

HEMODIALYSIS

In hemodialysis (HD), blood is shunted through an artificial kidney (dialyzer) for removal of toxins/excess fluid and then returned to the venous circulation. Hemodialysis is a fast and efficient method for removing urea and other toxic products and correcting fluid and electrolyte imbalances but requires permanent arteriovenous access. Procedure is usually performed three times per week for 4 hr. HD may be done in the hospital, outpatient dialysis center, or at home.

NURSING DIAGNOSIS: Injury, risk for [loss of vascular access]
Risk factors may include
 Clotting; hemorrhage related to accidental disconnection; infection
Possibly evidenced by
 [Not applicable; presence of signs and symptoms establishes an *actual* diagnosis.]
DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:
Dialysis Access Integrity (NOC)
 Maintain patent vascular access.
 Be free of infection.

ACTIONS/INTERVENTIONS	RATIONALE
<p>Hemodialysis Therapy (NIC)</p> <p>Independent</p> <p>Clotting Monitor internal AV shunt patency at frequent intervals: Palpate for distal thrill;</p> <p> Auscultate for a bruit;</p> <p> Note color of blood and/or obvious separation of cells and serum;</p> <p> Palpate skin around shunt for warmth.</p> <p>Notify physician and/or initiate declotting procedure if there is evidence of loss of shunt patency.</p>	<p>Thrill is caused by turbulence of high-pressure arterial blood flow entering low-pressure venous system and should be palpable above venous exit site.</p> <p>Bruit is the sound caused by the turbulence of arterial blood entering venous system and should be audible by stethoscope, although may be very faint.</p> <p>Change of color from uniform medium red to dark purplish red suggests sluggish blood flow/early clotting. Separation in tubing is indicative of clotting. Very dark reddish-black blood next to clear yellow fluid indicates full clot formation.</p> <p>Diminished blood flow results in “coolness” of shunt.</p> <p>Rapid intervention may save access; however, declotting must be done by experienced personnel.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p>Hemodialysis Therapy (NIC)</p> <p>Independent</p> <p>Clotting Evaluate reports of pain, numbness/tingling; note extremity swelling distal to access.</p> <p>Avoid trauma to shunt; e.g., handle tubing gently, maintain cannula alignment. Limit activity of extremity. Avoid taking BP or drawing blood samples in shunt extremity. Instruct patient not to sleep on side with shunt or carry packages, books, purse on affected extremity.</p> <p>Hemorrhage Attach two cannula clamps to shunt dressing. Have tourniquet available. If cannulas separate, clamp the arterial cannula first, then the venous. If tubing comes out of vessel, clamp cannula that is still in place and apply direct pressure to bleeding site. Place tourniquet above site or inflate BP cuff to pressure just above patient's systolic BP.</p> <p>Infection Assess skin around vascular access, noting redness, swelling, local warmth, exudate, tenderness.</p> <p>Avoid contamination of access site. Use aseptic technique and masks when giving shunt care, applying/changing dressings, and when starting/completing dialysis process.</p> <p>Monitor temperature. Note presence of fever, chills, hypotension.</p> <p>Collaborative</p> <p>Culture the site/obtain blood samples as indicated.</p> <p>Monitor PT, activated partial thromboplastin time (aPTT) as appropriate.</p> <p>Administer medications as indicated, e.g.: Heparin (low-dose);</p> <p>Antibiotics (systemic and/or topical).</p> <p>Discuss use of acetylsalicylic acid (ASA), warfarin sodium (Coumadin) as appropriate.</p>	<p>May indicate inadequate blood supply.</p> <p>Decreases risk of clotting/disconnection.</p> <p>Prevents massive blood loss while awaiting medical assistance if cannula separates or shunt is dislodged.</p> <p>Signs of local infection, which can progress to sepsis if untreated.</p> <p>Prevents introduction of organisms that can cause infection.</p> <p>Signs of infection/sepsis requiring prompt medical intervention.</p> <p>Determines presence of pathogens.</p> <p>Provides information about coagulation status, identifies treatment needs, and evaluates effectiveness.</p> <p>Infused on arterial side of filter to prevent clotting in the filter without systemic side effects.</p> <p>Prompt treatment of infection may save access, prevent sepsis.</p> <p>Ongoing low-dose anticoagulation may be useful in maintaining patency of shunt.</p>

NURSING DIAGNOSIS: Fluid Volume, risk for deficient

Risk factors may include

Ultrafiltration

Fluid restrictions; actual blood loss (systemic heparinization or disconnection of the shunt)

Possibly evidenced by

[Not applicable; presence of signs and symptoms establishes an *actual* diagnosis.]

DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:

Hydration (NOC)

Maintain fluid balance as evidenced by stable/appropriate weight and vital signs, good skin turgor, moist mucous membranes, absence of bleeding.

ACTIONS/INTERVENTIONS	RATIONALE
<p>Fluid Monitoring (NIC)</p> <p>Independent</p> <p>Measure all sources of I&O. Have patient keep diary.</p> <p>Weigh daily before/after dialysis run.</p> <p>Monitor BP, pulse, and hemodynamic pressures if available during dialysis.</p>	<p>Aids in evaluating fluid status, especially when compared with weight. <i>Note:</i> Urine output is an inaccurate evaluation of renal function in dialysis patients. Some individuals have water output with little renal clearance of toxins, whereas others have oliguria or anuria.</p> <p>Weight loss over precisely measured time is a measure of ultrafiltration and fluid removal.</p> <p>Hypotension, tachycardia, falling hemodynamic pressures suggest volume depletion.</p>
<p>Hemodialysis Therapy (NIC)</p> <p>Note/ascertain whether diuretics and/or antihypertensives are to be withheld.</p> <p>Verify continuity of shunt/access catheter.</p> <p>Apply external shunt dressing. Permit no puncture of shunt.</p> <p>Place patient in a supine/Trendelenburg's position as necessary.</p> <p>Assess for oozing or frank bleeding at access site or mucous membranes, incisions/wounds. Hematest/guaiac stools, gastric drainage.</p>	<p>Dialysis potentiates hypotensive effects if these drugs have been administered.</p> <p>Disconnected shunt/open access permits exsanguination.</p> <p>Minimizes stress on cannula insertion site to reduce inadvertent dislodgement and bleeding from site.</p> <p>Maximizes venous return if hypotension occurs.</p> <p>Systemic heparinization during dialysis increases clotting times and places patient at risk for bleeding, especially during the first 4 hr after procedure.</p>

ACTIONS/INTERVENTIONS	RATIONALE
<p>Fluid Monitoring (NIC)</p> <p>Collaborative</p> <p>Monitor laboratory studies as indicated:</p> <p>Hb/Hct;</p> <p>Serum electrolytes and pH;</p> <p>Clotting times, e.g., PT/aPTT, and platelet count.</p> <p>Administer IV solutions (e.g., normal saline [NS])/volume expanders (e.g., albumin) during dialysis as indicated;</p> <p>Blood/PRCs if needed.</p> <p>Reduce rate of ultrafiltration during dialysis as indicated.</p> <p>Administer protamine sulfate as appropriate.</p>	<p>May be reduced because of anemia, hemodilution, or actual blood loss.</p> <p>Imbalances may require changes in the dialysate solution or supplemental replacement to achieve balance.</p> <p>Use of heparin to prevent clotting in blood lines and hemofilter alters coagulation and potentiates active bleeding.</p> <p>Saline/dextrose solutions, electrolytes, and NaHCO₃ may be infused in the venous side of continuous arteriovenous (CAV) hemofilter when high ultrafiltration rates are used for removal of extracellular fluid and toxic solutes. Volume expanders may be required during/following hemodialysis if sudden/marked hypotension occurs.</p> <p>Destruction of RBCs (hemolysis) by mechanical dialysis, hemorrhagic losses, decreased RBC production may result in profound/progressive anemia requiring corrective action.</p> <p>Reduces the amount of water being removed and may correct hypotension/hypovolemia.</p> <p>May be needed to return clotting times to normal or if heparin rebound occurs (up to 16 hr after hemodialysis).</p>

<p>NURSING DIAGNOSIS: Fluid Volume, risk for excess</p> <p>Risk factors may include</p> <p>Rapid/excessive fluid intake: IV, blood, plasma expanders, saline given to support BP during dialysis</p> <p>Possibly evidenced by</p> <p>[Not applicable; presence of signs and symptoms establishes an <i>actual</i> diagnosis.]</p> <p>DESIRED OUTCOMES/EVALUATION CRITERIA—PATIENT WILL:</p> <p>Fluid Balance (NOC)</p> <p>Maintain “dry weight” within patient’s normal range; be free of edema; have clear breath sounds and serum sodium levels within normal limits.</p>
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ACTIONS/INTERVENTIONS	RATIONALE
<p>Fluid Management (NIC)</p> <p>Independent</p> <p>Measure all sources of I&O. Weigh routinely.</p> <p>Monitor BP, pulse.</p> <p>Note presence of peripheral/sacral edema, respiratory rales, dyspnea, orthopnea, distended neck veins, ECG changes indicative of ventricular hypertrophy.</p> <p>Note changes in mentation. (Refer to CP: Renal Dialysis; ND: Thought Processes, risk for disturbed.)</p> <p>Collaborative</p> <p>Monitor serum sodium levels. Restrict sodium intake as indicated.</p> <p>Restrict PO/IV fluid intake as indicated, spacing allowed fluids throughout a 24-hr period.</p>	<p>Aids in evaluating fluid status, especially when compared with weight. Weight gain between treatments should not exceed 0.5 kg/day.</p> <p>Hypertension and tachycardia between hemodialysis runs may result from fluid overload and/or HF.</p> <p>Fluid volume excess due to inefficient dialysis or repeated hypervolemia between dialysis treatments may cause/exacerbate HF, as indicated by signs/symptoms of respiratory and/or systemic venous congestion.</p> <p>Fluid overload/hypervolemia may potentiate cerebral edema (disequilibrium syndrome).</p> <p>High sodium levels are associated with fluid overload, edema, hypertension, and cardiac complications.</p> <p>The intermittent nature of hemodialysis results in fluid retention/overload between procedures and may require fluid restriction. Spacing fluids helps reduce thirst.</p>