

OFFICIAL

SA Health

Clinical Guideline No: CG009

Management of complications during Haemodialysis

Version 1.0

Approval date: 02/04/2025



Government
of South Australia

SA Health

Management of complications during Haemodialysis Clinical Guideline

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1. Name of clinical guideline

Management of complications during Haemodialysis

2. Key points

This Clinical Guideline outlines the process for the management of haemodialysis complications including:

- > Air Embolism
- > Blood Detected in Dialysate
- > Cardiac Arrest
- > Chest Pain
- > Clotting of circuit
- > Seizures
- > Muscle Cramps
- > Dialysis Disequilibrium Syndrome
- > Febrile Reaction
- > Dialyser Reactions
- > Acute Haemolysis
- > Intradialytic Hypotension
- > Exsanguination

3. Guideline statement

3.1 Purpose of guideline

This clinical guideline outlines the process for the management of Haemodialysis Complications. This clinical guideline has been prepared to promote and facilitate standardisation and consistency of practice, using a multidisciplinary approach. The clinical guideline is based on a review of published evidence and expert opinion.

3.2 Scope of guideline

This clinical guideline only applies to registered/enrolled nurses and credentialed Aboriginal health practitioners who work in Haemodialysis units.

Clinicians must also adhere to relevant SA Health policies and guidelines including these organisational wide instructions when undertaking any of these procedures.

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Health practitioners in the South Australian public health sector are expected to review specific details of each patient and professionally assess the applicability of the relevant clinical guideline to that clinical situation.

If for good clinical reasons, a decision is made to depart from the clinical guideline, the responsible clinician must document in the patient's electronic medical record, the decision made, by whom, and detailed reasons for the departure from the clinical guideline.

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This clinical guideline does not address all the elements of clinical practice and assumes that the individual clinicians are responsible for discussing care with patients in an environment that is culturally appropriate, and which enables respectful confidential discussion. This includes:

- > The use of interpreter services where necessary,
- > Advising consumers of their choice and ensuring informed consent is obtained,
- > Providing care within scope of practice, meeting all legislative requirements, and maintaining standards of professional conduct, and
- > Documenting all care in accordance with mandatory and local requirements.

4. Background

Nursing management of complications of haemodialysis involves a comprehensive approach to identifying, preventing, and treating potential complications that may arise during or after haemodialysis sessions. Haemodialysis is a life-saving treatment for individuals with end-stage renal disease (ESRD), but it can also lead to various complications due to its invasive nature and the underlying health conditions of patients.

Nursing management of complications of haemodialysis:

1. **Patient Assessment:** Before each haemodialysis session, nurses perform a thorough assessment of the patient's vital signs, fluid status, weight, and overall health condition. This assessment helps to identify any existing complications or potential risk factors.
2. **Vascular Access Monitoring:** One of the critical aspects of haemodialysis nursing management is monitoring the vascular access site. This may include arteriovenous fistulas (AVF), arteriovenous grafts (AVG), or central venous catheters (CVC). Nurses need to assess for signs of infection, thrombosis, or poor blood flow at the access site.
3. **Fluid Management:** Maintaining fluid balance is crucial during haemodialysis to prevent complications such as hypotension, fluid overload, or electrolyte imbalances. Nurses monitor fluid intake and output closely and adjust ultrafiltration rates based on the patient's condition.
4. **Blood Pressure Management:** Haemodialysis often causes fluctuations in blood pressure, including hypotension or hypertension. Nurses closely monitor blood pressure during dialysis sessions and intervene promptly to stabilize it using medications, adjusting fluid removal rates, or changing the patient's position.
5. **Electrolyte Monitoring and Management:** Haemodialysis can result in electrolyte imbalances, including hyperkalaemia or hypokalaemia. Nurses regularly monitor electrolyte levels and administer appropriate medications or adjust dialysate composition as needed.
6. **Anaemia Management:** Patients undergoing haemodialysis often experience anaemia due to reduced erythropoietin production. Nurses monitor haemoglobin levels and administer erythropoiesis-stimulating agents (ESAs) or iron supplements to manage anaemia effectively.
7. **Infection Control:** Infection prevention is paramount in haemodialysis units due to the increased risk of bloodstream infections associated with vascular access. Nurses adhere strictly to infection control protocols, including hand hygiene, aseptic techniques during access care, and surveillance for signs of infection.
8. **Patient Education:** Nurses play a crucial role in educating patients about self-care practices, including dietary restrictions, medication adherence, and recognizing signs of complications. Empowering patients with knowledge help them actively participate in their care and reduce the risk of complications.

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9. **Collaborative Care:** Nursing management of complications of haemodialysis often requires collaboration with a multidisciplinary team, including nephrologists, dietitians, social workers, and pharmacists. Open communication and coordinated care ensure comprehensive support for patients.
10. **Documentation and Monitoring:** Accurate documentation of nursing assessments, individual patient responses is essential for tracking trends, identifying potential issues, and evaluating the effectiveness of interventions. Regular monitoring of patients' progress helps in early detection and management of complications.

Nursing management of complications of haemodialysis demands vigilance, expertise, and compassionate care to optimize patient outcomes and enhance the quality of life for individuals receiving haemodialysis.

5. Definitions, acronyms and abbreviations

Acronyms

AVF	Arteriovenous Fistula
BFR	Blood Flow Rate
DDS	Dialysis Disequilibrium Syndrome
DFR	Dialysate Flow Rate
DIC	Disseminated Intravascular Coagulation
DRSABCD	Danger, Response, Send for help, Airway, Breathing, Commence cardiopulmonary resuscitation, attach Defibrillator
ECG	Electrocardiogram
EMR	Electronic medical record
EPO	Erythropoietin
et al	and others
HB	Haemoglobin
HDF	Haemodiafiltration
IBW	Ideal Body Weight
IDH	Intradialytic Hypotension
IV	Intravenous
MET	Medical Emergency Response
mg	milligram/s
mL	millilitre/s
MO	Medical Officer
PPE	Personal Protective Equipment
SBP	Systolic Blood Pressure
SLS	Safety Learning System
TMP	Trans Membrane Pressure
UFR	Ultra Filtration Rate

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6. Nursing Management

6.1 Air Embolism

Complication	Possible Cause(s)	Signs & Symptoms	Nursing Management
<p>Air Embolism</p> <p>Definition: A bolus of air introduced to the patient's vascular system that causes the patient to become symptomatic</p>	<ul style="list-style-type: none"> • Air entry into the dialysis circuit • Vented IV bottle. • Patient run back with air. • Malfunctioning or disarmed air detector. • Poorly primed dialyser or luer locks not secure. • Central venous catheter unclamped & bung not in situ. 	<p>1) In a SITTING position air tends to migrate to the cerebral system without entering the heart. Symptoms may include.</p> <ul style="list-style-type: none"> • Weakness. • Patients report 'whooshing' sound and may cry out. • Confusion. • Hemiparesis. • Loss of consciousness. • Convulsions / death. <p>2) In a RECUMBENT position air tends to enter the heart, generate foam in the right ventricle and pass to the lungs. Symptoms may include:</p> <ul style="list-style-type: none"> • Acute dyspnoea/cough/cyanosis. • Chest tightness. • Agitation. 	<ul style="list-style-type: none"> • Clamp venous line immediately. • Turn blood pump off. • Position patient in a supine position for haemodynamic support and oxygen delivery^{1,2}, use left lateral recumbent position if aspiration of air via permcath is to be undertaken¹. • Administer high flow oxygen via oxygen mask. • Monitor BP, conscious state, patient status. • Notify emergency response team and be prepared for cardiac arrest. • Assess for site of air entry. <p>Prevention</p> <ul style="list-style-type: none"> • Prime extracorporeal circuit to remove all air. • Test and arm air detector before commencing dialysis. • Ensure all lines are free of air, including venous line, before connecting patient • Secure all connections. • Never leave a patient alone when running back. • Never run back with air. • Never disarm the air detector during dialysis. <p>Documentation</p> <ul style="list-style-type: none"> • In all cases, complete required documentation (in EMR) including cause & action taken. • Report event on the Safety Learning System (SLS). • Contact renal consultant or make patients consultant aware.

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6.2 Blood Detected in Dialysate			
Complication	Possible Cause(s)	Signs & Symptoms	Nursing Management
<p>Blood detected in dialysate.</p> <p>Definition: Leaking of red cells across the dialyser membrane into the dialysate.</p>	<ul style="list-style-type: none"> Faulty or damaged dialyser. High pressure applied to membrane during priming or dialysis. 	<p>Classification of Blood Leak Alarms.</p> <p>Major Leak: Blood is visible in the dialysate line leaving the dialyser. (MACROSCOPIC)</p> <p>Minor Leak: Haemastix test is positive for blood, but blood is not visible. (MICROSCOPIC) test to be done on the Effluent side of the dialysate line of the dialyser (i.e., arterial end Hanson connector).</p> <p>False Alarm: Alarm is activated but haemastix test is negative.</p>	<ul style="list-style-type: none"> Mute alarm (do not override alarm until leak is classified). If blood is visible in spent dialysate or Haemostix Positive: Stop dialysis immediately. Discard the circuit. Recommence with new lines and dialyser. (Rationale: blood in the circuit has mixed with dialysate, which is not sterile - thus it must be discarded.) Check patient Haemoglobin and complete SLS report and other document on EMR. Inspect the dialyser and document the dialyser type and batch/lot number and complete manufacturers product complaint form. Document in the patient EMR. Incident to be logged on patient SLS per organisational requirements. <p>If Machine must be internally disinfected with bleach as per Machine Disinfection procedure before the next dialysis as the dialysate pathway has been contaminated by blood.</p> <p>Haemostix Negative and NO visible blood in dialysate:</p> <ul style="list-style-type: none"> Override the alarm. If the alarm continues repeat the test to verify that it is a false alarm. Check for air in the dialysate lines, which may cause a false alarm. Report to technicians if a false alarm continues and remove the machine from the patient care area.

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6.3 Cardiac Arrest

Complication	Possible Cause(s)	Signs & Symptoms	Nursing Management
<p>Cardiac Arrest.</p> <p>Definition: Collapse of the cardio-vascular system in which the patient is unconscious and there is absence of pulse and respiration.</p>	<ul style="list-style-type: none"> • Electrolyte imbalance (e.g., potassium, calcium) • Myocardial infarction. • Cerebral haemorrhage. • Air embolism / pulmonary embolism. • Anaphylaxis. • Severe hypotension. • Other cardiac or cerebral event • Haemolysis. • Pericarditis – tamponade. • Exsanguination. • Hypoxia. • Tension pneumothorax. 	<ul style="list-style-type: none"> • Absence of pulse and respiratory effort. • Unresponsiveness. • Cyanosis, pallor, cold, clammy etc. 	<p><u>RESUSCITATION OF THE PATIENT IS THE PRIORITY NOT THE MACHINE.</u></p> <ul style="list-style-type: none"> • Call other staff for assistance. • Call medical response team. • Lay patient flat – place board under patient if necessary. • Commence DRSABCD. • Disconnect patient from machine and recirculate blood (as soon as practical). • Flush access needles. Do not remove the fistula needles. • Assist the emergency team as required. • Notify the Renal Registrar. • Ensure other patients in haemodialysis unit are cared for and given appropriate explanations. <p>Prevention</p> <ul style="list-style-type: none"> • Ensure correct and appropriate potassium content of dialysate through regular electrolyte checks. • Ongoing assessment and monitoring of patient more frequently than hourly, particularly those at high risk. • Early diagnosis and appropriate treatment of pericarditis. • Ensure hypotensive patients are treated promptly and dialysis ceased if not responsive to treatment. • Thorough pre dialysis assessment of patient. <p>Documentation</p> <ul style="list-style-type: none"> • In all cases, complete required documentation in EMR.

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6.4 Chest Pain

Complication	Possible Cause(s)	Signs & Symptoms	Nursing Management
<p>Chest pain.</p> <p>Definition: Pain, pressure, tightness, or other discomfort originating in or radiating to the chest constitutes an important indicator of potentially serious cardiac or cardiovascular disorders.</p>	<ul style="list-style-type: none"> Hypotension. Pericarditis. Anaemia. Myocardial Infarction. Excessive ultrafiltration. Arrhythmias. Angina. Haemolysis. Electrolyte imbalances. Air Embolism. 	<ul style="list-style-type: none"> Central chest pain. May radiate to jaw, arm or back. Restlessness, distress. Dyspnoea, diaphoresis. Tingling jaw. <p>Assess</p> <p>It is important to assess the patient thoroughly to treat the patient appropriately as not all chest pain is of cardiac origin. Note severity- pain score, location, and nature of pain.</p>	<p>Management</p> <ul style="list-style-type: none"> Turn off UFR. Turn blood flow rate down. Place patient in comfortable position. Assess patient's oxygen saturation and administer oxygen if required via oxygen mask. Call medical response team. Take blood pressure and pulse and assess need for fluid bolus. Give 200mls online fluid bolus or 0.9% sodium chloride or online bolus if hypotensive. Take relevant bloods as per medical request. Arrange for ECG. If SBP is > 100, and patient is ordered anginine - administer and observe closely. Ensure a Medication Order is completed prior to administration. If pain is not resolved with anginine after 10 minutes, discuss with MO and consider taking the patient off dialysis. Review Haemoglobin, electrolytes. Document in the EMR. Stay with patient and continue to assess. <p>Prevention</p> <ul style="list-style-type: none"> Monitor and calculate UFR carefully. Avoid excessive UFR (UFR < 10mls/hr/kg as a guide). Monitor Haemoglobin – medical officer to review EPO dose and assess need for transfusion if Hb low (<10 g/l). <p>Documentation</p> <ul style="list-style-type: none"> In all cases, complete required documentation EMR.

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6.5 Clotting of the Circuit during Haemodialysis

Complication	Possible Cause(s)	Signs & Symptoms	Nursing Management
<p>Clotting of the Circuit during Haemodialysis.</p> <p>Definition: Clotting may occur throughout the circuit but is more commonly found in specific areas of the circuit. Most common sites for clotting include the dialyser and venous bubble. Once again individual situations may differ, but the following are provided as guidelines.</p>	<ul style="list-style-type: none"> Inadequate anticoagulation. Coagulation disorder (e.g., DIC). Blood pump stopped. Slow BFR / frequent interruptions due to access problems. High haemoglobin. Post dilution Haemodiafiltration. 	<ul style="list-style-type: none"> Increasing venous pressure may be observed if venous bubble is clotted, trans membrane pressure (TMP) may rise. If dialyser is clotting, it may appear darker – the venous pressure may fall and arterial pressure and TMP may rise. Blood circuit may appear dark and bubble traps may have clots in them. 	<p>Management</p> <ul style="list-style-type: none"> Administer an online bolus or a 0.9% sodium chloride flush if clotting is suspected This will enable visualisation of the circuit to problem solve if clotting is present and where it is. If still unsure attempt to recirculate. If clotting is throughout the circuit – discard lines and dialyser, recommence with new lines and dialyser (review anti-coagulation before starting.) If only part of the circuit is clotted (- i.e., Blood is still flowing) - return the blood to the patient to minimise blood loss. Ongoing assessment of patient's anticoagulation requirements. Take haemoglobin level next dialysis session as per medical order. <p>Prevention</p> <ul style="list-style-type: none"> Adequate assessment of anticoagulation needs. Comprehensive patient pre dialysis assessment. Pre-emptive line changes in patients at increased risk of clotting circuits. Consider pre dilution Haemodiafiltration (HDF). <p>Documentation</p> <ul style="list-style-type: none"> In all cases, complete required documentation in EMR. Report event on the SLS if complete circuit is discarded. Notify patients renal consultant.

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6.6 Seizures

Complication	Possible Cause(s)	Signs & Symptoms	Nursing Management
<p>Seizures.</p> <p>Definition: A seizure is a sudden change in movement or awareness due to a change in the electrical function of the brain. Sudden bursts of electrical energy may affect movement, sensation, and consciousness.</p>	<ul style="list-style-type: none"> Severe hypotension. Anaphylaxis. Existing Epilepsy. Arrhythmia. Dialysis Disequilibrium Syndrome. Hypoglycaemia. Anoxia - air embolism. Intracranial haemorrhage. Electrolyte imbalance. 	<ul style="list-style-type: none"> Patient unconscious or unresponsive. May have generalised - grand mal seizure. Focal seizures may also be seen especially with intracranial haemorrhage. 	<ul style="list-style-type: none"> Maintain/support airway. Remove equipment etc that may cause harm to patient. Call medical response team. Lay patient flat. Turn off UFR. Turn BFR down. Replace fluid if indicated. Check BP, pulse, state of consciousness. Replace fluid if indicated. Notify renal MO. Assess patient and cause of convulsion. Observe patient. <p>If seizure or unconsciousness continues:</p> <ul style="list-style-type: none"> Return blood and cease dialysis. Take blood and dialysate samples send to pathology for urgent testing electrolytes, haematological picture ordered by Medical Officer. Check anticonvulsant medication levels (if epileptic). Take endotoxin samples if patient is on HDF. Prepare for anticonvulsant administration if ordered. Continue to observe patient. When the convulsion stops, lay the patient on their side, and maintain their airway. <p>Prevention</p> <ul style="list-style-type: none"> Appropriate UFR during dialysis. New patient regime? Adequate monitoring of anticonvulsant therapy. Adequate monitoring of electrolytes and careful checking of dialysate (especially additives). Education for patients on the importance of taking their medications correctly. <p>Documentation</p> <ul style="list-style-type: none"> In all cases, complete required documentation EMR.

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6.7 Muscle Cramps

Complication	Possible Cause(s)	Signs & Symptoms	Nursing Management
<p>Muscle Cramps.</p> <p>Definition: A muscle cramp is an uncontrollable and painful spasm of a muscle.</p>	<ul style="list-style-type: none"> • Too rapid or excessive fluid removal³ • Patient dry - below ideal weight. • Disequilibrium - due to very aggressive dialysis. • Sodium imbalance • Electrolyte imbalance such as: Hypocalcaemia, hypomagnesaemia, and hypokalaemia. 	<ul style="list-style-type: none"> • Sudden sensation of uncontrollable and painful spasms in the muscle. • Muscle twitching. 	<ul style="list-style-type: none"> • Turn UFR off. • Reduce the blood flow rate (BFR^{3,4}) • Check blood pressure (BP). • If BP low, give 200mls via online bolus or a sodium chloride flush. • Apply warm compress to the affected area. • Rub affected area with appropriate cream. Massage. Stretch muscle if able. • Review UF goal for the dialysis session. • Review Ideal Weight, check if this is a common occurrence for the patient. • Report to MO depending on severity. <p>Prevention</p> <ul style="list-style-type: none"> • Re-educate patient re weight gains. • Ongoing assessment of ideal weight. • Review maximum weight loss. Set appropriate ultrafiltration rate (UFR). • Consider sequential dialysis for severely overloaded patients and increasing dialysis time. • Consider UF profiling. • Reconsider use of antihypertensives pre dialysis. • Low temperature dialysis. <p>Nursing Alert Sodium profiling should be used with extreme caution in a renal patient. Hypernatremia may cause increased thirst, increased interdialytic fluid gains and hypertension. Use of sodium profiling should be used when all other avenues have been explored and only in consultation with senior nursing and medical staff.</p> <p>Documentation In all cases, complete required documentation in EMR.</p>

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6.8 Dialysis Disequilibrium Syndrome (DDS)

Complication	Possible Cause(s)	Signs & Symptoms	Nursing Management
<p>Dialysis Disequilibrium Syndrome (DDS).</p> <p>Definition: A set of symptoms (systemic and neurological) that may occur during or soon after dialysis. It is usually associated with long, aggressive dialysis in severely uraemic patients and/or patients undergoing first haemodialysis session ^{1,5,6}.</p>	<p>The specific cause of DDS remains controversial but is thought to be due to acute brain oedema, either due to disequilibrium between brain and plasma urea content or changes in pH. (If urea is removed rapidly from the plasma resulting in a higher intracellular concentration in the brain, fluid will move into brain cells and cause cerebral oedema.) Non-attendance to dialysis on a regular basis may result in DDS.</p>	<p>Mild</p> <ul style="list-style-type: none"> • Nausea and vomiting. • Restlessness. • Headache. • Cramp. • Hypertension. <p>Severe</p> <ul style="list-style-type: none"> • Confusion. • Stupor. • Seizures. • Coma. • Death. 	<p>Management</p> <ul style="list-style-type: none"> • The major focus is on prevention as discussed below. The features are non-specific; therefore, diagnosis is difficult. • If mild symptoms are present liaise with medical officer re considering reducing BFR, DFR and time, or using con-current flow for this treatment only. • If severe - (e.g., Seizure) discontinue dialysis, contact emergency response team. • Co-current flow can be used for severely uraemic patients. <p>High risk patients Prevention</p> <ul style="list-style-type: none"> • Three groups of patients are most at risk of DDS and management should aim to prevent it. These are: <ol style="list-style-type: none"> 1. New patients starting maintenance dialysis. 2. Patients who are severely uraemic. 3. Patients who have missed 3 or more dialysis sessions. • A 'new patient pathway' must be utilised for patients commencing dialysis. • Severely uraemic patients can be at greater risk due to other electrolyte imbalances and concurrent illness (e.g., sepsis, respiratory failure). • A urea reduction of no more than 40% is recommended for acutely ill patients on their first dialysis. <p>Documentation</p> <ul style="list-style-type: none"> • In all cases, complete required documentation in EMR. • Report event on the Safety Learning System (SLS). • Discuss with MO or notify patients renal consultant.

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6.9 Febrile Reaction

Complication	Possible Cause(s)	Signs & Symptoms	Nursing Management
Febrile Reaction. Definition: Febrile response by a patient.	<ul style="list-style-type: none"> Endotoxins in the dialyser, water, or dialysate. Allergic reaction to dialyser membrane. Infection – central venous access / peripheral access / other e.g.: Sepsis. Transfusions / infusions. 	<ul style="list-style-type: none"> Fever / Chills. Rigours. Restlessness / distress. Hypotension. Tachycardia. 	Management <ul style="list-style-type: none"> Stop dialysis or infusion if appropriate. Recirculate if unsure. Notify MO. Take patient's temperature and vital signs. Take blood cultures, electrolytes and full blood examination as instructed by the medical officer. Take swabs from any obvious wound site. Take water / dialysate samples if cause uncertain. Discard blood if contamination suspected. Administer any medications ordered. Reassess the need for further dialysis in conjunction with treating medical officer. Prevention <ul style="list-style-type: none"> Prime dialyser with consideration to extending priming volume¹. Adequate water treatment and quality control testing. Concentrate bottles AND bicarbonate are SINGLE USE ONLY. Thorough assessment of patient prior to commencing dialysis. Documentation <ul style="list-style-type: none"> In all cases, complete required documentation EMR. Report event on the Safety Learning System (SLS) .

INFORMAL

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6.10 Dialyser Reactions Type A: Anaphylactic Type Reaction

Complication	Possible Cause(s)	Signs & Symptoms	Nursing Management
Dialyser Reactions. Definition: A collection of symptoms displayed by the patient within the first 15-30 minutes of dialysis .	<ul style="list-style-type: none"> Hypersensitivity to dialyser sterilant. Poorly primed dialyser. Membrane sensitivity. 	<ul style="list-style-type: none"> Dyspnoea. Wheezing, cough. Chest pain / back pain. Itching / Rash. Cardiac arrest. 	<ul style="list-style-type: none"> Stop dialysis. Institute emergency procedures. Call medical response team.

6.11 Dialyser Reactions Type B: Complement Activation

Complication	Possible Cause(s)	Signs & Symptoms	Nursing Management
Dialyser Reactions. Definition: A collection of symptoms displayed by the patient within the first 15-30 minutes of dialysis.	<ul style="list-style-type: none"> Hypersensitivity to dialyser sterilant. Poorly primed dialyser. Membrane sensitivity. 	<ul style="list-style-type: none"> Dyspnoea. Wheezing, cough. Chest pain / back pain. Itching / Rash. Cardiac arrest. 	<ul style="list-style-type: none"> Give oxygen via nasal specs. Assess and eliminate cardiac ischemia as a cause. Symptoms generally resolve after first hour. Prevention <ul style="list-style-type: none"> Always prime dialysers as per company recommendations. Prime dialyser with consideration to extending priming volume. Discussion with treating nephrologist prior to next dialysis treatment among those who have had a previous reaction. Documentation <ul style="list-style-type: none"> In all cases, complete required documentation EMR. Report event on the Safety Learning System (SLS).

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6.12 Acute Haemolysis

Complication	Possible Cause(s)	Signs & Symptoms	Nursing Management
Acute Haemolysis. Definition: Destruction (lysis) of red blood cells.	<ul style="list-style-type: none"> High dialysate temperature (alarm failure). Hypotonic or hypertonic dialysate. Formaldehyde / Bleach / Oxyacid/ Peracide. Water contaminants - chloramines, copper, and nitrates. Mismatched blood transfusion / Drug reaction. Blood trauma i.e., small needle size, over occluded blood pump. 	<ul style="list-style-type: none"> Back pain / chest pain. Dyspnoea. Tightness in chest. Pain up fistula arm. Blood leaving dialyser may be translucent. Weakness, cardiac arrest. Blood in lines - dialyser very dark (cherry red or port wine colour). 	<ul style="list-style-type: none"> Stop blood pump and clamp venous and arterial lines. Disconnect patient from dialysis machine. Assess patient and call Medical Officer to review. Take blood and dialysate samples (see below) to confirm haemolysis. Discard extracorporeal circuit. Assess patient and determine cause of haemolysis. Restart using new machine, circuit, and dialysate. <p>Nursing Alert Haemolysed blood has a very high potassium concentration and should not be reinfused. Management should include treatment of hyperkalaemia and possible drop in haemoglobin. Delayed haemolysis may occur after dialysis and hospitalisation may need to be considered and additional dialysis may be required to control hyperkalaemia.</p> <p>The following samples should be taken to assess patient and cause of haemolysis:</p> <ul style="list-style-type: none"> Urgent potassium and haemoglobin. Haptoglobin from venous line of the extracorporeal circuit. Chloramines, copper, nitrates, sterilant and electrolytes from the dialysate. <p>Prevention</p> <ul style="list-style-type: none"> Dialysate alarms are tested /check dialysate temp and conductivity. Adequate water treatment and quality controls. Residual tests for sterilant are always done & documented pre dialysis. Never leave machine "cutting back" or arterial pressure < -200 mmHg. Assess needle size appropriateness for BFR. <p>Documentation</p> <ul style="list-style-type: none"> In all cases, complete required documentation EMR. Report event on the Safety Learning System (SLS).

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6.13 Intradialytic Hypotension

Complication	Possible Cause(s)	Signs & Symptoms	Nursing Management
Intradialytic Hypotension. Definition: Systolic blood pressure (BP) of less than 100mmHg. (A lower BP is sometimes acceptable in patients who run low blood pressures continually).	<ul style="list-style-type: none"> Excessive Ultrafiltration. Dry weight too low (too much fluid removed). Myocardial infarction Arrhythmia or other cardiac condition. Anaphylactic reaction. Septicaemia. Pericarditis. Anti-hypertensive therapy. Ingestion of food. Anaemia. Low dialysate sodium. Hypoalbuminemia. 	<ul style="list-style-type: none"> Yawning. Dizzy / light-headed. Flushing / feeling hot. Nausea / vomiting. Cramp Distress / restlessness. Clammy/ Unconscious / disorientation. 	Management of Symptomatic Hypotension <ul style="list-style-type: none"> Lay patient flat . Turn off UFR. Assess blood pressure (BP) / pulse. Administer 100 - 200ml infusate via online bolus or 0.9%Normal Saline. Reassess BP and pulse. If no improvement calls medical response team and give further Boluses, up to a total of 500ml infusate via online bolus or 0.9% Normal Saline. Consider returning the patient's blood and taking patient off haemodialysis. If BP still low after 500mls fluid bolus, CONTACT RENAL MEDICAL OFFICER. Discuss with MO if appropriate to continue haemodialysis UFR/ fluid removal/ IBW. Consider other possible causes. Monitor fistula carefully. Prevention <ul style="list-style-type: none"> Monitor and calculate fluid removal carefully. Avoid excess UFR (> 10mls/hr/kg) during dialysis especially in small, unstable patients. Assess ideal weight every dialysis session. Educate patient and encourage engagement in fluid regime. Assess anti-hypertensive therapy. Frequent observation during dialysis - especially if having high UFR. Monitor and alter dietary intake on dialysis if appropriate. Documentation <ul style="list-style-type: none"> In all cases, complete required documentation EMR. Report event on the Safety Learning System (SLS).

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6.14 Exsanguination

Complication	Possible Cause(s)	Signs & Symptoms	Nursing Management
<p>Exsanguination.</p> <p>Definition:</p> <p>Accidental or traumatic loss of large volume of blood.</p>	<ul style="list-style-type: none"> • Separation of blood lines. • Needle(s) dislodged from access site. • Bungs loosened from central catheters. • Dialyser membrane rupture. • Rupture of AVF aneurysm. 	<ul style="list-style-type: none"> • Obvious source of bleeding. • Hypovolaemic shock. • Seizure. • Cardiac Arrest. 	<ul style="list-style-type: none"> • Stop bleeding at any site¹. • Return all appropriate blood to patient. • Administer volume expander if loss significant. • Administer oxygen. • Notify emergency response team. • Notify treating medical officer. <p>Documentation</p> <ul style="list-style-type: none"> • In all cases, complete required documentation EMR. • Report event on the Safety Learning System (SLS).

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Management of complications during Haemodialysis Clinical Guideline

7. References

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8. Document Ownership and History

Developed by:	Renal Community of Practice
Contact:	health.renalclinicalguidelines@sa.gov.au
Endorsed by:	Renal Community of Practice Clinical Practice Guideline Group
Date endorsed:	02/04/2025
Next review due:	02/04/2030
CG number:	CG009
CG history:	Is this a new clinical guideline (V1)? Y Does this clinical guideline amend or update an existing clinical guideline? N Does this clinical guideline replace another clinical guideline with a different title? N

Approval Date	Version	Who approved New/Revised Version	Reason for Change
02/04/2025	V1	Clinical Guideline Domain Custodian	Original