or when PD is contraindicated due to an intra abdominal

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- surgery, diaphragmatic hernia, peritonitis or respiratory embarrassment.
- Requires experience and technical expertise.
- Requires appropriate sized dialyzers, blood lines, and vascular catheters.
- Very small patients require priming of hemodialysis circuit with blood/packed cells.
- Rapid osmolar shifts could precipitate seizures, so rapid solute clearance should be avoided.

**Hemodialysis equipment**

**Vascular access**

Double lumen hemodialysis catheters of appropriate size are the preferred access. Arterio venous fistula can also be used as a vascular access. If the blood vessel size is too small for constructing a fistula. A poly-tetra-fluro-ethylene graft can be placed between artery and vein in the extremities.

**Blood Flow**



Rapid urea removal rate is usually not tolerated at least during the first few treatments. Smaller blood vessels cause higher venous resistance than in adults, which eventually limits flow, typically in the range of 50-150 ml/mt in small children and 150 -200 ml/mt in older children.

**Dialyzers and blood lines**

Dialyzers of smaller surface area are available. The size has to be chosen according to the patient's body surface area (DSA 75% of BSA). Appropriately sized blood lines allow control of extracorporeal circuit volume. If the volume of the entire extracorporeal circuit exceeds 10% of the patient's blood volume (>8ml/kg) a warmed blood, albumin or fresh frozen plasma prime should be given to ensure hemodynamic stability.

**Dialysate**

Bicarbonate dialysate is the standard for pediatric hemodialysis as it provides better hemodynamic stability and fewer intradialytic symptoms. Patients with small muscle mass will be unable to metabolize a large acetate load quickly.

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### Dialysis machine

Machines which provide volumetric ultra filtration control are required. Any error in the ultra filtration volume may cause symptomatic hypotension.

### Hemodialysis prescription

- Early treatments are programmed to ensure slow solute clearance especially if the patient is very uremic.
- Repeated short treatment are advisable if the BUN is too high.
- Most of the children can tolerate a dialysis for 3-4 hours after the first few sessions and better urea clearance and fluid removal can also be tolerated.
- Heparinisation is similar to that of adults. (50 IU/kg as a bolus at the start and 10-20 IU/kg as an infusion every hour).



### COMPLICATIONS

#### 1. Disequilibrium and seizures

Children develop seizures as a result of DDS more often than adults. Hence low blood flow rate and duration of HD is to be ensured for first few treatments. Rapid urea removal is avoided. Appropriately sized dialyzer to provide 3 ml/minute per kg urea clearance for the initial treatments is to be used. Keep the dialysate sodium at or slightly above the plasma level. During HD. infusion of 50% dextrose or mannitol (0.5 lg/kg body weight) can be given to prevent DDS.

#### 2. Hypotension

Volume removal must be closely monitored because B.P. is normally lower in children than in adults and there is a narrower margin to lead on to hypotension. Infants and very young children are prone to precipitous falls in blood pressure with no warning and no ability to communicate distress. Isolated UF or lower dialysate temperature can make fluid removal more tolerable. To decrease the risk of hypotension more than 3 treatments per week can be delivered to reduce the fluid removal.

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### 3. Hypothermia with isolated ultra filtration

During isolated ultra filtration, as there is no dialysate in circulation, the extracorporeal blood circuit will function as a radiator, cooling the blood and the child. Core body temperature should be monitored throughout dialysis, especially during isolated ultra filtration.

#### REFERENCES

Standards

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Document Title : Protocol for Internal Jugular, Femoral and Sub-clavian Catheter Insertion

<b>SUMMARY</b>	This document is a part of Dialysis Services Manual and provides protocols to be followed for jugular, femoral and sub-clavian catheter insertion
<b>DISTRIBUTION</b>	Part of Dialysis Services Manual

**PURPOSE AND SCOPE:** The purpose of this document is to provide guidance for jugular, femoral and sub-clavian catheter insertion

**RESPONSIBILITIES**

**Medical Director**

The overall responsibility of implementing the policy rests with the MD of the hospital.

**HOD - Nephrology**

Responsible for developing and implementing the procedure for jugular, femoral and sub-clavian catheter insertion

**Senior Dialysis Technicians**

Responsible for ensuring that the procedures are followed and results documented as per protocol

**PROCEDURES:**

Checklist for IJC, FC and SC catheterization:-

1. Catheterization tray
2. Gown pack.
3. Povidone iodine solution.
4. 70% Ethyl alcohol.
5. Syringes (10cc, 5cc, 2cc, 1cc).

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6. Straight dual lumen(or single lumen)catheter for femoral and sub clavian catheterization.

11.5Fr X 13.5 cm-2 nos.

7. Curved dual lumen (or single lumen) catheter for jugular catheterization.

11.5 Fr X 13.5 cm-2 nos.

8. Introducer needle (18G X 7 cm

9. Dilator (10 Fr, 12 Fr)

10. Guide wire (0.038" X 70 cm)

} Available in the catheter kit

11. Povidone iodine ointment 5% w/v

12. Suture with curved needle (3-0) - 1no.

13. Heparin (1000 IU/ml) - 1 vial

14. Xylocaine - 1 vial

15. Needles of different gauges.

16. Normal Saline 0.9% 500 ml - 1 no.

17. Infusion set - 1 no.

18. Sterile gauze pack and cotton pack.

19. Disposable sterile gloves of different sizes. (7.5", 7.0", 6.5", 6.0", 5.5")

20. Chittle forceps with Cidex solution.


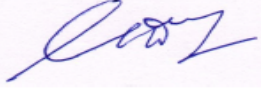
21. Bed sheet - 2 nos. / Sand bag.

22. Prepare patient's file with informed consent for HD and 2 HD order sheets.

**Assisting for IJC, FC and SC**

1. Arrange every item required for IJC, FC, or SC catheterization.

2. Call the ward staff and collect the HIV, HCV, HBsAg reports. Ask for any special orders written for the patient. Ask for the patient's condition. Ask the ward staff to do the preparation (neck

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and groin).

3. Inform the duty doctor.
4. Request the ward staff to shift the patient to the HD unit with the bystander.
5. Receive the patient.
6. Check the patient's BP, pulse respiration, height and weight and record these Calculate the patient' body surface area. Check the patient's file.
7. Take the consent for catheterization from the patient and from the bystander.
8. Explain the procedure briefly to the patient and bystander. Console the patient.
9. Position the patient for catheterization.
10. Scrub the area with Povidone iodine.
11. Inform the doctor when patient's ready.
12. Provide mask and cap to the doctor.

**For Catheters**

- Mask is provided to the patient removing the dressing in the case of IJC.
- Patients with catheters are received and properly positioned.
- The catheter dressing is removed carefully without disturbing the catheter.
- The site is inspected for evidence of any infection, pus, redness and swelling. If observed, the physician should be informed immediately.
- The HD set is opened and the catheter site is cleaned using povidone iodine solution.
- Cleaning is done from center to periphery.
- After 2 minutes the site should be thoroughly cleaned using spirit.
- Once the spirit is dry, povidone iodine ointment is placed at the site and covered using gauze.

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- Saline and heparin are taken and kept ready.
- Sterile drape is put over the cleaned area.
- The catheter caps are removed and the heparin filled in the lumen is withdrawn and discarded.
- The catheter is properly flushed and patency is ensured.
- The catheter site is covered using povidone iodine ointment and proper adhesive plasters are applied.
- The patient is then connected to the HD machine.
- After connecting the patient to the machine, the connecting sites of the catheter to the extracorporeal circuit is wrapped with a headline gauze in order to prevent infection.
- After starting HD, the HD sets are closed, the caps and connectors are put in povidone-iodine solution and the tray is kept ready for any emergency use.

**REFERENCES**

Standards

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