

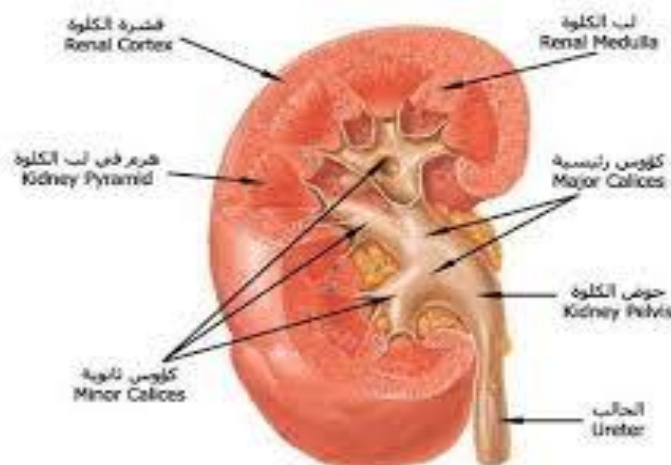
Urinary Elimination

❖ Anatomical and physiological of Urinary System

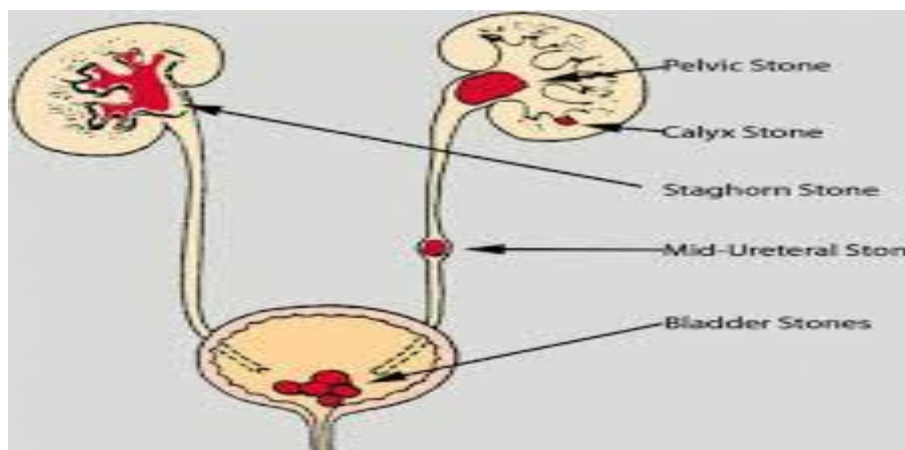
Urinary elimination, also known as micturition, urination, or voiding, is the process by which the body excretes waste products and excess water in the form of urine. This process is crucial for maintaining fluid and electrolyte balance, regulating blood volume and pressure, and eliminating metabolic byproducts. Effective urinary elimination relies on the coordinated function of the kidneys, ureters, bladder, and urethra, as well as neurological control.

The renal system or urinary tract, **Urinary Elimination** consists of

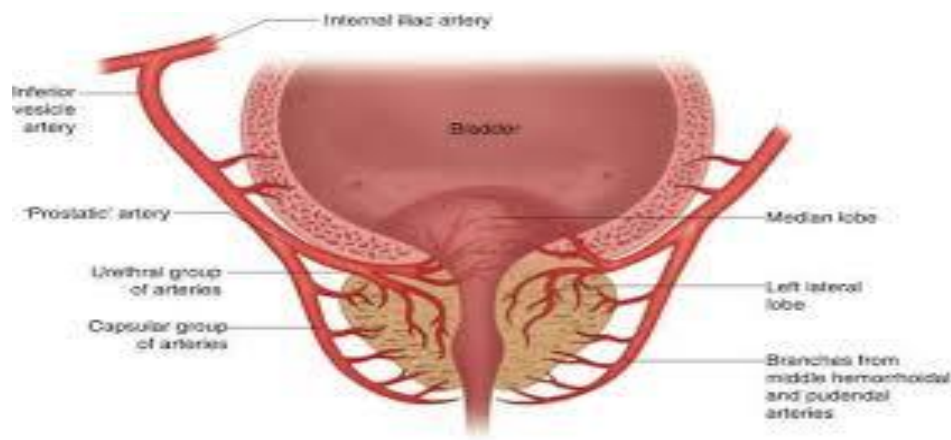
- 1- **Kidneys** : are situated on either side of the spinal column, behind the peritoneal cavity. The right kidney is slightly lower than the left due to the position of the liver they are the primary regulators of fluid and acid–base balance in the body. The functional units of the kidneys, the nephrons, filter the blood and remove metabolic wastes. In the average adult 1,200 mL of blood, or about 21% of the cardiac output, passes through the kidneys every minute.



- 2- **Ureters** are once the urine is formed in the kidneys, it moves through the collecting ducts into the calyces of the renal pelvis and from there into the ureters. In adults, the ureters are from 25 to 30 cm (10 to 12 in.) long and about 1.25 cm (0.5 in.) in diameter.



- 3- **Bladder** :The urinary bladder (vesicle) is a hollow, muscular organ that serves as a reservoir for urine and as the organ of excretion. When empty, it lies behind the symphysis pubis. In men, the bladder lies in front of the rectum and above the prostate gland but in women it lies in front of the uterus and vagina



- 4- **Urethra** :The urethra extends from the bladder to the urinary **meatus** (opening).

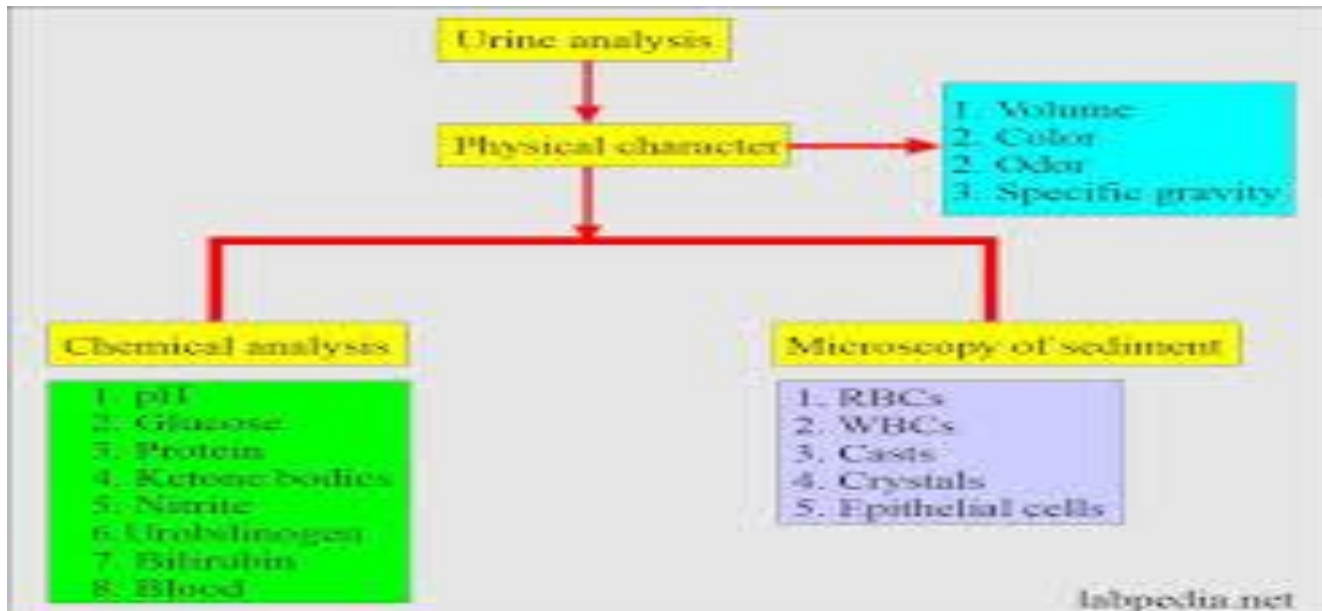
The function of the urinary system is:

- 1- Excretion: removal of waste products (including nitrogenous compounds, urea uric acid, excess ions and some drugs) from body fluids.,
- 2-Homeostasis of water and electrolyte concentrations within the body by:
 - regulation of blood volume and pressure.
 - regulation of plasma ion concentration.
 - Stabilizing blood pH.
 - Conserving nutrients.
- 3-Production of hormones: Renin, erythropoietin, thrombopoietin
4. Activate vitamin D.

Composition of urine

Urine (pee): is liquid waste that your kidneys create after they filter your blood. After your kidneys produce urine, it travels throughout the rest of your urinary system: Urine is clear and amber in color (due to presence of urobilin), **Urination** is the act of releasing urine from your body

Composition of Normal Urine	
Constituents	Amount present
Water	95%
Urea	9.3 to 23.3 gram/liter
Chloride	1.87 to 8.4 gram/liter
Sodium	1.17 to 4.39 gram/liter
Potassium	0.750 to 2.61 gram/liter
Creatinine	0.670 to 2.15 gram/liter
Sulfur	0.163 to 1.80 gram/liter



3. Characteristics of Urine

Normal urine has specific characteristics that can provide valuable information about a person's hydration status and overall health.

- **Color:** Typically pale yellow to amber, depending on the concentration of urochrome, a pigment produced from the breakdown of hemoglobin.

- **Pale yellow:** Usually indicates adequate hydration.

- **Dark amber:** May suggest dehydration or concentrated urine.

- Certain foods, medications, and medical conditions can alter urine color (e.g., beets can cause pink or red urine).

- Cloudy urine: May indicate the presence of bacteria, blood, mucus,

- **Clarity:** Normally clear or slightly hazy.

crystals, or pus, suggesting a urinary tract infection (UTI) or other medical conditions.

- **Odor:** Mildly aromatic.

- **Strong or foul odor:** May be a sign of a UTI, dehydration, or certain metabolic disorders. Some foods (e.g., asparagus) can also temporarily alter urine odor.

- **Specific Gravity:** A measure of the concentration of dissolved solutes in the urine, reflecting the kidney's ability to concentrate urine. Normal range is typically 1.005 to 1.030.

- **High specific gravity:** Indicates concentrated urine, possibly due to dehydration, reduced fluid intake, or increased solute excretion.

- **Low specific gravity:** Indicates dilute urine, possibly due to excessive fluid intake, diabetes insipidus, or impaired kidney function.

- **pH:** A measure of the acidity or alkalinity of urine. Normal range is typically 4.5 to 8.0, with an average of around 6.0 (slightly acidic). Diet can influence urine pH (e.g., a diet high in protein tends to make urine more acidic, while a vegetarian diet may make it more alkaline). Certain medical conditions and medications can also affect urine pH.

.The pH is around 6 (normal range of 4.5 – 8). Urine production is decreased during sleeping and exercise. A high dietary protein and alcohol intake leads to lower pH, while vegetables and fruit bring about a more alkaline pH.

The specific gravity of urine may range from 1.002 to 1.037.

- **Volume:** Varies depending on fluid intake, kidney function, and other factors.

Normal adult urine output is typically around 800 to 2000 mL per day.

Function of Urine

- Remove wastes from your blood
- Control the amount of blood in your body (blood volume)
- Regulate your [blood pressure](#)
- Keep your blood chemistry in the normal range.

The components of urine are:

1-Water 96%

2-Urea 2%

3-Electrolytes such as sodium, potassium, calcium, magnesium and chloride, Phosphates , Sulphates, Oxalates) 2%

- Organic acids such as uric acid
- Vitamins
- Hormones
- Nitrogenous chemicals such as urea and Creatinine , Ammonia ,



Urine Analysis

Physical Examination

Volume	Sample
Colour	Yellow
Aspect	Clear
Reaction	Acidic
Sp. Gr	

Physical Examination

Albumin	Nil
Sugar	Nil
Keton	Nil
Nitrite	Nil
Bilirubin	Nil
Bile Salts	Nil
Urobilinogen	Normal

Microscopic Examination

R.B.Cs	0 - 1 /	H.P.F
Pus Cells	1 - 3 /	H.P.F
Epithelial Cells	Nil	H.P.F
Casts	Nil	
Crystals	Uric acid (Few)	
Amorphous Material	Nil	
Bilharzial Ova	Nil	

Factors affecting voiding

1-Developmental factors

Infants ;may urinate as often as 20 times a day

Elders; Excretory function of the kidney diminishes with age, but not less than normal unless a disease is occur.

2-Psychological factors

A set of conditions helps stimulate the micturition reflex , include privacy , normal position , sufficient time , running water sometimes the client's accustomed conditions

3-Fluid and food intake

The healthy body maintains a balance between the amount of fluid ingested and the amount of fluid eliminated if fluid intake ↑, the output ↑.

Fluid that contain caffeine (e.g coffee, tea, cola) ↑ urine production.

4-Medications Diuretics (e.g chlorothiazide, furosemide) ↑ urine formation

5-Muscle tone

6-Pathologic conditions

A-Diseases Of The Kidneys .

B-Heart And Circulatory Disorders Such As Heart Failure, Shock Hypertension

C-Abnormal Amounts Of Fluid Loss (Vomiting Or High Fever)

D-A Urinary Stone May Obstruct A Ureters , Blocking Urine Flow From The Kidney To The Bladder.

E-Hyper Trophy Of The Prostate Gland .

F-Surgical And Diagnostic Procedures

H-Cystoscopy, surgical procedures, spinal anesthetics

Urination process :

The process of emptying the bladder is known as urination, micturition, or voiding. The nerve centers for urination are situated in the brain and the spinal cord. Urinating, or voiding, is largely an involuntary reflex act, but its control can be learned. Stretch receptors in the bladder are stimulated as the urine collects. The person feels a desire to void, usually when the bladder fills to about **150 to 250 mL** in an adult. The pressure within the bladder is many times greater during urination than it is during the time the bladder is filling. When urination is initiated, the detrusor muscle contracts, the internal sphincter relaxes, and urine enters the posterior urethra. The muscles of the perineum and the external sphincter relax, the muscle of the abdominal wall contracts slightly, the diaphragm lowers, and urination occurs. The kidneys filter blood in the nephrons and remove waste in the form of urine. Urine exits the kidney via the ureters and enters the urinary bladder, where it is stored until it is expelled by urination (also referred to as voiding). for an image of the male urinary system. The female urinary system is similar except for a smaller urethra. The act of **urination** is normally painless. The voluntary control of voiding is limited to initiating, restraining, and interrupting the act.

Part 2

Urinary Elimination •

Abnormal urinary elimination patterns :

- **Anuria:** Absence of urine output, typically found during kidney failure, defined as less than 50 mL of urine over a 24-hour period.
- **Dysuria:** Painful or difficult urination.
- **Frequency:** The need to urinate several times during the day or at night (nocturia) in normal or less-than-normal volumes. It may be accompanied by a feeling of urgency.^[5]
- **Hematuria:** Blood in the urine, either visualized or found during microscopic analysis.
- **Oliguria:** Decreased urine output, defined as less than 500 mL of urine in adults in a 24-hour period. oliguria is further defined as less than 0.5 mL of urine per kilogram per hour for adults and children or less than 1 mL of urine per kilogram per hour for infants
- **Nocturia:** is voiding two or more times at night. it is usually expressed in terms of the number of times the person gets out of bed to void,
- **Polyuria:** Greater than 2.5 liters of urine output over 24 hours, also referred to as **diuresis**. Urine is typically clear with no color. often several liters more than the client's usual daily output.
- **Pyuria:** At least ten white blood cells in each cubic millimeter of urine , indicating infection. pus may be visible in the urine
- **Urgency:** A sensation of an urgent need to void. Urgency can cause urge incontinence if the patient is not able to reach the bathroom quickly., strong desire to void. There may or may not be a great deal of urine in the bladder.

Urinary Incontinence: Involuntary leakage of urine.

Types of Urinary Incontinence

- 1- Stress Incontinence: Leakage of urine during activities that increase abdominal pressure (e.g., coughing, sneezing, laughing, exercise). Often due to weakened pelvic floor muscles
- 2- Urge Incontinence: Sudden, strong urge to void followed by involuntary leakage. Associated with overactive bladder
- 3- Overflow Incontinence: Frequent or constant dribbling of urine due to incomplete bladder emptying. Can be caused by bladder outlet obstruction (e.g., enlarged prostate) or impaired detrusor muscle contractility)
- 4-Functional Incontinence: Urinary leakage due to physical or cognitive limitations that prevent timely access to a toilet (e.g., mobility issues cognitive impairment),
- 5-Reflex Incontinence: Involuntary urination without the sensation of the need to void, often due to spinal cord injury or neurological impairment
- 6-Mixed Incontinence: A combination of stress and urge incontinence

Potential Causes for Abnormal Patterns

- **Urinary Tract Infections (UTIs)**: Cause pain, urgency, and cloudiness.
- **Neurological Disorders**: Spinal cord injuries or multiple sclerosis can disrupt bladder control nerves.
- **Prostate Issues**: Enlarged prostate (BPH) commonly causes hesitancy and frequency in men.
- **Diabetes**: Can cause excessive urine output (polyuria).
- **Medications**: Opioids, NSAIDs, and diuretics can lead to retention or high frequency.
- **Structural Abnormalities**: Congenital or acquired issues, such as polycystic kidney disease or tumors.

Nursing process approach

Assessment(A complete assessment of a client's urinary function includes the following;

Nursing history •

- Physical assessment of the genitourinary system, hydration status and examination of the • urine
- Relating the data obtained to the results of any diagnostic tests and procedures•
- The nurse determines the client's normal voiding pattern and frequency appearance of the urine and any recent changes, any past or current problems with urination, the presence of an ostomy, and factors influencing the elimination pattern.
- Physical Assessment; Complete physical assessment of the urinary tract usually includes percussion of the kidneys to detect areas of tenderness. Palpation and percussion of the bladder are also performed.

Diagnostic Tests

- 1- urea and creatinine, are routinely used to evaluate renal function. The kidneys through filtration and tubular secretion normally eliminate both urea and creatinine.
- 2-Urea, the product of protein metabolism, is measured as **blood urea nitrogen (BUN)**. Creatinine is produced in relatively constant quantities by the muscles. The **creatinine clearance** test uses 24-hour urine and serum creatinine levels to determine the glomerular filtration rate, a sensitive indicator of renal function.

Nursing Diagnosis: • Impaired Urinary Elimination: dysfunction in urine elimination

Planning

Examples of overall goals for clients with urinary elimination problems may include the following:

- Maintain or restore a normal voiding pattern.
- Regain normal urine output.
- Prevent associated risks such as infection, skin breakdown, fluid and electrolyte imbalance, and lowered self-esteem.
- Perform toileting activities independently with or without assistive devices.
- Contain urine with the appropriate device, catheter, ostomy appliance, or absorbent product .

Implementation

A. Maintaining Normal Urinary Elimination

Most interventions to maintain normal urinary elimination are independent nursing functions. These include promoting adequate fluid intake, maintaining normal voiding habits, and assisting with toileting.

B. Promoting Fluid Intake

Increasing fluid intake increases urine production, which in turn stimulates the micturition reflex. A normal daily intake averaging 1,500 mL of measurable fluids is adequate for most adult clients. Many clients have increased fluid requirements, necessitating a higher daily fluid intake. For example, clients who are perspiring excessively (have diaphoresis) or who are experiencing abnormal fluid losses through vomiting, gastric suction, diarrhea, or wound drainage require fluid to replace these losses in addition to their normal daily intake requirements.

Clients who are at risk for UTI or urinary calculi (stones) should consume 2,000 to 3,000 mL of fluid daily. Dilute urine and frequent urination reduce the risk of UTI as well as stone formation. Increased fluid intake may be contraindicated for some clients such as people with kidney failure or heart failure. For these clients, a fluid restriction may be necessary to prevent fluid overload and edema

C. Maintaining Normal Voiding Habits

Prescribed medical therapies often interfere with a client's normal voiding habits. When a client's urinary elimination pattern is adequate, the nurse helps the client adhere to normal voiding habits as much as possible.

D. Assisting with Toileting

Clients who are weakened by a disease process or impaired physically may require assistance with toileting. The nurse should assist these clients to the bathroom and remain with them if they are at risk for falling. The bathroom should contain an easily accessible call signal to summon help if needed. Clients also need to be encouraged to use handrails placed near the toilet.

Instructions provided for Preventing urinary tract infections

Rate of UTI in women is about 20% in men 0.1%. Most common causes of UTI is bacteria (E. coli)

.Drink 8 glasses of water/ day

.Practice frequent voiding every (2 to 4 hours

.Void immediately after intercourse

Avoid use of harsh soaps

Nursing care professionals play a crucial role in assisting clients with urinary elimination.,

• Promoting Normal Voiding Habits:

- Encourage adequate fluid intake (unless contraindicated).
- Establish a regular voiding schedule.
- Provide privacy and a relaxed environment for voiding.
- Assist with positioning for optimal bladder emptying (e.g., sitting upright for women, standing for men if able).
- Run water or use other sensory stimuli to help initiate urination.

• Managing Urinary Incontinence:

- Implement bladder training programs (e.g., scheduled voiding, urge

suppression techniques).

- Teach pelvic floor muscle exercises (Kegel exercises) to strengthen the pelvic floor.
- Use absorbent products (e.g., pads, briefs) to manage leakage and maintain skin integrity.
- Ensure easy access to toilets or bedside commodes.
- Consider medications or surgical interventions as prescribed.

• **Managing Urinary Retention:**

- Monitor fluid intake and output.
- Assess for bladder distension.
- Implement measures to stimulate urination (e.g., warm compresses to the lower abdomen, Crede's maneuver - gentle downward pressure on the bladder).
- Perform intermittent catheterization as needed to empty the bladder.
- Consider indwelling urinary catheterization if intermittent catheterization is not feasible or appropriate (use as a last resort due to the risk of infection).
- Address underlying causes (e.g., medication review, management of BPH).

• **Catheterization:**

- **Intermittent قثطرة Catheterization (Straight Catheter):** Insertion of a catheter into the bladder to drain urine, followed by immediate removal. Used for managing urinary retention or obtaining sterile urine specimens.
- **Indwelling دائمي Urinary Catheter (Foley Catheter):** A catheter that remains in the bladder for a period, held in place by an inflated balloon. Used for continuous drainage of urine in cases of severe retention, incontinence when other measures have failed, or for monitoring output in critically ill patients. Requires meticulous perineal care and catheter care to prevent infection.

• **Promoting Urinary Health:**

- Educate clients about the importance of hygiene to prevent UTIs (e.g., wiping front to back for women).
- Encourage adequate fluid intake to dilute urine and flush out bacteria.
- Advise clients to void after intercourse to help prevent UTIs.
- Recognize and report any changes in urinary patterns or urine characteristics