NURS 821 Alterations in Reproduction; Alterations in Elimination

Lecture 10

Part 2 Renal Disease

Functions of the Kidney

- Excretory Functions:
  - Maintain plasma osmolality near 285 m0sm by varying the excretion of water.
  - Maintain the normal plasma concentration of each electrolyte.
  - Maintain the plasma pH near 7.4 through the elimination of pH and the regeneration of HCO_3.
  - Excrete the nitrogenous end products of protein catabolism: urea, uric acid, creatinine.

Functions of the Kidney con't

- Endocrine Functions:
  - Production of renin by the juxtaglomerular apparatus. Renin is then released from the renal cortex in response to need for regulation of blood pressure and extracellular fluid volume.
  - Secretion of erythropoietin, which regulates the amount of circulating hemoglobin through stimulation of the bone marrow.
  - Degrade insulin
  - Produce prostaglandin
  - Metabolize vitamin D to it's active form.

Markers of Renal Function

- Proteinuria
  - structural or inflammatory progressive renal disease;
  - cardiovascular disease
- Microalbuminuria
  - Increased risk of progressive kidney disease, mortality (NIDDK, 2000)
- BUN
  - unreliable;
  - influenced by hydration

Markers of Declining Renal Function

- Creatinine
  - increased with decreased renal function;
  - changes are most important;
  - unreliable in advanced disease;
  - may indicate muscle damage

Normal Changes in the Urinary System with Aging

- Incontinence due to:
  - Decreased bladder capacity
  - Urinary retention
  - Nocturia
  - Weakening of urinary sphincter

Impact of Renal Failure

- 1996-74,116 new cases; 150% increase
- Progressive increase due to Type 2 DM
- 335,014 required life sustaining TX

Impact of Renal Failure (cont)

- Etiology-42% DM, 20% HTN; rest-glomerulonephritis, vasculitis, interstitial nephritis, genetic and congenital abnormalities, polycystic kidney disease
- Typically impacts over age 60; 2% (6,000) aged under 20-devastating impact on growth and development (NIDDK, 2000)

Ethnic Considerations in ESRD

- Highest incidence in African Americans and Native Americans
- Statistics on Hispanics unavailable
- African Americans
  - experience ESRD earlier than Whites-age 55.8 vs. 62.2
  - Account for 30% of ESRD patients
- (NIDDK, 2000)

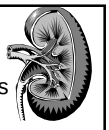
Measures to Decrease Incidence of ESRD

- Good glycemic control
- Optimum control of BP and use of ace inhibitors
- Screening for microalbuminuria (NIDDK, 2000)

Classification of Renal Failure Causes

- Pre-renal
  - physiologic states which result in diminished renal perfusion.

Causes of Renal Failure



- Pre-Renal
  - Vascular disorders
  - Infarction
  - Embolism
  - Congestive heart failure
  - Nephrosclerosis
  - Shock due to hemorrhage, burns, cardiogenic
  - Complications pregnancy; placenta previa, septic abortion, post-partum hemorrhage, eclampsia
  - Crush injuries
  - Hemolysis
  - Surgery in which the aorta or the renal arteries are clamped

Hemolytic Uremic Syndrome (HUS)

- Definition-Syndrome in which E Coli causes profound RBC damage which clogs renal blood vessels leading to RF
- Etiology-E Coli from contaminated meat (undercooked), dairy products, and juice (NIDDK, 2000)
- May be genetic predisposition

HUS

- Incidence-
  - Rare but most common cause of acute renal failure in infants and children, 80% of cases in ages 1-4
  - Affects children under 10
  - Slight increase in girls and white population
- Mortality rate high, only palliative treatment
- Morbidity-10-30% progress to ESRD

HUS

- Pathophysiology
  - E coli causes acute colitis
  - Toxins enter bloodstream and damage RBCs, platelets
  - Damaged cells and inflammatory products clog renal blood vessels and cause lesions

(NIDDK, 2000)

HUS Manifestations

- Acute colitic phase-lasts 1-15 days, most last 2-3 days
  - -abdominal pain, vomiting, bloody diarrhea
- Between 5-10% die during this phase
- May develop bowel and colon sequelae
- Most recover without complications

(NIDDK, 2000)

HUS

- After acute colitic phase-child remains pale, tired, irritable
- Toxins begin attacking hematopoetic system
  - Unexplained bruises
  - Small clot-sized hemorrhages visible in the mouth

(NIDDK, 2000)

HUS

- Renal failure results when damaged RBCs and platelets clog renal vessels, altering renal perfusion and glomerular filtration
  - Results in oliguria, edema, hypertension

(NIDDK, 2000)