URINARY ELIMINATION
RENAL OVERVIEW

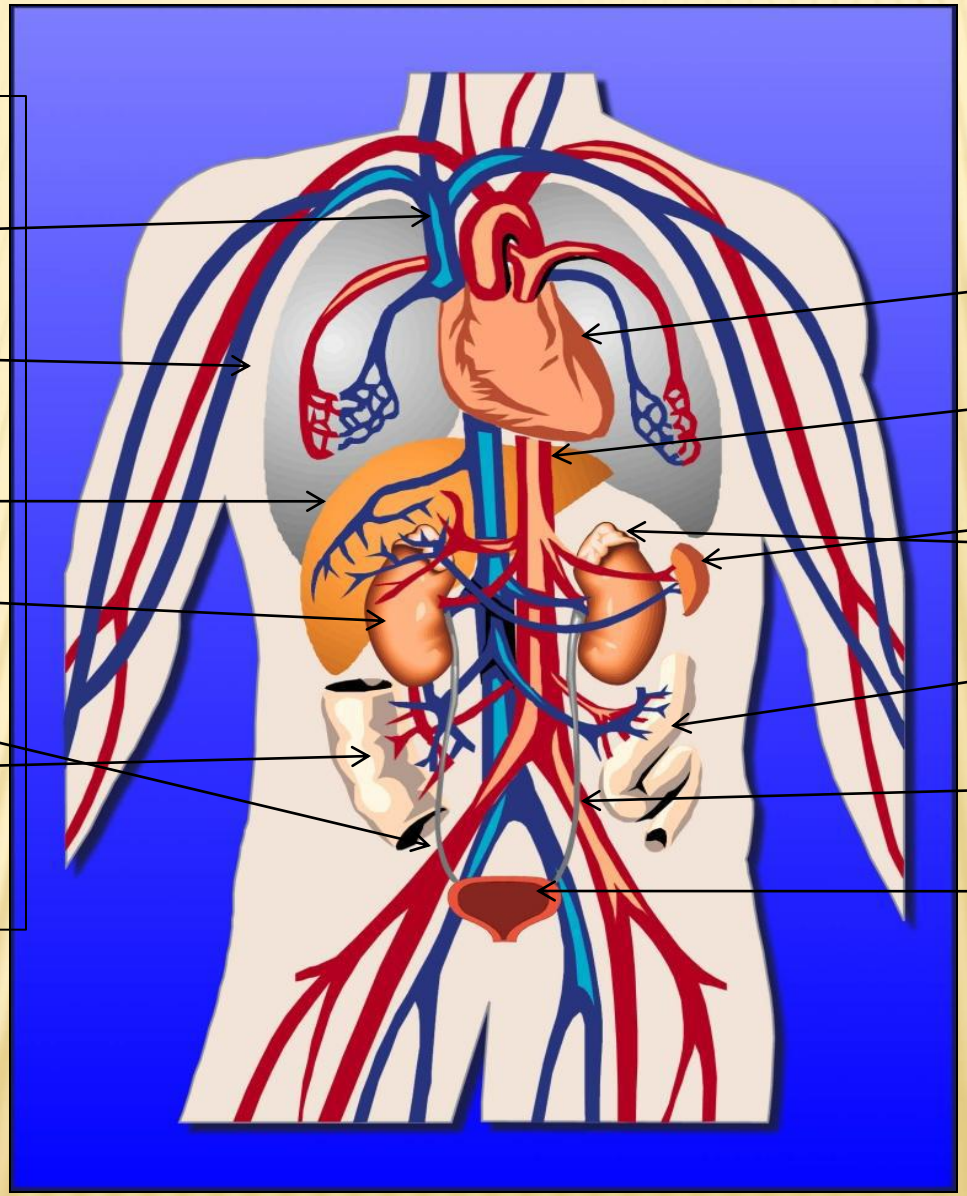
Urinary system – organ system that produces, stores and eliminates urine.

- **Kidneys** (filter)
- **Ureters**
  - Enter oblique angle
  - Peristalsis
- **Bladder**
  - Capacity up to 1.5Liters
- **Urethra** (exit)

URINARY SYSTEM

- **Ureters**
  - Length – 25 to 30cm
  - Enter bladder at posterior floor of bladder
  - Peristalsis & flaplike fold -> prevent urine reflux
- **Bladder**
  - Hollow, muscular organ
  - Reservoir of urine
  - Up to 1.5 Liter in capacity
  - Average urine output ~1 -1.5 L per day
- **Urethra**
  - Connection to meatus
  - Internal sphincter relaxes with micturation

Location of the Kidneys in Retroperitoneal Space



Superior Vena Cava

Lung

Liver

Right Kidney

Right Ureter

Large Intestine

Heart

Aorta

Spleen

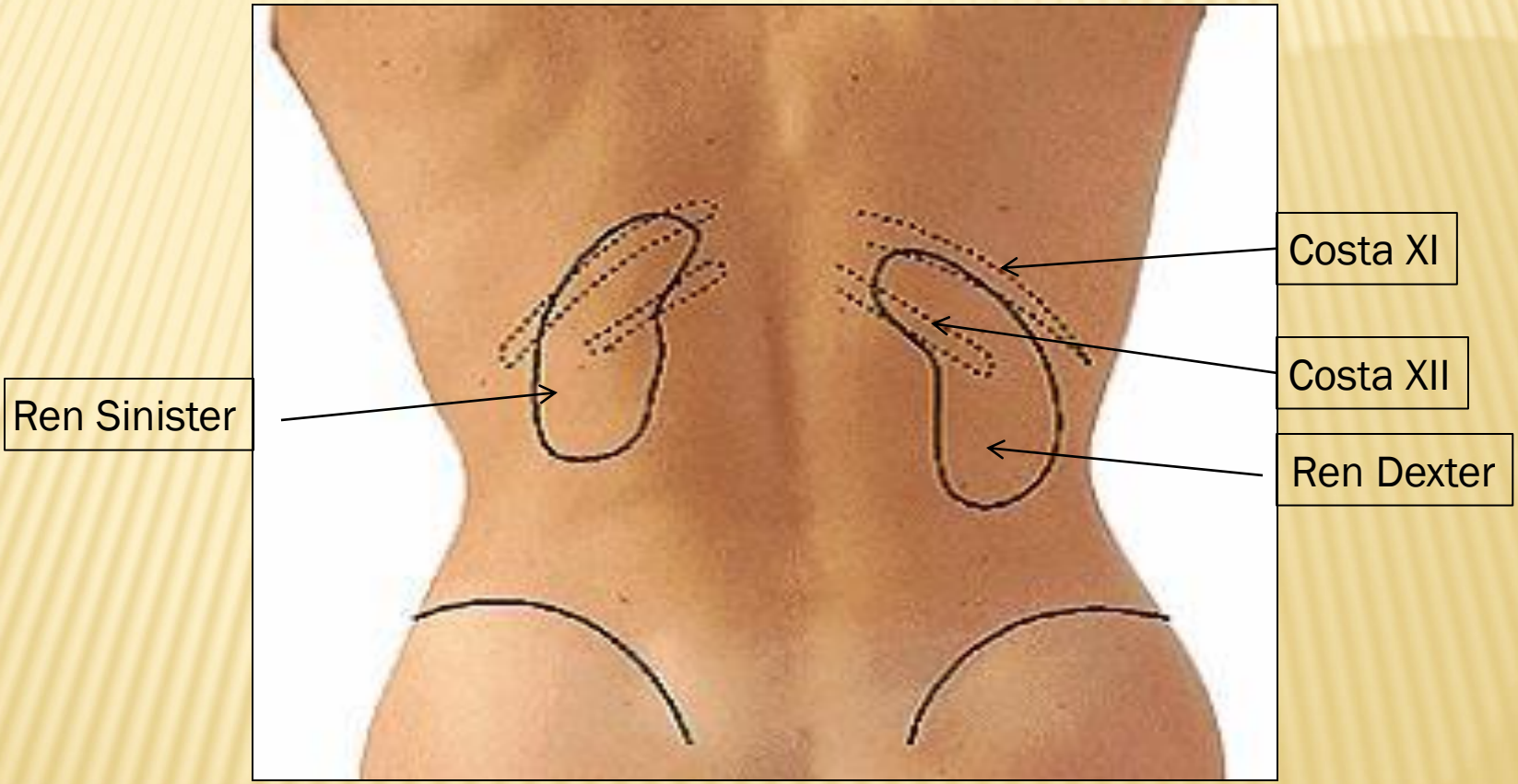
Adrenal Gland

Small Intestine

Left Ureter

Bladder

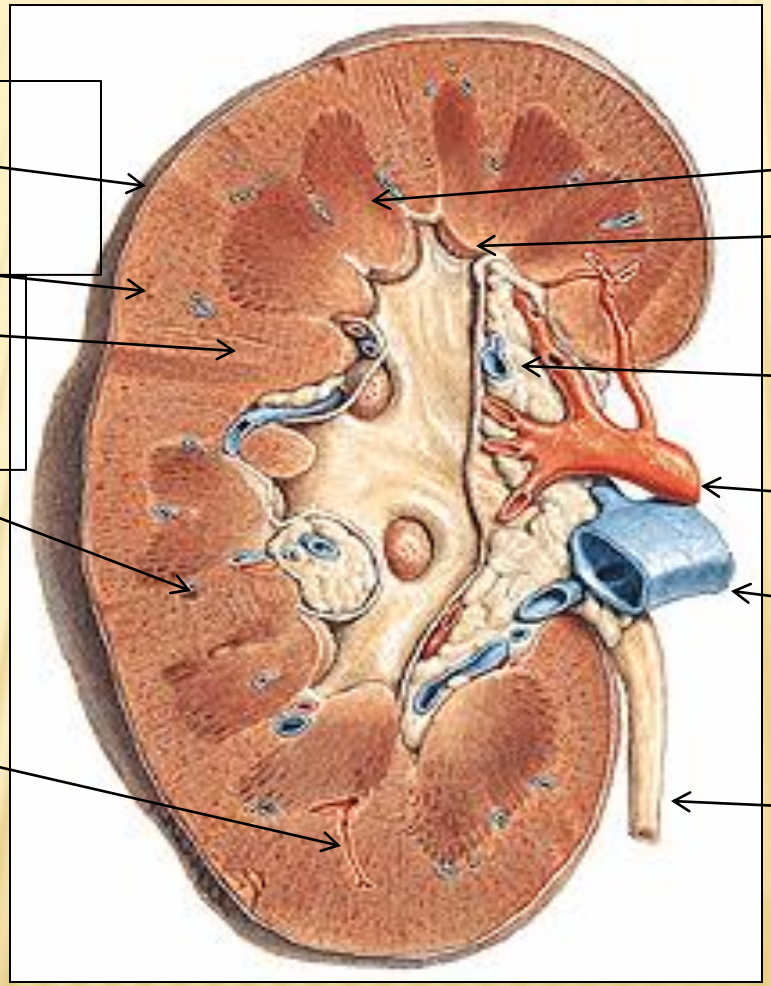
LOCATION OF KIDNEYS IN THE BACK



KIDNEY FUNCTIONS

- Eliminate metabolic waste products
- Eliminate foreign compounds
- Regulate electrolytes, fluid and acid-base
- Regulate blood pressure
- Regulate Red Blood cell production
- Regulation of Vitamin D & Calcium

CROSS-SECTION OF THE KIDNEY



Renal Capsula

Renal Cortex

Renal Column

Branch of the Renal Vein

Branch of the Renal Artery

Renal Medulla:
Pyramid
Papilla

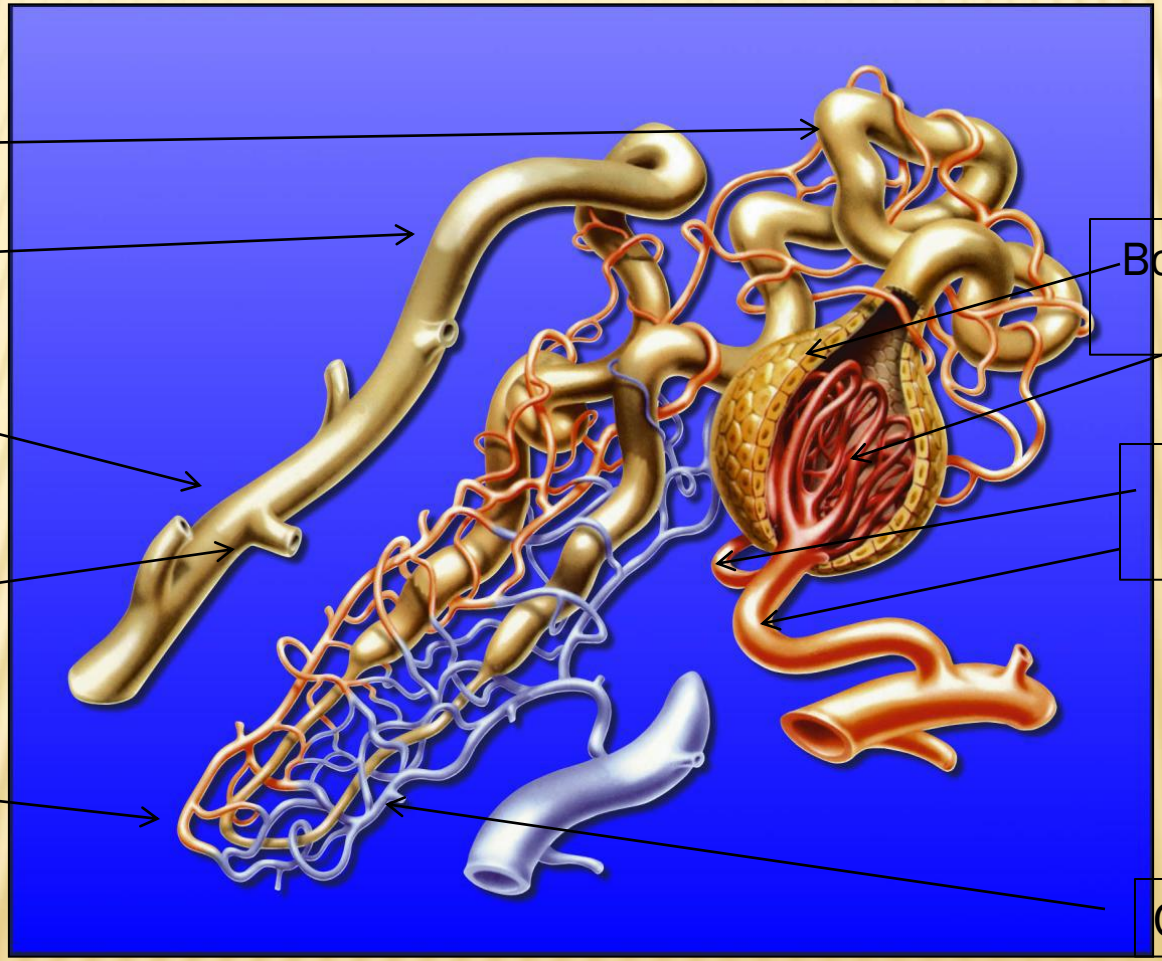
Renal Pelvis

Renal Artery

Renal Vein

Ureter

NEPHRON -FUNCTIONAL UNIT OF THE KIDNEY

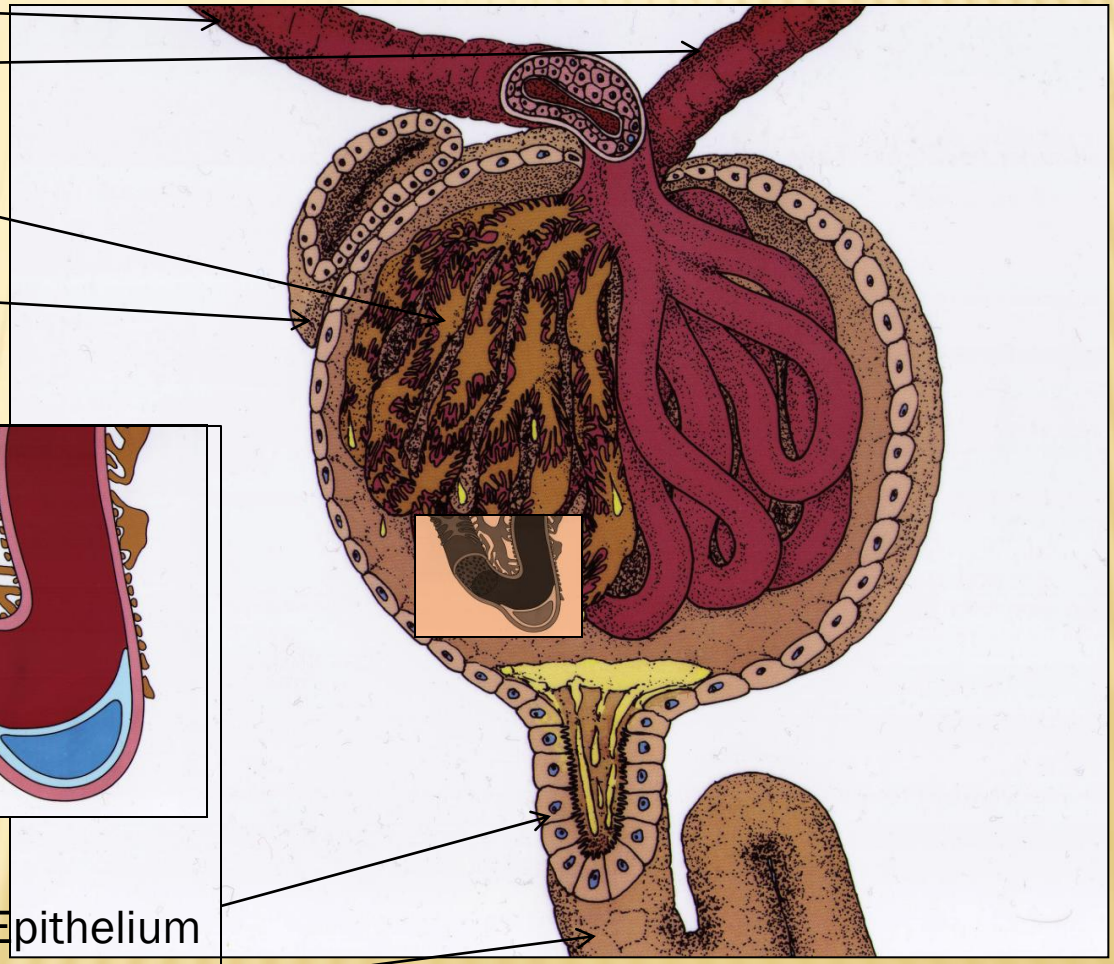


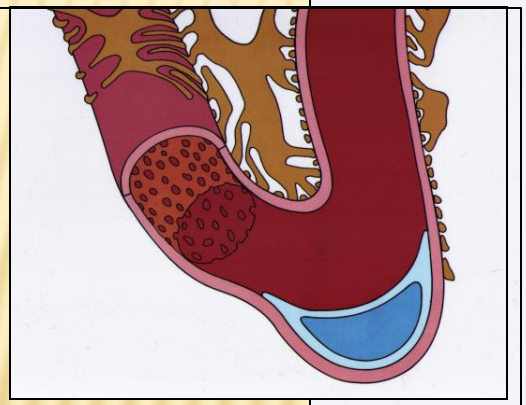
GLOMERULUS -GLOMERULAR FILTRATION

Afferent Arteriole
Efferent Arteriole

Capillary Loops

Bowman's Capsule

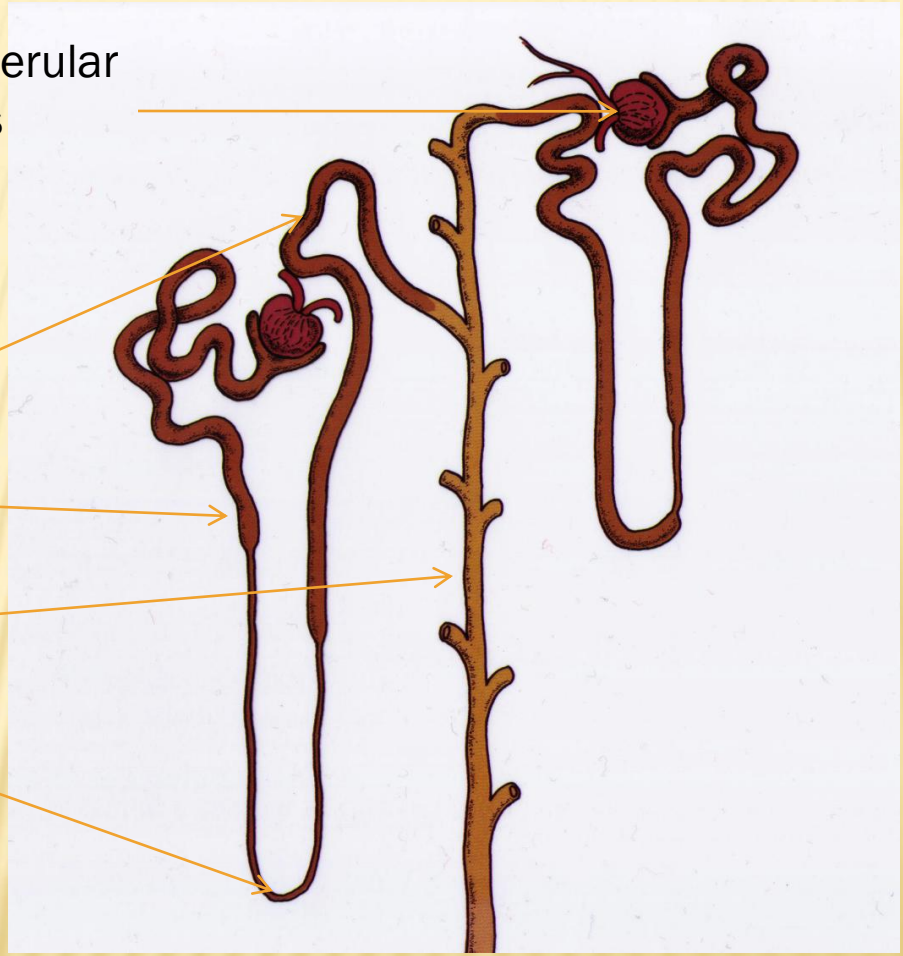




Plasma Ultrafiltrate
Basement Membrane
Podocytes

Epithelium
Proximal Tubule

TUBULAR SYSTEM



ELIMINATION OF WASTE PRODUCTS

- Urea Nitrogen
  - By Product of the protein metabolism
  - Measure clinically as serum BUN
  - Some amounts in blood; not reliable indicator of renal function alone. Can be elevated for dehydration & GI bleeds
- Creainine
  - By product of muscle metabolism
  - Normally, almost completely excreted
  - Fairly reliable as an indicator of renal function

RENAL FUNCTION

- RBC Production
  - Erythropoietin hormone produced by kidney to signal bone marrow to produce RBCs
- Vitamin D & Calcium regulation
  - Vitamin D activated in kidney
  - Calcium regulation in kidney/Parathyroid
- Acid-Base Balance
  - Hydrogen
  - Bicarbonate
- Blood pressure & volume regulation
- Renin-Angiotensin system: Maintenance of blood volume & altering peripheral vascular resistance
- Specialized cells sense – blood pressure
- Vasocontriction or relaxation
- Stimulates aldesterone (sodium & water retention)
- Antidiuretic Hormone (ADH): release from the posterior pituitary → more water retention in collecting ducts of kidneys.
-

FACTORS AFFECTING VOIDING

1-Developmental Factors

- Infants- less developed, frequent urination, dilute
- Elders
- Decreased kidney (less nephrons) function
- Decrease bladder tone → nocturnal frequency
- Decreased bladder emptying →residual urine, predisposing to bladder infections
- Urinary urgency/frequency
  - Males (Prostate)
  - Female (weakened floor muscles)
- 2-Psychosocial factors
- 3-Fluid and food intake
- 4-Medications, especially diuretics
- 5-Environmental factors (mobility)
- 6-Pathologic Conditions
- 7-Surgical and Diagnostic Procedures

ALTERED URINE PRODUCTION

- Polyuria – increase urine production, diabetes
- Oliguria – low urine output
  - Decreased urine flow
- Anuria – lack of urine production
  - VERY BAD, dialysis

ALTERED URINE VOIDING

- Kidney stones
- Tumors
- Trauma
- Enlarged prostate (frequency/nocturia/urgency)
- Neurologic damage
- Kidney failure
- Infection – dysuria

ALTERED URINARY ELIMINATION

Urinary incontinence – involuntary urination

- Common in elderly
- UTIs, surgery, trauma, multiple vaginal births, neurologic disorders

- Urinary retention
  - prostate, surgery, medication
  - Frequent infections, self-cath?
- Neurogenic bladder – spine nerve damage
  - No control, Catheter.

URINE ANALYSIS

- Normal urine – clear and straw colored
- Specific gravity – 1.010
- Glucosuria - diabetes
- Proteinuria – kidney issues?
- Hematuria (RBC)– blood
- Pyuria (WBC) – infection
- Ketonuria – ketones
- Nitrates – bacteria breakdown –infection?
- LeukoEsterase – WBC products – infections

NURSING ASSESSMENT

- Data about void patterns and habits
- Data about any problems that may affect urination
- Physical Assessment
  - Palpation bladder and kidneys
  - Inspect outputs
  - Skin breakdown
- Diagnostic Test (BUN / Cr) & U/A
- Usual pattern of elimination
- Incidences of incontinence, frequent urination
- Burning on urination
- Sense of urgency
- Times of day for elimination
- Total daily fluid intake
- Measuring urinary output
- In and Outs (I/Os)

NURSING GOALS/PLANNING

Maintain or restore normal voiding pattern

- Regain normal urine output
- Prevent
  - Infection
  - Skin breakdown
  - Fluids and electrolyte disturbances
- Cauterization care

Artificial Urine Outputs

"Foley" Catheter – through meatus

- Urinary diversions – like Ostomy
- Suprapubic catheter

NURSING DIAGNOSIS

- **Impaired urinary elimination R/T UTI M/B dysuria**
- **Functional urinary incontinence R/T mobility deficits M/B inability to ambulate to the bathroom.**
- **Stress urinary incontinence R/T weak pelvic muscle M/B dribbling with sneeze or cough.**
- **Urinary retention R/T Enlarged prostate M/B inability to urinate**

TYPES OF URINARY INCONTINENCE

- Stress: intra-abdominal pressure(cough or sneeze)
- Urge: sensing an urgent need to go
- Transient: appears suddenly and lasts 6 months or less
- Mixed: urine loss with features of two or more types of incontinence
- Overflow: overdistention and overflow of bladder
- Functional: caused by factors outside the urinary tract
- Reflex: emptying of the bladder without sensation of need to void(spinal cord injury)
- Total: continuous, unpredictable loss of urine

Patients at risk for UTIs

- Individuals with indwelling urinary catheter
- Women who use diaphragms for contraception
- Postmenopausal women
- Individuals with diabetes mellitus
- Older adults