Haemodialysis

SECOND EDITION

Standard Operating Procedures For Assistant Medical Officers in Haemodialysis

Haemodialysis
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Ministry Of Health, Malaysia

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FOREWARD

As the Ministry of Health strengthen our health care delivery as part of the Universal Health Coverage, there is a growing acknowledgement that optimal health care cannot be delivered by simply ensuring coexistence of infrastructure, medical supplies and health care providers. Strengthening our health care delivery requires a deliberate focus on quality of health services, which involves providing effective, safe, people-centred care that is timely, equitable, integrated and efficient. Therefore, in 2006 the Ministry of Health Malaysia produced its first edition Standard Operating Procedure for Assistant Medical Officers in Haemodialysis to ensure good quality haemodialysis for patients with end-stage renal disease (ESRD).

While we are aware that current haemodialysis treatment has limitation in alleviating patients suffering, morbidity and mortality. Transformative changes are needed to ensure that people living with kidney failure have more and better medical treatment. Thus, providing high-value, high-quality haemodialysis as described by this document is the minimum gold standard of care for patients with ESRD. The timely arrival of this document will serve as updated guidance and reference for clinicians particularly for the assistant medical officers in haemodialysis facilities as the standard of care and professionalism set out by the Ministry of Health of Malaysia.

On behalf of the Ministry of Health, I would like to extend my distinguished congratulations to the Medical Programme, esteemed nephrologists and medical consultants, as well as the Assistant Medical Officer Technical Committee for their tireless efforts and commitment to publish The Second Edition of Standard Operating Procedures for Assistant Medical Officers. My personal heart-warming appreciation tributes to assistant medical officers throughout the country who uphold highest standard of professionalism in the execution of their duties in order to provide quality health care to the community. The Ministry of Health Malaysia takes special pride in the fraternity's continuous determination for excellence in service delivery to the nation.

Tan Sri Dato' Seri Dr. Noor Hisham Abdullah
Director General of Health Malaysia

FOREWARD

Throughout the years, the standard of practice among the Assistant Medical Officers (AMO) in Haemodialysis Services under Ministry of Health has shown some great improvement. It is noted many years back, as there were few reference documents available, these AMO need to learn from their seniors through hands-on training with guidance of Nephrologists to acquire knowledge and skills in providing good quality care to patients undergoing Haemodialysis treatment.

The first Standard Operating Procedures (SOP) For Assistant Medical Officers in Haemodialysis was established more than ten years ago. This has been a reference guidebook in providing Haemodialysis services for the AMO since then. It is timely to have this SOP to be revised and this second edition for SOP will provide a greater impact on the services and performance of AMO in the hospitals and healthcare settings. The revised SOP is very essential and relevant in the current practice of Haemodialysis with the aim of having uniformity and standardisation with consistency of practice in this discipline where performance of AMO could be strengthened.

We believe with the adoption of this revised edition, the services rendered by Assistant Medical Officers will be enhanced to its optimum level. It also will serve as a reference to those who are new in the field of Haemodialysis.

It is our sincere hope that this updated version of SOP would form part of an important document to be complied with by the AMO in providing better care to patients. It is noted the task in preparing the revised edition is not an easy one, where it requires good leadership, teamwork, commitment, knowledge and dedication. With that, I would like to congratulate to those involved in developing this second edition of SOP for Assistant Medical Officers in Haemodialysis and our heartfelt appreciation to them for their passion and endless effort.

Dr. Ahmad Razid Bin Salleh
Director
Medical Practice Division

MESSAGE

Head of Service

I would like to congratulate all those who have contributed by sharing their experience and knowledge during the preparation of Standard Operating Procedures (SOP). Ever since the establishment of Chronic Haemodialysis programme in the year 1969 the first structured form of Haemodialysis SOP was published in August 2006. Currently the existing SOPs are reviewed for the purpose publishing second edition of Haemodialysis SOP.

Basically SOP is a written instruction of a particular procedure. It is vital especially in Haemodialysis Unit so that quality and uniformity is maintained all times. Therefore, it is necessary for healthcare professionals especially Assistant Medical Officers (AMOs) to adhere to the SOP while carrying out their duties.

This handbook on Haemodialysis Standard Operating Procedures is excellent as a guide to all AMOs who are learning as well as for those already active in the practice of haemodialysis. These includes new staff and others dialysis healthcare providers undergoing Renal Post Basic Course. Overall, I hope that this book will be very useful for all dialysis healthcare providers.

I would like to take this opportunity to thank all of our contributors for the outstanding work and hope that this book will be a useful reference for all AMOs, in optimizing care for our deserving haemodialysis patients. Lastly, I would like to thank Medical Development Division and Medical Practice Division, Ministry of Health for their support and sponsorship for publishing this book.

Nephrology Services, Technical Advisor

Dato' Dr. Ong Loke Meng
Head of National Nephrology Services and
Senior Consultant Nephrologist
Hospital Pulau Pinang

MESSAGE

Successive generations of Assistant Medical Officers who have worked in the Ministry of Health have all practiced the long-held tradition of hands-on training to ensure that everyone can acquire the latest knowledge and skills. While formal training has always been encouraged, this is not always possible for some for various reasons. To their credit this form of knowledge and skill sharing has been done rather effectively. While practicing the skill which they acquired through training never posed any problem, the lack of documents which specify standard methods of carrying various tasks has been a cause of anxiety and concern to many. Thus the arrival of this second edition of standard operating procedures for Haemodialysis will further strengthen the practice of AMOs in this field.

The second edition of SOP for Haemodialysis, which is long overdue, will be more relevant at this point of time because of new development in medical field, particularly in Haemodialysis. This SOP will ensure uniformity, standardization, correctness, accuracy and effectiveness as well consistency in performance. SOPs can be considered as mandatory or tasks which are complicated.

SOP can easily be “linked” to quality assurance. Compliance to SOP would certainly ensure quality care for the patients. This is important as our patients now are increasingly well informed of their rights and they expect nothing less than the quality of care that they perceive they deserve. This SOP will not only be useful to those who are already familiar with the procedures but staff who are fairly new will find it very useful.

Writing this SOP, I am sure, has not been an easy task. It requires a certain depth of knowledge, team approach and the courage to decide on what should constitute standard methods. To the authors of this SOP we owe them deep gratitude for their effort time and resilience. They must be congratulated for a job well done.

Dr. Md Zaki Bin Othman
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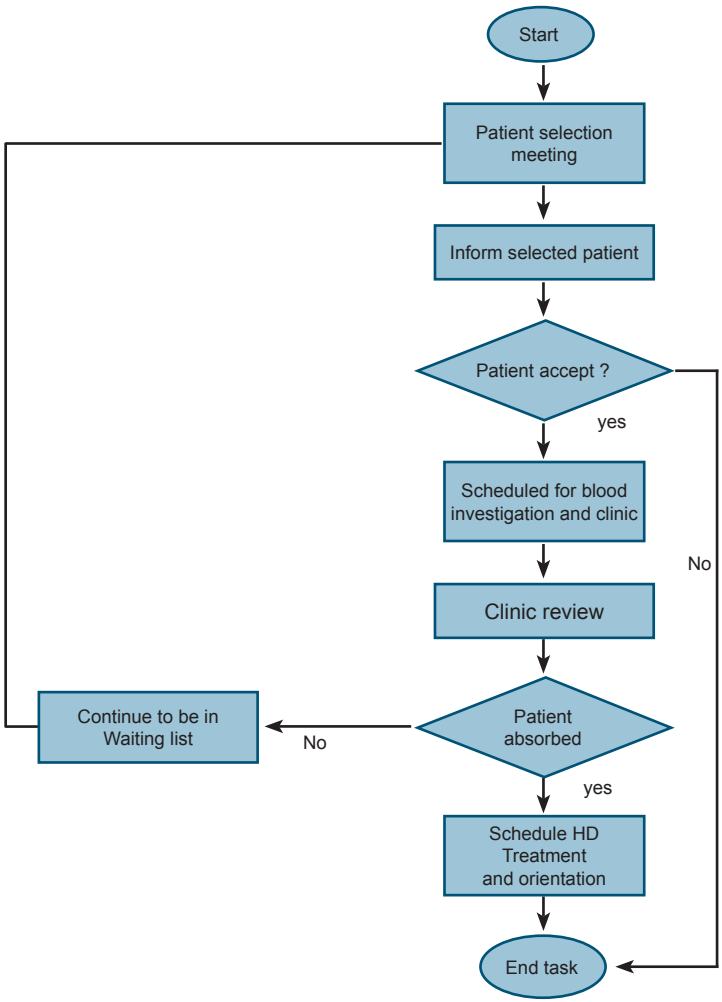
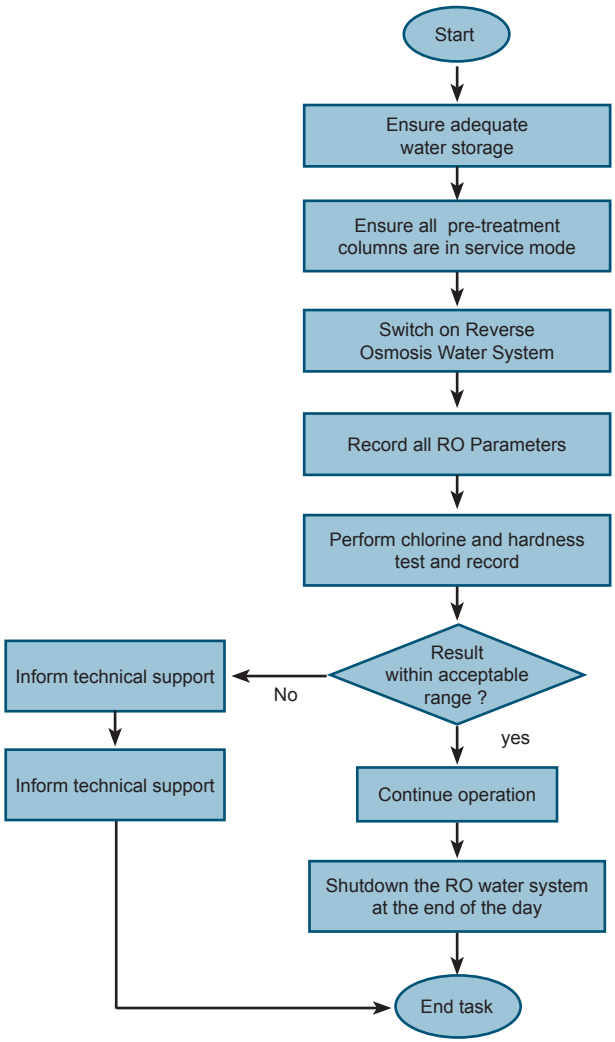
1. The Director General of Health, Malaysia
2. The Deputy Director General of Health (Medical)
3. The Director of Medical Development Division, MOH
4. The Director of Medical Practice Division, MOH
5. Head of National Nephrology Services
6. The Technical Advisors of SOP
7. All Senior Consultant Nephrologist, MOH
8. The Members of Technical Committee
9. The Panel of Reviewers
10. The Panel of Contributor
11. Assistant Medical Officer Service Section, MOH
12. Association of Dialysis Medical Assistants and Nurses Malaysia
13. National Kidney Foundation of Malaysia (NKF)
14. St. John Ambulance of Malaysia

All other colleague individuals and organization who have contributed directly or indirectly towards the success of this publication

PATIENT ACCEPTANCE TO CHRONIC HAEMODIALYSIS PROGRAM	
OBJECTIVE	To select patient for chronic Haemodialysis program in a transparent manner based on patient waiting list
SCOPE	All patients applied for chronic haemodialysis treatment

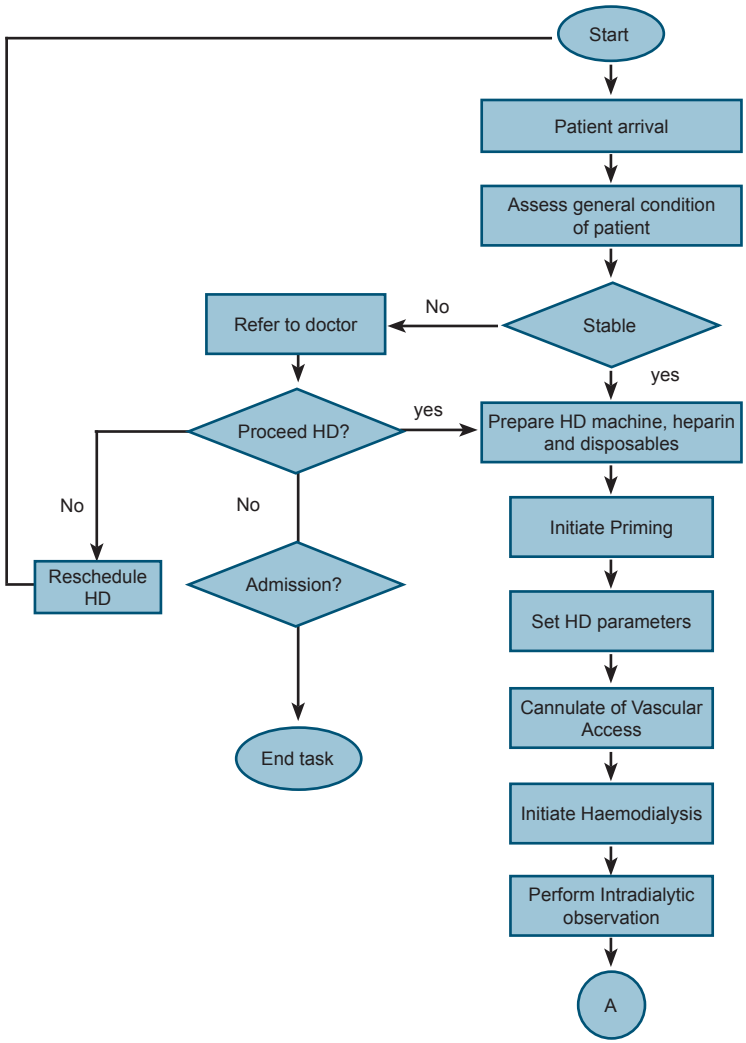


Activity	Work Process	Standard	Requirement
1. Patient selection meeting	1.1. Issue patient selection meeting call letter 1.2. Present waiting list and available vacant slot 1.3. Select patient according to available vacant slot 1.4. Minute the selection list of patient		Patient selection Committee
2. Inform selected patient	2.1. Staff in - charge to inform patient on patient selection into chronic haemodialysis program and give offer letter 2.2. Enquire from patient whether patient agreed to have his/her dialysis in the center 2.3. If patient refuse document in master waiting list and patient file 2.4. Give appointment date for blood investigation		
3. Scheduled for blood investigation and clinic appointment	3.1. Take and sent routine blood investigation sample including virology status 3.2. Trace all blood investigation result 3.3. Give appointment for clinic review		
4. Clinic review	4.1. Arrange patient to be seen by specialist/consultant Nephrologist 4.2. Ensure patient was given: • Consent for hemodialysis treatment • "Surat Akujanji" • Haemodialysis prescription		
5. Schedule HD treatment and orientation	5.1. Inform patient regarding his/her haemodialysis session 5.2. Orientate patient based on haemodialysis patient orientation check list (refer appendix 1)		

REVERSE OSMOSIS WATER TREATMENT SYSTEM	
OBJECTIVE	To deliver safe and adequate water for Haemodialysis TREATMENT which meets the requirement of AAMI/ISO standards
SCOPE	For all chronic and acute haemodialysis facility
FLOW CHART	

Activity	Work Process	Standard	Requirement
1. Routine Inspection	**1.1. Raw Water** 1.1.1. Ensure water storage is adequate 1.1.2. Ensure the following valves are open • Water inlet to raw water tank • Raw water pumps inlet / outlet **1.2. Pre - treatment** 1.2.1. Check the following are in service mode • Sediment column • Activated carbon columns with minimum Empty Bed Contact Time (EBCT) of 10min [EBCT= (V x 60min)/Q] • V= Carbon Bed Volume (m3) • Q= flow rate (m3/hr) • Softener Column • Brine tank-filled with sufficient saturated brine solution	• The tank capacity shall be at least 300L x number of HD machine which enable to last 4-5 hours of treatment • Water for microbiological analysis (bacterial count and endotoxin level) monthly • Raw water chemical analysis 6 monthly to conform to AAMI standard/ ISO 23500:2011 Standards • 6 monthly (minimum) or when necessary • Chemical cleaning of RO membrane • Chemical disinfection RO distribution loop • Disinfection of RO water storage tank (if applicable)	• Raw water storage tank should be made of stainless steel 304 (minimum) /High density polyethylene or equivalent • 2 Raw water pumps • Sediment column • Activated carbon columns • Water softener column • Brine tank, Salt • Guard Filter
2. Reverse Osmosis Water Quality Monitoring	2.1. Water Treatment System 2.2. Ensure all the pre-treatment columns are showing correct time. Ensure the schedule of backwash / regeneration of all the columns are correct 2.3. Switch ON and run for at least 15 minutes 2.4. Perform residual chlorine test after 1st Carbon Column. If residual chlorine is out of range - contact the vendor for re-bedding of carbon column - check residual chlorine test after the 2nd carbon column 2.5. Residual chlorine test - if test is negative, proceed with dialysis - if test is out of range, the operation of RO system should be ceased immediately and contact the vendor	• According to Operator Manual • Total Chlorine Negative (< 0.1 ppm) • Water Hardness Negative (< 17 ppm) • The difference between the inlet and outlet pressure of guard filter should be less than 10psi	• Chlorine Test strips • Water Hardness Test strips • TDS • Pre RO TDS/ Conductivity

Activity	Work Process	Standard	Requirement
	2.6. Perform hardness test after softener column. If hardness is out of range check whether regeneration is done, increase the frequency of regeneration otherwise contact the vendor for re-bedding of softener column 2.7. Change guard filter should be done when the inlet and outlet pressure difference is more than 10 PSI or monthly 2.8. If RO tank is used, check the UV light indicator - If it is not functioning, contact the vendor - The UV device should be changed yearly even if the unit is functioning		
3.Recording in the Log Book	Refer to appendix 3 (RO Log Chart)	• Refer to Operator Manual	• Log Book
4.Shut down of Reverse Osmosis Water System	4.1. Ensure all haemodialysis machines had been disinfected and switched off 4.2. Ensure all dialyser reprocessors had been sanitized and switched off 4.3. Shutdown (standby mode) reverse osmosis system as stated in the operational manual	• Refer to Operator Manual	• Operator Manual
5.Reporting	5.1. Report breakdown of system to the relevant technical support service if any abnormal parameters/result as in SOP 11 Equipment Breakdown	• Follow as HSIP	

HAEMODIALYSIS VIA PERMANENT VASCULAR ACCESS	
OBJECTIVE	To deliver safe haemodialysis treatment according to prescription
SCOPE	All patients on chronic haemodialysis treatment via permanent vascular access
FLOW CHART	

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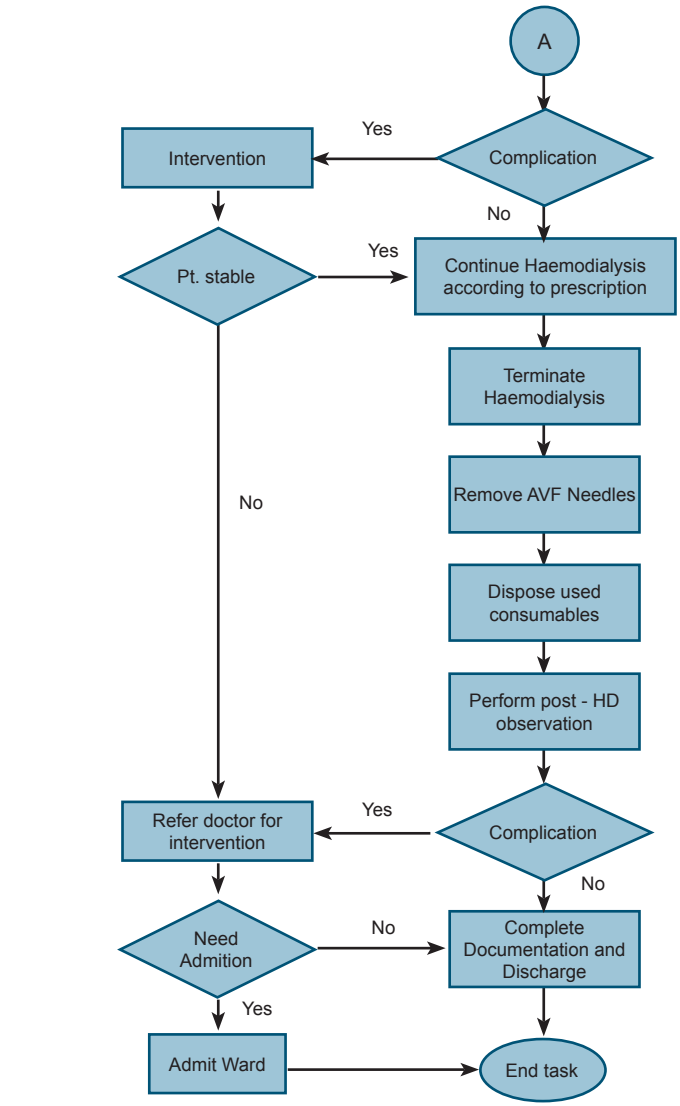
FLOW CHART	

Activity	Work Process	Standard	Requirement
1. Registration	1.1. Confirm patient's schedule appointment 1.2. Register all patients	• Name • NRIC • Date/Time	Patient information system
2. Pre treatment assessment / Assess general condition of patient	2.1. Assess general condition • Fluid overload • Effort tolerance • Fistula: -Thrill -Inflammation -Haematoma 2.2. Vital sign • Blood pressure • Weight • Pulse • Temperature (if necessary) • Pain score		<u>Equipment</u> • B/P set • Stethoscope • Weighing scale • Thermometer • Pain score ruler
3. Preparation of Haemodialysis machine, anticoagulant and disposables	**3.1. Preparation of Haemodialysis machine** 3.1.1. Turn on water and power supply 3.1.2. Switch on machine to rinse at least 10 minutes or according to operators manual 3.1.3. Connect 'A' concentrate 3.1.4. Connect 'B' concentrate (solution/powder) Wait till temperature and conductivity stabilize **3.2. Preparation of anticoagulant** 3.2.1. Heparin 10,000 units in 10 mls. Mark/label the syringe 3.2.2. Prepare heparinize saline (1000 units heparin in 500 mls Normal saline). Mark/label the saline **3.3. Prepare haemodialysis disposables**	Refer as in operator manual Ensure all required disposables/ consumable have valid expired date As prescribed by Nephrologist	<u>Disposable</u> • Syringe 10 cc / 20cc • IV Drip set • Sterile Glove • Dressing set • A/V needles • Dialyser as prescribed • Blood Line • Transducer • Swab/Gauze • Plaster • Tourniquet Drugs / Consumables • Normal saline 0.9% • Alcohol 70% / 2% chlorhexidine in 70% alcohol • Concentrate 'A' and 'B' Or Bicart powder • Heparin vial 5000 units/ml

Activity	Work Process	Standard	Requirement
4. Initiate Priming	**4.1 New Dialyser** 4.1.1. Secure dialyser in its holder with arterial inlet upright 4.1.2. Clamp all small clamps on the AV bloodline set 4.1.3. Prepare normal saline with I/V set 4.1.4. Prime the I/V set and connect to arterial end of the bloodline 4.1.5. Set up arterial blood line onto the machine 4.1.6. Prime the arterial blood line and arterial chamber with blood pump speed (Qb) of 150-250 ml/min of normal saline 4.1.7. Stop blood pump when saline reach end of arterial line 4.1.8. Connect arterial bloodline to arterial blood port of dialyser and then invert dialyser with venous blood port facing upward 4.1.9. Connect venous blood line to venous end of dialyser 4.1.10. Place the tip of venous blood line into a receiver/priming bag 4.1.11. Restart blood pump 4.1.12. Continue priming dialyser and bloodlines with the remaining normal saline 4.1.13. Stop blood pump and clamp venous bloodline 4.1.14. Change the Normal saline to heparinised saline 4.1.15. Connect dialysate coupling to dialyser 4.1.16. Flush heparin line with blood flow rate less than 100ml/min 4.1.17. Prime the venous blood line and venous chamber with Qb of 150-250 ml/min of normal saline 4.1.18. Ensure that both the arterial and venous chambers are completely filled up during priming		

Activity	Work Process	Standard	Requirement
	4.1.19. Continue to flush the bloodline and retain about 100ml of heparinise saline 4.1.20. Stop blood pump 4.1.21. Change to a new pint of normal saline 4.1.22. Set the fluid level of arterial and venous chamber approximately 1inch from the top of chamber 4.1.23. Clamp the main arterial and venous bloodline 4.1.24. Clamp I/V line and disconnect from the arterial tip of bloodline 4.1.25. Connect the IV line to the infusion line of the arterial blood line and unclamp 4.1.26. Clean venous tip of bloodline with alcohol swab and connect to the arterial tip of bloodline 4.1.27. Unclamp both main clamps of bloodlines 4.1.28. Start blood pump with a Qb of 200 -350 ml/min for recirculation procedure for about 10-15 minutes		
	4.2. Reuse Dialyser 4.2.1. Verify dialyser for the correct patient: 4.2.2. Name, ID, Date 4.2.3. Check the dialyser for • Sufficient sterilant filling • Sterilant potency • Number of usage • Fibrin formation • Intact blood and dialysate port caps 4.2.4. Clamp all small clamps on the AV bloodline set. 4.2.5. Prepare normal saline with I/V set 4.2.6. Prime the I/V set and connect to arterial end of the bloodline 4.2.7. Set up arterial blood line onto the machine		

Activity	Work Process	Standard	Requirement
	4.2.8. Prime the arterial blood line and arterial chamber with Qb of 150-250 ml/min of normal saline 4.2.9. Stop blood pump when saline reach end of arterial line 4.2.10. Connect arterial blood line to arterial blood port of dialyser and then invert dialyser with venous blood port facing upward 4.2.11. Connect venous blood line to venous end of dialyser 4.2.12. Place the tip of venous blood line into a receiver/priming bag. If receiver is used ensure that the venous tip does not touch the receiver 4.2.13. Restart blood pump. Prime about 250ml normal saline 4.2.14. Stop blood pump and connect dialysate coupling to the dialyzer and allow the dialysate to fill up the compartment 4.2.15. Continue priming with dialyzer venous upright 4.2.16. Stop blood pump and clamp venous bloodline 4.2.17. Change the Normal saline to heparinised saline 4.2.18. Flush heparin line with blood flow rate less than 100ml/min 4.2.19. Flush the venous blood line and venous chamber with Qb of 150-250 ml/min of normal saline 4.2.20. Ensure that both the arterial and venous chambers are completely filled up during priming 4.2.21. Test for residual sterilant at end of venous blood line. Continue flushing if test still positive. Keep about 100ml of heparinize saline in the bottle by stopping blood pump 4.2.22. Change to a new bottle of normal saline		

Activity	Work Process	Standard	Requirement
	4.2.23. Set the fluid level in both of venous and arterial chamber approximately one (1) inch from the top of chamber ensuring that there is no free falling of blood 4.2.24. Clamp the main arterial and venous bloodline 4.2.25. Clamp I/V line and disconnect from the arterial tip of bloodline 4.2.26. Connect the IV line to the infusion line of the arterial blood line and unclamp 4.2.27. Clean venous tip of bloodline with alcohol swab and connect to the arterial tip of bloodline 4.2.28. Unclamp both main clamps of bloodline 4.2.29. Start blood pump with a speed of 200 - 350 ml/min for recirculation procedure for about 10 - 15 minutes * Reminder: for safety purpose please ensure that all peripheral lines are clamped and capped		
5. Setting haemodialysis parameter	5.1. Set haemodialysis parameter as prescribed 5.1.1. Duration of treatment 5.1.2. Ultrafiltration 5.1.3. Heparinisation		HD Prescription form - appendix 4
	6.1. Arterial cannulation 6.1.1. Inform the patient about the procedure 6.1.2. Perform hand hygiene (staff) 6.1.3. Ensure patient wash at cannulation site 6.1.4. Withdraw approximately 20mls of heparinized saline 6.1.5. Flush AVF needle with Heparinized Saline 6.1.6. Swab cannulation site with antiseptic solution 6.1.7. Apply tourniquet, if necessary		

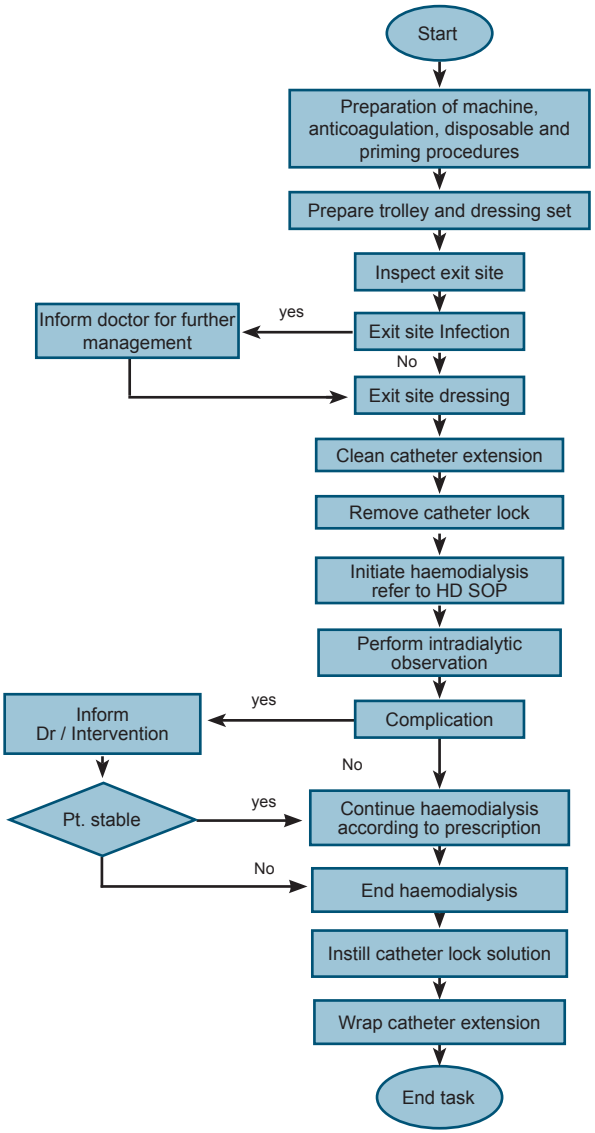
Activity	Work Process	Standard	Requirement
6. Cannulation	6.1.8. The direction of the needle is preferably away from the anastomosis site (antegrade) 6.1.9. For retrograde needling (direction of needling is towards the anastomosis site), cannulation site should be at least 5 cm away from the anastomosis site 6.1.10. Anchor securely with plaster (appendix picture technique of plastering) 6.1.11. Check patency of blood flow and clamp fistula needle 6.1.12. Stop blood pump 6.1.13. Clamp and disconnect both the arterial and venous blood line 6.1.14. Place tip of venous bloodline to the side of receptacle with the connector. OR Connect to drainage bag 6.1.15. Unclamp venous bloodline 6.1.16. Clamp both infusion lines (I/V and bloodlines) 6.1.17. Connect the arterial bloodline to fistula needle 6.1.18. Unclamp both fistula needle and arterial bloodline 6.2. Venous needle cannulation 6.2.1. Flush AVF needle with heparinized saline 6.2.2. Swab cannulation site with antiseptic solution 6.2.3. Apply tourniquet, if necessary 6.2.4. Cannulate at least 5cm away from the arterial cannulation site 6.2.5. Anchor securely with plaster (Appendix 9 Taping Technique) 6.2.6. Check patency of blood flow and clamp fistula needle		

Activity	Work Process	Standard	Requirement
7. Initiating Haemodialysis	7.1. Start blood pump (100-150 mls/min) 7.2. Flush out the heparinized saline from the bloodline and dialyser if necessary 7.3. Inject bolus heparin as prescribed into the extracorporeal circuit when blood reaches the dialyser and mount the syringe to the heparin pump 7.4. Stop blood pump and clamp the venous bloodline when venous chamber is filled with blood 7.5. Swab the tip of venous bloodline with antiseptic and connect to the venous AVF needle 7.6. Unclamp the venous bloodline 7.7. Expel any air bubbles 7.8. Unclamp the venous AVF needle 7.9. Connect the venous and arterial pressure (if necessary) monitoring lines to the transducer protectors and unclamp 7.10. Ensure the bloodlines is inserted into the priming detector 7.11. Invert the dialyser with arterial end up. 1 1 - 2 ON blood pump to a Qb of 100 -150mls/min and observe for any complication 7.12. Turn ON blood pump to a Qb of 100-150mls/min and observe for any complication 7.13. Activate UF controller 7.14. Gradually increase the Qb to the prescribed blood flow rate within 1 - 2 minutes	• 25-50units/kg body weight	

Activity	Work Process	Standard	Requirement
8. Intradialytic observation	8.1. Perform hourly observation and document in the treatment record : - • Blood pressure • Pulse • Time • Venous pressure • TMP/UF • Temperature • Blood flow rate • Amount of heparin left in the syringe • Pain score * Assist patient if any problem * Inform doctor if any intra - dialytic complications * Document in the haemodialysis treatment record	• 25-50units/kg body weight	
9. Terminating Haemodialysis Treatment	9.1. Ensure patient has completed his/her hemodialysis treatment with the presence of end treatment alarm. (mute the alarm) 9.2. Ensure both arterial infusion line and I/V Drip set is clamped 9.3. Disconnect I/V Drip set from the arterial infusion line and recap with a stopper. Attach a connector to the IV Drip set to withdraw 10 mls of Normal Saline for flushing 9.4. Stop blood pump 9.5. Clamp both the arterial needle and arterial bloodline and disconnect 9.6. Flush arterial needle tubing with normal saline, clamp and recap with a stopper 9.7. Connect the arterial bloodline to the I/V Drip set pre-attached with a connector		

Activity	Work Process	Standard	Requirement
	9.8. Unclamp the I/V Drip set and the arterial bloodline 9.9. Start blood pump 200-250mls/min 9.10. When the venous bloodline is cleared of blood, stop the blood pump, clamp both the venous needle and venous bloodline 9.11. Disconnect the venous bloodline from venous needle 9.12. Recap the venous needle tubing with a stopper/syringe NB : Do not disconnect I/V Drip from the infusion line before “End Treatment Alarm” Stopper shall be pre-soaked in 2% chlorhexidine in 70% Isoprophyl Alcohol (using the patient’s dressing set)		
10. Remove AVF needles	10.1. Remove venous needle and apply continuous moderate pressure with a piece of sterile gauze until bleeding stops 10.2. Apply necessary dressing over the cannulation site 10.3. Remove arterial needle and apply continuous moderate pressure with a piece of sterile gauze until bleeding stops 10.4. Apply necessary dressing over the cannulation site 10.5. Immediate and discard used syringes and needles into the Sharps Bin 10.6. Remove the bloodlines and dialyser from the haemodialysis machine 10.7. Discard bloodlines and dialyser (if not reuse) into the Clinical Waste Bin 10.8. Send dialyser for reprocessing (if for reuse)		

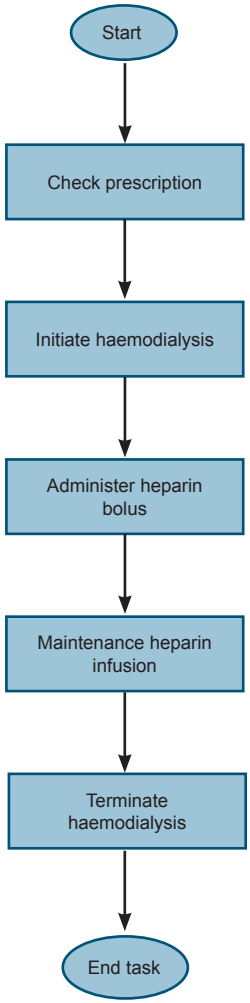
Activity	Work Process	Standard	Requirement
11. Post haemodialysis observation and documentation in haemodialysis treatment record	11.1. Vital signs: • Blood pressure • Weight • Pulse • Temperature • Pain score 11.2. Performance measurement: • Total Blood volume process 11.3. Treatment plan (if necessary) • Medication • Investigation • Blood Transfusion		
12. Discharge	12.1. Patient goes home if there is no complication 12.2. Remind patient of next dialysis schedule		

HEMODIALYSIS TREATMENT VIA TEMPORARY VASCULAR ACCESS	
OBJECTIVE	To deliver safe haemodialysis according to prescription
SCOPE	All patients on haemodialysis treatment via haemodialysis catheter
FLOW CHART	

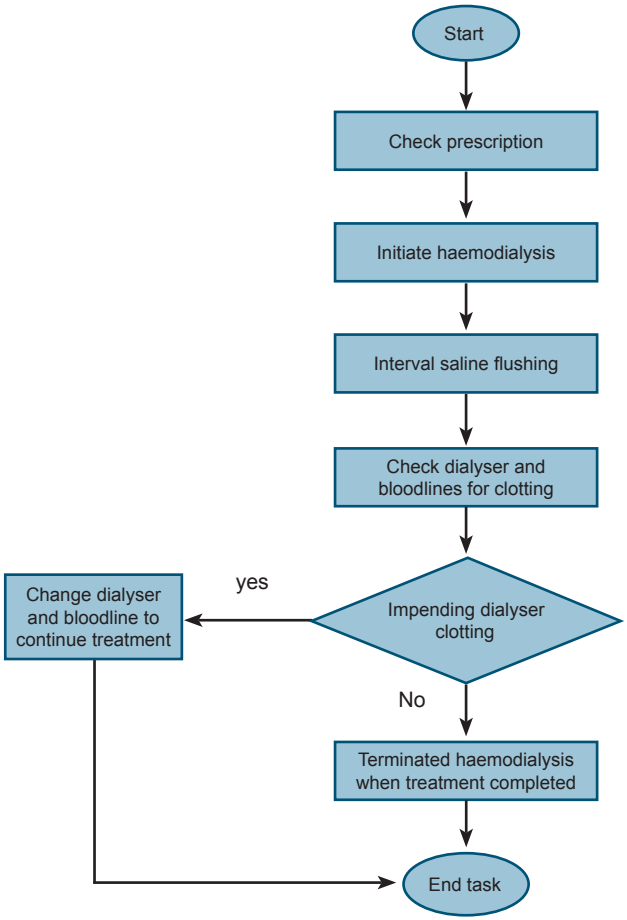
Activity	Work Process	Standard	Requirement
1.Preparation of machine, anticoagulation, disposable and priming procedures	Refer to SOP 03 Haemodialysis via permanent vascular access		
2. Preparation of dressing trolley	2.1. Lay out dressing set, syringes drapes and other sterile disposable 2.2. Wear full PPE and wash hand 2.3. Pour disinfectant **eg**.- chlorhexidine 2% in 70% alcohol (or 10% povidone iodine). Check the compatibility of catheter material with povidone iodine	Universal precaution	- Disposable set - Dressing set - Swab/gauze - Plaster - Syringe - Sterile gloves - Mask - Stopper
3. Exit site and catheter extension dressing	3.1. Inform patient about the procedure and ask patient to wear mask 3.2. Wear non - sterile glove 3.3. Loosen the dressing at exit site and catheter extension 3.4. Wash hand and wear sterile gloves 3.5. Remove dressing with forceps 3.6. Inspect catheter exit site for sign of inflammation or infection. Take swab c&s if infection suspected and inform doctor 3.7. Clean the exit site with disinfectant in an outward direction 3.8. Apply antibiotic cream **eg**. mupirocin or gentamicin and apply dry sterile dressing. Secure with plaster / transparent dressing 3.9. Remove gloves, perform hand hygiene and change to new sterile gloves. If only one (1) person if performing the procedure, the person may need to wear two (2) pairs of sterile gloves 3.10. Hold catheter extension with forceps and clean extension tubings with disinfection (use one gauze/swab for each extension). Allow to dry for about 1 min	Standard precaution	**Drugs** Chlorhexidine 2% in 70% alcohol Vial Heparin 5000units/ml Gentamycin Citrate Mupirocin Ointment

Activity	Work Process	Standard	Requirement
	3.11. Drape and place the catheter on the drape 3.12. Clean and remove stopper 3.13. Clean the arterial and venous ends of the catheter with disinfectant with separate gauze. Allow to dry for about 1 min 3.14. Remove the catheter lock solution (approximately 2mls) from each lumen 3.15. Check patency of lumen by flushing with heparinized saline		
4. Initiate haemodialysis	4.1. Connect the arterial bloodline to the arterial end of the catheter 4.2. Start haemodialysis machine by another staff if possible. For those single performers can use the double glove method for the following steps: 4.3. Start blood pump with Qb 100-150 mls/min 4.4. Flush out the heparinized saline from the bloodline and dialyser 4.5. When blood reaches the dialyser, inject bolus heparin as prescribed into the extracorporeal circuit and mount the syringe to the heparin pump 4.6. Stop blood pump and clamp the venous bloodline when venous chamber is filled with blood 4.7. If necessary remove first glove to maintain aseptic technique. Apply hand disinfection if necessary 4.8. Swab the venous end of the catheter, swab the tip of venous bloodline with antiseptic. Allow to dry then connect to the venous end of the catheter 4.9. Expel any air bubbles 4.10. Wrap the catheter extension and bloodline connection with sterile gauze		

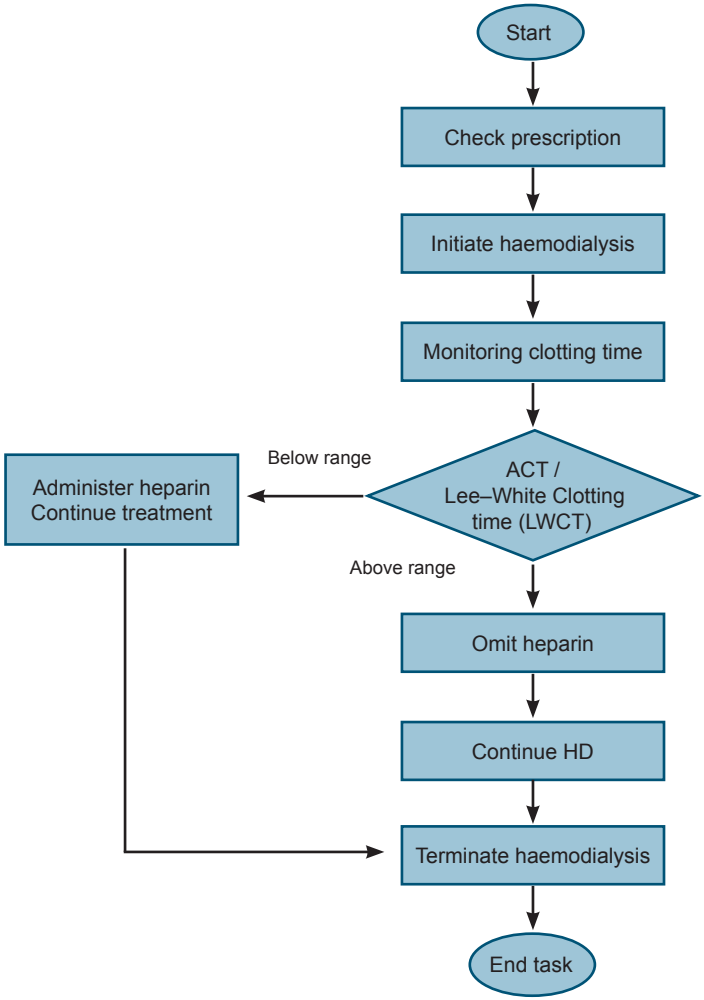
Activity	Work Process	Standard	Requirement
5. Perform Intradialytic observation	5.1. Refer to to SOP Haemodialysis treatment Intra - dialytic observation for details		
6. End of haemodialysis treatment/ Instill catheter lock solution / Wrap Catheter extension	6.1. Wear full PPE and wash hands 6.2. Prepare and draw anticoagulation lock (refer to appendix 6) 6.3. Open new dressing set 6.4. Wear sterile gloves 6.5. Remove sterile gauze at the connection with forceps 6.6. Flush arterial and venous lumen with normal saline 6.7. Instill catheter lock solution to both lumens according to its priming volume slowly about 5s 6.8. Change new stoppers after each haemodialysis. Needle free haemodialysis stopper can be changed less frequently 6.9. Apply dry sterile dressing over the catheter extension and secure with tape 6.10. Refer to SOP 03 haemodialysis treatment - Terminating haemodialysis Treatment for details	Standard precaution	- 4% citrate - 1000iu/ml of Heparin

NORMAL HEPARIN	
OBJECTIVE	To carry out haemodialysis treatment using adequate heparin base on body weight to prevent clotting of extracorporeal circuit
SCOPE	For patients with no risk of bleeding tendencies
FLOW CHART	

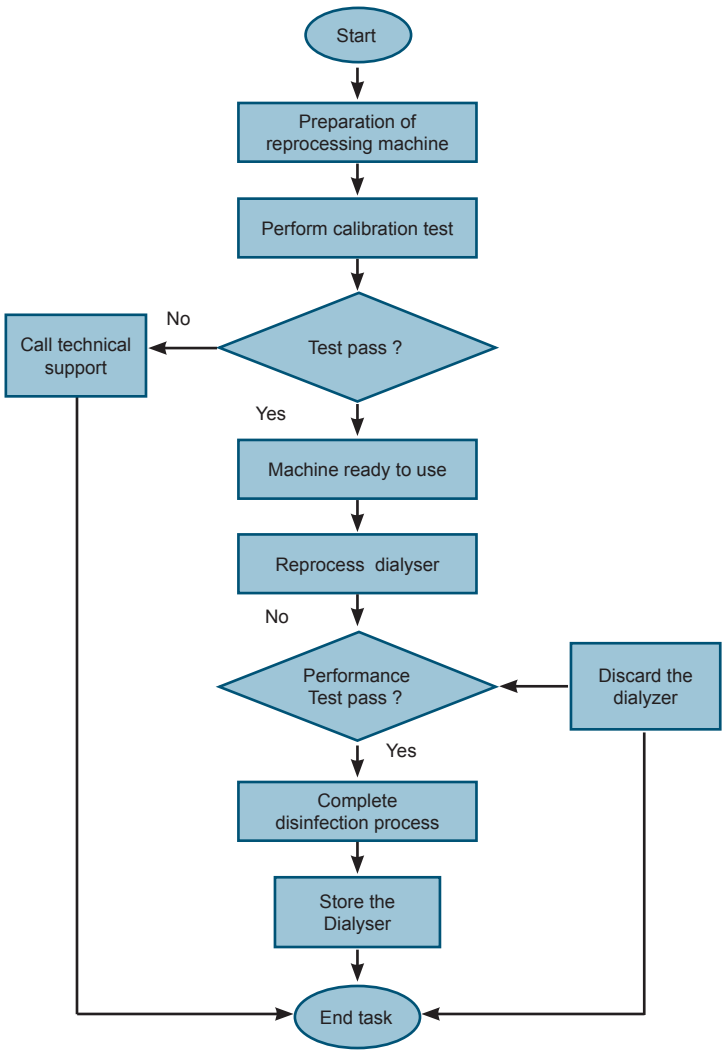
Activity	Work Process	Standard	Requirement
1. Receive prescription	1.1. Check heparin dosage and other in the haemodialysis prescription form. (refer to appendix 4)		HD prescription form
2 Initiate haemodialysis	2.1. Initiate haemodialysis. according to work process in SOP - 03 & SOP - 04 2.2. Inject bolus dose of heparin into heparin line according to standard heparin dosage into the extra corporeal circuit 2.3. Dose of heparin 25-50 units/kg		Heparin 5000 units per ml units 20mls syringe
3 Maintenance heparin	3.1. Ensure maintenance heparin is infused 3.2. Maintenance dose: 10 - 20 units / kg 3.3. Stop heparin infusion 1 hour before end of Haemodialysis	Renal Replacement Therapy CPG MOH	
4. Terminate haemodialysis	4.1. Refer work process on terminating haemodialysis		

HEPARIN FREE HAEMODIALYSIS	
OBJECTIVE	To carry out haemodialysis treatment using adequate heparin base on body weight to prevent clotting of extracorporeal circuit
SCOPE	For patients known to have bleeding tendencies as well as patients plan for surgery
FLOW CHART	

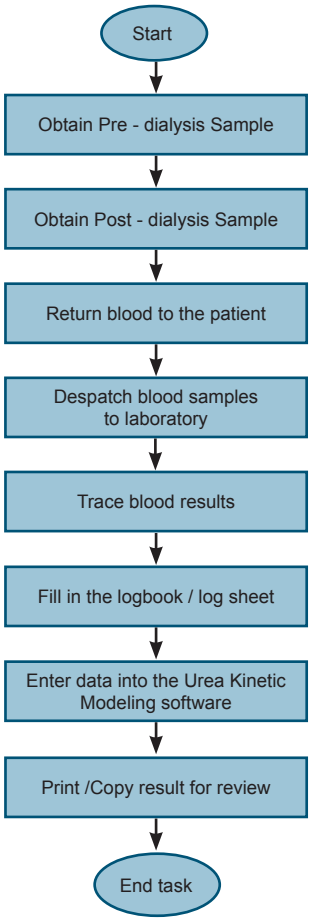
Activity	Work Process	Standard	Requirement
1. Receive prescription	1.1. Check heparin dosage and other haemodialysis prescription (refer to appendix 4)		Patient Case Note Haemodialysis. Prescription Form
2. Initiate haemodialysis	2.1. Initiate Haemodialysis. according to work process in SOP 02 & 03 2.2. Ensure that no heparin is added into the priming fluid (saline) 2.3. If heparin saline pre-flushing of the dialyser is required, the order should be specified explicitly in the HD prescription form		Heparin 5000 units per ml units 20mls syringe
3. Interval saline flushing	3.1. Perform interval saline flushing 150mls-200mls using normal saline 0.9% every 20 minutes. Document it in the flushing Chart (Refer Appendix 5) 3.2. Ensure the saline flush is added to the total ultrafiltration 3.3. Avoid high filtration fraction to prevent dialyser clotting. (refer to appendix 6 on calculation of filtration fraction)		Normal Saline 0.9% Interval Saline Flushing Chart (Refer Appendix 5)
4. Check dialyser and bloodlines for clotting	4.1. Ensure the dialyser and bloodlines are clear of blood clots each time when flushing is done 4.2. Observe for rising of Transmembrane pressure (TMP) 4.3. Change dialyser when: i. Visible clotting at arterial / venous chamber ii. significant clotting of capillary fibers of dialyser iii. TMP is above 400 mmHg 4.4. Return patient's blood and replace dialyser and bloodline promptly to continue treatment and to prevent blood loss as a result of clotting 4.5. Document any blood loss due to clotting of dialyser and bloodlines in the Patient Case Note 4.6. Inform doctor for further management		
5. Terminate haemodialysis	5.1. Terminate Haemodialysis. according to work process in SOP-03 & SOP-04 5.2. For Haemodialysis via catheter, citrate lock should be used		Documentation

TIGHT HEPARINISATION WITH MONITORING OF CLOTTING TIME	
OBJECTIVE	To carry out haemodialysis treatment using minimum heparin while taking necessary precaution to prevent clotting of extracorporeal circuit
SCOPE	For patients known to have bleeding tendencies as well as subsequent post-operative hemodialysis treatment. For patients who are at slight risk for bleeding, when the risk of bleeding is chronic and prolonged, and where use of heparin-free dialysis has been unsuccessful because of frequent clotting
FLOW CHART	

Activity	Work Process	Standard	Requirement
1.Receive prescription	Check haemodialysis prescription as prescribed by Nephrologist esp. heparin dosage		Patient Case Note Haemodialysis. Prescription Form
2.Measure baseline clotting time	2.1 Check baseline clotting time: a. Activated Clotting Time (ACT) b. Lee – White Clotting Time (LWCT)	Ref: Hand book of dialysis Chapter 14 / Anticoagulation, pg:159	Activated Clotting Time (ACT): a. ACT machine b. ACT reagent tube c. 1ml syringe d. injection needle Lee – White Clotting Time (LWCT) a. 1ml syringe b. injection needle c. Glass tube
3.Initiate haemodialysis	3.1. Initiate Haemodialysis. as in work process for initiating Haemodialysis as in SOP HD 3.2. Heparin dose i. Bolus dose of heparin at 10-20units/kg body wt ii. Start maintenance heparin infusion at a rate of 5-10 units/ kg body wt per hour iii. Stop the heparin infusion one (1) hour before the end of dialysis		Heparin 10000 units 20mls syringe
4.Monitoring of clotting time and administration of heparin	4.1. Monitor ACT/LWCT when feasible a. Adjust heparin dose according to ACT/LWCT b. Refer to Appendix 7 on how to perform and monitor anticoagulation	Ref: Hand book of dialysis Chapter 14 / Anticoagulation, pg:159	
5.Terminate haemodialysis	Refer to work process on terminating Haemodialysis as SOP- 03 & SOP - 04 For Haemodialysis via catheter, citrate lock should be used		

REPROCESSING OF DIALYSER	
OBJECTIVE	To carry out reprocessing of dialyser which meets standards to ensure safe reuse practice
SCOPE	For all types of hollow fiber dialyser intended for reuse
FLOW CHART	

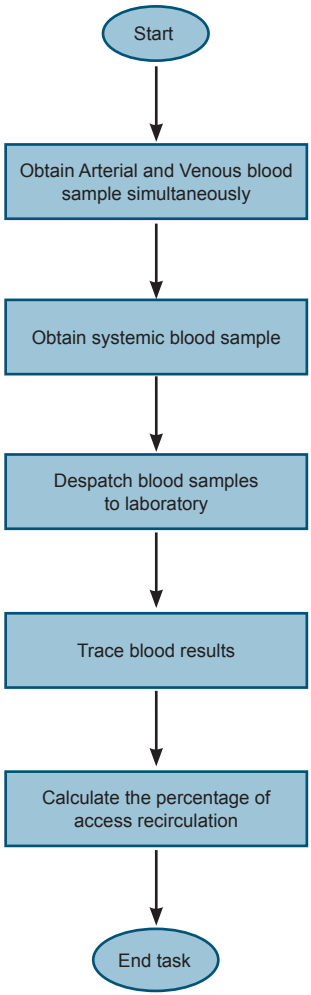
Activity	Work Process	Standard	Requirement
1. Preparation of reprocessing machine	1.1. Check adequate RO water storage in the RO water storage tank for reprocessing machine or check for adequate incoming water pressure to the reprocessing machine for direct feed 1.2. Ensure the incoming water supply valve is open 1.3. Check sterilant for expiry date 1.4. Check adequate sterilant in the container 1.5. Switch on power supply to reprocessing machine	• Use AAMI/ ISO standards • National HD Quality Standard	• Fully automated dialyser reprocessing machine
2. Calibration of reprocessor	2.1. Perform daily calibration of the machine according to operator's manual 2.2. Record the calibration result	• The calibration test result should be within the range as recommended by the manufacturer	
3. Inspection of dialyser	3.1. Discard dialyser that is leaking, cracked or clotted with fibrin or blood		
4. Reprocessing of dialyzer	4.1. Flush the dialyzer with RO water 4.2. Connect blood and dialysate port of dialyzer to reprocessing machine 4.3. Select mode according to the type of dialyzer: Low Flux, High efficiency, High Flux 4.4. Activate reprocessing machine as in operator's manual (rinse cycle begins and ends automatically, discard the dialyser if test failed) 4.5. Remove dialyser from reprocessing machine 4.6. Fix dialysate and blood port caps of dialyzer 4.7. For each shift, check the first dialyser processed for each reprocessing machine with potency test strip. If out of range, discard or reprocess dialyser with another machine and contact vendor 4.8. Store dialyser in an individual storage compartment 4.9. Document the total cell volume (TCV) result	• It is recommended that the operator set the reference volume of the dialyzer to be reprocessed to be set 80% of the priming volume of new dialyser • Reprocessed and stored according to hepatitis status • Manufacturer manual	• Sterilant • Sterilant potency test strips • Storage cupboard • Reprocessing record book • Blood and dialysate port caps Pre-soaked in peracetic acid hydrogen peroxide (PAHP) sterilant 1%) • Diluted sterilant (1%) should be freshly prepared daily and any excess should be discarded at the end of the day
5. Shut down and maintenance of the machine	5.1. Sanitise the machine end of the day 5.2. Switch off the power supply 5.3. Wipe the exterior surface with disinfectant wipes 5.4. Sanitize Reprocessing Machine with bleaching solution monthly or as recommended by manufacturer	Manufacturer manual	

BLOOD SAMPLING TECHNIQUE FOR DIALYSIS ADEQUACY MEASUREMENT	
OBJECTIVE	To obtain blood sample using correct methodology for a precise measurement of dialysis adequacy for all chronic haemodialysis patients
SCOPE	For all chronic haemodialysis patient on 3 monthly basis
FLOW CHART	

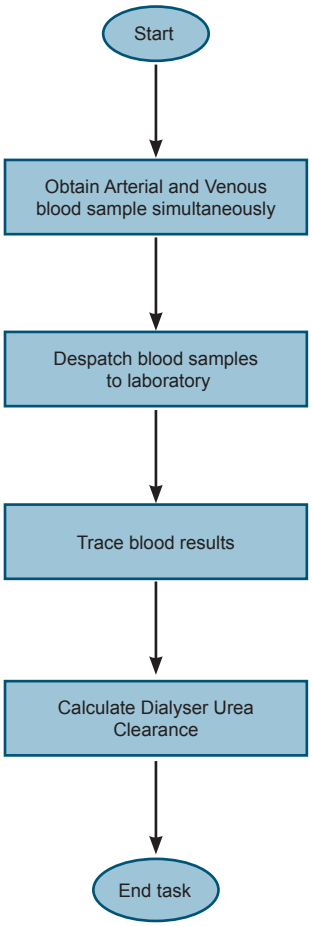
Activity	Work Process	Standard	Requirement
1. Pre dialysis blood sampling	1.1. Ensure AVF needle is not filled with saline. Avoid dilution effect by taking pre hemodialysis blood sample from an empty AVF needle, before giving heparin or before initiating hemodialysis 1.2. Cannulate AV fistula/ graft with AVF needle draw 2 mls of blood from arterial access 1.3. When using venous catheter, remove 3mls of anticoagulation block from the arterial lumen of the catheter and discard 1.4. Withdraw blood sample using a new 2ml syringe 1.5. Transfer the blood into specimen tube labelled as pre-dialysis blood urea 1.6. Despatch blood sample to laboratory	RRT CPG	Dialysis adequacy should be measured at 3 monthly interval, during midweek hemodialysis Disposables • 2mls syringe • 5mls syringe • Alcohol swab • Blood specimen tube (heparinised) • IM needle size 21G • Blood test request form Urea kinetic modelling software
2. Post dialysis blood sampling	2.1. Stop Pump Method 2.1.1. Ensure treatment has been completed as prescribed 2.1.2. Turn off the dialysate flow 2.1.3. Turn off Ultrafiltration 2.1.4. Clamp venous monitor line to prevent interruption of alarms 2.1.5. Reduce blood pump speed to 25-50mls/minute for 1-2 minutes to minimise effect from access recirculation 2.1.6. Stop blood pump before sampling 2.1.7. Draw 2mls of blood sample from arterial sampling port 2.1.8. Fill the blood into blood specimen tube labelled as post urea 2.1.9. Unclamp venous monitor line 2.1.10. Terminate HD (SOP - 03& SOP -04) 2.1.11. Despatch blood sample to laboratory	RRT CPG	Disposables • 2mls syringe • Alcohol swab • Blood specimen tube (heparinised) • IM needle size 21G • Blood test request form Urea kinetic modelling software Measurement of Pre and Post Hemodialysis Blood Urea Nitrogen (BUN) levels must be drawn at the same hemodialysis session

Activity	Work Process	Standard	Requirement
3. Data entry	3.1. Trace blood results 3.2. Fill in the pre and post Hemodialysis blood urea results as well as other required parameters into the log book/log sheet 3.3. Enter data into the Urea Kinetic Modeling Software programme 3.4. Select the dialyser name. If not available the Kuf and Urea clearance should be entered to obtain the KoA of the dialyser 3.5. Print / copy the result for review and quality Improvement	Delivered spKt/V* of 1.2 per dialysis not including residual kidney function (RKF) or URR of 65% Time average concentration of blood urea (TACBU) should be < 50mg/dl (18mmol/L) Normalised protein catabolic rate(nPCR) should be between 1.0-1.2gm/kg body weight *Kt/V should be interpreted with total body water (TBW). If the displayed result for TBW/Weight (%) is < 20% or > 80%, Kt/V result should not be used	Equipment: • Software programme • Log book/log sheet

BLOOD SAMPLING TECHNIQUE FOR ACCESS RECIRCULATION MEASUREMENT

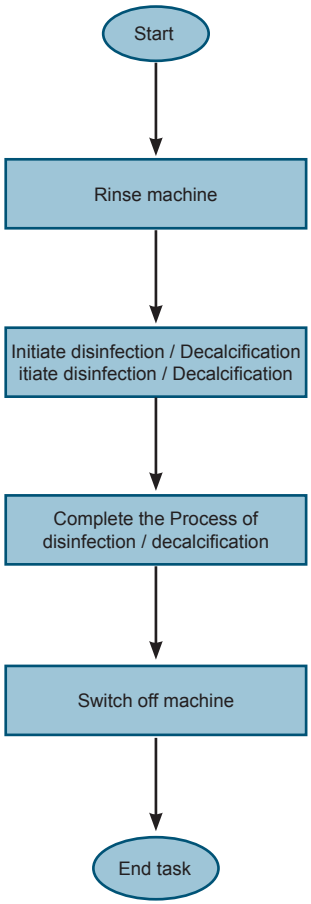


Activity	Work Process	Standard	Requirement
1. Arterial and Venous blood sampling (pre & post dialyser)	1.1. Ensure both Arterial and Venous blood sample is obtained half an hour after initiating Hemodialysis treatment 1.2. Fill the blood into heparinised blood specimen tube and label as Arterial and Venous blood urea respectively 1.3. Despatch blood samples to laboratory	Two staff shall be available for simultaneous blood sampling. The samples shall be obtained without reducing the set blood flow rate	Disposables • 2mls syringe • Alcohol swab • Blood specimen tube (heparinised) • IM needle size 21G • Blood test request form
2. Systemic blood sampling	2.1. Turn off or decrease the dialysate flow to its minimum setting 2.2. Turn off Ultrafiltration 2.3. Clamp venous monitor line to prevent interruption of alarms 2.4. Reduce blood pump speed to 100mls per minute for 15 to 30 seconds 2.5. Stop blood pump before sampling or obtain sampling while blood pump is running at 100ml/min 2.6. Draw 2mls of blood sample from arterial sampling port. (access) 2.7. Fill the blood into heparinised blood specimen tube and label as Systemic blood urea 2.8. Unclamp venous monitor line 2.9. On back dialysate flow as prescribed 2.10. On back Ultrafiltration as prescribed 2.11. Set back the blood flow rate as prescribed 2.12. Continue the Hemodialysis treatment 2.13. Despatch both samples to laboratory 2.14. Trace all blood urea nitrogen (BUN) results (Arterial, Venous and Systemic) 2.15. Calculate percentage of Access Recirculation	Systemic blood sample shall be obtained immediately (less than 1 minute) after simultaneous blood sampling from Arterial and Venous port The blood urea concentration of Arterial and Systemic sample, more or less should be the same because both were obtained from same source (arterial port) In the event of Access Recirculation the blood urea concentration of arterial sample will be lower than the systemic sample Arterial blood sample is obtained with the presence of possible recirculation effect, while the systemic blood sample is obtained with Slow Flow/Stop Pump technique which minimises the recirculation effect Calculation of percentage of Access Recirculation : $\frac{S - A}{S - V} \times 100\%$ S = Systemic A = Arterial V = Venous	Disposables • 2mls syringe • Alcohol swab • Blood specimen tube (heparinised) • IM needle size 21G • Blood test request form

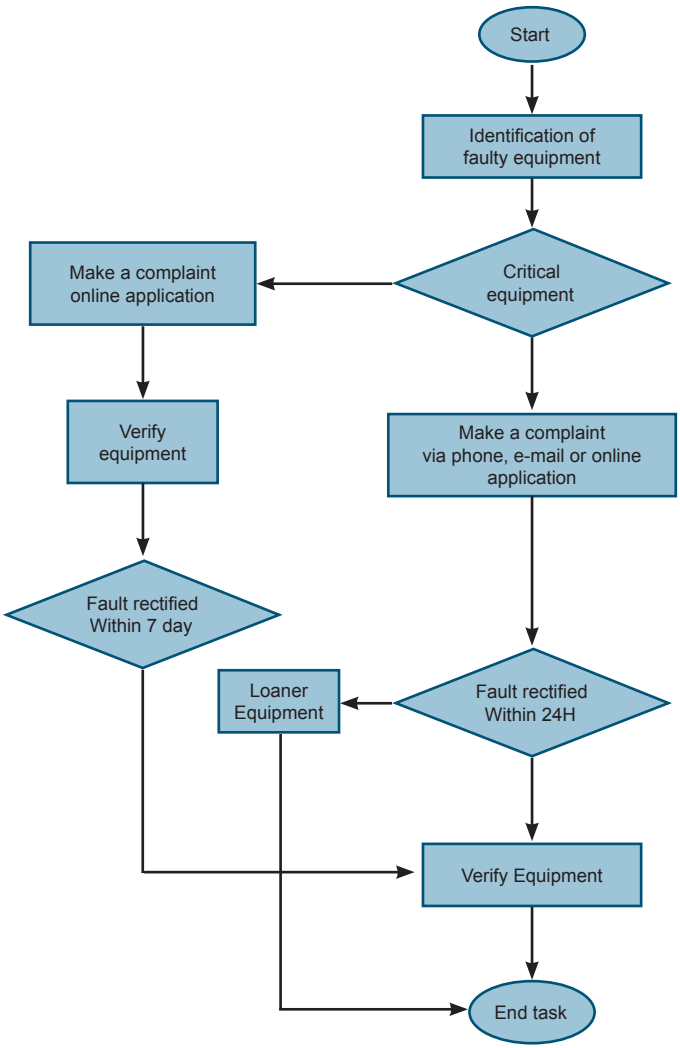
BLOOD SAMPLING TECHNIQUE FOR DIALYSER UREA CLEARANCE	
OBJECTIVE	To carried out the correct technique in obtaining blood sample to measure dialyser urea clearance
SCOPE	All type of dialyser which need to under go for study
FLOW CHART	

Activity	Work Process	Standard	Requirement
1. Arterial and Venous blood sampling (pre & post dialyser)	1.1. Set blood flow rate at 300ml/min and dialysate flow rate at 500ml/min 1.2. After initiating Hemodialysis for 30 minutes, stop/off Ultrafiltration 1.3. Wait for 5 minutes and obtain blood samples from Arterial and Venous sampling port simultaneously 1.4. Fill the blood into heparinised blood specimen tube and labelled as Arterial and Venous blood urea respectively 1.5. On back Ultrafiltration as prescribed 1.6. Set back the blood flow rate as prescribed and continue Hemodialysis treatment 1.7. Despatch both samples to laboratory 1.8. Trace all blood urea nitrogen (BUN) results (Arterial and Venous) 1.9. Calculate Dialyser Urea Clearance	Dialyser Urea Clearance is the amount of blood cleared of particular substance (eg.Urea) over a period of time, which is expressed in ml/min The blood specimen for Dialyser Urea Clearance shall be obtained in a single dialysis session Ensure that blood pump is set at 300ml/min and dialysate flow at 500ml/min as to compare the clearance with the dialyser specification Ensure that correct ID (internal diameter) of blood pump segment is selected for accurate blood pump calibration Calculation of Dialyser Urea Clearance : Arterial - Venous X Qb Arterial Arterial Blood Urea : 30mmol/L Venous Blood Urea : 10mmol/L Blood flow rate(Qb) : 300ml/min $\frac{30 - 10}{30}$ X 300ml/min $\frac{20}{30}$ X 300ml/min **200ml/min (Dialyser Urea Clearance)** at Blood Flow Rate of 300ml/min	Disposables • 2mls syringe • Alcohol swab • Blood specimen tube (heparinised) • IM needle size 21G • Blood test request form

DECALCIFICATION AND DISINFECTION OF HEMODIALYSIS MACHINE	
OBJECTIVE	To clean and disinfect the hydraulic component of haemodialysis machines
SCOPE	All haemodialysis machines should be decalcification and disinfected at the end of each day

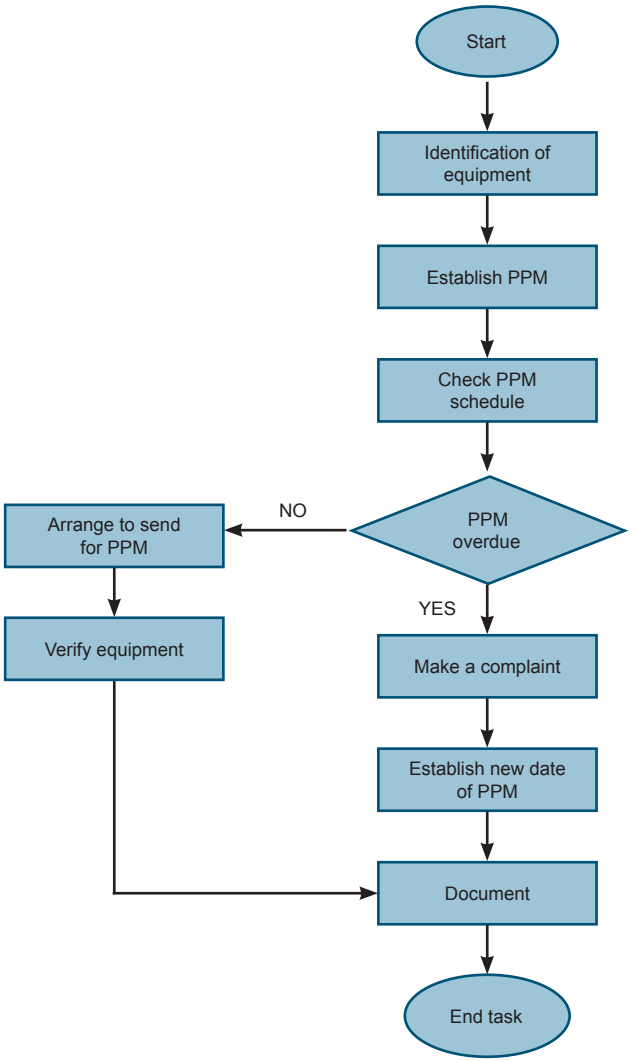


Activity	Work Process	Standard	Requirement
1. Rinse machine	1.1. Place concentrate pick up lines back to the machine 1.2. Start rinse process and follow the instructions displayed on the panel 1.3. Wait till the machine completes the mandatory rinse cycle before initiating other sanitisation process (or as recommended in the operator's manual)	• Machine fluid path free from chemicals • Machine fluid path and hydraulic free from scaling	Disposables • 2mls syringe • Alcohol swab • Blood specimen tube (heparinised) • IM needle size 21G • Blood test request form
2. Decalcification	2.1. Initiate decalcification process by activating the decalcification button after the completion of the rinse cycle. Follow the step by step instructions as displayed on the machine's panel. (Decalcification may differ for different make and model of machine please follow the operators manual when necessary)	• Follow operator Manual	• Decalcifying agent
3. Disinfection	3.1. Daily heat or chemical disinfection should be done at the end of the day's operation (or when necessary) 3.2. Bleaching with disinfectant recommended by the manufacturer should be done at the end of each week and when necessary 3.3. Activate the disinfection button on the panel after the mandatory rinse cycle 3.4. Choose the desired mode by pressing the relevant button on the panel	• Machine fluid path free from bacterial	Disinfectant Bleach Germicide
4. Switch off machine	4.1. Switch off power and water supply after the completion of decalcification and disinfection process		

EQUIPMENT BREAKDOWN	
OBJECTIVE	To reduce brake down time and ensure that equipment is safe working condition after repair
SCOPE	All equipment in the contract hospitals and institution covered in the concession agreement. (CA)
FLOW CHART	

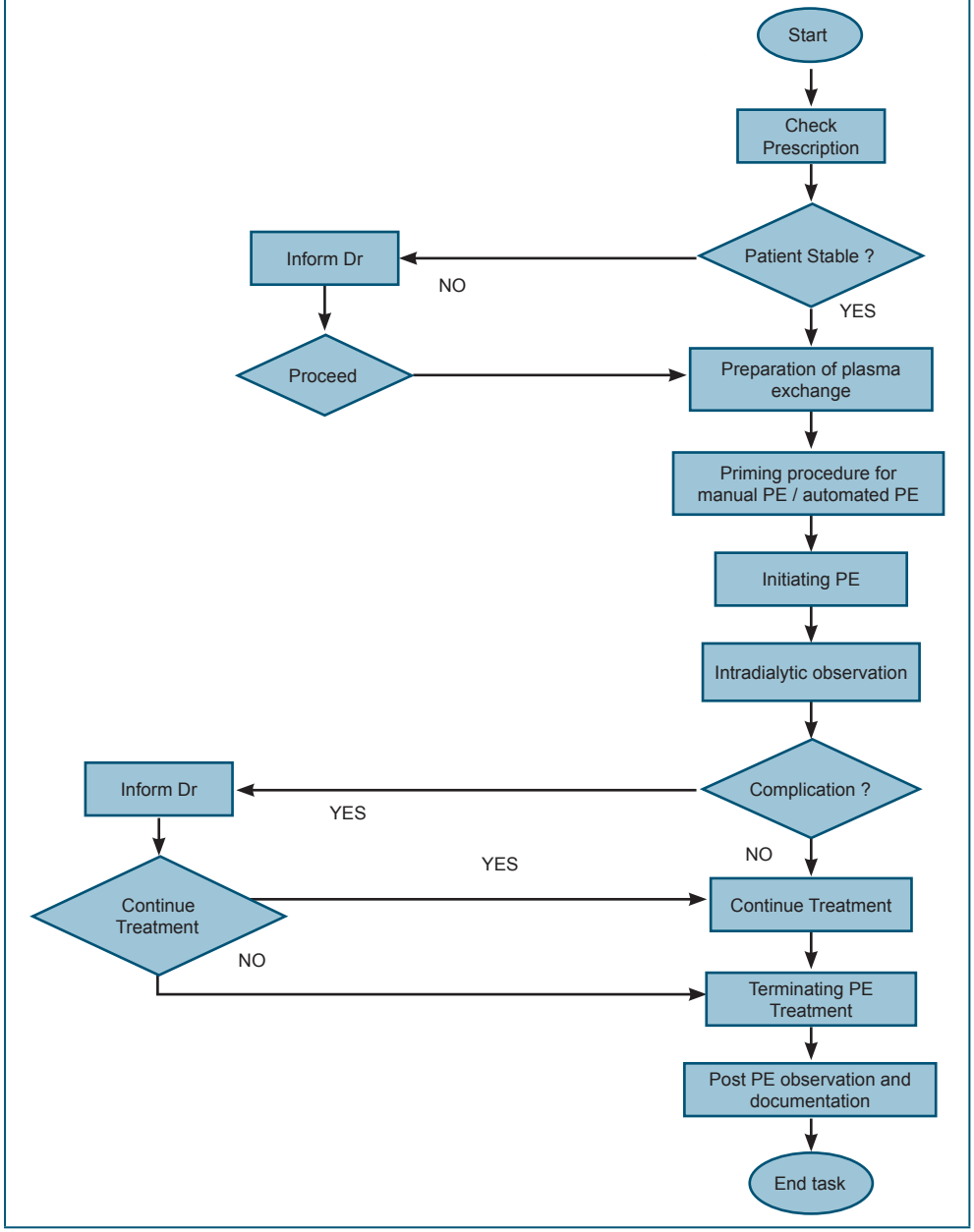
Activity	Work Process	Standard	Requirement
1. Identification of equipment	1.1. Identify the faulty equipment and make a complaint to the concession company		
2. Faulty equipment needed urgent repair (Critical equipment)	2.1. For the equipment which is out of service and needed urgent repair, make a complaint to the concession company via phone, e-mail or online application 2.2. Tag a 'Out of Service sticker label on the equipment while waiting for repair or service 2.3. If fault is rectified, verify equipment and if conforms to the verification checklist the equipment shall be put to use 2.4. If the equipment does not conform to the requirements 2.5. stated in the verification checklist and do not close the work order 2.6. Request the concession company to provide a loaner equipment where applicable as soon as possible 2.7. Verify the loaner equipment before use. If it is in working condition, the equipment shall be put to use 2.8. If the equipment is not in working condition, inform Director of Hospital through Head of Department for purchase of alternative service 2.9. If the breakdown dialysis unit equipment is rectified, verify the equipment before it is ready for use 2.10. Close the work order		

Activity	Work Process	Standard	Requirement
3. Faulty equipment not urgently needed. (Non critical equipment)	3.1. For the equipment which is out of service and doesn't need urgent repair, make a complaint to the concession company via phone, e-mail or online application 3.2. Tag a 'Out of Service 'sticker label on the equipment while waiting for repair or service 3.3. If fault is rectified, verify equipment and if conforms to the verification checklist the equipment shall be put to use 3.4. If the equipment does not conform to the requirements 3.5. stated in the verification checklist do not close the work order 3.6. Request the concession company to provide a loaner equipment where applicable, after 7 days 3.7. Verify the loaner equipment before use. If it is in working condition, the equipment shall be put to use 3.8. If the equipment is not in working condition, request for new loaner equipment 3.9. If the breakdown of dialysis unit equipment is rectified, verify the equipment before it is ready for use 3.10. Close the work order		
4. Documentation	4.1. File in all relevant PPM document		

EQUIPMENT MAINTENANCE	
OBJECTIVE	To prolong the life span of equipment and to reduce down time through planned preventive maintenance as to ensure safety and reliability of the equipment
SCOPE	For all haemodialysis related equipment
FLOW CHART	

Activity	Work Process	Standard	Requirement
1.Identification of equipment	1.1. Identify and establish a list of biomedical equipment critical and non critical item which require planned and scheduled maintenance		Kew. PA 2 Kew. PA 4 No Pendaftaran Aset
2.Plan Preventive Maintenance Scheduling	2.1. Establish PPM schedule for the equipment identified which should be mutually agreeable between the user and the concession company or recommended by the manufacturer 2.2. Ensure the PPM schedule should include the frequency of maintenance together with appropriate maintenance checklist for the equipment and the time taken to complete the work	• Manufacturer manual and Institutional policy	• HSIP
3.Check PPM schedule	3.1. Check that maintenance of equipment is as per schedule according to the PPM sticker placed on the equipment 3.2. Ensure that the concession company has notified the user two weeks in advance prior to PPM 3.3. After completion of PPM verify the equipment before putting in use 3.4. If maintenance of equipment is overdue inform supervisor to fill and send a complaint form to the concession company 3.5. Reschedule PPM with the concession company within 14 days		
4.Documentation	4.1. File in all relevant PPM document		

PLASMAPHERESIS (PE)

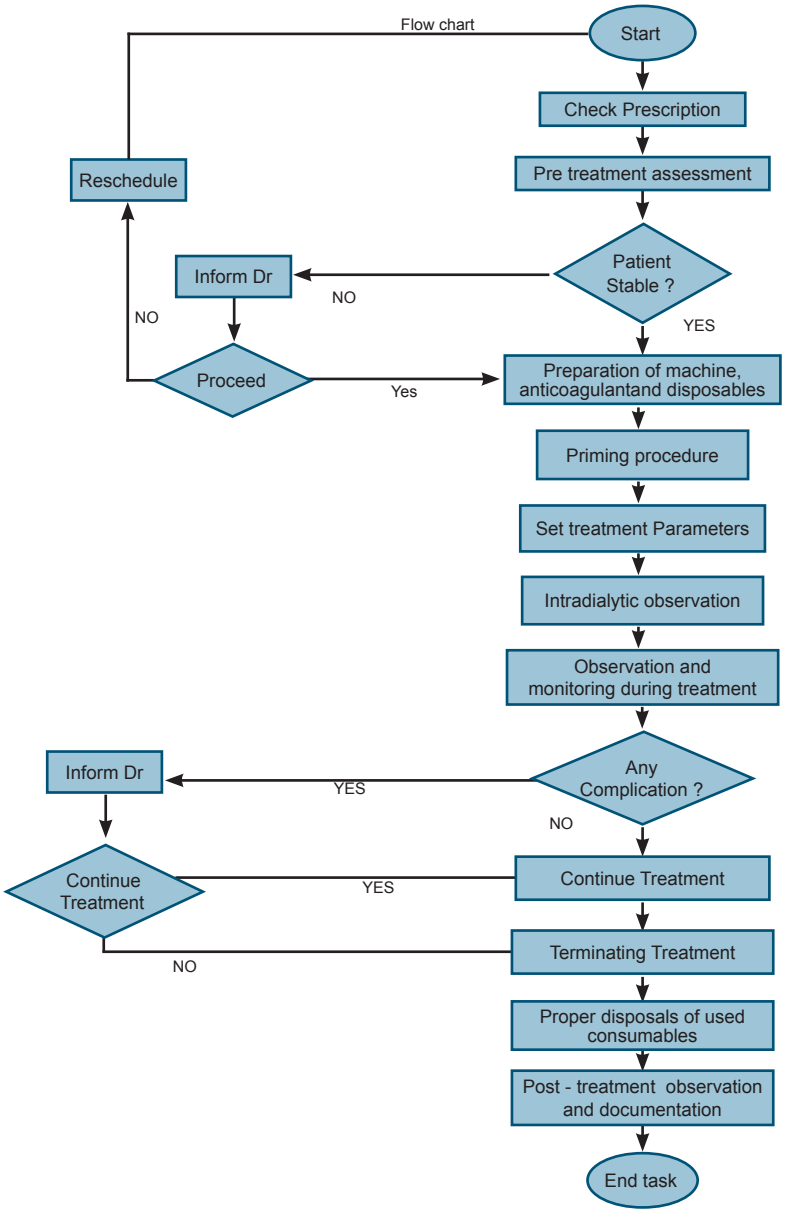


Activity	Work Process	Standard	Requirement
1. Check Prescription	1.1. Check prescription as written by Nephrologist ▪ Total plasma removal ▪ Type of replacement solution. ▪ Volume of replacement ▪ Type of plasma filter ▪ Heparin dosage ▪ Calcium gluconate 20% (if required)	▪ As prescribed by Nephrologist	
2. Pre - treatment assessment	2.1. Assess general condition Fluid Overload Effort tolerance Assess Catheter 2.2. Vital sign	▪ Blood pressure ▪ Weight ▪ Pulse ▪ Temperature (if necessary) ▪ Pain score	**Equipment** ▪ B/P set Thermometer
3. Preparation of plasma exchange	3.1. Preparation of machine, anticoagulant and disposables Refer to SOP Haemodialysis Treatment 03 if HD machine is being used for plasma exchange	Operator manual	**Consumables** ▪ Syringe 10 cc/ 20cc ▪ IV Drip set ▪ Sterile Glove ▪ Dressing set ▪ Plasma filter as prescribe ▪ Blood Line ▪ Transducer ▪ Swab/Gauze ▪ Plaster ▪ Swab ▪ 3 way catheter ▪ Urine bag with indicator **Drugs** ▪ Normal saline 0.9% ▪ Alcohol 70% ▪ Concentrate 'A' and 'B' ▪ Or Bicart powder ▪ Heparin vial 5000 units/ml ▪ Calcium gluconate 20%

Activity	Work Process	Standard	Requirement
4. Priming procedure for manual PE	4.1 Refer to SOP Haemodialysis Treatment 03 if HD machine is being used for plasma exchange 4.2 Ensure the blood flow rate between 50 - 100 ml/minute 4.3 Do not attach dialysate coupling to the plasma filter 4.4 Connect effluent line to the dialysate port of the plasma filter (venous end) 4.5 Attach the end of the effluent line to a urine bag 4.6 Connect a stopper to the dialysate port of the plasma filter (arterial end) 4.7 Prime the effluent line and clamp		
5. Priming procedure for automated PE	Refer operator manual if Automated PE machine is being used		
6. Initiating PE	6.1 Refer to SOP 03 Haemodialysis Treatment Procedure via temporary assesses 6.2 Gradually increase the blood pump speed (not more 100 mls / min) and closely observe plasma effluent in the urine bag 6.3 Observe venous pressure and other alarms closely 6.4 Ensure TMP is kept below 100 mmhg to avoid blood leakage from plasma filter 6.5. Ensure that the rate of replacement match with the rate of effluent		
7. Intradialytic observation	7.1 Observe patient's condition and treatment parameters closely (every 15 minutes) * Assist patient if any problem * Inform doctor if any intra - dialytic complications present	▪ Blood pressure ▪ Pulse ▪ Time ▪ Venous pressure ▪ TMP ▪ Blood flow rate ▪ Replacement in Effluent out	Record all parameter in the PE Chart

Activity	Work Process	Standard	Requirement
8. Terminating PE Treatment	8.1 Refer to SOP 03 Haemodialysis Treatment Procedure via temporary assesses	▪ Standard precaution	Disposeable ▪ Dressing set ▪ Swab/gauze ▪ Plaster ▪ Syringe ▪ Sterile gloves ▪ Mask ▪ Stopper
9. Post PE observation and documentation	9.1 Vital signs: ▪ Blood pressure ▪ Weight ▪ Pulse ▪ Temperature 9.2 Treatment record ▪ Total treatment time ▪ Total plasma removal ▪ Total plasma replacement Any complications		

HAEMOPERFUSION



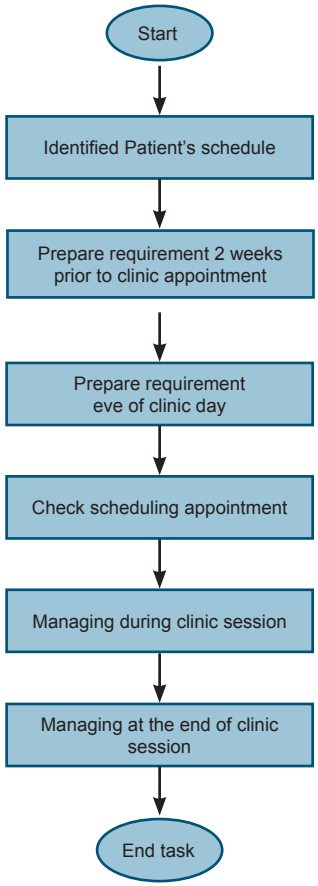
Activity	Work Process	Standard	Requirement
1.Receive Patient/ Check Prescription	1.1. Confirm request for Haemoperfusion Treatment by Nephrologist in case notes 1.2. Check patient's name and MRN 1.3. Check prescription as ordered by Nephrologist • Total duration of treatment • Heparinisation • The following groups are not recommended for this procedure: o Infants and children o Underweight patient o Pregnant women o Patient with heart disease o Thrombocytopenia	• As prescribed by Nephrologist	
2.Pre - treatment assessment	2.1. Assess general condition • Assess catheter • Blood pressure • Pulse • Temperature (if necessary) • Glucose level		**Equipment** ▪ B/P set ▪ Thermometer
3.Preparation of machine, anticoagulant and disposables	3.1. Preparation of haemodialysis machine as in SOP - 04 3.2. Preparation of disposables Refer to consumable	Refer as in information product leaflet	**Haemodialysis machine** • Syringe 10 cc / 20cc • IV Drip set • Sterile Glove • Dressing set • Hemoperfusion Cartridge • Blood Line • Transducer • Swab/Gauze • Plaster • Swab **Drugs/Consumables** • Normal Saline 0.9% • Dextrose 5% • Alcohol 70% • Concentrate 'A' and 'B' • Or Bicart powder

Activity	Work Process	Standard	Requirement
			• Heparin vial 5000 units/ml • Inj. Dextrose 50% **Disposable** • Syringe 10 cc/ 20cc • IV Drip set • Sterile Glove • Dressing set • Hemoperfusion Catridge • Hemodialysis Boodline • Swab/Gauze • Plaster • Swab **Drugs/Consumables** • Normal saline 0.9% • Dextrose 5% • chlorhexidine 2% in 70% alcohol Heparin vial 5000 units/ml
4. Priming of activated charcoal Haemoperfusion column	4.1. Ensure that the activated charcoal Haemoperfusion column is mounted upright in the holder, as indicated on its label 4.2. Set up 5% dextrose I/V line 4.3. Prime the I/V line to expel air bubble and then clamp 4.4. Connect I/V set to arterial needle end of the bloodline 4.5. Set up arterial blood line onto the machine, and ensure all clamps are closed except the main clamp 4.6. Turn on the blood pump and set at 100ml/min to prime the arterial blood line with 500 ml of 5% dextrose	• Priming with dextrose 5% is done in order to prevent drop in blood glucose during treatment	**Equipment** ▪ B/P set ▪ Thermometer

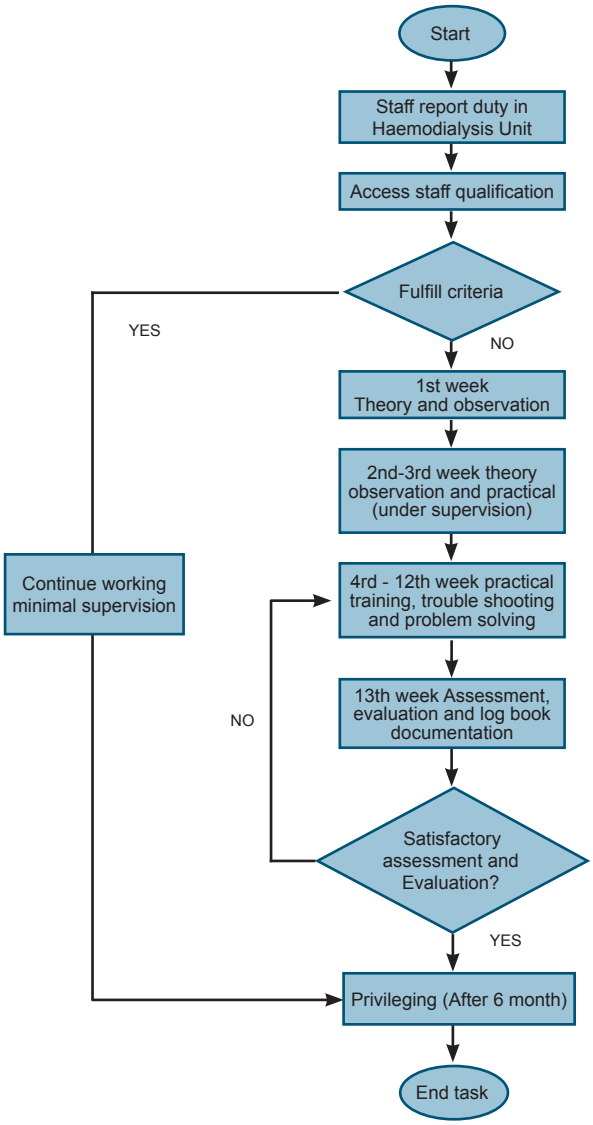
Activity	Work Process	Standard	Requirement
	4.7. Then stop the blood pump 4.8. Connect arterial blood line to arterial inlet of activatedcharcoal Haemoperfusion Cartridge and then invert it with arterial inlet facing down 4.9. Connect venous bloodline to venous outlet of activated charcoal Haemoperfusion Cartridge and ensure the venous chamber monitoring line is clamped 4.10. Place needle end of venous bloodline into a receiver. Needle end of venous bloodline should be left hanging inside the receiver 4.11. Start blood pump 4.12. Continue priming the activated charcoal haemoperfusion cartridge and bloodlines with the remaining 5% dextrose 4.13. Stop blood pump 4.14. Change 5% dextrose to 0.9% normal saline and continue priming of the circuit *** Failure to completely replace the 5% dextrose solution with normal saline and then heparinised saline may lead to Haemolysis due to a drop in osmotic pressure** 4.15. Stop blood pump 4.16. Change 0.9% normal saline to heparinised saline. 4.17. Clamp the main clamp of the venous blood line 4.18. Flush infusion line 4.19. Flush heparin line 4.20. Flush arterial pressure monitoring line 4.21. Flush venous pressure monitoring line 4.22. Flush venous needle end 4.23. Change heparinised saline to 0.9% normal saline	• The entire priming procedure should be done at blood pump flow rate of 100mls/min	

Activity	Work Process	Standard	Requirement
	4.24. Lower the fluid level of both arterial and venous chambers 4.25. Clamp the arterial and venous bloodline 4.26. Clamp I/V line and disconnect from the arterial needle end 4.27. Connect I/V line to infusion line		
5. Set treatment parameters	5.1. Setting of Haemoperfusion prescription 5.1.1. Duration of treatment 5.1.2. Heparinisation	• As prescribed by Nephrologist	
6. Cannulation / Temporary Access	Follow as in SOP 04 or SOP 05 (for patients with temporary vascular access)		
7. Initiating Haemoperfussion treatment	7.1. Swab the needle end of venous bloodline with antiseptic and connect to the venous needle 7.2. Unclamp the venous bloodline 7.3. Expel air bubbles if any 7.4. Unclamp the venous needle 7.5. Activate air bubble detector 7.6. Connect the venous and arterial pressure monitoring line via the transducer protector to the respective monitor port and unclamp 7.7. Turn the activated charcoal Haemoperfussion cartridge in upright position as indicated on its label (arterial end up) 7.8. Start blood pump to a speed of 100mls/min and observe the venous pressure 7.9. Administer bolus heparin 2000 – 4000 units or according to prescription written by Nephrologist. Mount the syringe to the heparin pump to continue hourly maintenance dose if required 7.10. Gradually increase the blood flow rate to the standard flow rate	• Standard precaution • As prescribed by Nephrologist • Blood flow rate is usually 200mls/min but may vary depending on the patient's condition	

Activity	Work Process	Standard	Requirement
8. Observation and monitoring during treatment	Close observation : i. Every 15 min • Venous pressure • TMP ii. Every 30 min • Blood pressure • Pulse • Time • Blood flow rate • Glucose level ***Attend to patient and inform doctor if any problem arises**		Record all parameter in the hemoperfusion Chart
9. Terminating haemoperfusion treatment	9.1. Refer to SOP 04 & SOP 05	Standard precaution	
10. Post haemoperfusion observation and documentation	10.1. Post Haemoperfusion observation for at least 1 hour or until patient stable Vital signs (every 30 min): • Blood pressure • Weight • Pulse • Temperature • Glucose level **Record If any complication**		
11. Discharge	Send patient back to respective ward		

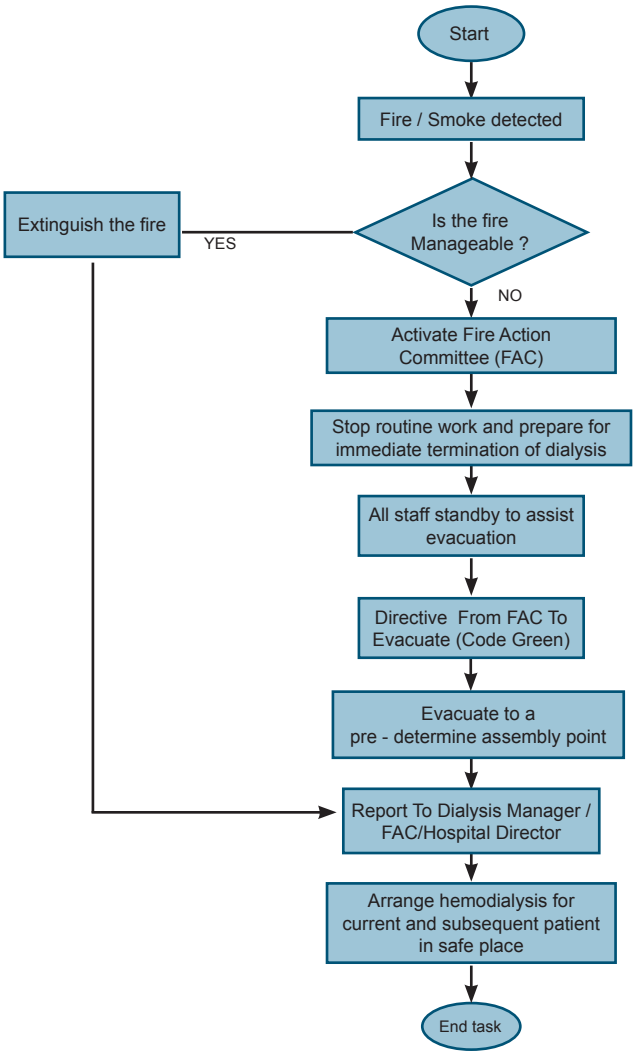
CLINIC PATIENT REVIEW	
OBJECTIVE	To carried out patient's schedule for review by Nephrologist in the clinic season
SCOPE	For all patient undergoing haemodialysis treatment
FLOW CHART	

Activity	Work Process	Standard	Requirement
1.Identified patient's schedule	1.1 Identified the patient's turn according to the schedule		
2.Prepare requirement 2 weeks prior to clinic appointment	2.1. Staff to take blood specimen 2.2. Remind patients of their clinic appointment if necessary 2.3. Send for ECG, x-rays if required 2.4. Fill in all laboratory results in the Dialysis Laboratory Result Chart	Standard precaution	
3.Prepare requirement eve of clinic day	3.1. Retrieve all patients medical records, clinical charts, flow chart, ECG, x-rays if any 3.2. Get ready (if possible) medical records and x - rays of new referral cases		
4.Patient arrive on clinic day	4.1. Patients are scheduled to come by block appointment 4.2. If patient comes unscheduled, reschedule if time permits 4.3. Priority will be given depending on urgency of cases		
5.Managing during clinic session	5.1. Assist Nephrologist / Doctor in examining patients 5.2. Inform patients of changes in medication 5.3. Inform patients of follow up frequency, and referral to other discipline if any		
6.Managing at the End of Clinic Session	6.1. Assist patient to make appointment if referred to any other specialty 6.2. Give referral letter to patient after making appointment and inform date and time 6.3. Give appointment date to patient for blood taking and next clinic session 6.4. Carry out all treatment changes as ordered by the doctor		

NEW STAFF TRAINING PROGRAM	
OBJECTIVE	To ensure all haemodialysis staff are competent to carry out haemodialyis treatment according to National Haemodialysis Quality Standards and Haemodialysis Standard Operating Procedures
SCOPE	For all new and existing haemodialysis staff
FLOW CHART	

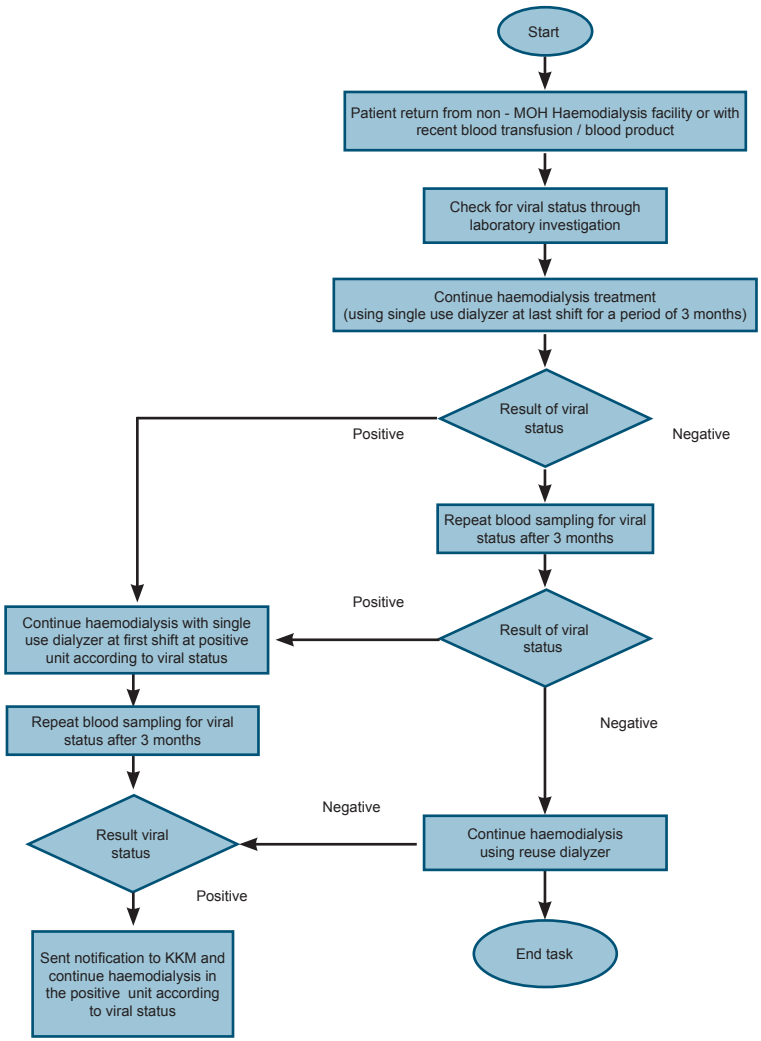
Activity	Work Process	Standard	Requirement
1.Staff report duty in Haemodialysis Unit	1.1. General departmental orientation		
2.Access staff qualification	2.1. Collect and keep copies of all relevant document and certificate • Diploma Pembantu Perubatan / Diploma Kejururawatan • Post Basic Renal Certification • Annual Renewal Certificate • Haemodialysis Care Allied Health Professionals Credentialing & Privileging Certificate 2.2. Discuss training plan with new Haemodialysis staff without Post Basic Renal Certification 2.3. Give orientation kit • Log Book and explain the contents and time frame for completion of Log Book • HD SOP • National HD Quality Standards 2.4. Assign mentor to oversee the training program		
3.1st week theory and observation	3.1. Tutorial in : • Introduction to RRT • Principal of Dialysis • Haemodialysis vascular access	CPG on RRT National HD Quality Standards	
4.2nd-3rd week theory observation and practical (under supervision)	4.1. Tutorial in : • Procedure Heamodialysis (Refer to Standard Operating Procedures in Haemodialysis) • Haemodialysis equipment and consumable use • Water treatment 4.2. Observation and practical 2nd week: 4.2.1. Assessment of patient for Haemodialysis treatment 4.2.2. Preparation of Haemodialysis machine 4.2.3. Setting up and priming of dialyzer and bloodline	Standard operating procedures in haemodialysis book	

Activity	Work Process	Standard	Requirement
	4.2.4. Anticoagulation therapy 4.2.5. Care of arterio-venous fistula (native and graft) 3rd Week : 4.2.6. Cannulation technique 4.2.7. Initiation of Haemodialysis treatment 4.2.8. Termination of Haemodialysis treatment 4.2.9. Disinfection and decalcification of Haemodialysis machine		
5.4th - 12th week Practical, trouble shooting and problem solving	5.1. Theory and Practical: 5.1.1. Reprocessing of dialyzers 5.1.2. Management of intradialytic complications 5.1.3. Identification of components and functions of Haemodialysis machine 5.1.4. Monitoring and management of water treatment system 5.1.5. Parenteral iron administration 5.1.6. Management of Erythropoeisis stimulating agents 5.1.7. Assessment of dialysis adequacy 5.1.8. Vascular access recirculation study 5.2. Trouble shooting and problem solving 5.2.1. Intradialytic complications eg Hypotention, first use syndrome 5.2.2. Haemodialysis machine alarm eg. Venous pressure alarm, conductivity alarm	Refer to criteria set by Ministry of Health for credentialing of Haemodialysis staff	Standard operating procedures in Haemodialysis book **Log Book**
6.13th week Assessment and Evaluation	6.1. Ensure Log Book is completed 6.2. Practical assessment based on Haemodialysis SOP 6.3. Viva assessment 6.3.1. Theory 6.3.2. Trouble shooting 6.3.3. Problem solving		
7. Privilege	Apply for Privileging Certification after 6 month		Privileging Form

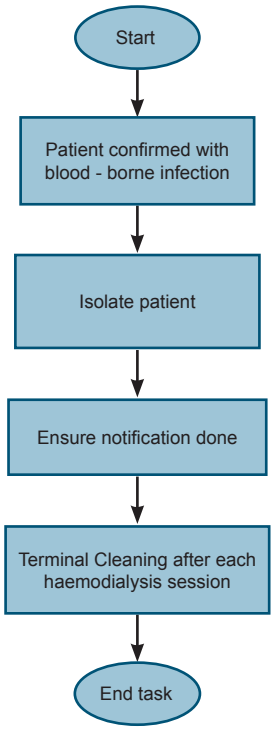
FIRE EMERGENCY EVACUATION PROCEDURES	
OBJECTIVE	The purpose of this procedure is to establish a plan for the safe evacuation of all personnel from the facility/building in the event of fire
SCOPE	All staff, patient, relative and customer in the Dialysis Unit
FLOW CHART	

Activity	Work Process	Standard	Requirement
1. Fire / Smoke detected	1.1. Confirm fire 1.2. Activate the nearest Fire Alarm Break Glass IMMEDIATELY 1.3. Contact Emergency Call Center (ECC) from nearest safe area 1.4. Provide details to ECC of exact location and extent of fire	Standard Operating Procedure Fire Evacuation and Disaster Plan	Patient and staff roster
2. Extinguish the fire	2.1. Extinguish the fire if it is manageable (Not more than 1 extinguisher to be used) 2.2. If fire not manageable, plan to evacuate immediately to safe place	Fire extinguisher guide	Equipment :- • Phone • Fire extinguisher
3. Activate fire action plan	3.1. Alert everyone in the facility to evacuate in an orderly manner using the nearest exit	Role and responsibility of Fire Action Committee member	Patient and staff roster
4. Stop routine work and prepare for immediate termination of dialysis.	4.1. Clamp the blood line, AVF needles or catheter, disconnect and cap off 4.2. Prioritise patient by their mobility • Ambulating • Wheelchair bound • Stretcher bound 4.3. Switch off all electrical equipments 4.4. Bring along patient and staff roster (for head count) 4.5. Leave all unnecessary items behind 4.6. Evacuate in an orderly manner once ready	Standard Operating Procedure Fire Eva cuation and Disaster Plan	Patient and staff roster
5. Evacuation procedure	5.1. Ensure that the patient, relatives, support service personnel and other staff present in the Dialysis Unit, are given particular attention during evacuation 5.2. Assist people to the evacuation assembly point and ensure they don't obstruct traffic or emergency responders. Follow instructions by FAC to assembly point	Standard Operating Procedure Fire Evacuation and Disaster Plan Assembly point should at least 10 meter from the affected building	Patient and staff roster

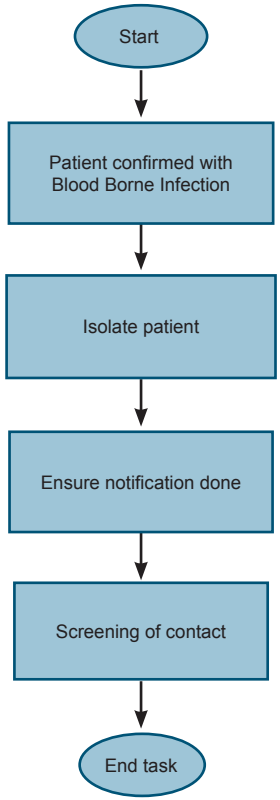
Activity	Work Process	Standard	Requirement
	5.4. Roll call and head count all patient, relative and other staff at assembly point. Identify any missing persons and report to first responder 5.5. Assist FAC to use any available information or floor plan of the affected area 5.6. Evaluate patient by medical team 5.7. Do Not re-enter the building		
6.Report and documentation	6.1. Floor Manager shall report any known information about the nature and location of the emergency to the evacuation director who will relay the information to the first respondent 6.2. Report to the evacuation director and document any unaccounted persons who may have remained behind or missing, especially if the affected area is known		
7.Arrange hemodialysis for current and subsequent patient in safe location	7.1. Evaluate current patient by medical team 7.2. Staff and doctor ensure current and subsequent patient affected receive adequate dialysis in safe location		

MANAGEMENT OF PATIENT POST BLOOD TRANSFUSION AND AFTER LODGING IN non - MOH HAEMODIALYSIS CENTRE	
OBJECTIVE	To prevent cross infection in haemodialysis facility
SCOPE	All patients who had a recent blood transfusion or with history of lodging in non - MOH Haemodialysis centre
FLOW CHART	

Activity	Work Process	Standard	Requirement
1. Patient return from non - MOH Haemodialysis facility or with recent blood transfusion / blood product	Explain to Patient regarding the need for preventing infection such as a. Viral screening b. Change of haemodialysis treatment shift c. Single use dialyzer d. Isolation if needed	Refer to Appendix 8 Infection control in dialysis unit (No. 4e)	
2. Check blood sample for viral status	Request for blood investigation: a. HBsAg b. Anti-HCV c. Anti-HIV		
3. Haemodialysis treatment	3.1. Continue haemodialysis treatment a. Dialyzer: single use b. Schedule: Last shift c. Location: negative unit d. Duration: period of 3 months 3.2. If baseline virology result is negative: Continue Haemodialysis treatment as above (3.1) 3.3. If baseline virology result is positive: a. Dialyzer: single use b. Schedule: first shift c. Location: positive unit d. Duration: period of 3 months		
4. Repeat blood sampling for viral status	4.1. Repeat blood sampling for viral status after 3 months 4.2. If result Negative a. Dialyzer: Reuse b. Schedule: according to previous shift c. Location: previous unit 4.3. If result positive, repeat blood sampling for: a. Hepatitis B: HBV DNA b. Hepatitis C: HCV RNA c. HIV : anti - HIV 4.4. Isolate patient and come out with incident reporting and notification of infectious diseases	Refer to Appendix 8 Infection control in Dialysis Unit (No. 10)	Borang notifikasi penyakit berjangkit Rev. 2010

HEMODIALYSIS PATIENT WITH BLOOD - BORNE INFECTION MRSA / MRO / CRE	
OBJECTIVE	To prevent cross infection in haemodialysis facility
SCOPE	Chronic Haemodialysis patients who are confirmed with blood - borne infection (eg. MRSA / MRO/ CRE)
FLOW CHART	

Activity	Work Process	Standard	Requirement
1.Patient confirm with Blood borne infection (eg MRSA / MRO / CRE)	Receive HD prescription from Nephrologist/Medical Officer		
2.Isolate patient	2.1. Isolate patient during Haemodialysis procedure 2.2. Staff to practice barrier nursing 2.3. Perform Haemodialysis using single use dialyzer	Refer to Appendix 8 Infection Control in dialysis unit (No. 10) Refer to Policies and Procedures on infection Control KKM	
3.Notification of infection	3.1. Ensure notification sent to relevant authority	Refer to Appendix 8-Infection control in dialysis unit (No. 10)	Borang WEHU L1/L2
4.Terminal cleaning	4.1. Inform concession company 4.2. Perform Terminal Cleaning after each haemodialysis session 4.3. Change curtain each haemodialysis session	Refer to Appendix 8 Infection control in dialysis unit (No. 5c)	Terminal Cleaning kit

HEMODIALYSIS PATIENT WITH AIR - BORNE INFECTION	
OBJECTIVE	To prevent cross infection of air - borne infection among staff and haemodialysis patients
SCOPE	Chronic haemodialysis patients who are confirmed with air - borne infection (eg. Tuberculosis infection, H1N1, MERS-cov, COVID-19)
FLOW CHART	

Activity	Work Process	Standard	Requirement
1.Patient confirm with air - borne infection (eg. Tuberculosis infection, H1N1, MERS-cov, COVID-19)	Receive HD prescription from Nephrologist / Medical Officer		
2.Isolate patient	2.1. Isolate patient during Haemodialysis procedure 2.2. Staff to practice barrier nursing 2.3. Patient must put on 3ply surgical mask	Refer to Appendix 8 -Infection control in dialysis unit (no. 10) For Tuberculosis refer to CPG Management of Tuberculosis (3rd Edition) For MERS-Cov Refer Guideline on Middle East Respiratory Syndrome (MERS) Management in Malaysia For covid-19 Refer to SOP for Management of COVID-19 in Dialysis Centres and Nephrology Unit	
3.Ensure notification done	3.1. Ensure notification sent to relevant authority		Borang WEHU L1/L2
4.Screening of contact	4.1. List all immediate contact 4.2. Despatch the list to relevant authority (eg.OSH / Respiratory / medical unit) for screening of contact		

Appendix 1

HAEMODIALYSIS PATIENT ORIENTATION CHECKLIST

NAME OF PATIENT: .....
AGE: .....
NRIC: .....
GENDER: .....
UNIT / DEPARTMENT: .....

NO	TITLE	DATE	SIGNATURE
1.	Orientation to HD staff		
2.	Haemodialysis schedule i. Adherence ii. Change of treatment schedule iii. Punctuality iv. Queue management system		
3.	Consent for haemodialysis		
4.	Counseling for transplant		
5.	Haemodialysis prescription		
6.	Routine blood test		
7.	3 monthly clinic follow up and referral to other department		
8.	Unschedule appointment i. HD schedule ii. Medical illness		
9.	Health education i. Compliance towards dialysis ii. Compliance towards medications iii. Compliance towards diet & fluid intake		
10.	Billing		
11.	Medical support		
12.	Mentoring		
13.	Complain		

Appendix 1

NO	TITLE	DATE	SIGNATURE
14.	Patient's Right		
15.	Hari Bersama Pelanggan		
16	Public facility		
17.	i. Toilet ii. Surau iii. Parking iv. Registration counter v. Cafeteria		
18.	Consent		
19.	Arrangement of haemodialysis in others MOH centre		
20.	Safety issue		
21.	Diet		
22.	Clinical waste disposal		
23.	Hand hygiene		
24.	Important contact numbers		
25.	Safety of personal belongings at own risk		

PATIENT'S NAME : ……

SIGNATURE : ……

DATE: ……

NAME OF UNIT HEAD : ……

SIGNATURE: ……

DATE : ……

Appendix 2

HEMODIALYSIS TREATMENT RECORD

(This record must be completed by staff for each treatment procedure)

NAME : .....

DATE OF HD / SHIFT : .....

TIME STARTED : .....

TIME ENDED : .....

NAME OF STAFF : 1 ..... (starting)
2. ..... (ending)

Treatment Type : ☐ Chronic ☐ Acute

1. HD TREATMENT		MEDICATION	INVESTIGATIONS
Data HD Variables as treated :- Td = ... Min Qb = ... ml/min Qd = ... ml/min UF = ... L Heparin Initial = ...units Hourly = ... units	**Dialyser** (Please tick ☑ accordingly) Dialyser (Brand & Model) ..... First Use : ☐ Reuse : ☐ Number of use :	Medication to be administered : 1..... 2..... 3..... 4.....	Investigation to be carried out (if any): 1..... 2..... 3..... 4.....

2. PRE HD ASSESSMENT

(Please tick ☑ accordingly)

General appearance :

Fluid overload : Breathing / SOB Yes ☐ No ☐

: Ankle oedema Yes ☐ No ☐

: Breathlessness Yes ☐ No ☐

Fistula :

Thrill and Bruit : Yes ☐ No ☐

Inflammation : Yes ☐ No ☐

Heamatoma : Yes ☐ No ☐

Aneurysm Yes ☐ No ☐

Pus Yes ☐ No ☐

Limb oedema Yes ☐ No ☐

Remarks : _____

3. OBSERVATION

PRE - HD	INTRADIALYTIC (Hourly)								POST - HD
Sitting B/P : ___/___mmHg Pulse : _____ / min Weight : _____ kg Temperature : _____˚C Pain Score : ..... IDWG - _____ kg (Intradialytic Weight Gain)	Time	BP	Pulse	Dial. Temp.	Qb	Hep.	VP	TMP	Sitting B/P : ___/__mmHg Pulse : _____ / min Weight : _____ kg Temperature : _____ ˚C Pain Score : .....
	TMP – Transmembrane Pressure (mmHg) Qb – Blood Flow Rate (ml/min) VP – Venous Pressure								

4. CRITICAL INCIDENT REPORT : (Any incident occuring during HD treatment which needed medical intervention)

(Please tick ☑ accordingly)

Yes ☐ No ☐

Incident
- ☐ Chills & Rigor
- ☐ Hypotension
- ☐ Hypertension
- ☐ Cramps
- ☐ Chest pain
- ☐ Vomiting
- ☐ Blood loss : Volume : ..... ml
  Cause : .....
- ☐ Others (state) : .....

Actions & Immediate care : .....

.....

5. POST HD ASSESSMENT

(Please tick ☑ accordingly)

- ☐ Comfortable
- ☐ Weak
- ☐ Giddiness
- ☐ Hypotension
- ☐ Hypertension
- ☐ SOB (Shorthness of breath)

Blood volume Processed : L

Others : .....

Actions & Immediate care : .....

.....

GENERAL REMARKS

.....

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Appendix 2

DAILY OPERATING LOG FOR REVERSE OSMOSIS WATER TREATMENT SYSTEM

Date From : ……..to ……..

DAY		MON	TUE	WED	THU	FRI	SAT	SUN
DATE								
RAW WATER TANK LEVEL								
TIMER POSITION								
Sediment Filter (Day)								
Carbon Filter 1 (Day)								
Carbon Filter 2 (Day)								
Softener (Day)								
RAW WATER PUMP SELECTION								
Pump 1 / Pump 2 (change daily)								
PRESSURE	*RANGE							
Raw Water Pump (psi)								
Guard Filter In (psi)								
Guard Filter Out (psi)								
Product Pressure (psi)								
System In (psi)								
System Out (psi)								
VALUE	*RANGE							
Product Flow (LPM)								
Reject Flow (LPM)								
Conductivity (uS)								
RO Run Time (Hour)								
Time of logging								
SOFT WATER ANALYSIS	RANGE							
Water Hardness Test (ppm)	< 17							
Chlorine Test (ppm)	< 0.1							

MISCELLANEOUS					
Brine Tank (Full / Empty)					
UV Light %					
Heat Disinfection Date					
REMARKS / INTERVENTION					
Date :					
Date :					
Date :					
Date :					
Date :					
INITIAL / SIGNATURE					
Staff Dialysis Manager Nephrologist					

* Range: refer to manufacturer recommendation

Date-Guard Filter Replaced …… …… Signature: ……..

Date-Bacterial Filter Replaced …… …… Signature: ……..

Appendix 4

PRESCRIPTION FOR HAEMODIALYSIS TREATMENT

Name of Patients: …… MRN No: …… Location:……..……

1. Type of haemodialysis:
   - ☐ a. Conventional HD
   - ☐ b. "Gentle" Haemodialysis
   - ☐ c. Sequential Ultrafiltration
   - ☐ d. SLED / SLEDf (Qf:……..……)
   - ☐ e. HDF (vol of exchange:……..L)

2. Type of haemodialysis machine
   - ☐ a. Negative machine
   - ☐ b. HCV +ve machine
   - ☐ c. HBV +ve machine
   - ☐ d. HIV +ve machine
   - ☐ e. Unknown machine

3. Duration of treatment:
   - ☐ 2 hours
   - ☐ 3 hours
   - ☐ 4 hours
   - ☐ Others: ……hours

4. Type of vascular access
   - ☐ a. Non - cuffed catheter: ……..……
   - ☐ b. Cuffed catheter: ……..……
   - ☐ c. Native fistula:……..……..
   - ☐ d. Graft: ……..……

5. Heparinisation
   - ☐ a. Normal Heparin
   - ☐ b. Tight Heparin
   - ☐ c. Heparin Free
   - ☐ d. Others pls specified …….

6. Dialysate flow rate
   - ☐ a. 100ml/min
   - ☐ b. 300ml/min
   - ☐ c. 500ml/min
   - ☐ d. Others: ……..……ml/min

7. Blood flow rate: ……..ml/min

8. Ultrafiltration: ……L/dialysis

9. Dialysate temperature
   - ☐ a. Normal temperature
   - ☐ b. Others: ……0C

10. Reprocessing
    - ☐ a. Reuse
    - ☐ b. Single use

11. Medications /Transfusion during treatment
    - ☐ a. ESA: ……
    - ☐ b. Bld/Bld products: ……
    - ☐ c. I/V meds: ……
    - ☐ d. Others: ……

12. Other Instructions

    a. ……..……
    b. ……..……
    c. ……..……
    d. ……..……

Prescribed By: Dr ……

Date: ……../……../…….. Signature: ……..……

** This prescription is valid for 2 weeks*

Appendix 5

Interval Normal Saline Flushing Chart

Name Of Patient :_____

ID No. : _____

Date : _____

Indications for Heparin Free HD : _____

Time of flushing	Volume of Flushing*	Remarks	Intervention	Staff signature

* in normal practice about 150ml Normal Saline flushing is done every 20 min

Appendix 6

CALCULATION OF FILTRATION FRACTION

During haemodialysis treatment, the filtration fraction should be maintained below 30% in order to minimise clotting of extra corporeal circuit as to prevent blood lost.

Example:
Blood flow rate per minute : 300 ml

Ultrafiltration: 3000 ml

Ultrafiltration rate per minute: 3000/240 minute = 12.5 ml/min

[Filtration fraction = Ultrafiltration rate per minute / Blood flow rate per minute x 100%]

- 12.5 / 300 x 100 = 4.16 %

Appendix 7

1. Tight heparin, constant-infusion method

a. Obtain baseline clotting time (ACT or Lee–White clotting time (LWCT))
b. Initial bolus dose = 750 units. (10 - 20unit/kg body wt)
c. Recheck ACT or LWCT after 3 minutes. Administer a supplemental bolus dose if needed to prolong ACT or LWCT to a value of baseline plus 40%
d. Start dialysis and heparin infusion at a rate of 600 units (5 - 10 unit/kg body wt) per hour
e. Monitor clotting times every 30 minutes
f. Adjust the heparin infusion rate to keep ACT or LWCT at baseline plus 40% Continue heparin infusion until 1 hour before the end of dialysis

2. Activated clotting time (ACT).

The ACT test is similar to the WBPTT test but uses siliceous earth to accelerate the clotting process. ACT is less reproducible than WBPTT, especially at low blood heparin levels. Devices that automatically tilt the tube and detect clot formation facilitate standardization and reproducibility of both WBPTT and ACT. It is for unfractionated heparin monitoring only

1.1 ACT Monitoring Procedure

a. Take blood sample without dilution effect (saline/heparin) before giving bolus heparin
b. Inject blood sample into ACT reagent tube
c. Activate ACT machine when sample comes into contact with reagent in tube. Gently shake the tube till reagent completely dissolved
d. Place tube in ACT machine
e. Wait till machine give buzzer alarm
f. Record baseline ACT reading

1.2. Target clotting time during dialysis

Test	Baseline value	Routine heparin (Desired range)		Tight heparin (Desired range)	
		During dialysis	End of dialysis	During dialysis	End of dialysis
ACT	120 -150s	+80%	+40%	+40%	+40%
		(200-250s)	(170-190s)	(170-190s)	(170-190s)

3. Lee–White clotting time (LWCT).

The Lee–White test is performed by adding 0.4 mL of blood to a glass tube and inverting the tube every 30 seconds until the blood clots. Usually, the blood is kept at room temperature. Disadvantages of the LWCT test include the long period of time required before clotting occurs, extensive use of technician time required, and the relatively poor standardization and reproducibility of the test. LWCT is the least desirable method of monitoring clotting during hemodialysis

Test	Baseline Value	During Dialysis	At End of Dialysis
Lee–White clotting time (LWCT)	4–8 min	9–16min	9–16min

Appendix 8

INFECTION CONTROL IN DIALYSIS UNIT

1. Universal Precaution
   a. Hand hygiene
      - Use hand disinfectant in between patients
      - Wash hands with soap and clean running water if hands are soiled
      - Ensure there are disposable paper towels available at hand basin
      - Ensure hand basin is large enough to correctly wash hands and scrub without touching basin
      - Hands-free tap should be provided

   b. Wear gloves
      - Change in between patients
      - Use hand disinfection or wash hands after removal of gloves
      - Beware of false sense of security
   c. Do not recap needles
   d. Provide sharp container
      - Placed close as practical to point of use
      - Not accessible to children
      - Container puncture resistant
      - Container leak proof and water proof
      - Wide opening to allow for ease of drop
      - Sealed and disposed when 3/4 full
      - Securely sealed before disposal
   e. Staff attire
      - Remove bracelets, rings
      - Wear plastic gown
      - Remove protective wear as soon as possible on completion of treatment
      - Do not wear gown, overshoes to lunch
      - Do not wear gown outside of work area
      - Do not wear face mask under chin
      - Ensure clean work attire every shift

2. Dedicated Treatment Area.
   a. All patient shall be isolated according to the viral status
   b. All Hepatitis B and C patients shall be dialysed strictly at their respective Unit.
   c. Retrovirus positive patients shall be dialysed with separate machine in separate area
   d. Patients with Tuberculosis shall be dialysed in a dedicated area with full facility to avoid spread Tuberculosis between patient and staff. Ideally they must be placed at negative pressure control isolation room
   e. Dedicated/separated room for dialyzers reprocessing machine should be available according to specific viral status.
   f. All the treatment area must be cleaned with recommended antiseptic agent (Germiside) in between patient initiated on haemodialysis treatment and after completion of haemodialysis treatment. Cleaning shall also be considered in the event of blood or chemicals spillage

3. Personnel
   c. Continues infection control awareness programs and documented

4. Patient.
   a. All new patients shall be screened for viral status before being accepted into the unit
   b. All center patients shall be screened for viral status 3 monthly
   c. All patients must have vaccination record
   d. All patients shall be given infection control education program and undergo audit on hand hygiene at least yearly including caregiver
   e. Patients who had a recent blood transfusion or return from non-MOH centre shall have their viral screen checked upon their return and repeated after 3 months. During this period the unit may either adopt single use dialyser or monitor liver enzymes monthly
   f. All patients shall be informed about their viral status including tuberculosis screening result. The importance of isolation shall be informed to affected patients with viral infection and other infections as to avoid cross infection in unit
   g. Patient education program related to infection control must be provided by organization

5. Haemodialysis facilities
   a. Haemodialysis machine
      - Decalfilcation and disinfection at the end of the day
      - Rinse machine between every dialysis session
      - All haemodislysis machine shall be cleaned with disinfection wipes in between dialysis session
      - Use external pressure transducers for each patient and do not re-use
      - Haemodialyser port caps, interior pathways of dialysis machine should be disinfected at the end of the day or after dialyzing a patient with unknown hepatitis status with an intermediate level disinfectant according to manufacturer's recommendations
      - Bleaching as recommended by manufacturer should be done for all haemodialysis machine once a week
   b. Dialysis chair, bed, table, cardiac table, dressing trolley
      - All dialysis chair / bed should be cleaned with disinfection wipes after each dialysis session
   c. Isolation room
      - For isolation room (infection area) terminal cleaning should be done after each haemodialysis session
   d. Dialyzer Reprocessing Machine
      - Calibration test shall be done for all dialyzer reprocessing machine, every morning
      - Place used dialyser and blood lines in individual leak proof containers for transport from station to reprocessing or disposal area
      - Do not mix dialysers and blood lines of different patients together
      - All dialyzer-reprocessing machine should be cleaned with disinfection wipes at the end of the day
      - Sanitize all dialyser reprocessing machine at the end of the day
      - Bleaching should be done for all dialyzer reprocessing machine once a month
   e. Dialyser storage box/pigeonhole
      - The dialyser storage/pigeon hole should be cleaned with disinfection wipes at the end of the day
      - The dialyser storage area should be away from direct sun light

f. Water treatment system
   - Ensure monthly microbiology analysis done which comprises of total bacterial count and endotoxin unit from post - RO, first treatment point, last treatment point and from RO water storage tank (if being use for dialyser reprocessing)
   - If the result falls within the action limit, additional disinfection is required and to be followed with reanalysis of water sample.
   - Disinfection of RO distribution pipe shall be done weekly if the system is Incorporated with heat disinfection Unit
   - Six (6) monthly chemical disinfection of RO distribution pipe shall be done if the system is not Incorporated with heat disinfection Unit
   - Water treatment room shall be mopped on dally basis

6. Drug/ Injection Preparation Room (Clean Utility Room)
   a. All preparation of drugs/injection should be done in Clean Utility Room. All staff shall use appropriate PPE during preparation of drugs/ injection. (CDC guideline Recommendations for Preventing Transmission of Infections among Chronic Haemodialysis Patients). The room should be cleaned with germicidal agent at least once a day or more frequent if spillage occurs
   b. Medications and syringes used in the patient's station should not be returned to the clean area
   c. Single-use vials are strongly encouraged. Multiple-use vials (e.g. heparin) if used, are to be prepared in a clean area and all doses to be drawn in the same session. DO NOT USE reused needles or syringes

7. Waste Product Management
   a. All clinical waste products should be disposed according to environmental act
   b. Waste should be segregated and contained at source
   c. Waste bags must have sufficient strength
   d. Waste bags should not be over filled
   e. Waste bags should be tied and stored in a waste room until collection
   f. Waste bags should be appropriately colour-coded
   g. Gloves must be worn when handling waste bags
   h. All sharp items should be dispose into the dedicated sharp bin and must be sealed after reaching its maximum allowable limit before sending to the clinical waste management service for disposal
   i. Clinical waste product should be disposed into the dedicated clinical waste bin and disposed every day or every shift according to unit policy

8. Cleaning & Housekeeping
   a. Bins, floors and bench tops cleaned with a Sodium Hypochlorite solution
   b. Walls and windows washed every 3 months
   c. Curtains changed every 3 months
   d. Cleaning solution mixed daily 1part Sodium hypochlorite / 10 parts water
   e. Cleaning equipment to not be used outside of dialysis unit
   f. Housekeeping personnel adhere to dress code
   g. All spilled blood MUST be removed immediately

9. Infection Control staff/team
   Every Unit shall appoint Infection Staff / Team to carry out an audit on infection control practices to ensure adherence among the staff members

10. Notification
    a. All sero-convertion shall be reported to the NRR and Disease Control Division of Ministry Of Health within 24 hours
    b. If staff known to have Tuberculosis the staff In - charge shall report to Occupational Safety and Health (OSH) Unit and Disease Control Division Ministry of Health within 24 hours
    c. If patient known to have tuberculosis the staff in charge shall report to Disease Control Division Ministry of Health within 24 hours
    d. If patient known to have resistance bacteria/viral/fungus the staff in charge shall notify to infection control unit within 24 hours

11. Recommended Audit
    a. Hand hygiene
    b. Catheter Exit Site Care

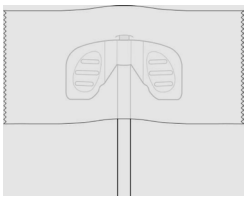
12. Miscellaneous
    a. There should be adequate space for each patient (at least 4.5 sq meter)
    b. Ensure general cleanliness of the unit
    c. Avoid touching surfaces with gloved hands that will subsequently be touched with un-gloved hands before being cleaned
    d. Cleaning of external surfaces of the dialysis machine and other surfaces that are touched frequently and potentially contaminated with patients blood
    e. Avoid clutter to facilitate adequate cleaning and disinfection
    f. Routine staff training and education on infection control practices
    g. Routine training and education for patients and their families on infection control

Appendix 9

Taping technique

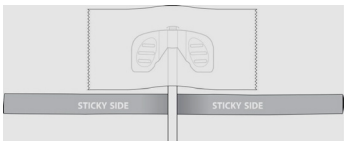
Figure 1. Securing needles using the 'chevron' taping technique

Step 1



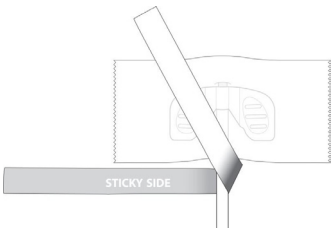
The needle is fixed in place by a rectangle of adhesive fabric (such as Mefix, Mölnlycke Health Care)

Step 2

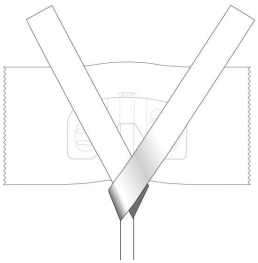


The tape (such as Millipore, 3D) used to make the chevron is positioned under the needle tubing close to the adhesive fabric with the sticky side facing up

Step 3

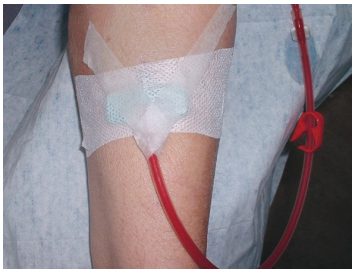


Step 4

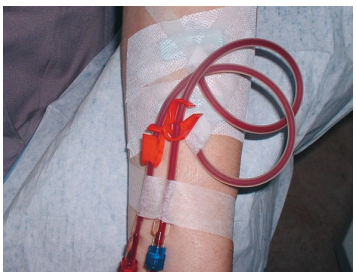


The ends of the tape are then crossed over to form the 'chevron' which helps secure the wings of the needle and resists tugging on the needle tubing

Ref: Chamney, M. J., Van Waeleghem, J. P., Lindley, E. and Pancírová, J. (2008). Venous needle dislodgement: how to minimize the risks. Journal of Re nal Care, 34(4), pp. 163-168. doi: 10.1111/j.1755-6686.2008. 00047.x



Haemodialysis units should have a consistent procedure for taping needles and blood lines



Blood lines should be looped loosely to allow movement of the patient and to prevent blood lines pulling on the needles