Pediatric Nursing: Urological System:

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IMPORTANT TERMS:

Cystitis is inflammation of the bladder.

Urethritis is inflammation of the urethra.

Pyelonephritis is inflammation of the upper urinary tract and kidneys.

Urosepsis is febrile UTI coexisting with systemic signs of bacteria illness; blood culture reveals presence of urinary pathogen.

Bacteriuria is presence of bacteria in the urine.

Hydrocele is the presence of fluid in the processes testes and is a result of the same developmental process as inguinal hernia.

Anorchism is the complete absence of a testis.

Cryptorchidism is failure of one or both testes to descend normally through the inguinal canal into the scrotum.

Epispadias is a defect of the urinary system characterized by failure of urethral canalization.

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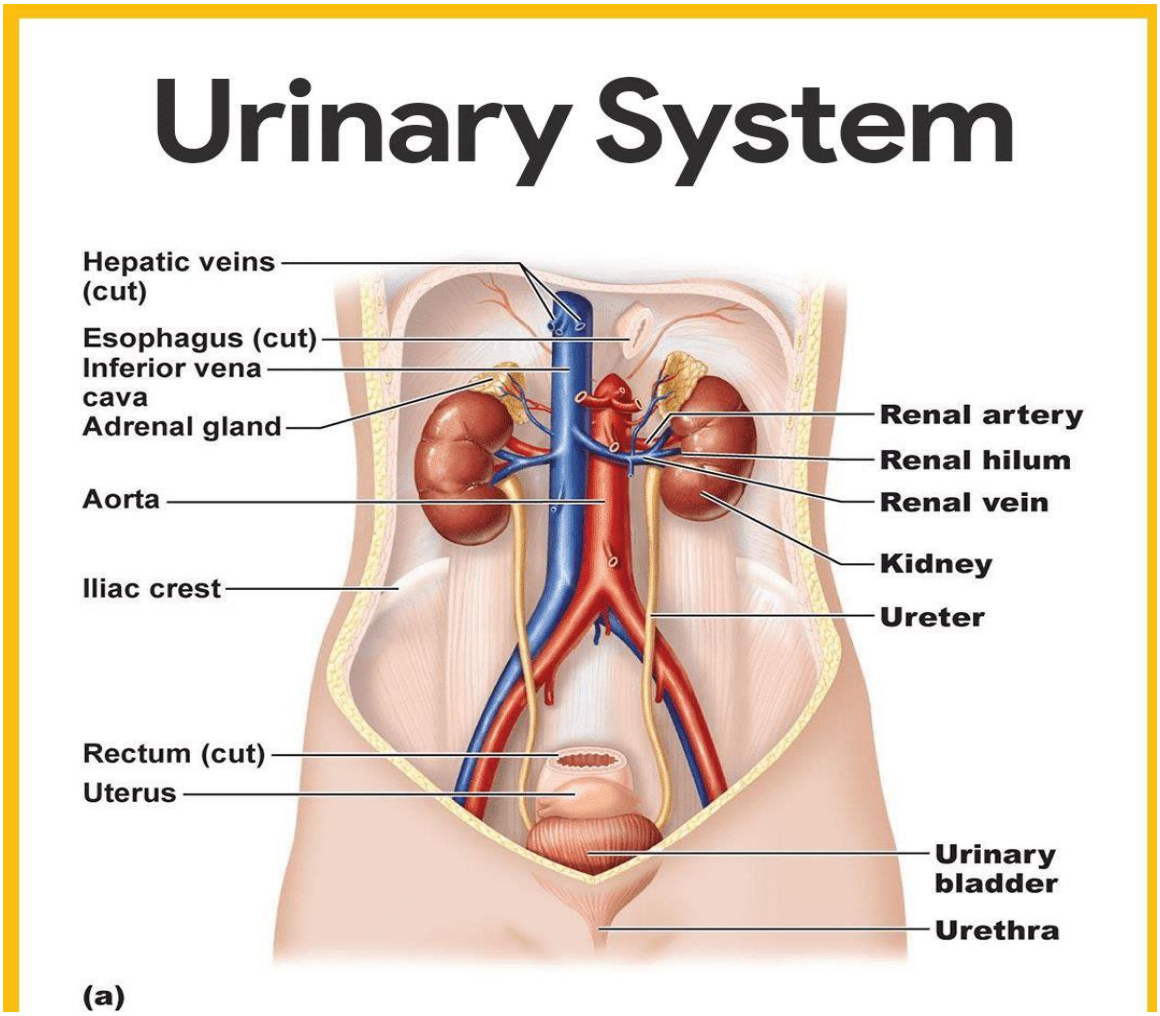

URINE OUTPUT

Bladder capacity is about 30 mL in the newborn; it increases to the usual adult capacity of about 270 mL by 1 year of age. The expected urine output in the infant and child is 0.5 to 2 mL/kg/hr., with the average 1-year-old voiding about 400 to 500 mL per day. The average urine output for a teenager is about 800 to 1,400 mL per day. The infant and toddler may void as often as 9 or 10 times per day. By age 3 the average number of voids per day is the same as an adult (3 to 8).

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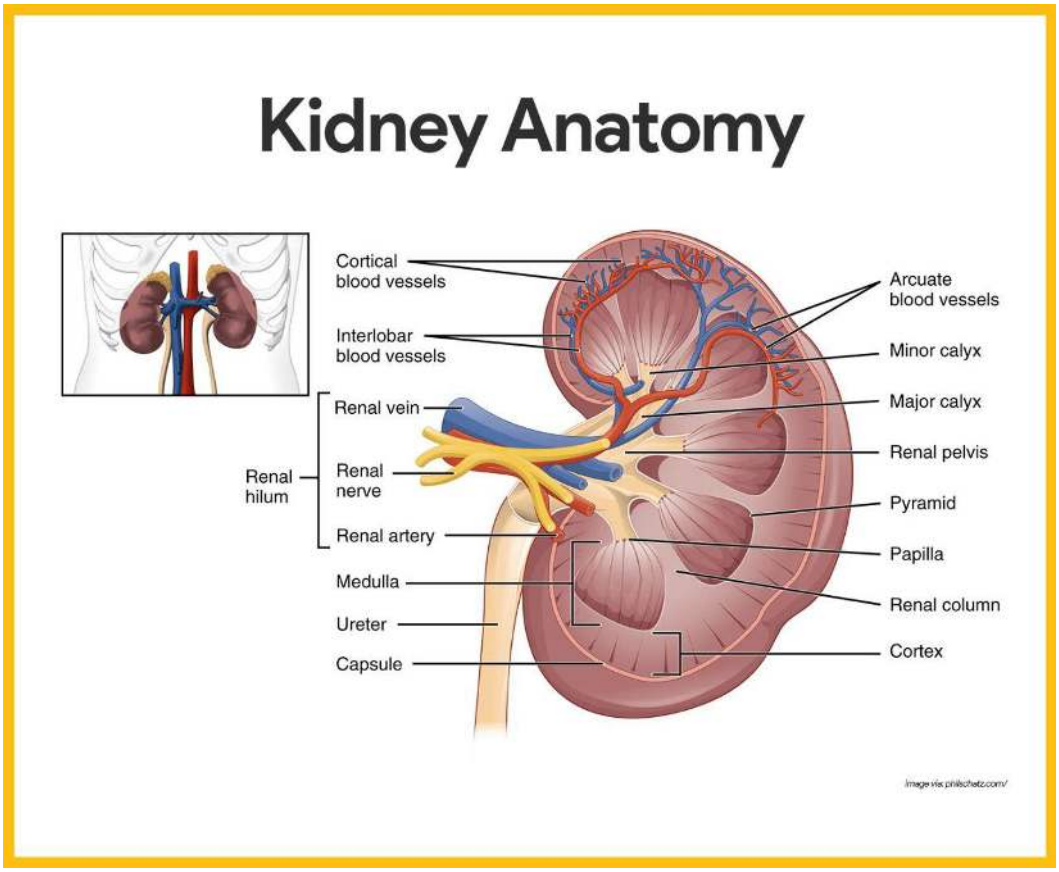
How does the urinary system work?

The urinary system's function is to filter blood and create urine as a waste by-product.

Two kidneys.

- Remove waste products and drugs from the body
- Balance the body's fluids
- Release hormones to regulate blood pressure
- Control production of red blood cells



Two ureters. These narrow tubes carry urine from the kidneys to the bladder.

Bladder. This triangle-shaped, hollow organ is located in the lower abdomen. It is held in place by ligaments that are attached to other organs and the pelvic bones.

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Two sphincter muscles. These circular muscles help keep urine from leaking by closing tightly like a rubber band around the opening of the bladder.

Nerves in the bladder. The nerves alert a person when it is time to urinate, or empty the bladder.

Urethra. This tube allows urine to pass outside the body.

ASSESSMENT ~~——→~~ ***HEALTH HISTORY***

- **When determining the history of the present illness, inquire about the following:**

1. Burning on urination
2. Changes in voiding patterns
3. Foul-smelling urine
4. Vaginal or urethral discharge
5. Genital pain, irritation, or discomfort
6. Blood in the urine
7. Edema
8. Masses in the groin, scrotum, or abdomen

PHYSICAL EXAMINATION : Physical examination of the GU system includes inspection and observation, auscultation, percussion, and palpation.

- Observe the external genitalia area for infant diaper rash, constant urine dribble, displaced urethral opening, reddened urethral opening, or discharge.
- In females, note vaginal irritation or labial fusion. In males, observe the scrotal sac for enlargement or discoloration.

PERCUSSION : Percuss the abdomen. Note unusual dullness or flatness (dullness is usually heard over the spleen at the right costal margin, over the kidneys, and 1–3 cm below the left costal margin). A full bladder may yield dullness above the symphysis pubis.

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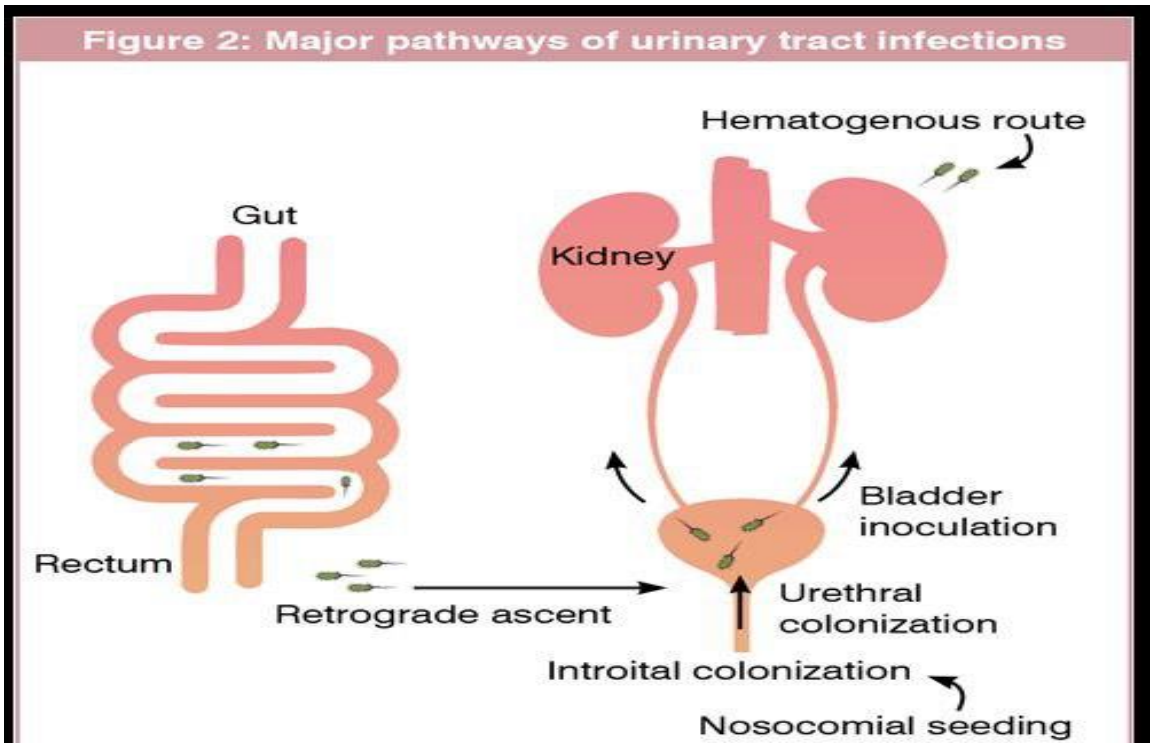
URINARY TRACT INFECTION

UTI is an infection of the urinary tract, most commonly affecting the bladder. UTI occurs most often because of bacteria ascending to the bladder via the urethra. About 8% of girls and 2% of boys will experience at least one UTI during childhood.



Pathophysiology:

Escherichia coli most commonly causes UTI, as it is usually found in the perineal and anal regions, close to the urethral opening. Other organisms include *Klebsiella, Staphylococcus aureus, Proteus, Pseudomonas*, and *Haemophilus.*

- Numerous factors may contribute to bacterial proliferation Urinary stasis contributes to the development of a UTI once the bacteria have gained entry. Urine that remains in the bladder after voiding allows bacteria to grow rapidly.
- A decreased fluid intake also contributes to bacterial growth, as the bacteria become more concentrated. If the urine is alkaline, bacteria are better able to flourish.

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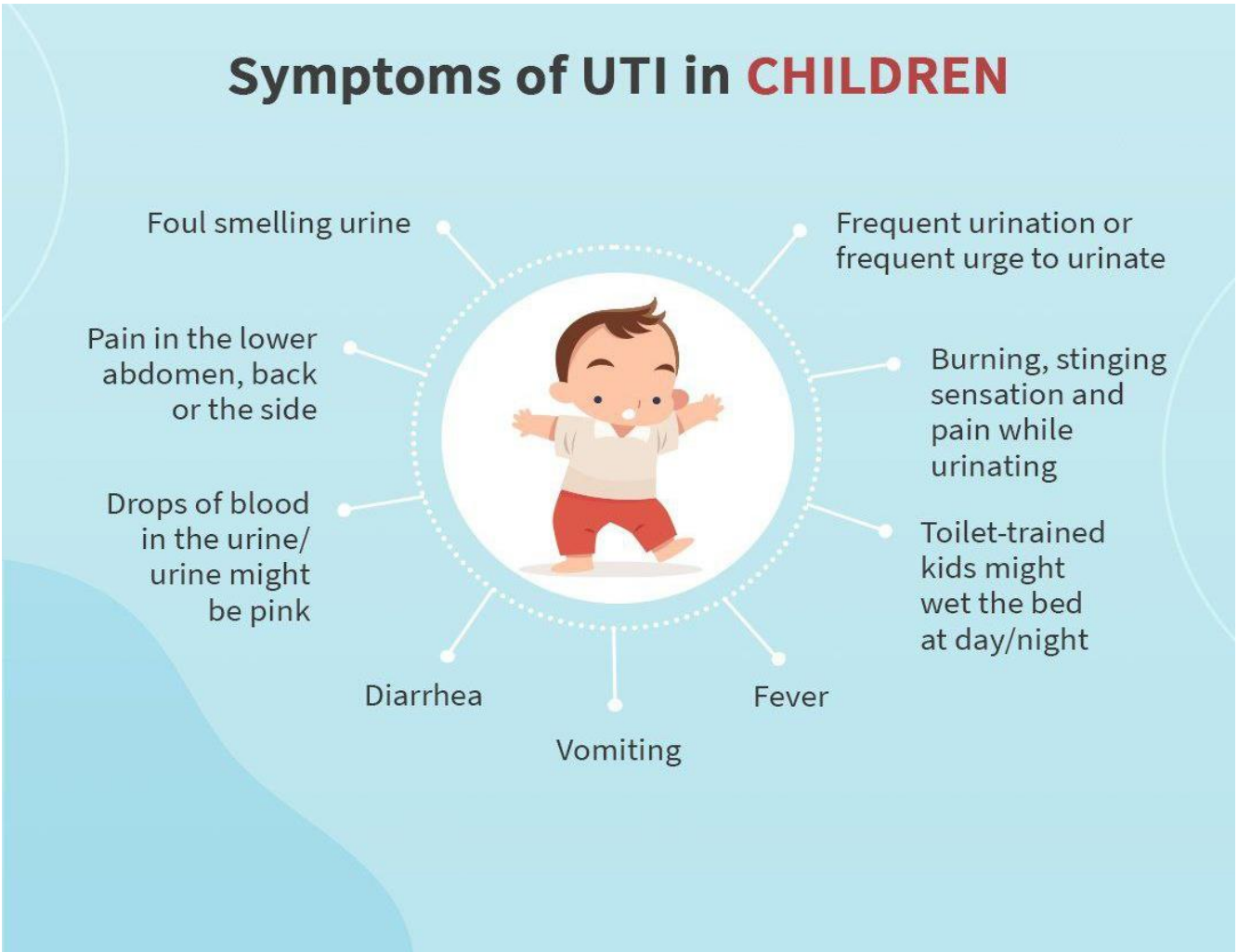
- Untreated bladder infection may allow reflux of infected urine up the ureters to the kidneys and result in pyelonephritis, a more serious infection.

Therapeutic Management

UTIs are treated with either oral or intravenous antibiotics, depending on the severity of the infection.

- Urine culture and sensitivity determine the appropriate antibiotic. A 7- to 14-day course of antibiotics is often prescribed, though 2- to 5-day courses may be as effective.
- Adequate fluid intake is necessary to flush the bacteria from the bladder. Fever management may also be needed.



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Physical Examination

In the neonate or young infant, observe for jaundice or increased respiratory rate.

- In infants and children, inspect the perineal area for redness or irritation.
- Observe the urine for visible blood, cloudiness, dark color, sediment, mucus, or foul odor.
- Note pallor, edema, or elevated blood pressure.
- Palpate the abdomen. Note distended bladder, abdominal mass, or tenderness, particularly in the flank area.

Laboratory and Diagnostic Tests

Common laboratory and diagnostic studies ordered for the assessment of UTI include:

- ✓ Urinalysis (clean-catch, suprapubic, or catheterized): may be positive for blood, nitrites, leukocyte esterase, white blood cells, or bacteria (**bacteriuria**)
- ✓ Urine culture: will be positive for infecting organism
- ✓ Renal ultrasound: may show hydronephrosis if child also has a structural defect

Nursing Management

Goals for nursing management include *eradicating infection, promoting comfort, and preventing recurrence of infection*

Eradicating Infection

- ✓ The child who can tolerate oral intake will be prescribed an oral antibiotic.
- ✓ The child who has protracted vomiting related to the UTI or who has suspected pyelonephritis will require hospitalization and intravenous antibiotics.
- ✓ Children younger than 3 months, and those with dehydration, a toxic appearance, or sepsis should also be hospitalized for administration of intravenous antibiotic prescribed.
- ✓ Urge the parent to complete the entire course of oral antibiotic at home, even though the child is feeling better.
- ✓ Administer intravenous fluids as ordered or encourage generous oral fluid intake to help flush the bacteria from the bladder.

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Promoting Comfort

- Administer antipyretics such as acetaminophen or ibuprofen to reduce fever.
- A heating pad or warm compress may help relieve abdomen or flank pain.
- If the child is afraid to urinate due to burning or stinging, encourage voiding in a warm sits or tub bath.

TEACHING GUIDELINES Preventing Urinary Tract Infection in Females

- Drink enough fluid (to keep urine flushed through bladder).
- Drink cranberry juice to acidify the urine.
- Avoid colas and caffeine, which irritate the bladder.
- Urinate frequently and do not "hold" urine (to discourage urinary stasis).
- Avoid bubble baths (they contribute to vulvar and perineal irritation).
- Wipe from front to back after voiding (to avoid contaminating the urethra with rectal material).
- Wear cotton underwear (to decrease the incidence of perineal irritation).
- Avoid wearing tight jeans or pants.
- Wash the perineal area daily with soap and water.

Preventing Recurrence of Infection

Encourage the parents to return as ordered for a repeat urine culture after completion of the antibiotic course to ensure eradication of bacteria.

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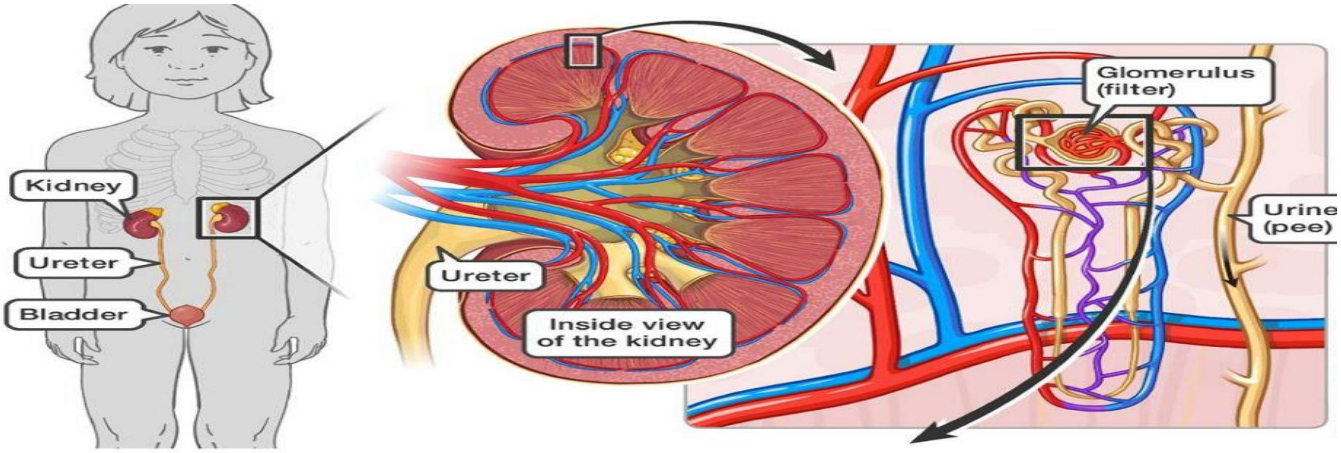
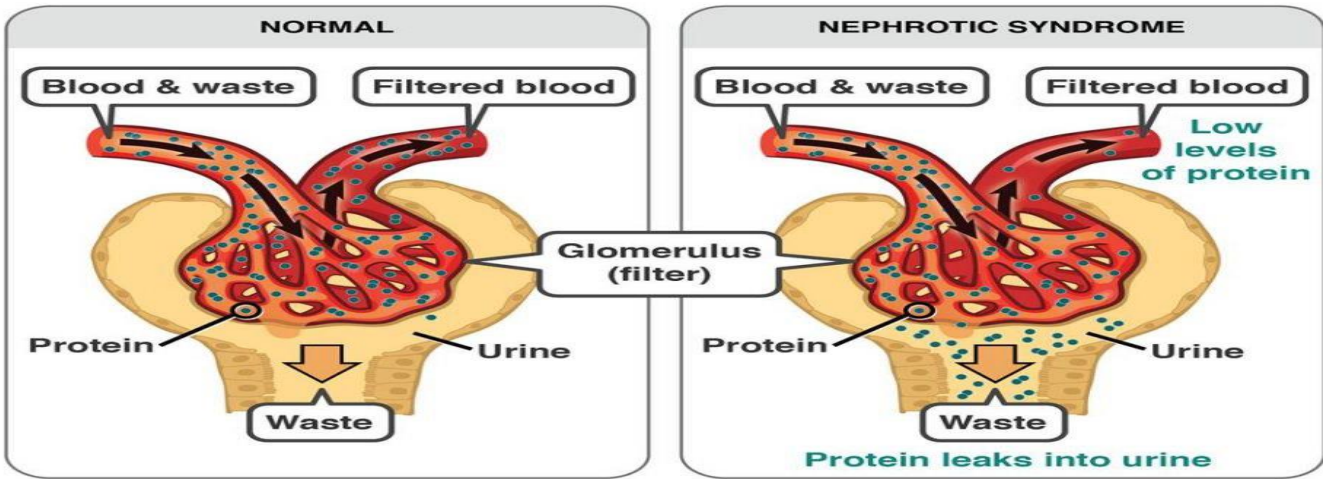
NEPHROTIC SYNDROME

Nephrotic syndrome occurs as a result of increased glomerular basement membrane permeability, which allows abnormal loss of protein in the urine.





Nephrotic syndrome can be classified as

1. **Minimal Change Nephrotic Syndrome** (MCNS).

a. Approximately 80% of cases of nephrotic syndrome.
b. Seen at any age but is mainly in the preschool child age.
c. Rare in children younger than 6 months of age, uncommon in infants younger than 1 year of age, and unusual after the age of 8 years.
d. Males outnumber females 2: 1. In adolescence the ratio is 1: 1.
e. Usually, a viral upper respiratory tract infection often precedes the manifestations by 4 to 8 days as risk factor rather than a cause.

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2. Secondary Nephrotic Syndrome.

a. Occur after or in association with glomerular damage.

b. Less occurs during the course of collagen vascular diseases (such as systemic lupus erythematosus and anaphylactoid purpura) or as a result of toxicity to drugs (such as trimethadione and heavy metals), stings, or venom.

c. The major presenting symptom of renal disease in pediatric patients with acquired immunodeficiency syndrome.

d. Rare causes are sickle cell disease, hepatitis, malaria, cyanotic heart disease, tuberculosis, infected ventriculojugular.

3. Congenital Nephrotic Syndrome.

a. A recessive gene on an autosome causes the hereditary form of nephrotic syndrome.

b. Infants who have nephrotic syndrome are small for gestational age, and proteinuria and edema manifest early.

c. The disease does not respond to the usual therapy and death in the first year or two of life if the infant does not receive dialysis or a successful kidney transplant.

Complications of nephrotic syndrome include anemia, infection, poor growth, peritonitis, thrombosis, and renal failure.

Pathophysiology

- Increased glomerular permeability results in the passage of larger plasma proteins through the glomerular basement membrane.
- Children with nephrotic syndrome are at increased risk for clotting (thromboembolism) because of the decreased intravascular volume. They are also at increased risk for the development of serious infection, most commonly pneumococcal pneumonia, sepsis, or spontaneous peritonitis. Steroid-resistant nephrotic syndrome may result in acute renal failure.

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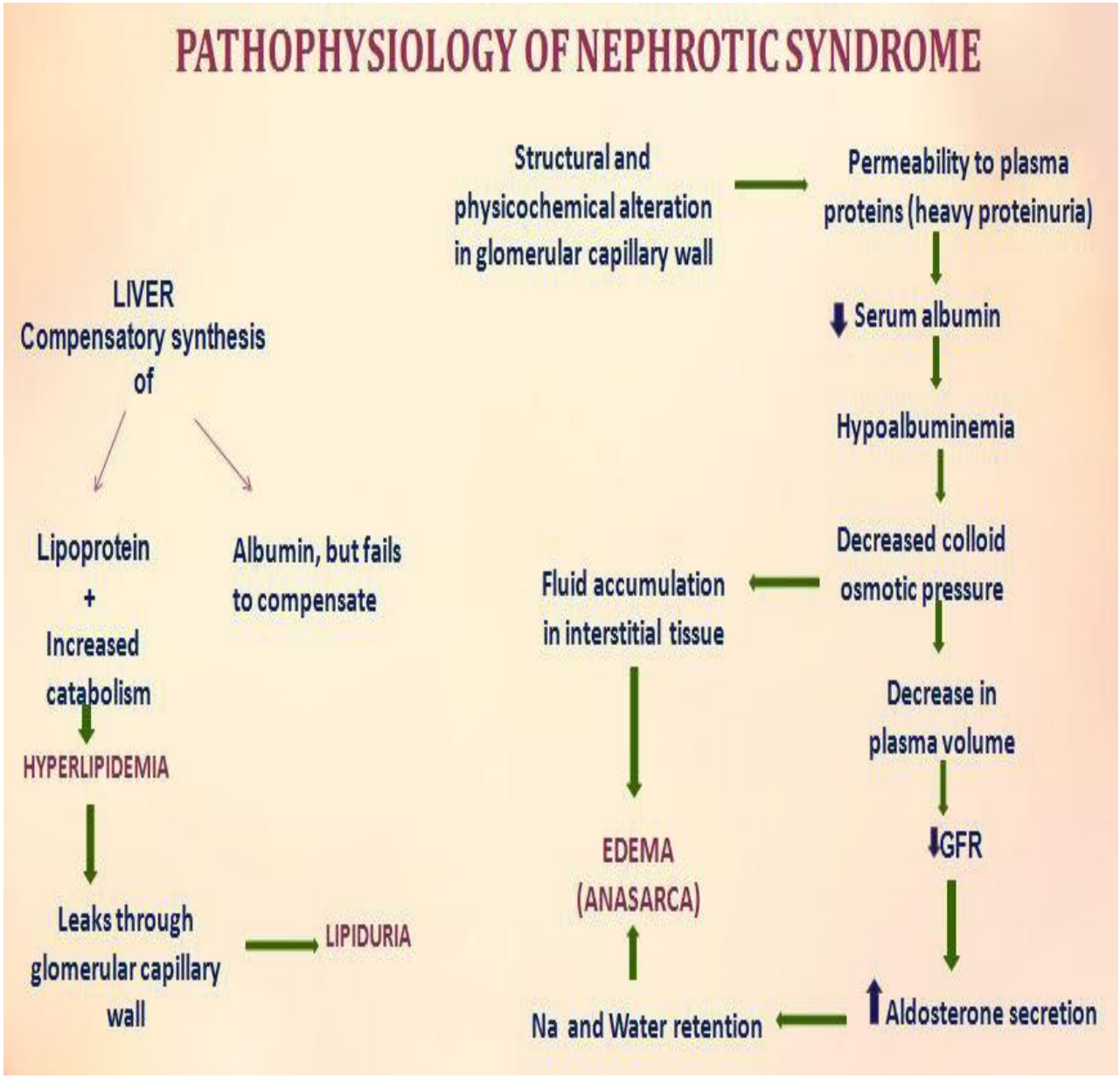

Therapeutic Management

- Medical management of MCNS usually involves the use of **corticosteroids**.
- Intravenous albumin may be used in the severely edematous child.
- Diuretics are also required in the edematous phase. Long-term therapy is usually required to induce remission.
- Immunosuppressive therapy such as cyclophosphamide, cyclosporine A, may be necessary.

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Health History

a description of the present illness and chief complaint. Common symptoms reported during the health history might include:

1-Nausea or vomiting (may be related to ascites)

2-Recent weight gain

3-History of periorbital edema upon waking, progressing to generalized edema throughout the day

4-Weakness or fatigue and Irritability or fussiness



Explore the child current and past medical history for risk factors such as:

1-Intrauterine growth retardation 2-Young age (younger than 3 years)

3- Male sex

Laboratory and Diagnostic Tests

- ✓ Urine dipstick test will reveal marked proteinuria.
- ✓ Infrequently, mild hematuria is also present.
- ✓ Serum protein and albumin levels will be low (often markedly so).
- ✓ Serum cholesterol and triglyceride levels are elevated.
- ✓ creatinine and BUN may become elevated.

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Nursing Management

Goals for nursing management include *promoting diuresis, preventing infection, promoting adequate nutrition, and educating the parents about ongoing care at home.* As with other chronic disorders, provide ongoing emotional support to the child and family.

Promoting Diuresis

- Administer corticosteroids as ordered.
- Administer diuretics if ordered, usually furosemide.
- Children may develop hypokalemia because of potassium loss as an adverse effect of furosemide.
- Those children may require potassium supplementation or a diet higher in potassium-containing foods.
- Monitor urine output and the amount of protein in the urine.
- Weigh the child daily on the same scale either naked or wearing the same amount of clothing.
- Assess for resolution of edema.
- Measure pulse rate and blood pressure every 4 hours to detect hypovolemia resulting from excessive fluid shifts.
- Enforce oral fluid restrictions if ordered

❖ **In cases of severe hypoalbuminemia, 1-** intravenous albumin may be administered. **2-** Increases in the serum albumin level cause fluid to shift from the subcutaneous spaces back into the bloodstream. **3-** A diuretic such as furosemide administered immediately after the albumin infusion allows for optimal diuresis and prevents fluid overload.

Preventing Infection

- Monitor the child temperature.
- Administer pneumococcal vaccine as prescribed.
- Administer prophylactic antibiotics, if prescribed.

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- **Delay administering live vaccines until at least 2 weeks after corticosteroid or other immunosuppressive medication therapy ceases.**

Encouraging Adequate Nutrition and Growth

- Encourage a nutrient-rich diet within prescribed restrictions.
- Fluid restriction is reserved for children with massive edema.
- Sodium intake may be restricted in the edematous child in an effort to prevent further fluid retention.
- Consultation with the dietitian is often helpful in meal planning because many of the foods that children like are high in sodium.
- Encourage protein-rich snacks.

Educating the Family

- Teach parents how to give medications and monitor for adverse effects.
- Demonstrate the urine dipstick technique for detecting protein and encourage the family to keep a chart of dipstick results.
- The child may return to school but should avoid contact with sick playmates.
- If the child is exposed to another child with an infectious illness, explain to the parents that they should monitor temperature and urine dipstick.