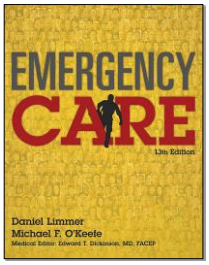
Emergency Care

THIRTEENTH EDITION



CHAPTER 24

Hematologic and Renal Emergencies

The Hematologic System

- Blood
  - Represents its own organ system
  - Has specific functions
    - Control of bleeding - clotting
    - Delivery of oxygen to cells
    - Removal of carbon dioxide from cells
    - Removal and delivery of other waste products to organs that filtrate and remove them

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The Hematologic System

- Blood
  - Made up of solid components
    - Red blood cells
    - White blood cells
    - Platelets
    - Suspended in plasma
  - Medications can affect some components of blood.

Blood Clotting

- Aggregation of platelets is body's most rapid and initial response to stop bleeding.
- Clotting factors are a group of proteins produced in liver and released into the bloodstream.
- Once activated, clotting factors form clots through clotting cascades.

Coagulopathies

- Abnormal clotting of blood
- Can occur when body forms clots too readily or patient clots too slowly
- Certain diseases make patients prone to poor clotting:
  - Advanced liver disease (cirrhosis)
  - Hemophilia (decreased or defective clotting factor)
  - von Willebrand disease (platelets are functionally defective)

Identifying Patients with Coagulopathies

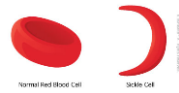
- Certain medical conditions (MI, Stroke, Afib), medications in which the normal ability to form clots can worsen patient's disease
- Patients with prescribed "blood thinners‟ and ASA/Plavix
  - Patients more prone to have life-threatening bleeding when injured than patients not on these medications

Anemia

- Lack of normal amount of red blood cells
- Acute anemia
  - Sudden blood loss
- Chronic anemia
  - Excessive menstrual periods
  - Slow gastrointestinal bleeding
  - Diseases affecting bone marrow

Sickle Cell Anemia

- Genetic disease affecting RBCs
- More prevalent in certain ethnicities
  - African Americans (1 in 12)
  - Indian or Middle Eastern descent
- Defective shape resembles a sickle
- RBC's have a short life span leading to chronic anemia



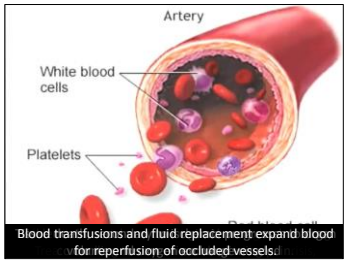
Sickle Cell Anemia

- Complications
  - Gallstones
  - Sickle pain crisis (sickled red blood **cells** block small blood vessels that carry blood to your bones)
  - Acute chest syndrome (chest pain, cough, fever, hypoxia, infiltrates)
  - Priapism
  - Stroke
  - Jaundice
- Sickle cell trait doesn't always lead to complications.

Patient Care

- Administer supplemental oxygen.
- Monitor for inadequate respiration.
- Monitor for signs of hypoperfusion.
- Transport to stroke center if stroke is suspected.

Sickle Cell Anemia Video



Click on the screenshot to view a video on the topic of sickle cell anemia.

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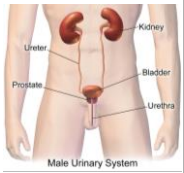
The Renal System

The Renal System

- Components
  - Two kidneys
  - Two ureters
  - One urethra
- Responsible for filtering blood and removing waste
- Maintains fluid balance
- Maintains acid/base balance



Male Urinary System

Urinary Tract Infections

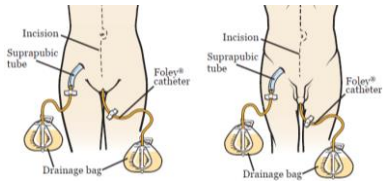
- Most common disease that afflicts renal and urinary system
- Caused by bacteria
- Usually limited to the bladder
- Cause pain and frequent urination
- If left untreated, can result in pyelonephritis
  - UTI ascends up ureter into kidney.
  - Unilateral flank pain

Kidney Stones

- Usually made of calcium and formed within the kidney
- In the kidney - no symptoms.
- When they become dislodged, can cause unilateral flank pain that radiates to the groin area.
- Patients may report nausea and vomiting.

Patients with Urinary Catheters

- As a result of:
  - Renal obstruction of bladder outflow
  - Neurological disorder



Patients with Urinary Catheters

- Use urinary catheters to drain urine
  - Commonly inserted in urethra
  - May be placed through skin
- Complications of UTI and local trauma at site of catheter insertion
- Keep bags lower than the patient
- Note urine discoloration, odor, amount

Renal Failure

- Occurs when kidneys lose ability to adequately filter and remove toxins
- Acute failure typically results from shock or toxic ingestion.
- Chronic failure may be inherited or secondary to damage from uncontrolled diabetes or hypertension.

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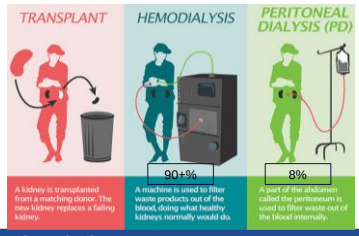
Renal Failure

- End-stage renal disease (ESRD)
  - Irreversible renal failure



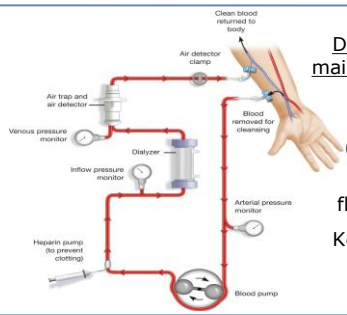
Renal Failure

- More than 400,000 Americans on dialysis who are treated in dialysis centers undergo three treatments a week, each lasting three to four hours.
- Only 8% treat themselves at home.
- ESRD patients often rely on EMS for transport to and from dialysis.

Hemodialysis

- Patient connected to a dialysis machine that pumps blood through specialized membranes
- Treatments last several hours, multiple times a week.

Hemodialysis Process



Dialysis replaces 3 main kidney functions:

Removes waste from the blood (cleans the blood)

Removes excess fluid from the blood

Keeps electrolytes in balance

Two-Port Catheter

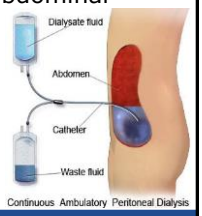
A two-port catheter for hemodialysis inserted into a major vein of the torso.
© Edward T. Dickinson, MD

AV Fistula

Fistula complications include: infection, peritonitis, and bleeding

Peritoneal Dialysis

- Uses peritoneal cavity's large surface area
- Special fluid infused into abdominal cavity and left for several hours to absorb waste and excess fluid
- Fluid is removed and discarded.



Peritoneal Dialysis

Peritoneal dialysis catheter. © *Edward T. Dickinson, MD*

Peritoneal Dialysis

- Continuous ambulatory peritoneal dialysis (CAPD)
  - Gravity exchange process repeated several times a day
- Continuous cycler-assisted peritoneal dialysis (CCPD)
  - Machine used to fill and empty abdominal cavity while person sleeps

Medical Emergencies in ESRD

- Two broad groups
  - Loss of normal kidney function
  - Complication of dialysis treatments
- Most dialysis patients have underlying medical factors.
  - Diabetes
  - Hypertension

Complications of ESRD

- Usually relate to patient missing dialysis
- Present with signs and symptoms similar to congestive heart failure
  - Shortness of breath
  - Edema
  - Electrolyte disturbances

Patient Care

- For the ESRD patient who has missed dialysis
  - Assess ABCs.
  - Obtain vital signs and be aware of fistulas.
  - Administer oxygen.
  - Monitor vital signs closely and have AED ready.
  - Transport to facility capable of dialysis.

Complications of Dialysis

- Bleeding from A-V fistula site
- Clotting and loss of function of the A-V fistula
- Bacterial infection of blood due to contamination at A-V fistula or dialysis catheter site
  - Peritonitis

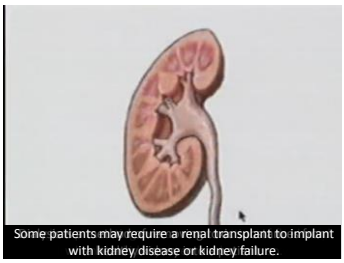
Patient Care

- ESRD patient with dialysis complications
  - Assess ABCs.
  - Administer oxygen
  - Control bleeding.
    - Direct pressure, elevation, hemostatic dressings.
    - Tourniquet if unable to control.
  - Treat for shock.
    - Keep patient supine and warm.
  - If peritonitis is suspected, transport dialysis fluid for confirmation.

Kidney Transplant Patients

- Kidneys are the most commonly transplanted organs.
  - Approximately 16,000 transplants per year
- Patients spend their lives on special class of drugs.
  - Help prevent organ rejection
  - Increased susceptibility to infections

Information About Renal Failure Video



Click on the screenshot to view a video on the topic of renal failure.

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Chapter Review

Chapter Review

- Blood delivers oxygen to the cells, removes carbon dioxide from the cells, and controls bleeding by clotting.
- Blood consists of red cells, white cells, and plasma.
- Anemia is lack of red blood cells in circulation.

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Chapter Review

- Sickle cell anemia is an inherited disease in which a defect in the hemoglobin results in sickle shape to red blood cells. This misshaping inhibits movement of red blood cells through capillaries, causing "sludging" and blockages in smaller blood vessels.

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Chapter Review

- The renal system is comprised of the kidneys, the ureters, the bladder, and the urethra.
- The kidneys perform vital filtering of the blood to remove waste products. They also help maintain water balance within the body.

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Chapter Review

- Problems with the renal system include infection, kidney stones, and renal failure.
- Renal failure is a condition in which the kidneys are unable to filter waste and provide a balance of fluids and electrolytes in the body.

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Chapter Review

- Dialysis removes excess fluid and electrolytes from the body by filtration.
- Hemodialysis or peritoneal dialysis.
- Hemodialysis at dialysis centers is generally performed 3 x per week.
- Peritoneal dialysis is done at home and is usually done several times daily.

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Chapter Review

- Major complications in patients with end-stage renal disease can occur after the patient has missed a dialysis appointment, from infections, or as a result of bleeding from hemodialysis access sites.

Remember

- Blood has specific cellular components.
- Abnormal blood cells can significantly affect patients.
- The renal system is critical to maintaining homeostasis.
- Renal failure can be chronic or acute.
- End stage renal disease is managed through dialysis.

Questions to Consider

- Does my patient have a history of sickle cell disease or ESRD?
- Does my patient have an A-V fistula?
- Will I need to make an early request for ALS because of complications from a missed dialysis appointment?

Critical Thinking

- You have a patient who is transported routinely for dialysis three times per week. She was sick and canceled the trip yesterday. Now she calls saying she can't breathe and feels like she is going to die. Is it possible that she has a legitimate complaint after missing dialysis by only one day?