

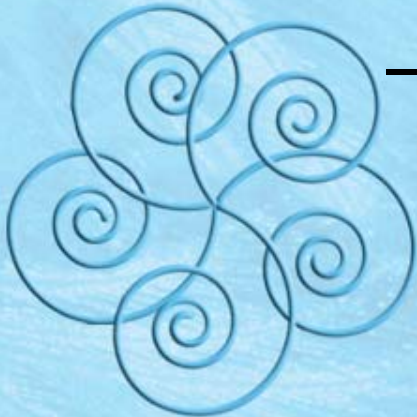
House Officer's Guide To Renal Patients

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Water Exchange

- Sensible water loss
 - able to be measured
- Insensible water loss
 - evaporatory water loss through skin and lungs
 - normally 10 cc/kg/day
 - depends on pt' s status
 - body surface area, temperature, humidity



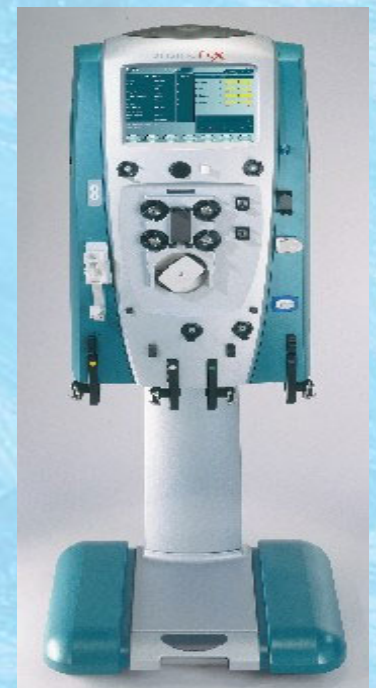
Water Exchange

- Sensible losses
 - Urine 800-1500cc
 - Intestinal 0-250cc
 - Sweat 500cc
- Insensible losses
 - 600 -900 cc
 - Respiratory 400cc



Dialysis Patients

- Some dialysis pts still make urine
- Treat them as if the fluid you give will remain
 - gain 1-4 kg in between dialysis sessions



Dialysis Patients

- Studies have suggested that each 250cc increment in a daily urine volume is associated with a 36% reduction in mortality.
- They also show a 56% risk reduction for death in patients with residual renal function.



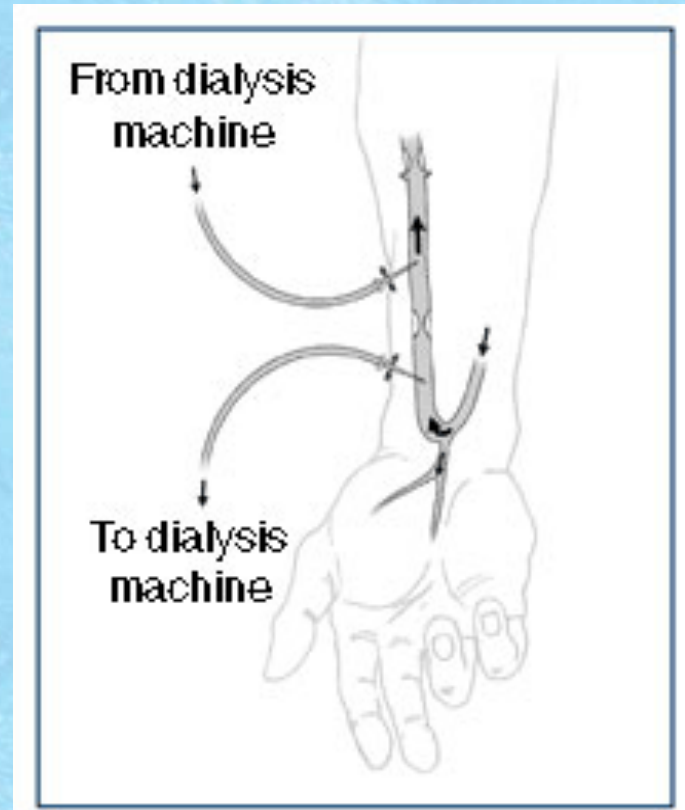
Vascular Access

- Three main types of access
 - arteriovenous fistula
 - arteriovenous graft
 - HD catheter
- Never stick the fistula or graft
- Avoid bp measurements, labs, IV' s in access arm



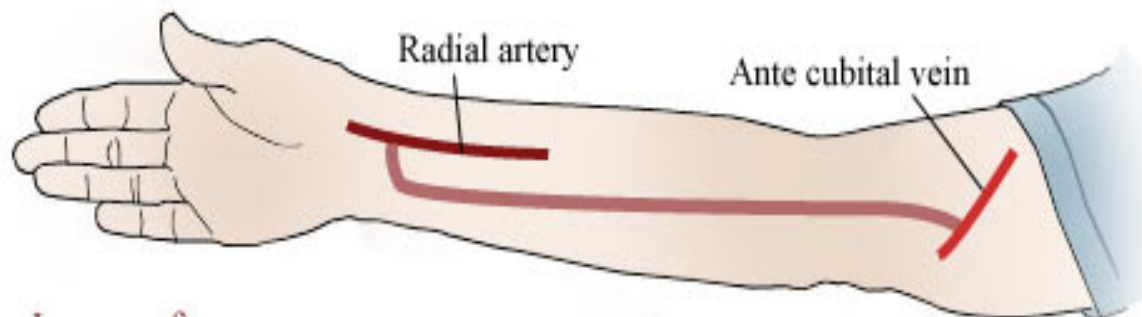
AV Fistula- Fistula First

- Preferred access
- Direct artery and vein connection
 - weeks to months to mature
 - can last for decades
 - lowest risk of infection

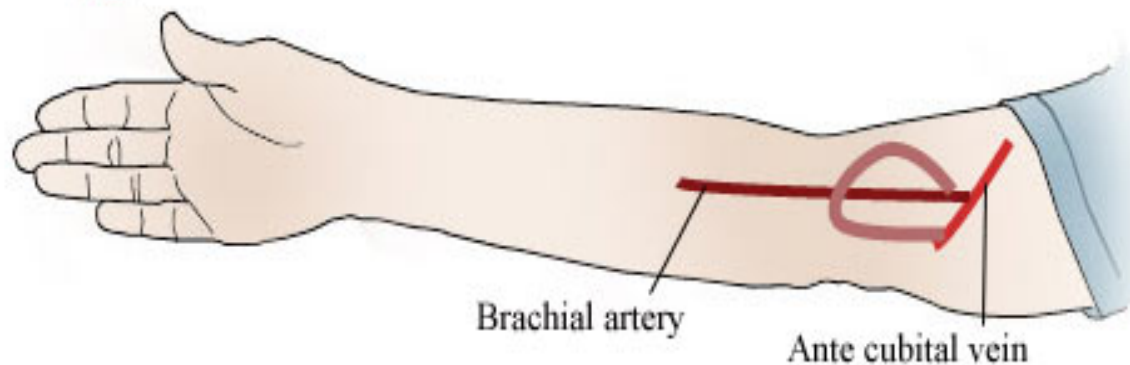


AV Grafts

Straight graft



Loop graft



Vascular Access

- Check the access for a thrill and bruit
- Hypotension leads to thrombosis of the AFV/AVG
- Write hold orders for anti-hypertensives to avoid BP drops



Vascular Access

- Decathalon Gold
 - heparin coating
 - anchoring to prevent thrombosis



Catheters

- Usually patients have a tunneled catheter accessing the IJ vein
- Try to avoid using the subclavian v
 - stenosis more frequently
 - complicating AFV/AVG on that side
- Patients may have a catheter for access as they await maturation of the AFV/AVG
 - short term option



Catheters

- catheter is heparinized with 1:5000 solution
 - heparin flush is 1:1000
- catheter is labeled with the amount of flush for each port
 - add 0.1 cc to the labeled amount



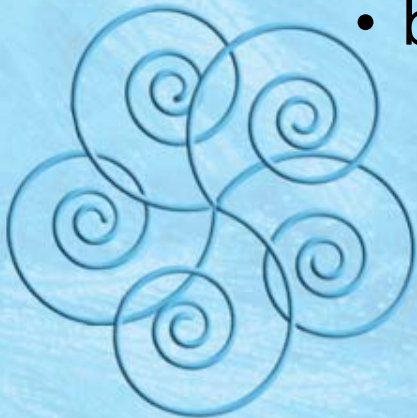
Catheters

- If the catheter must be used for IV support
 - draw off 10cc of blood from the port
 - flush with saline
 - never advance the heparin into the patient.
- Call Pt' s nephrologist before using the catheter
- Obviously, in a code situation aspirate 10cc' s and use the line!

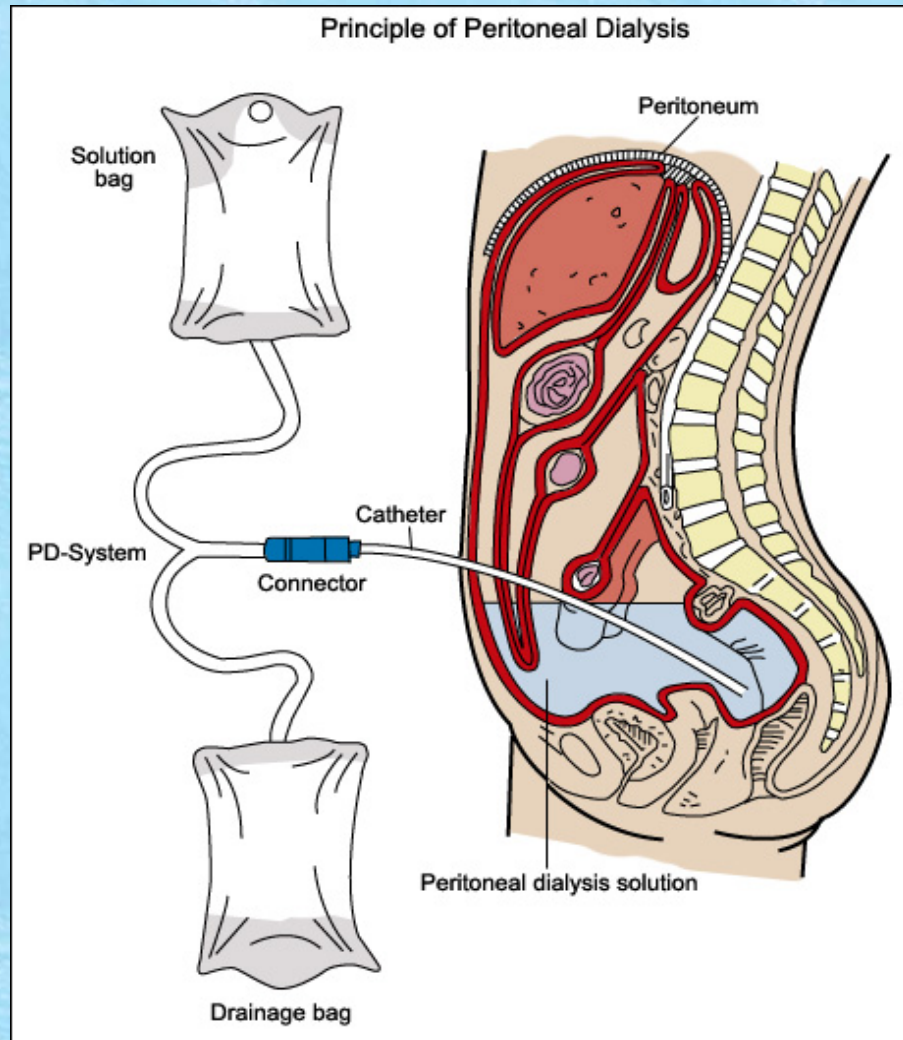


Peritoneal Dialysis

- Peritoneal dialysis uses the peritoneum
 - has many tiny holes and acts as a filter
 - allows waste products and fluid from the blood to pass through it
 - holes are too small to allow large molecules to pass through
 - blood and dialysate will never mix



Peritoneal Dialysis Concept



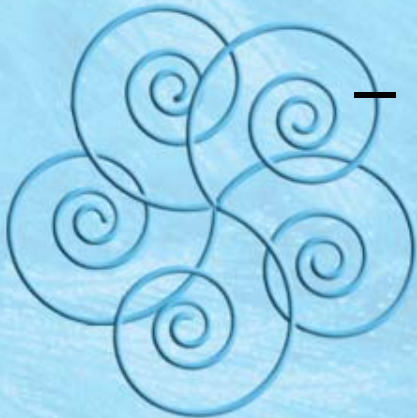
Peritoneal Dialysis

- Do not confuse a PD catheter for a PEG tube
- Infusing feedings into a PD catheter can be fatal



Pain Meds

- HD patients usually require fewer narcotics than other patients
- Typically, a patient will have an order for morphine 2-4 mg q 2-4 hours
- Alternative choices
 - Dilaudid
 - Fentanyl



Pain Meds

- If the dose is inadequate, you can always give more.
- Giving more narcotics is always easier than treating with a narcan drip and pressors
- Avoid demerol if possible
 - its metabolite normeperidine can cause seizures if it accumulates



Pain Meds

- If a patient has residual renal function, try to avoid NSAID's
- Remember that overdosing NSAIDS can lead to salicylate toxicity
- Pts present with tinnitus, headache, nausea, and fever
- HD patients have a narrow therapeutic range and develop salicylism with less drug



Diabetics

- As kidney function declines and ceases, insulin is not cleared as quickly.
- The insulin and oral agent's effects last longer
 - Sulfonylureas
 - Avoid Metformin once GFR is less than 40 ml/min



Diabetics

- The patient's response to insulin and oral agents is a marker of getting close to dialysis
- Patients think their DM is doing great
 - needs less insulin to control blood sugars.



Diabetics

- What really happens is:
- The patient is uremic and loses his appetite
- He eats less
- The insulin hangs around
- Now the blood sugars look great and the patient needed a fistula last month



Hemostasis

- Uremic plasma factors lead to abnormal platelet aggregation and adhesion
- Dialysis removes these factors
- Unfortunately, the dialysis membrane alters the platelet membrane receptors for vWF and fibrinogen



Hemostasis

- Manifestation of this platelet dysfunction can range from oozing at a venipuncture site to GI hemorrhage
- If a patient is bleeding after a simple procedure, start with the simple treatments



Hemostasis



- DDAVP may be used if the bleeding cannot be controlled
- Use 0.3mg/kg IV over about 20 minutes
- DDAVP stimulates release of vWF
 - increases GPIIb platelet adhesion factor expression



Reminders

- When you evaluate a patient keep in mind that HD patients are different
- These patients need the same workup for the same complaints
- Your differential will be the same
- Your treatment may be modified



Causes of Outpatient Mortality

- Cardiovascular events
- GI bleed
- Infection



Inpatient Mortality

- Sepsis/Infection
- Cardiovascular events
- GI bleed



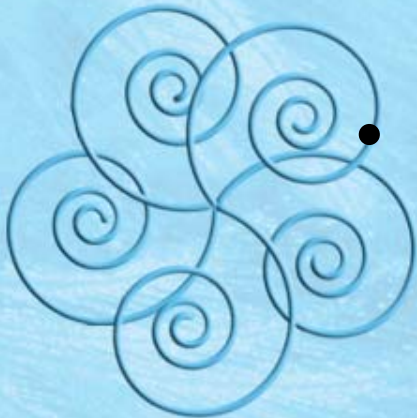
Cardiovascular Risk of Patients with CKD

- Treat them as if they have already had their first MI.
- Should be on B-Blocker, ASA, Statin, and ACE or ARB.
- May need to stop the ACE/ARB as renal function declines
- Think about restarting it once they are on dialysis.
- Be careful about writing “no ACE/ARB or Contrast” in these pts.



Hypotension

- Treat the HD patient with IV fluids
- 0.9% saline, 250cc bolus
- Albumin / Hespan
- Check for response
- You have treated the HD patients like the other patients
- All you changed was the amount of fluid



Meds to Consider

- Demerol
- Morphine
- NSAID' s
- ACEI / ARBS
- Glucophage
- Antibiotics



Meds to Avoid/Think About

- Contrast- IV contrast can be given in dialysis patients
- Keep in mind that the osmotic effects of contrast can shift fluid into the intravascular space and cause pulmonary edema



Bibliography

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