

Dialysis Procedures



Dialysis Procedures

- It is simple. There are only 3 procedures:
 - Initiation
 - Monitoring
 - Discontinuation
- Well, maybe not so simple...

Initiation of Dialysis

- Pre Dialysis Safety Checks
- Initiation Procedures
- Immediate Post Initiation Procedures

Predialysis Safety Checks

- **Water system**
 - Temperature
 - Resistivity
 - Residual disinfectant
- **Prescribed Dialyzer & Concentrate**
- **Dialysis Machine Safety**
 - Alarms active
 - Dialysate conductivity &/or pH
- **Integrity of Extracorporeal Circuit**
- **If Dialyzer Reused**
 - Check patient's name on label
 - Disinfectant residual test

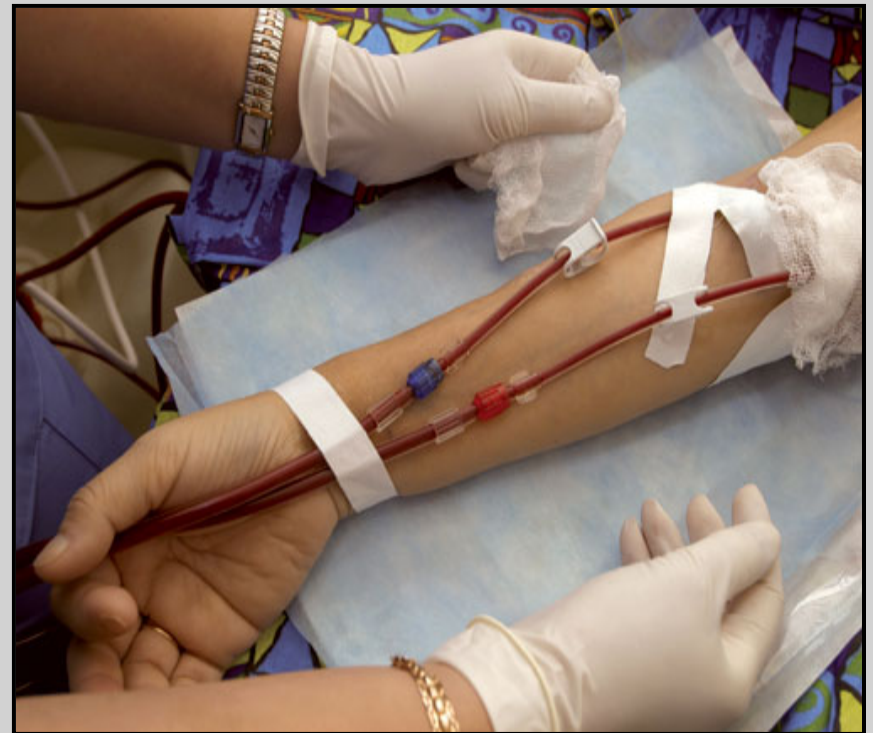


Predialysis Patient Evaluation

- **Physical Parameters**
 - Weight • BP (stand & sit) • Temp
 - Pulse & Resp • Complaints
- **Evaluate Access Status**
 - Signs of infection – redness, tenderness, unusual warmth, purulent drainage
 - Patency
 - Graft & AVF: bruit, thrill
 - Catheter: easy aspiration (*post disinfection*)
 - Direction of flow (identify A & V)
- **Follow Universal Precautions**
 - Wash hands • Glove • Gown
 - Eye protection • Mask

Initiation of Dialysis

- Graft/Fistula
 - Select sites • Disinfect
 - Anesthetize • Insert needles
- Catheters
 - Disinfect catheter limbs
 - Aspirate heparin from limbs
 - Evaluate patency
- Draw Blood Work
 - Prior to administering heparin
 - From arterial port
 - Administer heparin post draw
- Initiate Blood Flow to Dialyzer
 - Connect lines
 - Start at low BFR



Post Initiation

- **Calculate/Apply TMP**
 - Fluid gain/ # Hours = UF vol (ml/hr)
 - UF Volume/ UF Coefficient = TMP
 - $TMP = V \text{ resistance} + \text{Neg pressure}$
- **Set machine parameters**
 - BFR • DFR • UFR • Alarm limits
 - Dialysate temp • Heparin Infusion rate
- **Patient comfort measures**

Charting

- **Over-riding objectives**
 - *Complete* • *Legible*
- **Treatment documentation**
 - Prescribed parameters
 - Pre & Post patient assessment
 - Vital signs during treatment
 - Medications given
 - Treatment parameters
 - BFR, DFR, A & V pressures, TMP/UFR
 - Patient/machine complications
 - Your signature



Monitoring During Treatment

- **Detection of Complications**
 - Blood Related
 - Dialysate Related
 - Patient Related
- **Extracorporeal Circuit Pressures**
- **Anticoagulation**
- **Treatment Factors**
 - Impact on Clearance
- **Charting**



Blood Side Complications

- Air in Blood Circuit
 - Minor: usual cause is careless set-up, drip chamber level will drop, alarm will sound
- Air Embolism
 - Major: air detector alarm failure
- Blood Loss
- Access Recirculation
- Clotting
- Poor BFR
- Needle Infiltration

Dialysate Side Complications

- **Dialysate Temperature**
 - Hypothermia
 - Hyperthermia
- **Hemolysis**
 - Dialysate temperature, kinked blood lines, formaldehyde in dialysate lines, inadequate water treatment (chloramines, copper, zinc, nitrates)
- **Crenation**
 - Hypertonic dialysate



Patient Related Complications

- Hypotension
- Hypertension
- Muscle Cramps
- Headache
- Nausea & Vomiting
- Headache
- Fever &/or Chills
- Fistula/Graft Infection, Thrombosis
- Fistula Aneurysm, Psuedoaneurysm
- Central Venous Catheter Infection
- Catheter Thrombosis
- Cardiac Dysrhythmia
- Pericarditis, pericardial effusion, cardiac tamponade
- Dialysis Disequilibrium Syndrome
- First Use Syndrome
- Seizures
- Angina
- Anaphylaxis
- Pruritis
- Steal Syndrome
- Cardiac Arrest
- Dialysis Encephalopathy (Al⁺⁺)

Extracorporeal Circuit Pressures

- Blood Side
 - Elevated Pre Pump Arterial Pressure
 - RBC damage if greater than -250 mmHg
 - Increase indicates obstruction of blood flow into pump
 - Elevated Post Pump Arterial Pressure
 - Increase indicates obstruction of blood flow into dialyzer
 - Elevated Venous Pressure
 - Increase indicates obstruction of blood flow into patient
- Dialysate Side
 - Failure of Negative Pressure pump
- Watch Both – Transmembrane Pressure is key

Anticoagulation

- Three methods
 - Saline flush
 - Flush blood circuit with saline q 30 min
 - No drugs
 - No bleeding risk during or post dialysis
 - Trisodium citrate
 - Difficult: requires 2 infusion pumps, 0 Ca⁺⁺ dialysate
 - No bleeding risk during or post dialysis BUT maintaining patient's calcium balance is difficult & risky
 - Citrate is metabolized into bicarbonate
 - Heparin

Two Heparin Methods

- **Systemic**
 - Method: bolus + constant infusion until last hour
 - Objective: maintain ACT 1.5-2.0 baseline
- **Tight Systemic**
 - Method: same but lower doses
 - Objective: maintain ACT 1.2-1.4 baseline



Treatment Factors: Impact on Clearance 1

- Blood Flow Rate
 - \uparrow BFR \rightarrow \uparrow small molecule (ex. urea) clearance
 - BFR has much less effect on large molecules
- Ultrafiltration Rate
 - \uparrow UFR will result in \uparrow clearance, via “solute drag”
 - Mainly involves larger molecules
 - Minimal effect on total clearance
- Dialysate flow rate
 - \uparrow DFR will \uparrow clearance
 - Minimal effect on total clearance
 - If BFR > 350, hi flux dialyzer, 500 DFR \rightarrow 800 DFR = C_{urea} \uparrow 5-10%*

Treatment Factors: Impact on Clearance 2

- Anticoagulation

- Clotting reduces available membrane surface area, thus clearance

- Treatment Time

- Longer time = ↑ clearance
- Shorter time = ↓ clearance

5 min ↓ per Tx X 156 Tx/yr = 780 min or > 3 dialysis/yr

- Access Recirculation

- Causes: needles too close, access stenosis, cardiopulmonary recirculation
- Result: freshly dialyzed blood mixes with uremic blood being drawn into the arterial blood line

Discontinuation

- Termination of Treatment
- Needle Removal/Catheter Care
- Post Dialysis Patient Assessment
- Documentation
- Post Dialysis Machine Care

Termination of Treatment

- **Discontinue Heparin infusion**
 - Per unit protocol (usually 30-60 min pre D/C)
- **Chart patient & machine parameters**
- **D/C TMP**
- **Draw post dialysis blood samples**
 - Reduce BFR to 100 ml/min, wait \approx 15 seconds
 - Alternative: draw several minutes post dialysis
- **Return blood to patient**
- **Check patient's BP before disconnection**
 - In case further fluid infusion is required



Needle Removal

- Remove one needle at a time
- Withdraw at same angle as insertion
- Apply pressure over vessel (*not skin*) insertion site
- Amount of pressure matters
 - Too little: prolonged bleeding, hematoma formation
 - Too much: clotted access
- Clean & dress site after bleeding stops

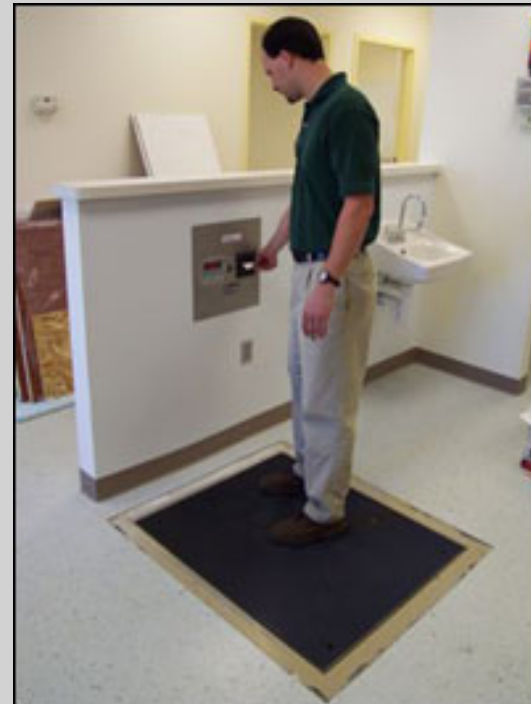
Note: If fistula clamps used, should follow strict protocol because application of proper pressure is difficult.

Catheter Care

- Prior to removing dialysis lines , disinfect catheter ports with:
 - Providone iodine **or**
 - Chlorhexadine gluconate
- Flush each catheter lumen with normal saline
- Instill heparin into each lumen
 - 5,000-10,000 units per lumen is most common dosage range
 - NOTE: volume of heparin should just barely exceed lumen volume
- Place fresh sterile dressing over catheter site
- Label catheter site
 - “DO NOT FLUSH”
 - # units heparin per lumen
 - Date and initials of staff member

Post Dialysis Patient Assessment

- Vital signs
 - BP sitting & standing
 - TPR
- Physical assessment
 - Heart & lung sounds
 - Edema
 - Weight (fluid loss)
- Vascular access
- Patient symptoms
 - Patient comments, complaints
- Overall condition observations
 - General condition, behavior, mental status



Documentation

- Dialysis data
 - Time stopped
 - Volume of rinseback saline
 - Blood loss, if any (include clots in dialyzer, drip chambers)
- Patient condition
 - Vital signs, physical assessment
 - Overall condition, including vascular access
- Special instructions to patient, if any
- Time & method of departure

Post Dialysis Machine Care

- Disconnect and rinse concentrate lines
- Remove dialyzer & bloodlines
 - Dispose in hazardous waste container
 - If to be reused
 - Ensure filled with saline or heparinized saline, per unit protocol
 - Ensure properly labeled with patient ID data
 - Deliver to reuse area within 10-15 min post dialysis
- Remove other disposables
 - Dispose in hazardous or non-hazardous waste container, as appropriate
- Remove & disinfect non-disposables (ex. clamps)
- Clean & disinfect outside of machine

Dialysis Procedures Summary

- Initiation
- Monitoring
- Discontinuation

It is not simple!

YOU are the key.

