Pediatric Genitourinary Disorders NCLEX Review

I. Overview

The urinary system consists of organs and structures involved in the production and transport of urine. These are the kidneys and the urinary tract. The kidneys are found in the posterior part of the upper abdominal area protected by the lower ribs. The left kidney is higher than the right kidney due to the location of the liver within the abdomen. There are two divisions of the kidneys:

- Renal cortex: Outside surface of the kidney
- Renal medulla: Inside the kidney where nephrons are located

NEPHRONS

Nephrons are the site where urine is formed. A branch of the abdominal aorta called the renal artery transports blood inside the kidney to the glomerulus. The area that surrounds the glomerulus is called the Bowman capsule. The Bowman capsule narrows into a proximal convoluted tubule that eventually enters the loop of Henle and then through a network of small bloods that delivers blood to the nephron tubules in a process called glomerular filtration. Nephron tubules filter waste fluid from blood. Waste fluid (urine) is secreted into the urinary tract while proteins, electrolytes, and blood cells are resorbed by the nephron tubules and returned to the bloodstream.

AGE	24-HR U.O.
Newborn	300 mL
1 month – 1 y.o.	550 mL
2 – 4 y.o.	800 mL
5 – 12 y.o.	1400 mL
13 – 18 y.o.	1500 mL

THE URINARY TRACT

The urinary tract has three components:

- **Ureters:** Tubes that connect each kidney to the bladder
- **Bladder:** A flexible muscular pouch used to store urine
- **Urethra:** The tube that connects the bladder to outside the body to excrete urine As waste fluid is filtered by the kidney, it moves through the ureters through peristaltic contraction to the bladder. The ureters have valves that prevent urine from back flowing from the bladder to the kidneys.

As the bladder fills usually to about 300 mL, the micturition reflex occurs, triggering a signal to the brain that there is a need to urinate. The greater the volume of urine in the bladder, the higher the urge to urinate is received by the brain. The person can voluntarily inhibit the micturition reflex until he or she voluntarily releases the urethral sphincter allowing urine to exit the urethra.

NCLEX!!! Voluntarily inhibition of the micturition reflex, commonly referred to as toilet training, occurs by 3 years of age.

REGULATOR

The kidneys regulate electrolytes, fluid volume, and blood pressure. Electrolytes are sodium, potassium, calcium, phosphorus, chloride, bicarbonate, and magnesium. Electrolytes must be balanced to ensure cell metabolism and muscle and nerve function. The kidneys help maintain this balance by excreting or retaining electrolytes.

Fluid volume is maintained by the kidneys excreting or retaining urine based on the volume of fluid in the body. When the body is dehydrated, the kidneys produce a low urine output to conserve fluid, and when the body is overhydrated, the kidneys increase urine output to reduce fluid volume in the body.

The kidneys produce the hormone erythropoietin (EPO), which stimulates the production of red blood cells in the bone marrow. Therefore, renal failure causes less production of EPO and thus decreases production of red blood cells, resulting in the patient becoming anemic.

The kidneys also produce the enzyme renin, which regulates blood pressure by stabilizing blood vessels. Decreased blood pressure signals the kidneys that there is insufficient blood for perfusion. In response, the kidneys increase renin production, which indirectly causes vasoconstriction and increases secretion of aldosterone to increase blood pressure.

Functions of the Kidneys (A-WET-BED):

A – acid-base balance

W – water balance

E – erythropoeisis – stimulates RBC production in the bone marrow.

T – toxin removal

B – blood pressure control (RAAS)

E – electrolyte balance – ensures cell metabolism and muscle and nerve function. Done by excreting or retaining electrolytes.

D – Vitamin D metabolism – enhances Calcium absorption.

II. Urinary Tract Infection

Urinary tract infection occurs when a microorganism, typically a gram-negative bacteria such as E. coli, enters the urinary tract. The microorganism is present in the genital area and enters through the urethral opening or during sexual contact. A nosocomial urinary tract infection can also develop in patients who have a urinary catheter in place or who have undergone procedures such as a

cystoscopy where an instrument is placed in the urinary tract.

Assessment:
- Dysuria, Low back pain, feeling of fullness in suprapubic area.

Diagnosis:

Urinalysis: presence of WBC, RBC, and nitirites

Urine C&S: microorganisim is identified and the antibiotic that it is susceptible to.

Nursing Interventions:

1. Monitor intake and output.
2. Monitor VS.
3. Encourage fluid intake.
4. Encourage cranberry juice to acidify urine.
5. Phenazopyridine (for dysuria causes orange-colored urine).
6. Administer antibiotics as per ordered.

III. Glomerulonephritis

- Inflammation of the glomerular capillaries.
- A latent period of two to three weeks occurs between strep-infection and symptoms of AGN.

Causes:

1. **Group A Beta hemolytic streptococcal infection**
2. Viral infections (varicella, Epstein-Barr, Hepa B, HIV).
3. Skin infections (impetigo).

Types:

1. Acute – occurs 2-3 weeks after strep infection.

- Disease of children older than 2 y.o.

1. Chronic – may occur after acute phase or may insidiously develop.

Complications:

1. Renal Failure
2. Hypertensive encephalopathy
3. Pulmonary edema
4. Heart Failure

Assessment:

1. Periorbital and facial edema
2. Hypertension – most important and it has to be identified early in the disease process. It has to be monitored to prevent the progression of kidney injury --> pulmonary edema and hypertensive encephalopathy.
3. Oliguria

- Decreased kidney filtration --> water retention.

1. Anorexia
2. Pallor, irritability, lethargy
3. Brown/cola/tea-colored urine (due to the presence of blood and protein in the urine).
4. Older child: headaches, abdominal/flank pain, dysuria.
5. Azotemia
6. Proteinuria (bubbly/foamy urine)
7. Increased BUN and CREA
8. Increased anti-streptolysin O titer.

Interventions:

1. Strict I&O.
2. Fluids are given according to fluid loss and daily weight.
3. Administer antibiotics.
4. Increase carbohydrates for energy and to reduce protein catabolism.
5. Restrict protein when there is renal insufficiency and Nitrogen retention (elevated BUN).
6. Sodium restriction for Hypertension, edema and heart failure.
7. Loop diuretics and antihypertensives.
8. Corticosteroids to reduce inflammatory response.

IV. Pyelonephritis

A kidney infection typically following a urinary tract infection commonly caused by E. coli, Klebsiella, Enterobacter, Proteus, Pseudomonas, and Staphylococcus saprophyticus. Inflammation may impair renal function.

Risk Factors (SCARRIN' UP):

S – ex (F < 40; M > 40 y.o.)

C – atheterization

A – ge (infant, elderly)

R – enal lesions

R – efflux (vesicoureteral)

I – mmunodeficiency

N – IDDM, IDDM

U – rinary obstruction

P - regnant

Assessment:

1. Flank pain (CVA tenderness)
2. INFECTION:
3. Fever and chills
4. Nausea, vomiting and diarrhea.
5. Increased HR.
6. Frequency, urgency, dysuria due to UTI.

DX:

Urinalysis: presence of bacteria, nitrites, RBC, and WBC.

Urine C&S: identifies m.o.

CBC: elevated WBC

Treatment:

- Antibiotics: Nitrofurantoin, Ciprofloxacin, Levofloxacin, Ofloxacin, Trimethoprim-sulfamethoxazole, Ampicillin, Amoxicillin
- Antipyretics
- Fluids for dehydration
- Administer phenazopyridine for relief of dysuria symptoms.
- Repeat urine culture after completion of antibiotic course.

Nursing Interventions:

1. Monitor vital signs
2. Monitor intake and output.
3. Assess for side effects of medication
4. Teach patient that phenazopyridine will cuase orange-colored urine.

V. Nephrotic Syndrome

- primary glomerular disease characterized by:

1. proteinuria
2. hypoalbuminemia
3. edema
4. high serum cholesterol and ldl (hyper lipidemia.

Causes:

1. Chronic glomerulonephritis
2. DM with intercapillary glomerulosclerosis.
3. Multiple myeloma
4. Renal vein thrombosis

Assessment:

Below are the **4 classic manifestations** of nephrotic syndrome:

- **Massive proteinuria** – caused by increased glomerular permeability.
- **Hypoalbuminemia** – resulting from excess protein loss in the urine.
- **Edema** – specifically periorbital, facial (prominent in the morning) and peripheral edema and ascites; caused by low serum protein and albumin as fluid is pulled into interstitial spaces and body cavities.
- **Hyperlipidemia** – related to increased compensatory protein and lipid production by the liver.

Additional symptoms include decreased urine output, fatigue, pallor, and weight gain

1. Leg, ankle, labial or scrotal edema
2. Dark and frothy urine
3. Blood pressure is normal to slightly decreased
4. Lethargy, anorexia, pallor
5. Decreased serum protein.

Diagnostic Findings:

1. Proteinuria - >3-3.5 g/day.
2. Increased WBCs, granular, and epithelial casts.

Tx:

1. Diuretics for severe edema.
2. ACE inhibitors.
3. Corticosteroid (WOF: infection)
4. Immunosuppresants (Imuran) – to reduce relapse rate and induce long-term remission.
5. Diet: Low sodium, Liberal Protein, low saturated fats.

Interventions:

1. Monitor VS, weight, I&O
2. Monitor Urine specific gravity and Protein.
3. Monitor for edema.
4. Infection prevention: Instruct parents to watch out for signs of infection and the need to avoid contact with sick children.
5. DIET: make the food attractive to the child’s eye.

VI. Hemolytic-Uremic Syndrome

- Associated with bacterial toxins, chemicals, and viruses that case acute kidney injury in children.
- Common: 6 mos-5y.o.

Assessment:

- TRIAD: hemolytic anemia, thrombocytopenia, and kidney failure.
- Proteinuria, hematuria, and presence of urinary casts.
- Elevated BUN and CREA
- Hgb and Hct decreased

Manifestations:

1. Vomiting
2. Lethargy
3. Irritability
4. Pallor

5. Oliguria/anuria
6. CNS involvement: seizures, stupor, coma
7. Hemorrhagic manifestations: bruising, petechiae, jaundice, bloody diarrhea

Interventions:

1. HD/PD for anuric children.
2. Strict I&O; fluid restrictions.
3. Infection prevention measures.
4. Adequate nutrition.
5. Other treatments: administration f blood products to treat severe anemia.

VII. Cryptorchidism

- one or both testes fail to descend through the inguinal canal into the scrotal sac.

Assessment: Unpalpable testes.

Interventions:

1. Monitor for spontaneous descent of the testes until 12 months of age.
2. Orchipexy between 1-2 y.o.
3. Monitor for bleeding and infection.
4. Instruct parents in postop home care measures: pain control and activity restrictions.
5. Human chorionic gonadotropin, a pituitary hormone may be prescribed for an older child for it stimulates the production of testosterone.

VIII. Epispadias and Hypospadias

- Genital anomalies in which the urethral opening is above or below the glans penis.
- Easy entry of bacteria into the urine.

Assessment:

Epispadias: urethral orifice on the dorsal surface. Common in bladder exstrophy.

Hypospadias: urethral orifice on the ventral surface or below the glans penis.

TX: surgery is done before toilet training (16-18 mos of age)

WHY? Circumcision is not performed on newborns because the foreskin may be used in surgical reconstruction of the defect.

Nursing Diagnosis:

- Altered urinary elimination related to congenital anatomical defect of the penis.
- Pain related to surgery and treatments.
- Self-esteem disturbance r/t anatomical defect in penis and resulting disturbance in ability to void standing up.
- Knowledge deficit related to condition, surgeries, outcome.

Post-Op Interventions:
1. Monitor VS.

1. A stent or urinary diversion is used to maintain urethral meatus patency. (with pressure dressing)
2. Encourage fluid intake to maintain adequate urine output and patency of the stent.
3. Monitor input and output, especially urine characteristics.
4. Notify HCP if no output after 1 hr.
5. Pain medication to relieve bladder spasms (anticholinergics).
6. Administer antibiotics.
7. No tub baths until the stent is removed.

WOF: No urine output 1 hour post surgery indicates an obstruction or kink.

IX. Bladder Exstrophy (ectopia vesicae)

- Congenital anomaly wherein the urinary bladder is outside of the body through a defect in the lower abdominal wall.
- Etiology: unknown.

TX: reconstructive surgery within the first few days of life to achieve urinary continence.

Assessment:

1. Exposed bladder mucosa
2. Widened symphysis pubis
3. Defects of external genitalia.

Nursing Interventions:

1. Monitor urine output.
2. Monitor wound or urinary tract infections.
3. Administer antibiotics.
4. Monitor lab values.
5. Maintain integrity of the exposed bladder mucosa. Prevent it from drying.
6. The bladder is covered with a sterile, nonadherent dressing to protect it until surgical closure is performed.
7. Provide support.
8. Do not apply petroleum jelly because it dries out and adheres to the bladder mucosa.

X. Enuresis

- A child is unable to control bladder function even though the child has reached an age at which control of voiding is expected or the child has successfully completed a bladder control program.
- 5 y.o. – aware of bladder fullness and has good bladder control.
- 2 types:

Primary Nocturnal Enuresis

1. Bed-wetting in a child who has never been dry for extended periods.
2. Common in children (outgrow it).
3. Unable to sense a full bladder, does not awaken to void.
4. Delayed maturation of the CNS
5. Child should be evaluated for any pathological causes before the diagnosis of primary nocturnal enuresis is made.

Secondary/Acquired Enuresis

1. Wetting occurs after a period of established urinary continence.
2. Occurs during nighttime (nocturnal), only during waking hours (diurnal), or during daytime and nighttime.
3. The child may complain of dysuria, urgency, or frequency.
4. Assess UTI.

Assessment: History of bed-wetting with noe extended period of dryness in a child > 5 y.o.

Nursing Interventions:

1. Perform urinalysis and urine culture (to rule out infection or an existing disorder).
2. Limit OFI at night, encourage voiding prior going to bed.
3. Involve the child in caring for the wet sheets and changing the bed to assist the child to take ownership of the problem.
4. Provide reward system.
5. Incorporate behavioral conditioning techniques
6. Mediations (TCA, antidiuretics, antispasmodics)
7. Follow-up to determine the effectiveness of the treatment.

XI. Wilms Tumor (Nephroblastoma)

- Most common intraabdominal and kidney tumor of childhood.
- Begins in the womb that is linked to abnormal chromosomal and congenital renal abnormalities.
- Encapsulated but may begin to metastasize at 4 y.o.
- Prognosis: good if the tumor has not metastasized.

Stage 1: tumor contained in 1 kidney

Stage 2: tumor metastasized beyond the kidney, but still can be removed.

Stage 3: lymph and abdomen is affected.

Stage 4: bone, liver, lung, and brain metastasis

Stage 5: both kidneys are affected.

Signs and Symptoms:

- Nontender abdominal mass confined to one side.
- Enlarged abdomen
- Hematuria or Urinary Retention or both
- Hypertension (due to excessive Renin released by the tumor)
- Vomiting
- Constipation
- Anemia (due to hemorrhage within the tumor)
- Pallor, anorexia, lethargy
- Other signs involving metastases of specific organs.

Treatment:

- Surgical removal of the tumor or nephrectomy
- Chemotherapy (dactinomycin, vincristine) to decrease tumor size.
- Radiation to reduce tumor size.

Nursing intervention:

1. DON’T PALPATE the tumor site (place a sign at the bedside)
2. Monitor VS
3. Handle the child carefully during transportation and repositioning to avoid tumor rupture.
4. Measure abdominal girth at least once daily.

POST-OP

1. Monitor temp and BP
2. Signs of hemorrhage and infection
3. Strict I&O.
4. Monitor abdominal distention
5. Monitor GI activity because of the risk for intestinal obstruction.