

To Pee Is To Be

2013 VIRGINIA EMS CONFERENCE



...IF YOU
DO NOT
PEE, YOU
WILL NOT BE

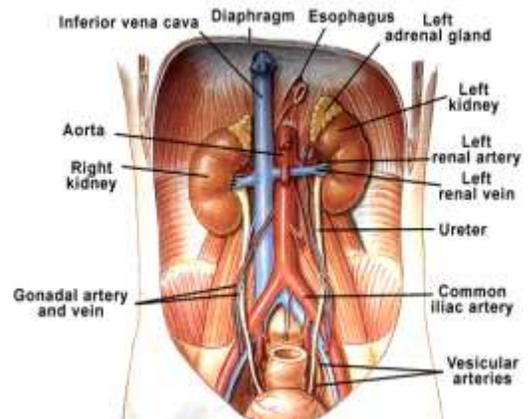
Anatomy

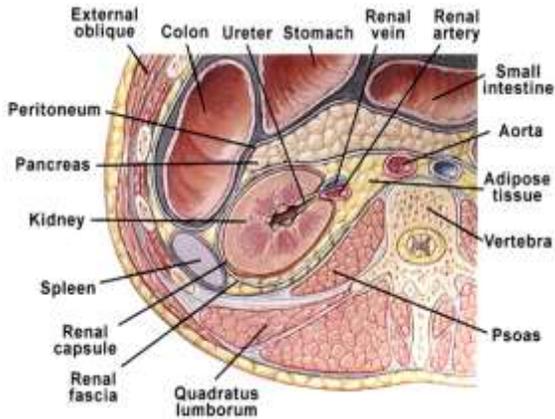
- 2 Kidneys
- 2 Ureters
- Bladder
- Urethra



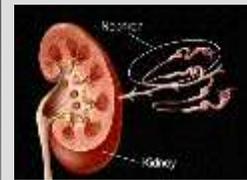
Kidneys

- Located on either side of the spinal column
- The right kidney sits lower than the left
- Located retroperitoneal



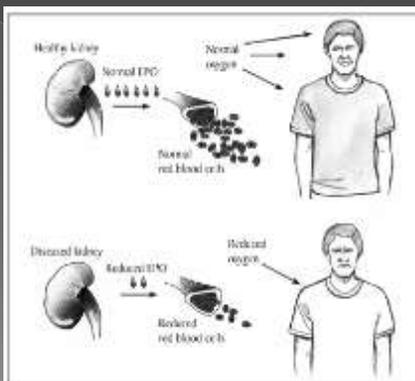
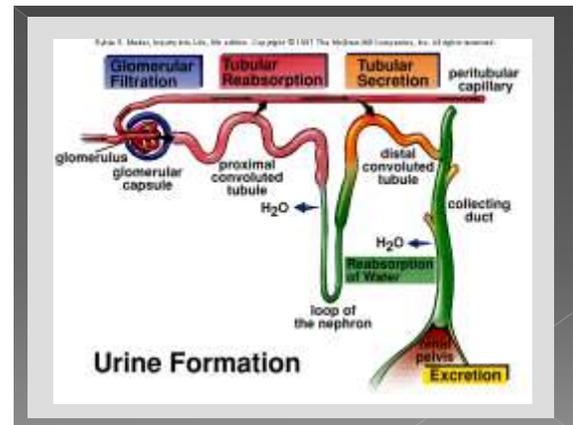


What do the kidneys do??



Kidney Function

- ◉ Stimulate RBC production
- ◉ Regulate blood pressure and electrolyte balance
- ◉ Detoxify the blood
 - > Filtration
 - > Re-absorption
 - > Secretion



What is Kidney Failure?

- ◉ The level of kidney function is < 15%
- ◉ When the kidneys stop working completely

○ Acute Renal Failure

○ Chronic Renal Failure

Acute Renal Failure

- Usually reversible
- A sudden and marked *decrease* in filtration
 - > Rapid reduction in urine output
 - > Accumulation of salt, water, and nitrogenous wastes

Urine Formation

- Urea
 - > 21 g / day
- Creatinine
 - > 1.8 g / day
- Uric acid
 - > 480 mg / day

Acute Renal Failure

- The resulting condition is called **Uremia**
 - > Altered mental status
 - > Hypotension
 - > Tachycardia
 - > ECG indicative of hyperkalemia
 - > Pale, cool, moist skin



Physical Assessment

Edema of face, hands, or feet

Abdominal findings dependent on the cause of ARF

Scars, ecchymosis, bulges, pulsating masses



Acute Renal Failure

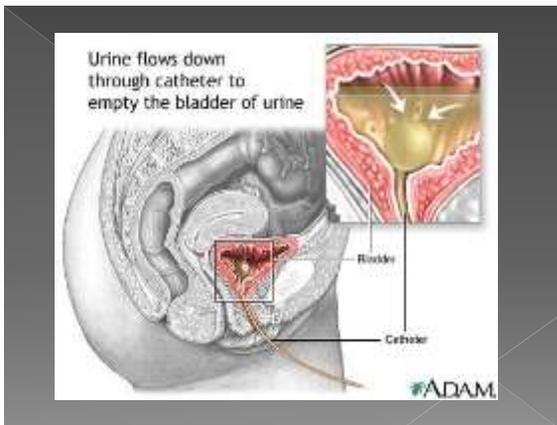
- Pre-renal = 55%
- Renal (intrinsic) = 40%
- Post-renal = 5-15%

Prerenal ARF	Renal ARF	Postrenal ARF
<p>Hypovolemia (hemorrhage, dehydration, burns)</p> <p>Cardiac failure (myocardial infarction, congestive heart failure, valvular disease)</p> <p>Cardiovascular collapse (shock, sepsis)</p> <p>Renal vascular anomalies (renal artery stenosis, or thrombosis, embolism of renal vein)</p>	<p>Small vessel/glomerular damage (vasculitis—often immune-mediated; acute glomerulonephritis; malignant hypertension)</p> <p>Tabular cell damage (acute tubular necrosis—either ischemic or secondary to toxin)</p> <p>Interstitial damage (acute pyelonephritis, acute allergic interstitial reactions)</p>	<p>Abrupt obstruction of both ureters (secondary to large stones, blood clots, tumor)</p> <p>Abrupt obstruction of the bladder neck (secondary to benign prostatic hypertrophy, stones, tumor, clot)</p> <p>Abrupt obstruction of the urethra (secondary to inflammation, infection, stones, foreign body)</p> <p>OBSTRUCTION</p>

Renal ARF

Urinary Tract Infection

- Lower UTI's
 - E. Coli from bowel (STD's in males)
- > Involve bladder and urethra
- > Common among women
 - Short length of urethra, proximal to rectum



Renal ARF

Pyelonephritis

- Associated with microbial infection that reaches the kidneys
 - > lower UTI
 - > bloodstream

Renal ARF

Pyelonephritis

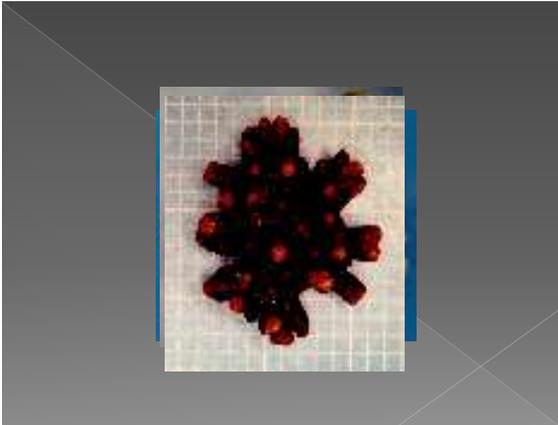
- Gradual onset of signs and symptoms
 - > Fever
 - > Chills
 - > Flank pain
 - > Cloudy/bloody urine
- Can progress to sepsis/scarring and result in renal failure



Post-renal ARF

Urinary Calculi

- Pathological concretions that originate in the renal pelvis
- Result from supersaturation of urine with insoluble salts (uric acid and calcium)
- Recurrent and occur typically between ages 30 - 50



Postrenal ARF

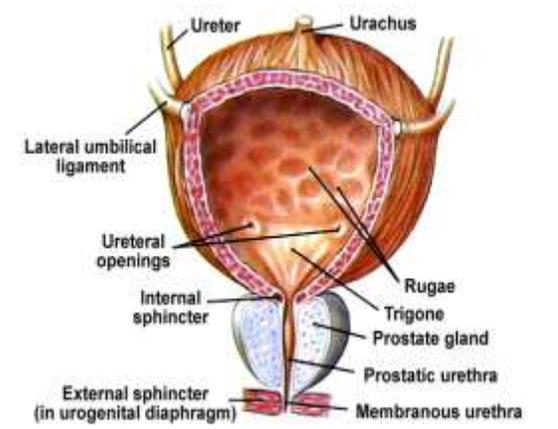
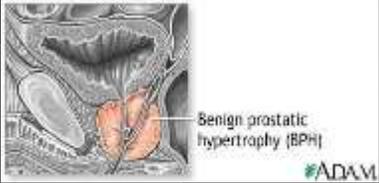
Urinary Calculi

- Signs and Symptoms
 - > Acute excruciating pain that originates in flank area and radiates to:
 - right and left lower abdominal quadrant
 - groin and testes (male)
- Severe pain of waxing-waning cycle

Genitourinary disorders that may cause acute pain

Urinary Calculi

- Restlessness
- Nausea and vomiting
- Urinary urgency or frequency
- Diaphoresis
- Hematuria
- Dysuria

Benign prostatic hypertrophy (BPH)



Acute Renal Failure Management

- Treat life-threatening conditions
- Identify the cause, if possible
- Treat reversible elements
 - > Hydrate
 - > Relieve obstruction

Chronic Renal Failure

- Irreversible systemic disease
- May be caused by:
 - > Congenital disorders
 - Loss of renal mass, reduction of nephron mass
 - > Prolonged pyelonephritis
 - > Diabetes, HTN

75% of function can be lost before its noticeable

Chronic Renal Failure

- Patient requires some type of dialysis
- 2 types
 - > Hemodialysis
 - > Peritoneal dialysis

Hemodialysis

- The patient's blood is artificially cleaned by a machine
 - > Dialyzer
- Usually 3 days/week
- 4-5 hours per tx



Other hemodialysis options

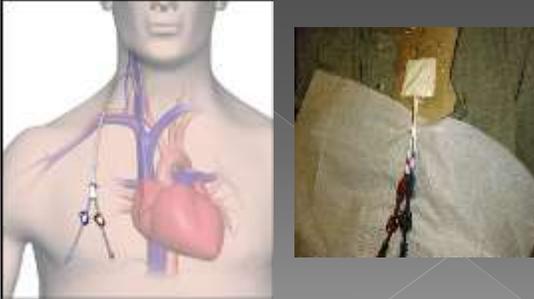
- Short Daily Dialysis
- Nightly Dialysis
- Home Hemodialysis
 - > Takes long time to learn
 - > RN/tech support



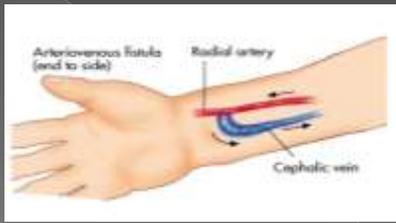
Types of Access

- Temporary site
- AV fistula
- AV graft

Double Lumen Catheter

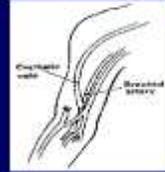


AV Fistula

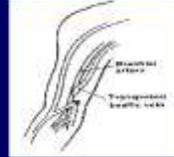


A surgeon creates an AV fistula by connecting an artery directly to a vein, usually in the forearm

Brachio-Cephalic Fistula

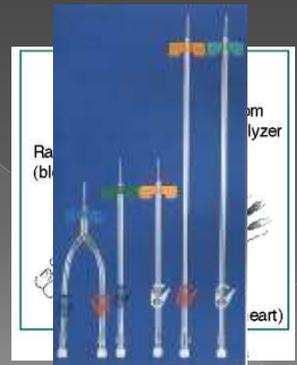


Brachio-Basilic Fistula

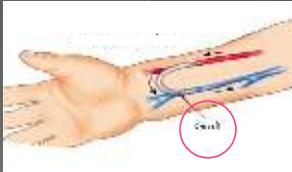


Needles

- Most dialysis centers use two needles—one to carry blood to the dialyzer and one to return the cleaned blood to the body
- Some specialized needles are designed with two openings for two-way flow of blood



AV Graft



- Pt. has small veins that won't develop properly into a fistula
- Surgically implanted synthetic
- Problems with clotting and infections

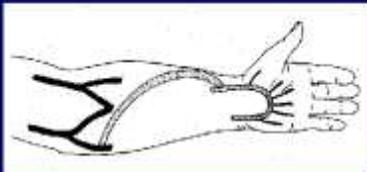
Loop Graft



Upper Arm Graft



Straight Graft

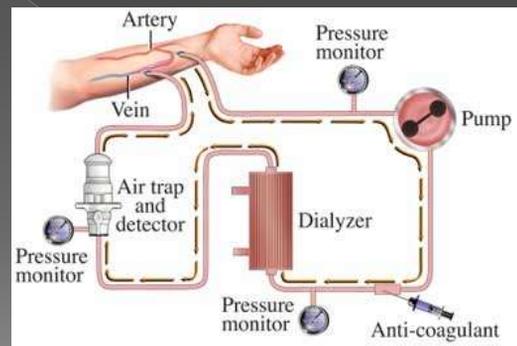


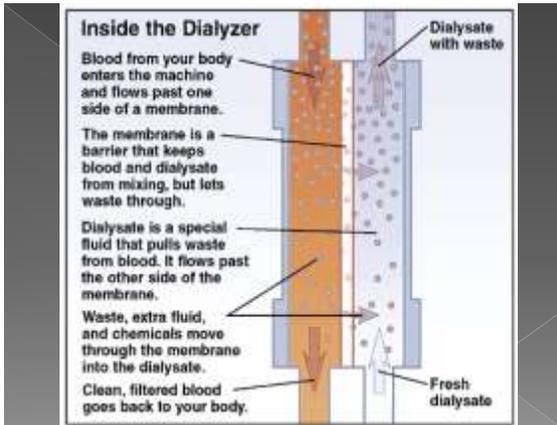
Access Considerations

- No B.P. or I.V.'s on same arm as fistula or graft
- Remove all constricting jewelry
- Control obvious hemorrhage
 - > Bleeding will be arterial
 - > Maintain direct pressure
- A "thrill" should be felt/palpated

Hemodialysis

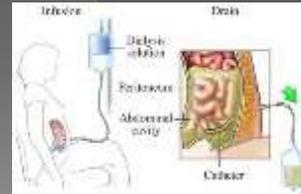
- Dialyzer performs the function that the kidneys have lost





Peritoneal Dialysis

- The patient's blood is cleansed inside the body by using the peritoneum as the filter



Catheter

- Placed into the abdomen about an inch below and to the side of the navel



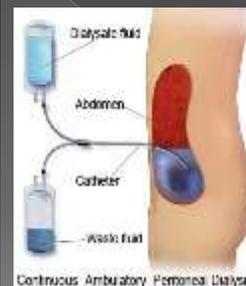
Peritoneal Dialysis - APD

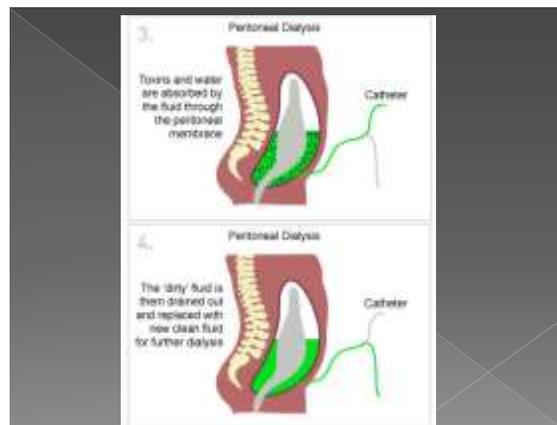
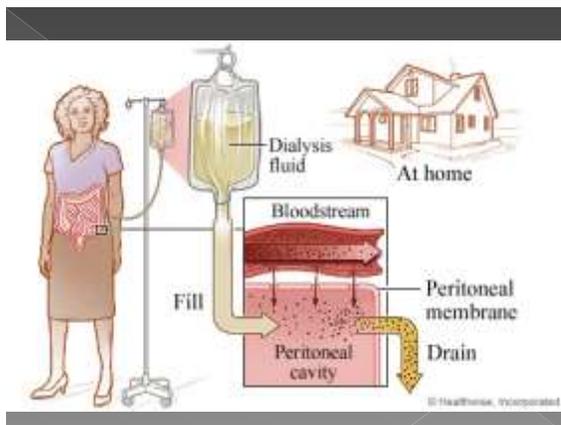
- Automated Peritoneal Dialysis
- Dialysis exchanges are done with a "cycler"
- Works during the night



Peritoneal Dialysis - CAPD

- Continuous Ambulatory P.D.
- More common
- Done manually



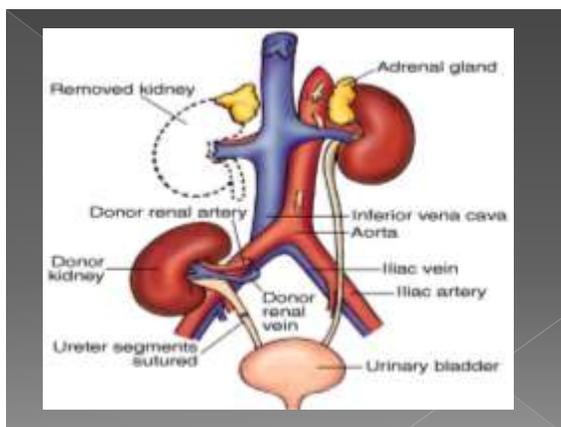


EMS Considerations

- Make sure the dressing remains intact
- Do not push or pull on the catheter
- Do not disconnect any of the catheters
- Always transport the patient and bags/catheters as one piece

Chronic Renal Failure

- Transplant
 - > Must find donor
 - > Waiting period long
 - > Must take an immunosuppressant for life
 - > Good survival rate – 1 year 95-97%
 - > Rejection
 - Watch for fever, elevated B/P, and pain over site of new kidney



Other Dialysis Emergencies

- Vascular access problems
- Hemorrhage
- Hypotension
- Dysrhythmias
- Muscular cramping

Dialysis Emergencies

- ◉ Air Embolism
 - > Misplacement/dislodgement of needles
 - > Malfunction in the dialysis machine

Either can allow an air embolism to enter the patient's blood stream

Dialysis Emergencies

- ◉ Air Embolism
 - > Administer high-concentration oxygen
 - > Transport rapidly to a medical facility
 - > Position patient on the left side and in a modified Trendelenburg position

Questions ?



THANKS FOR COMING !

Christopher Ebright

NREMT-P, B.Ed

EMS Education Coordinator
National EMS Academy
Covington, LA

cde61969@yahoo.com