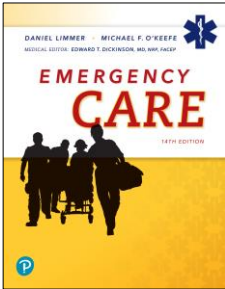



## Emergency Care

Fourteenth Edition




**Chapter 28**  
Hematologic and Renal Emergencies

 Pearson Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved


## Topics

- [The Hematologic System](#)
- [The Renal System](#)

 Pearson Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved


## The Hematologic System

[Back to Topics](#)

 Pearson Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved


## The Hematologic System (1 of 2)

- Blood
  - Represents its own organ system
  - Has specific functions
    - Control of bleeding by 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

 Pearson Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved


## The Hematologic System (2 of 2)

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

 Pearson Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## 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.

 Pearson Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## 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
  - Hemophilia
  - von Willebrand disease



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Identifying Patients with Coagulopathies

- Certain medical conditions in which the normal ability to form clots can worsen patient's disease
- Patients with prescribed "blood thinners"
  - More prone to have life-threatening bleeding when injured than patients not on these medications



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Care for Patients with Coagulopathies (1 of 2)

- Emergency treatment
  - Take appropriate Standard Precautions.
  - Perform a primary assessment and care for any immediate life threats.
  - Obtain a history from the patient and identify which specific blood thinning medication he is taking, or which bleeding disorder he suffers from.
  - Notify the hospital as early as possible.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Care for Patients with Coagulopathies (2 of 2)

- Emergency treatment
  - Monitor the patient for the development of the signs and symptoms of shock or decreasing mental status.
  - Administer supplemental oxygen if the patient appears to be in shock or has a decreased mental status.
  - Transport to an appropriate receiving hospital.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Anemia

- Lack of normal amount of red blood cells in circulation
- Acute anemia
  - Sudden blood loss
- Chronic anemia
  - Recurrent heavy menstrual periods
  - Slow gastrointestinal bleeding
  - Diseases affecting bone marrow or structure of hemoglobin



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Sickle Cell Anemia (1 of 4)

- Genetic disease affecting RBCs
- Most commonly occurs in patients of African descent
- Defective shape resembles a sickle.
- Cells have a short life span, leading to chronic anemia.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Sickle Cell Anemia (2 of 4)

- Complications
  - Destruction of spleen
  - Sickle pain crisis
  - Acute chest syndrome
  - Priapism
  - Stroke
  - Jaundice



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Sickle Cell Anemia (3 of 4)

- It is estimated that 1 in 13 African Americans has the sickle cell trait.
- Sickle cell trait doesn't always lead to complications.
  - Possible to lead a normal life with sickle cell trait



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Sickle Cell Anemia (4 of 4)

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



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## The Renal System

[Back to Topics](#)



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## The Renal System

- Components
  - Two kidneys
  - Two ureters
  - One urethra
- Kidneys essential for life
  - Filter blood.
  - Remove certain waste products, excessive salts, and excessive fluid.
  - Maintain fluid balance.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Diseases of the Renal System

- Affect many different portions
- Range from minor to life threatening



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## 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.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Kidney Stones

- Usually made of calcium and formed within the kidney
- When in the kidney, they usually cause no symptoms.
- When they become dislodged, can cause severe unilateral flank pain.
- Patients may report nausea and vomiting.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Patients with Urinary Catheters

- Need for urinary catheter
  - Obstruction of bladder outflow
  - Neurologic disorder
- These patients 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



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Renal Failure (1 of 3)

- 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.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Renal Failure (2 of 3)

- End-stage renal disease (ESRD)
  - Irreversible renal failure
  - Requires dialysis
    - Hemodialysis
    - Peritoneal dialysis
- 90% receive hemodialysis in specialized centers.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Renal Failure (3 of 3)

- Vast majority of more than 450,000 Americans on dialysis who are treated in dialysis centers undergo 3 treatments a week, each lasting 3 to 4 hours.
- Only 8 percent treat themselves at home.
- ESRD patients often rely on EMS for transport to and from dialysis.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

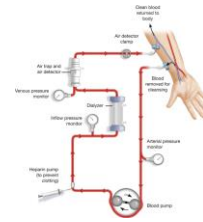
## Hemodialysis (1 of 5)

- Patient connected to a dialysis machine that pumps blood through specialized filters
- Two large catheters create a circuit by which blood is removed from the body, filtered, and returned to the body over several hours.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Hemodialysis (2 of 5)



[For long description, see slide 51: Appendix 1](#)

How hemodialysis works. Adapted from *Treatment Methods for Kidney Failure*, National Institute of Diabetes and Digestive and Kidney Diseases; U.S. Centers for Disease Control and Prevention.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Hemodialysis (3 of 5)

- Two types of access to blood circulation
  - Two-port catheter
  - A-V fistula
    - Characteristic thrill when palpated



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Hemodialysis (4 of 5)



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



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Hemodialysis (5 of 5)



A fistula surgically connects an artery and a vein in an extremity.  
© Edward T. Dickinson, MD



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Peritoneal Dialysis (1 of 3)

- 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.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Peritoneal Dialysis (2 of 3)

- 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



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Peritoneal Dialysis (3 of 3)



Peritoneal dialysis catheter.  
© Edward T. Dickinson, MD



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Medical Emergencies in ESRD

- Medical emergencies encountered in patients with ESRD can be broadly divided into two groups.
  - Those that arise from the loss of normal kidney function
  - Those that are complications of patients' dialysis treatments
- Vast majority of dialysis patients have other underlying diseases such as diabetes and high blood pressure.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## 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



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Care for ESRD Patient Who Has Missed Dialysis

- For the ESRD patient who has missed dialysis
  - Assess ABCs.
  - Obtain vital signs.
  - Place patient in position of comfort.
  - Administer oxygen.
  - Consider use of CPAP.
  - Monitor vital signs closely and have AED ready.
  - Transport to facility capable of dialysis.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## 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



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Care for ESRD Patient with Complications of Dialysis (1 of 2)

- ESRD patient with complications of dialysis
  - Assess ABCs.
  - Control bleeding.
    - Use direct pressure, elevation, and hemostatic dressings as needed.
    - If bleeding cannot be controlled by other means, a tourniquet should be applied.
  - Administer oxygen.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Care for ESRD Patient with Complications of Dialysis (2 of 2)

- Treat for shock.
  - Keep patient supine and warm.
- If peritonitis is suspected, transport dialysis fluid for confirmation.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Kidney Transplant Patients

- Kidneys are the most commonly transplanted organs.
  - Approximately 21,000 transplants per year
- Patients spend their lives on special class of drugs.
  - Help prevent organ rejection
  - Increased susceptibility to infections



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Chapter Review



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Chapter Review (1 of 6)

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



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Chapter Review (2 of 6)

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



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

### Chapter Review (3 of 6)

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



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

### Chapter Review (4 of 6)

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



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

### Chapter Review (5 of 6)

- Dialysis removes excess fluid and electrolytes from the body by filtration. Dialysis may be performed in either of two ways: hemodialysis or peritoneal dialysis. Hemodialysis at dialysis centers is generally performed three times per week. Peritoneal dialysis is done at home and is usually done several times daily.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

### Chapter Review (6 of 6)

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



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

### 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.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

### 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?



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved



## 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?



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Copyright



This work is protected by United States copyright laws and is provided solely for the use of instructors in teaching their courses and assessing student learning. Dissemination or sale of any part of this work (including on the World Wide Web) will destroy the integrity of the work and is not permitted. The work and materials from it should never be made available to students except by instructors using the accompanying text in their classes. All recipients of this work are expected to abide by these restrictions and to honor the intended pedagogical purposes and the needs of other instructors who rely on these materials.



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved

## Appendix 1

An arm with a fistula and a diagram of blood flow through the dialysis process. The diagram begins with unfiltered blood being removed via catheter from the fistula. Blood flow is controlled via blood pump, which helps blood to move forward. An arterial pressure monitoring gauge is attached before the blood pump. After the blood pump, a syringe is attached to the tubing, and the label states, Heparin pump, to prevent clotting. Then, blood flows into a dialyzer where toxins and excess water are removed. Before the dialyzer is an inflow pressure monitoring gauge, and after the dialyzer is a venous pressure monitoring gauge. Lastly, filtered blood passes through an air detector chamber into a catheter that is inserted into the patient's arm fistula.

[Return to presentation](#)



Copyright © 2021, 2016, 2012 Pearson Education, Inc. All Rights Reserved