Global Educare Nclex-RN academy

Urinary system

1.UTI

Urinary tract infections are the most common bacterial infection in women.

Escherichia coli is the most common pathogens causing a UTI and is primarily seen in women.

Urosepsis is a UTI that has spread systemically and is a life threatening condition requiring emergency treatment.

Signs and symptoms

Dysuria, frequent urination, urgency and suprapubic discomfort or pressure. The urine may contain grossly visible blood (hematuria) or sediment, giving it a cloudy appearance.

Flank pain, chills and fever indicate an infection involving the upper urinary track (Pyelonephritis).

Older patients: Older patients are less likely to experience a fever with UTI. They may have cognitive impairment.

Diagnostic procedure: Clean catch urine sample is needed. Collect the specimen 1 to 2 seconds after voiding start. Refrigerate urine immediately after collection. The urine should be cultured within 24 hours of refrigeration.

Medical Management: First choice drugs Trimethoprim/ Sulfametnoxazole, Nitrofurantoin.

Application of local heat to the suprapubic area or lower back may relieve the discomfort associated with the UTI.

Emptying the bladder regularly and completely. Wiping the perineal area from front to back after urination and defecation and drink an adequate amount of liquid each day

Caffeine, alcohol, citrus juices, chocolate and highly spiced foods or beverages should be avoided because they are potential bladder irritants.

2. Glomerulonephritis

Strep throat, Impetigo and scarlet fever: If these diseases are not treated in a proper way, it leads to antigen-antibodies complex and that deposit into kidneys. Ultimately it damages the kidneys.

Teach the patient if your baby is suffering with any kind of above mentioned disease, should complete the course of antibiotic. For eg.7,14,21 days.

Signs and symptoms: Edema, HTN, Gross hemeturia(tea, coffee, coal color)

Complications: Periorbital edema, Urine color change and anasarca.

Treatment: No antibiotics. Only symptomatic treatment.

Prevention: Early diagnosis and treatment of sore throats and skin lesions.

Goodpasture syndrome

It is an autoimmune disease characterized by circulating antibodies against glomerular and alveolar basement membrane.

Both respiratory and real complications are present

Signs and symptoms: Pulmonary symptoms: cough, mild shortness of breath, hemoptysis, crackles.

Renal involvement causes hematuria, weakness, pallor, anemia and renal failure.

Treatment: Corticosteroid and immunosuppressive drugs Eg. Cyclophosphamide and azathioprine.

Cyclophosphamide: is an Immunosuppressive drug. Encourage to increase the fluid intake unless contraindicated.

Long term use: cause bladder cancer

Short term use: Hemorrhagic cystitis.

Nephrotic syndrome

When the glomerulus is excessively permeable to plasma protein causing proteinuria.

That leads to low plasma albumin and tissue edema.

Signs and symptoms:

Ascites, anasarca, decreased total serum protein.

Anticoagulant protein lost: Increase coagulant protein inside the body and the patient is at risk of clot formation. Pulmonary emboli occur in about 40% of nephritic patients with thrombosis.

Treatment: Corticosteroids, Prednisone and cyclophosphamide

Nephrolithiasis: Kidney stone disease-

More common in men than in women. The majority of patients are between 20 and 55 years of age. Stone formation is more frequent in whites than in African Americans.

Obstruction with urinary stasis and UTI with urea splitting bacteria (Eg. Proteus, Klebsiella, pseudomonas and some species of staphylococci. These bacteria cause the urine to become alkaline and contribute to the formation of Struvite stones.

Cystinuria an autosomal recessive disorder is characterized by a markedly increased excretion of Cystine.

Symptoms: A person feels a sharp pain in flank area, back or lower abdomen.

Pain resulting from the passage of a calculus down the Ureter is intense and colicky. CT scan usually non contrast.

Management: of the acute attack by treating the pain, infection and/ or obstruction.

Administer Opoids to relieve renal colic pain. Most stones are 4mm or less in size and will probably pass spontaneously.

Tamsulosin or Tetrazosin relax the smooth muscles in the ureter, can be used to facilitate stone passage.

Teaching: Adequate hydration, dietary sodium restrictions, dietary changes and drugs are employed to minimize urinary stone formation. Best treatment for struvite stone is management of infection.

Lithotripsy: is used to fragment ureteral and large bladder stones.

Foods associated with kidney stones

Purine high: Sardines, herring, mussels, liver, kidney, goose, venison, meat soups, sweetbreads, Chicken, salmon, crab, veal, mutton, bacon, pork, beef and ham.

Calcium High food: Milk, cheese, ice cream, yogurt, sauces containing milk, lentils, fish with fine bones (Eg. Sardines, kippers, herring, salmon); dried fruits, nuts, ovaltine, Chocolate and coca.

Oxalate high food: Dark roughage, spinach, rhubarb, asparagus, cabbage, tomatoes, beets, nuts, celery, parsley, chocolate, coca, instant coffee, Ovaltine, tea, Worcestershire sauce.

Bladder cancer

Cigarette smoking, exposure to dyes used in the rubber and other industries.

Women treated with radiation for cervical cancer, patients who received cyclophosphamide and patients who take the diabetes drug pioglitazone also have an increased risk for bladder cancer.

Painless hematuria is the most clinical manifestation of bladder cancer.

Approximately 7 to 10 days after tumor resection, the patient may observe dark red or rust colored flecks in the urine.

Eg. Doxorubicin and methotrexate.

Bacille Calmette-Guerin (BCG), a weakened strain of mycobacterium bovis, is the treatment of choice for carcinoma in situ. BCG stimulate the immune system rather than acting directly on cancer cells in the bladder.

May cause flu like symptoms, increased urinary frequency, hematuria or systemic infection.

If BCG fails include Thiotepa (Thioplex), Valrubicin (Valstar).

Thiotepa can significantly reduce WBC and platelet counts.

Urinary Incontinence (UI)

Is an involuntary leakage of urine. Followings are the causes:

D: Delirium, depression and dehydration.

R: Restricted mobility, rectal impaction.

I: Infection, inflammation, impaction

P: Polyuria, Polypharmacy

Best recommendations: Teach kegel exercise.

Urinary retention: is the inability to empty the bladder when the person voids or the accumulation of urine in the bladder because of an inability to urinate. Common cause in men is an enlarged Prostate. Longstanding diabetes mellitus, Chronic alcoholism.

Normal PVR : 50-75 ml.

Scheduled toileting and double voiding may be effective in chronic urinary retention with moderate PVR volumes.

For chronic retention: Patient may be managed by behavioral methods, indwelling or intermittent catheterization.

Void every 3-4 hours.

Acute Kidney Injury:

Creatinine increases and or a reduction in urine output.

Azotemia

Abrupt decline in kidney function, leading to a rise in serum creatinine or a reduction in urine output or both.

Causes: Prerenal, Intrarenal and Postrenal.

Pre-renal causes: No damage to the kidney tissue. Correct dehydration.

Vasoactive medications: ACE inhibitors, ARBs, Epinephrine, large dose of dopamine.

Hemorrhage or GI losses, Sepsis or anaphylaxis, MI, CHF or cardiogenic shock.

Intra-renal causes:

Direct damage to kidneys by inflammation, toxins, drugs, infection, or reduced blood supply.

Physical trauma, chemical injury

Medications: Vancomycin, cyclosporine, methotrexate, NSAIDs.

Pyelonephritis and Glomerulonephritis.

Post- renal causes:

AKI involve mechanical obstruction in the outflow of urine. As the flow of urine is obstructed, urine refluxes into the renal pelvis, impairing kidney function. The most common causes are BPH, prostate cancer, calculi, trauma and external tumor.

Clinical Manifestations:

Lethargy with persistent vomiting and diarrhea.

Dehydration, CNS: Drowsiness, headache, muscle twitching and seizures.

Anemia.

AKI phases: Oliguric, Diuretic and recovery.

Oliguric phase: Oliguria (less than 400ml/ day).

Proteinuria may be present if kidney failures is related to glomerular membrane dysfunction.

When urine output decreases fluid retention occurs. The severity of the symptoms depends on the extent of the fluid overload.

Metabolic acidosis: Kidney cannot excrete Hydrogen ions.

Hyperkalemia is also formed due to inappropriate kidney functions.

Acidosis worsens hyperkalemia. Leukocytosis is often present with AKI. The most common cause of AKI is death. The most common cause of infections are respiratory and urinary systems.

Diuretic phase: Gradual increase in urine output.

Labs stop rising and gradually begin to decrease.

Large losses of fluid and electrolytes, the patient must be monitored for hyponatremia, hypokalemia and dehydration. The diuretic phase may lasts 1-3 weeks.

Recovery phase: When GFR increases. Lab values return to normal, May take upto 3-12 months.

Hyperkalemia is the major problem: first treat hyperkalemia

Insulin and sodium bicarbonate serve as a temporary measure for treatment of hyperkalemia by promoting the shift of potassium into the cells.

Kayexalate and dialysis also remove potassium from the body.

Do not give Kayexalate to patient with a paralytic ileus because bowel necrosis can occur.

Reduce metabolic rate by promoting bed rest. Promote pulmonary functions by breathing exercises.

Avoid infection: Care of Catheter.

Skin care.

Chronic Kidney Disease (CKD) involves progressive, irreversible loss of kidney function.

--end stage kidney (renal) disease occurs when the GFR is less than 15 mL/min

--the leading causes are diabetes and hypertension.

--the GFR decreases, the BUN and serum creatinine levels increases. The BUN increased not only by kidney failure, but also by protein intake, fever, corticosteroids and catabolism.

--patients with diabetes who develop uremia may require less insulin than before the onset of CKD. This is because insulin, which depends on the kidneys or excretion, remains in circular longer.

Hyperkalemia

--Sodium may be elevated, normal or low in kidney failure. Because of impaired sodium excretion, sodium along with water is retained.

--If large quantities of water are retained, dilutional hyponatermia occurs.

--ingesting magnesium is discouraged (e.g., milk of magnesia, magnesium citrate, antacids containing magnesium).

--Clinical manifestations of hypermagnesemia can include absence of reflexes, decreased mental status, cardiac dysrhythmias, hypotension and respiratory failure.

--Metabolic acidosis

--The anemia is due to decreased production of the hormone erythropoietin.

--The most common cause of death in patients with CKD is cardio vascular disease.

--Myocardial infarction, ischemic heart disease, peripheral arterial disease, HF, cardiomyopathy, and stroke are leading causes of death

--Hypertension is highly prevalent in patients with CKD because hypertension is both a cause and a consequence of CKD.

--Skeletal complications include osteomalacia , which results from demineralization from slow bone turnover

--**Uremic red eye** is caused by the irritation from calcium deposits in the eye.

Intracardiac calcifications can disrupt the conduction system and cardiac arrest

--Women usually have decreased levels of estrogen, progesterone, and luteinizing hormone, causing an ovulation and menstrual changes (usually amenorrhea). Menses and ovulation may return after dialysis is started. Men experience loss of testicular consistency, decreased testosterone levels, and low sperm counts.

Lb values:

- Creatinine: Over 1.3

-Creatinine clearance:

-GFR: <15ml/min

-Proteinuria

Medical management

-Goal: To maintain kidney function and homeostasis as long as possible.

-Diet: Low Protein, K and water restriction, High calorie, vitamin supplement

-Dialysis: Peritoneal and hemodialysis

--target BP be less than 130/80 mm Hg for patients with CKD and 125/75 mm Hg for patients with significant proteinuria.

--antihypertensive drugs most commonly used are diuretics, calcium channel blockers, ACE inhibitors and angiotensin receptor blocker (ARB) agents.

--CKD-MBD include limiting dietary phosphorus, administering phosphate binders include calcium based binders: calcium acetate (PhosLo) and calcium carbonate (caltrate) . They bind phosphate in the bowel and are then excreted in the stool.

--non-calcium based phosphate binders such as lanthanum carbonate (Fosrenol) and sevelamer, carbonate Renvela

Give phosphate binders with meals

Ideal body weight

--Water and any other fluids are not routinely restricted in patients with CKD stages 1 to 5 who are not receiving HD.

--Patients are advised to limit fluid intakes so that weight gains are no more than 1 to 3 kg between dialyses.

--Patients with CDK are advised to restrict sodium. Sodium-restricted diets may vary from 2 to 4 g/day

Peritoneal Dialysis

--Preparation of the patient for catheter insertion includes emptying the bladder and bowel, weighing the patient

The three phases of the PD cycle are inflow (fill), dwell (equilibrium), and drain- THE PHASES ARE CALLED EXCHANGE

Prescribed amount of solution, usually 2 L, infused through an establish catheter over about 10 minutes

--the dwell time can last from 20 or 30 minutes to 8 more hours

--Drain time takes 15 to 30 minutes and may be facilitated by gently messaging the abdomen or changing position

Automated peritoneal dialysis (APD) is the most popular form of PD because it allows patients to do dialysis while they sleep.

Complications of PD:

- Exit site infection: Peritonitis , fever increased HR, Cloudy Drainage

- Respiratory distress: crackles, dyspnea
- Outflow problems: Insufficient Outflow
- Assess patient
- Assess device
- Side-lying

  --manifestations of peritonitis are abdominal pain and cloudy peritoneal effluent with a WBC count greater than 100 cells/ Ul

  --GI manifestations of peritonitis may include diarrhea, vomiting, abdominal distention and hyperactive bowel sounds.

  Hemodialysis

  --Arterivenous Fistulas and Graft. A subcutaneous arteriovenous fistula (AVF) is usually created in the forearm or upper arm with an anastomosis between an artery and a vein- usually cephalic or basilica

  --maturation may take 6 weeks to months. AVF should be placed at least 3 months before the need to initiate HD

  --Thrill and Bruit

  Vascular Access Sites:

- Arteriovenous Fistula: Surgically connecting a vein and an artery, usually in the forearm
- Require 4 to 6 weeks to mature.
- No BP, blood samples, infuses fluids, meds in access site.
- Anticoagulation: To prevent blood clots from forming within the dialyzer or the blood tubing, anticoagulation is needed during HD treatments. Heparin IV is the most commonly used drug to prevent clots from forming.

- **Steal Syndrome**

  Classic manifestations of steal syndrome are pain distal to the access site, numbness or tingling of fingers that may worsen during dialysis and poor capillary refill.

  Procedure

  --The needles used for HD large bore, usually 14 to 16 gauges and are inserted into the fistula or graft to obtain vascular access.

  --red lumen used to draw blood and blue lumen to return blood.

  --Heparin is added to the blood as it flows into the dialyzer because any time blood contacts a foreign substance it has a tendency to clot.

  Complications

  --Hypotension that occurs during HD primarily results from rapid removal of vascular volume.

  Kidney transplant

  --Contraindications to transplantation include disseminated malignancies, refractory or untreated cardiac disease, chronic respiratory failure, extensive vascular disease, chronic infection and unresolved psychological disorders (e.g., non adherence to medical regimens, alcoholism, drug addiction.

--presence of hepatitis B or C and HIV is not a contraindication to transplantation
--HLA – six
--Paired organ donation
Hepatitis B and C, HIV and cytomegalovirus (CMV) testing is done to assess any transmitted diseases- IN DONOR
IF CADEVER KIDNEY USED—the donor must be free of active IV drug abuse; severe hypertension; longstanding diabetes mellitus; malignancies; sepsis and communicable diseases, including HIV, Hepatitis B and C, syphilis, and tuberculosis
--They can be preserved for up to 72 hours—COLD TIME LESS THAN 24 HOURS IS PREFERRED
--Prolonged cold time increases the likelihood that the kidney will not function immediately and acute tubular necrosis (ATN) may develop.
Renal failure signs –Azotemia---elevated BUN and creatinine

- If hypovolemic (pre-renal), tachycardia, orthostatic hypotension, dry skin and mucous membranes
- Weight loss due to chronic disease
- Peripheral edema
- Decreased urinary output
- Uremic pruritis—see excoriations from scratching
- Anemia in chronic disease—kidneys produce erythropoietin

Treatment

Administer intravenous fluids to correct hypovolemia.

- Administer inotropic agents for patients with CHF to enhance cardiac output.
- Administer antibiotics for pyelonephritis.
- Stent placement or catheter (urethral, suprapubic, nephrostomy) to allow for drainage of urine if blockage present.
- Dialysis
- Administer erythropoietin to treat anemia.
- Restrict potassium, phosphate, sodium and protein in diet.
- Administer phosphate binders to reduce phosphate levels.
- Administer sodium polystyrene sulfonate to reduce potassium levels.
- Monitor electrolyte levels.

Interventions

Monitor vital signs for changes in heart rate or blood pressure.

- Monitor intake and output.
- Assess intravenous site for redness, swelling or pain.
- Check dialysis assess site for signs of infection.
- No contrast dye tests.
- No nephrotoxic medication
- Monitor patient very closely.

HIGH POTASSIUM FRUITS—Apricot, raw (medium), Avocado, Banana-Cantaloupe-Dried fruits-Grapefruit juice – honeydew, orange-orange juice-prunes-raisins

VEGETABLES==Baked beans—Butternut squash—refried beans-black beans-broccoli, cooked carrots, raw green, except kale
Mushrooms, canned—potatoes, white and sweet—spinach cooked—tomatoes or tomato products—vegetable juices