CHAPTER 17

Gastrointestinal and Urologic Emergencies

National EMS Education Standard Competencies

Medicine

Applies fundamental knowledge to provide basic and selected advanced emergency care and transportation based on assessment findings for an acutely ill patient.

Abdominal and Gastrointestinal Disorders

Anatomy, presentations, and management of shock associated with abdominal emergencies

- Gastrointestinal bleeding (p 616)

Anatomy, physiology, pathophysiology, assessment, and management of

- Acute and chronic gastrointestinal hemorrhage (p 616)
- Peritonitis (p 614)
- Ulcerative diseases (p 615)

Genitourinary/Renal

- Blood pressure assessment in hemodialysis patients (p 626)

Anatomy, physiology, pathophysiology, assessment, and management of

- Complications related to:
  - Renal dialysis (p 626)
  - Urinary catheter management (not insertion) (p 626)
- Kidney stones (p 618)

Knowledge Objectives

1. Understand the anatomy and physiology of the gastrointestinal system. (p 611)
2. Define the term "acute abdomen." (p 614)
3. Explain the concept of referred pain. (p 614)
4. Understand that abdominal pain can arise from other body systems. (p 614)
5. Discuss the various potential causes of acute abdomen, including diverticulitis, cholecystitis, appendicitis, perforated gastric ulcer, aortic aneurysm, hernia, cystitis, kidney infection, kidney stone, pancreatitis, urinary tract infections, and ectopic pregnancy and pelvic inflammation in women. (p 615)
6. Define peritonitis and list its potential signs and symptoms. (pp 614–615)
7. Describe the assessment process for patients with acute abdomen. (pp 620, 623)
8. Discuss general management of a patient with acute abdomen. (pp 624–625)
9. Describe the procedures to follow in managing the patient with shock associated with abdominal emergencies. (p 619)
10. Understand the anatomy and physiology of the renal system. (p 618)
11. Discuss the various types of urologic pathophysiology, including urinary tract infections (UTIs), renal calculi (kidney stones), acute renal failure, and chronic renal failure. (p 617)
12. Explain the purpose of renal dialysis. (p 626)
13. Describe potential complications of dialysis or a missed dialysis treatment. (p 626)
14. Describe the assessment process for patients with urologic emergencies. (p 617)
15. Discuss general management of a patient with a urologic emergency. (pp 624–625)
16. Discuss assessment and management of specific urologic emergencies, including urinary tract infections (UTIs), renal calculi (kidney stones), acute renal failure, and chronic renal failure. (pp 617–618)

Skills Objective

1. Demonstrate the assessment of a patient's abdomen. (pp 617–618)

Introduction

Abdominal pain is a common complaint, but the cause is often difficult to identify, even for a physician. As an AEMT, you do not need to determine the exact cause of acute abdominal pain. You simply need to be able to recognize a life-threatening problem and act swiftly in response. Remember, the patient is in pain and is probably anxious, requiring all your skills of rapid assessment and emotional support.

This chapter begins by explaining the anatomy and physiology of the gastrointestinal (GI) and genitourinary systems. It then discusses the pathophysiology of an acute abdomen, including signs and symptoms of the acute abdomen and how to examine the abdomen. Next, it discusses the different causes of an acute abdomen and appropriate emergency medical care.

Anatomy and Physiology

The Gastrointestinal System

The GI system is also known as the digestive tract. It consists of the mouth and many organs. Figure 17-1 shows the four quadrants of the abdomen. Figure 17-2 shows the solid and hollow organs of the abdomen.

The digestive process begins with saliva, which is secreted into the mouth to help lubricate food. The combination of pulverizing and lubrication creates a substance that can be easily moved. Saliva also contains enzymes that begin the chemical breakdown of foods—in particular, starches. These complex carbohydrates can be disassembled into simple sugars that are more easily absorbed. In addition, some initial breakdown of triglycerides occurs.

Once food is swallowed, it moves through the esophagus. This muscular tube is typically collapsed (that is, closed in on itself), which allows for air to easily flow into the lungs but not into the stomach. This collapsed tube idea also explains how gastric dilation and impairment of lung expansion can occur during ventilation. If a person needs positive-pressure ventilation, bag-mask ventilation can push air into the lungs. If the pressure of inhalation during breathing is too high, the esophagus dilates; air then follows the path of least resistance. Given the choice between moving through a large tube into a large open space (the stomach) or moving down a series of progressively smaller tubes (the trachea into the right or left mainstem bronchus), air will flow into the stomach.

Intertwined around the esophagus are veins that drain into an even more complex series of veins, which ultimately join together to form the portal vein. The portal vein transports venous blood from the GI tract directly to the liver for processing of the nutrients that have been absorbed. If blood flow through the liver slows for any reason, the blood may back up throughout the entire GI system because this series of veins lacks any valves. The veins surrounding the stomach and esophagus then become dilated. Even a low amount of pressure may cause leaking or rupture of these vessels.

The esophagus does not absorb nutrients but rather pushes the food along using rhythmic contractions called **peristalsis**. The food travels through the diaphragm and comes to a doorway—namely, the sphincter located at the junction of the esophagus and the stomach. The cardiac sphincter (which earns its name because people who have regurgitation of acid out of the stomach into the esophagus often feel they are having a heart attack) is designed to prevent food from backing up into the esophagus.

When empty, the stomach is rather small, but it is capable of stretching many times beyond its normal size to accommodate meals. As the food enters this muscular organ, the stomach begins to secrete hydrochloric acid, which helps to break down the food. To mix the acid with the food more evenly, the stomach also contracts, churning the acid and food mixture together until a relatively smooth consistency is achieved. The material that exits the pyloric sphincter, the doorway at the inferior portion of the stomach, is called chyme.

The stomach absorbs some materials, such as water and fat-soluble substances (for example, alcohol). Alcohol is absorbed

YOU are the Provider — PART 1

You are dispatched to a local dialysis clinic for a patient who "needs transport to the emergency department." On your arrival, you are greeted by clinic staff, who state that the patient receives dialysis every Monday, Wednesday, and Friday because of anuria, and today (Monday) when he came in he "wasn't acting right" and seemed a little short of breath. The clinic staff tell you that they are unable to perform dialysis on this patient until his mental status improves.

1. What are some potential causes of altered mental status in a patient receiving dialysis?
2. On the basis of the information provided, what type of dialysis does this patient receive?
3. What is anuria?

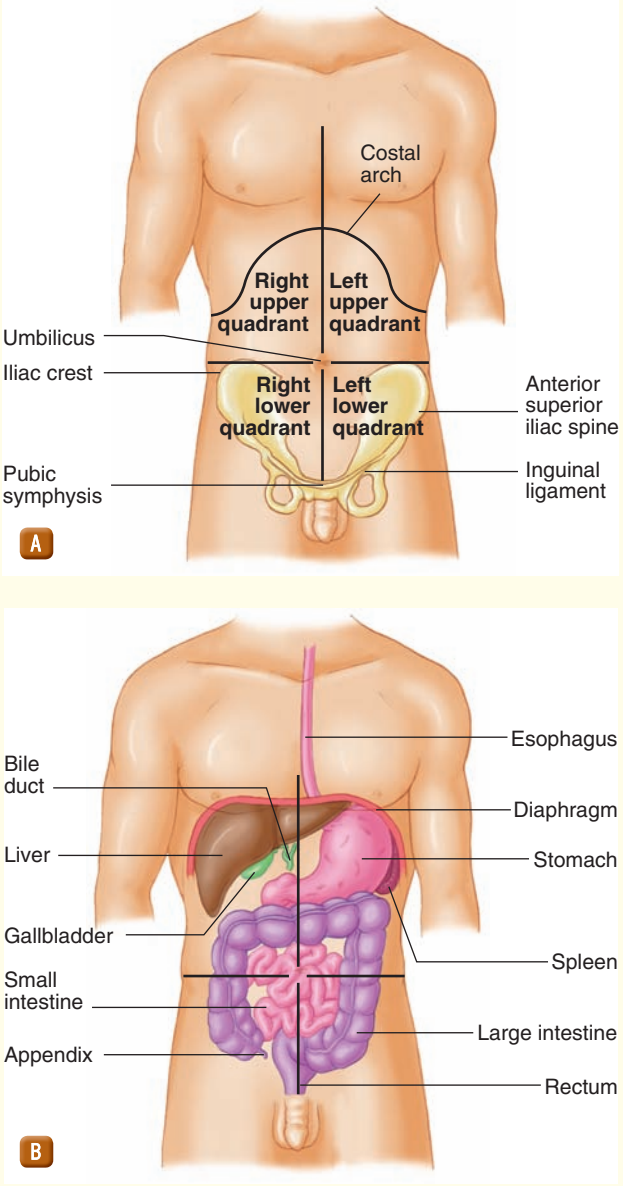

Figure 17-1 The anatomy of the abdomen. **A.** The four quadrants of the abdomen. **B.** Abdominal organs can lie in more than one quadrant.

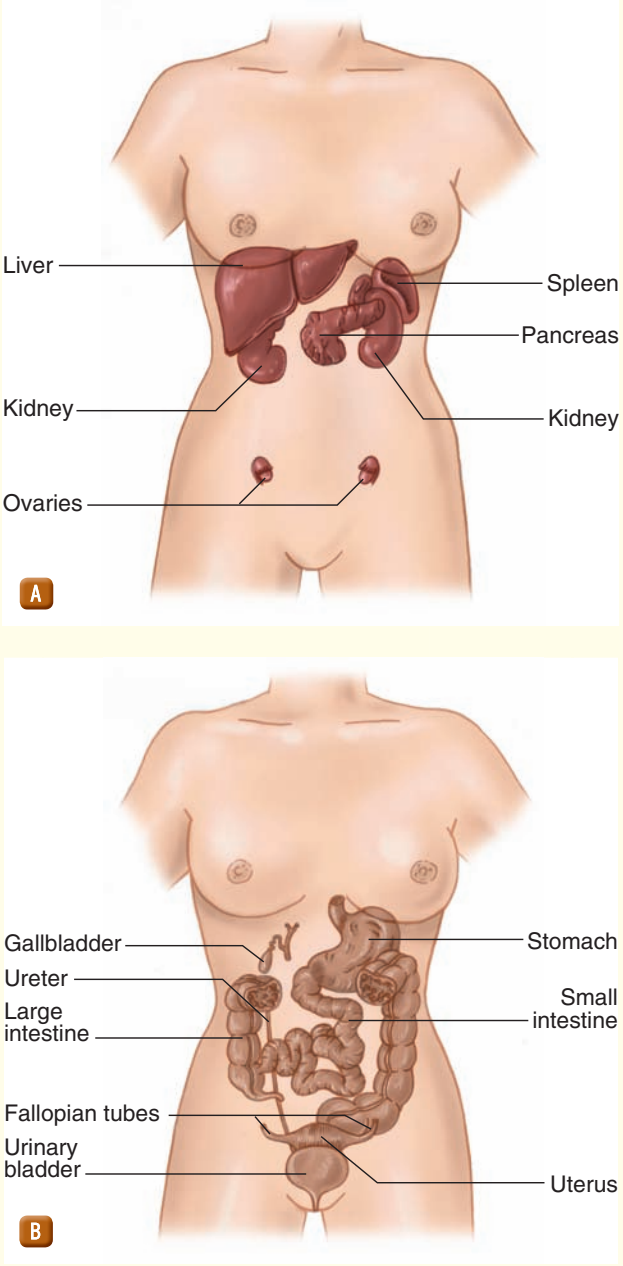

Figure 17-2 The solid and hollow organs of the abdomen. **A.** Solid organs include the liver, spleen, pancreas, kidneys, and, in women, ovaries. **B.** Hollow organs include the gallbladder, stomach, small and large intestine, and urinary bladder.

slowly within the stomach, but it is rapidly absorbed within the duodenum. The longer the alcohol remains within the stomach, the slower the rate of its absorption into the bloodstream. Drinking alcohol with a fatty meal will delay gastric emptying as the stomach works to digest the difficult fats.

The real purpose of the digestive system is revealed in the next portion of the GI system, the duodenum. The main function of the GI system is to absorb resources for use by other cells in the body.

The duodenum is the first part of the small intestine. It is where the pancreas, liver, and gallbladder connect to the digestive system. It is where the active stage of absorption begins. The stomach is designed to release only small amounts of the food into the duodenum, thereby enabling the small intestine to better manage digestion. The exocrine portion of the pancreas secretes several enzymes into the duodenum that assist with digestion of fats, proteins, and carbohydrates. In addition, pancreatic juice helps to neutralize gastric acids.

The liver creates bile, which is then stored in the gallbladder. Bile is an enzyme used by the body to help break down fats. Bile is released into the duodenum, where it helps to emulsify (that is, dissolve into solution) the fats.

The liver also affects the GI system indirectly, through carbohydrate metabolism. Brain cells can burn only one fuel source—glucose. If the blood glucose level falls, the liver can convert glycogen into glucose. Dramatic drops in sugar glucose will cause the liver to convert fats and proteins into sugar. As blood flows through the liver, fat and protein metabolism continues. Without a functioning liver, a person would soon die because he or she would not be able to use any of the proteins that were absorbed from the GI system. In addition, the liver detoxifies drugs, completes the breakdown of dead red and white blood cells, and stores vitamins and minerals.

The real workhorse of the digestive system is the small intestine; 90% of all absorption occurs there. This 22′-long structure is divided into three sections: the duodenum (the last section of the upper GI system), the jejunum (the first part of the lower GI system), and the ileum. The small intestine produces enzymes that work with the pancreatic enzymes to turn chyme into substances that can be directly absorbed by the capillaries of the small intestine and thereby move into the bloodstream.

Blood filled with these nutrients exits the intestinal circulation and heads to the liver, where additional metabolism of fats and proteins takes place. The blood then leaves the liver and enters the subclavian vessels. Water-soluble vitamins are absorbed into the bloodstream for use by cells.

The large intestine, or colon, is the next destination. The substance that arrives in this 5′-long structure is no longer called chyme, but rather feces. The valve between the ileum and the first portion of the large intestine is called the cecum. Located directly posterior to the ileocecal valve is the appendix. This blind pouch is able to hold small amounts of material. If the feces contains too much bacteria, indigestible foreign bodies are present, or the appendix becomes compressed or twisted, it can become inflamed, resulting in appendicitis.

Rising up from the cecum is the ascending colon. It attaches to the transverse colon, which runs from right to left. After a 90° turn, the descending colon begins. The end of the colon is therefore found near the left lower quadrant. The sigmoid colon then takes an "S" turn, which aligns its most inferior portion in the center of the abdomen. Attached to the sigmoid colon is the rectum, the last portion of the colon. The colon terminates at a sphincter called the anus, where the feces are expelled from the body.

The primary role of the large intestine is to complete the reabsorption of water. Although the majority of water is reabsorbed in the small intestine, the osmotic function within the colon helps to solidify the digested material into a formed stool. Failure of this portion of the bowel can lead to a soft, watery stool, termed diarrhea.

The colon is also the site of bacterial digestion. Bacteria normally found within the colon help to finish the breakdown of the chyme. This breakdown produces gas as a by-product. Flatulence may be considered impolite, but it is certainly normal.

The entire digestion process takes 8 to 72 hours. At this pace, bowel movements normally range between three movements per day and one movement every 3 days. Of course, this number varies based on the types of food a person eats, the amount of water consumed, exercise level, and stress level.

The Genital System

The abdominal space also holds the male and female reproductive organs. The male reproductive system consists of the testicles, epididymis, vasa deferentia, seminal vesicles, prostate gland, and penis. The female reproductive system includes the ovaries, fallopian tubes, uterus, cervix, and the vagina.

The Urinary System

The urinary system performs two main functions for the body. It acts as the body's accounting firm, keeping track of the electrolytes, water content, and acids of the blood; and it acts as the blood's sewage treatment plant, removing metabolic wastes, drug metabolites, and excess fluids. The kidneys perform these functions continuously, filtering 200 L of blood each day.

The urinary system consists of the **kidneys**, which filter the blood and produce **urine**; the **urinary bladder**, which stores the urine until it is released from the body; the **ureters**, which transport the urine from the kidneys to the bladder; and the **urethra**, which transports the urine from the bladder out of the body. The bean-shaped kidneys are found in the retroperitoneal space (behind the peritoneum), which extends from the 12th thoracic vertebra to the third lumbar vertebra. The right kidney is slightly lower than the left owing to the position of the liver. The medial side of the kidney is concave, forming a cleft called the **hilus**, where the ureters, renal blood vessels, lymphatic vessels, and nerves enter and leave the kidney Figure 17-3.

A fibrous capsule covers the kidney and protects it against infection. Surrounding this capsule is a fatty mass of adipose tissue, which cushions the kidney and holds it in place in the abdomen. A layer of dense fibrous connective tissue called the **renal fascia** anchors the kidney to the abdominal wall.

Once the urine enters the collecting ducts, it passes through the minor calyx, into the major calyx, and then into the renal pelvis. From there, the urine moves through the ureter (one ureter from each kidney) and is stored in the urinary bladder. Most of the bladder sits in the anterior abdominal cavity, but the dome of the bladder sits in the posterior abdominal cavity, or retroperitoneum, where the ureters and kidneys reside. When empty, the bladder collapses, and the muscular walls fold over onto themselves. In contrast, as urine accumulates, the bladder expands and becomes pear-shaped. Normally, the brain exerts control over the urge to void, keeping the external urinary sphincter contracted until conditions are favorable for urination. At this point, the inhibition of the external urinary sphincter is reduced and the urine passes from the urinary bladder into the urethra.

The beginning of the urethra, through which urine is expelled, sits at the inferior aspect of the bladder. In females, the urethra exits at the site of the external genitalia. The female urethra is shorter than the male urethra (4 cm versus 20 cm).

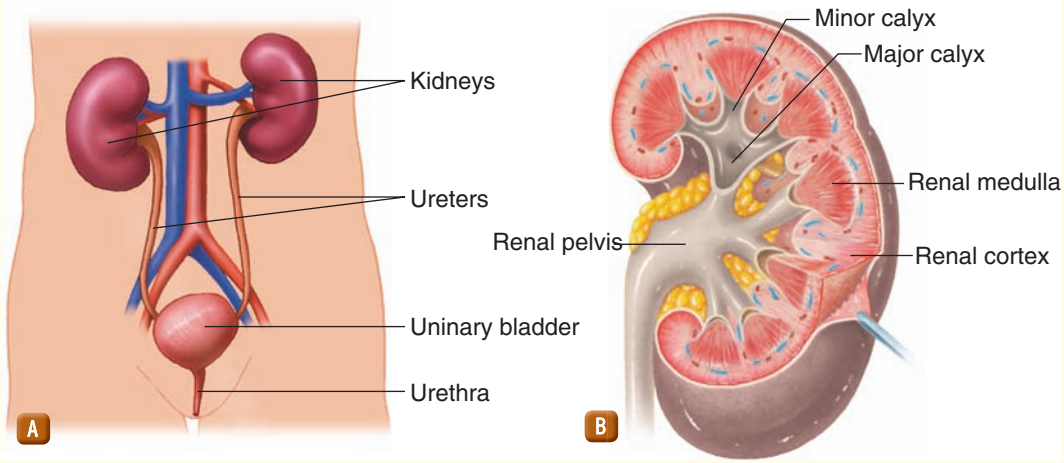

Figure 17-3 The urinary system. **A.** Anterior view showing the relationship of the kidneys, ureters, urinary bladder, and urethra. **B.** Cross-section of the human kidney showing the renal cortex, renal medulla, and renal pelvis.

Pathophysiology

Acute abdomen is a medical term referring to the sudden onset of abdominal pain that indicates an irritation of the peritoneum, the thin membrane that lines the entire abdominal cavity. This condition, called peritonitis, can be caused by an infection, a penetrating abdominal wound, a blunt injury severe enough to damage abdominal organs, and many diseases. In all cases, the major symptom is the same: severe pain. The major clinical signs are abdominal tenderness and distention.

Anatomically, the peritoneum is not one membrane, but two. The *parietal peritoneum* lines the walls of the abdominal cavity; the *visceral peritoneum* covers the surface of each of the organs in the abdominal cavity.

Two different types of nerves supply these two areas of the peritoneum. The parietal peritoneum is supplied by the same nerves from the spinal cord that supply the skin overlying the abdomen; it can therefore perceive many of the same sensations: pain, touch, pressure, heat, and cold. These sensory nerves can easily identify and localize a point of irritation. In contrast, the visceral peritoneum is supplied by the autonomic nervous system. These nerves are far less able to localize sensation. The visceral peritoneum is stimulated when distention or contraction of the hollow abdominal organs activates the stretch receptors. This sensation is usually interpreted as colic, a severe, intermittent cramping pain. Other painful sensations that occur because of an irritated visceral peritoneum may be perceived at a distant point on the surface

YOU are the Provider — PART 2

As you begin to interview the patient, you find that he is able to answer all questions appropriately; however, he is very slow to formulate his answers. According to the patient and staff, the patient is normally as "sharp as a tack," and this is abnormal for him. The patient denies having any abnormal activities over the weekend but states that he went to his granddaughter's birthday party on Saturday and may have overexerted himself.

Recording Time: 0 Minutes	
Appearance	Pale; "sick" looking
Level of consciousness	Alert; oriented to person, place, time, and event; however, slow to respond to questions
Airway	Patent
Breathing	36 breaths/min; normal rhythm
Circulation	Bounding radial pulses; skin warm, dry, and pink

4. The patient seems to be answering all questions appropriately, but more slowly than what is reported to be normal. Should you approach the dialysis staff and request that he undergo dialysis in an attempt to help improve his mental status?
5. You note a "bump" in his left forearm. What is this bump, and why is it important to AEMTs?

of the body, such as the back or shoulder. This phenomenon is called **referred pain**.

Referred pain is the result of connections between the body's two separate nervous systems. The spinal cord supplies sensory nerves to the skin and muscles; these nerves are a part of the somatic (voluntary) nervous system. The autonomic nervous system controls the function of the abdominal organs and the caliber of the blood vessels. The nerves connecting these two systems cause the stimulation of the autonomic nerves to be perceived as stimulation of the spinal sensory nerves. For example, *acute cholecystitis* (inflammation of the gallbladder) may cause referred pain to the right shoulder because the autonomic nerves serving the gallbladder lie near the spinal cord at the same anatomic level as the spinal sensory nerves that supply the skin of the shoulder Figure 17-4.

Peritonitis typically causes **ileus**, or paralysis of the muscular contractions that normally propel material through the intestine (peristalsis). The retained gas and feces, in turn, cause abdominal distention. In the presence of such paralysis, nothing that is eaten can pass normally out of the stomach or through the bowel. The only way the stomach can empty itself, then, is by **emesis**, or vomiting. For this reason, peritonitis is almost always associated with nausea and vomiting. These complaints do not point to a particular cause because they can accompany almost every type of GI disease or injury.

Peritonitis is associated with a loss of body fluid into the abdominal cavity and usually results from abnormal shifts of fluid from the bloodstream into body tissues. This decreases the volume of circulating blood and may eventually cause hypovolemic shock. This problem can be compounded by massive internal or external bleeding, resulting in severe inadequate perfusion (shock). The patient may have normal vital signs or, if the peritonitis has progressed further, signs of shock (such as restlessness, tachycardia, and hypotension). When peritonitis is accompanied by hemorrhage, the signs of shock are much more apparent.

Fever may or may not be present, depending on the cause of the peritonitis. Patients with **diverticulitis** (an inflammation of small pockets in the colon) or **cholecystitis** (inflammation of the gallbladder) may have a substantial elevation in temperature, which may be due to the inflammatory process itself or an underlying infection. However, patients with acute **appendicitis** may have a normal temperature until the appendix ruptures and an abscess starts to form.

The more common abdominal emergencies, with most common locations of direct and referred pain, are listed in Table 17-1.

Causes of Acute Abdomen

Many organs in the abdominal cavity are covered by visceral peritoneum; parietal peritoneum covers the inside aspect of the abdominal wall that forms the abdominal cavity. The entire abdominal cavity normally contains a very small amount of peritoneal fluid to bathe the organs. Any condition that allows pus, blood, feces, urine, gastric juice, intestinal contents, bile, pancreatic juice, amniotic fluid, or other foreign material to lie within or adjacent to this cavity can cause peritonitis and, thus, an acute abdomen. Technically, organs such as kidneys, ovaries,

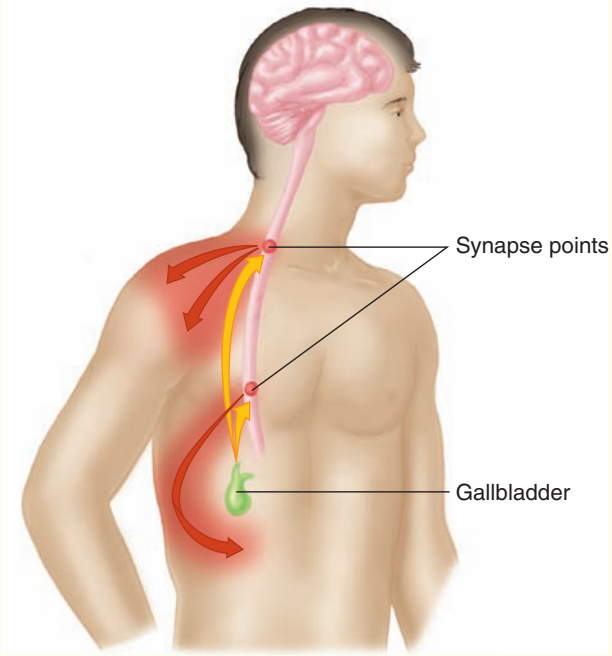

Figure 17-4 Acute cholecystitis can cause referred pain to the shoulder, as well as abdominal pain.

Table 17-1 Common Abdominal Conditions

Condition	Localization of Pain
Appendicitis	Around navel (referred); right lower quadrant (direct)
Cholecystitis	Right shoulder (referred); right upper quadrant (direct)
Duodenal ulcer	Upper midabdomen or upper back area
Diverticulitis	Left lower quadrant
Aortic aneurysm (ruptured or dissecting)	Low back and right lower quadrant
Cystitis (inflammation of the urinary bladder)	Lower midabdomen (retropubic)
Kidney infection (pyelonephritis)	Costovertebral angle
Kidney stone	Right or left flank, radiating to genitalia (referred)
Pelvic inflammation (in women)	Both lower quadrants
Pancreatitis	Upper abdomen (both quadrants); back

and other genitourinary structures are *retroperitoneal* (behind the peritoneum). However, because they lie next to the peritoneum, problems in these organs can lead to an acute abdomen.

Therefore, nearly every kind of abdominal problem can cause an acute abdomen.

Ulcers

The stomach and duodenum are subjected to high levels of acidity. To prevent damage to these organs, protective layers of mucus line both organs. In peptic ulcer disease, the protective layer is eroded, allowing the acid to eat into the organ itself during a period of weeks, months, or even years.

Most peptic **ulcers** are the result of infection of the stomach with *Helicobacter pylori*. Another major cause is long-term use of nonsteroidal anti-inflammatory drugs. Alcohol and smoking can also affect the severity of peptic ulcer disease by increasing gastric acidity.

Peptic ulcer disease affects men and women equally but tends to occur more often in the older population. As people age, the immune system's ability to fight infection decreases, making infection more likely. The geriatric population, in general, also uses nonsteroidal anti-inflammatory drugs frequently for arthritis and other musculoskeletal conditions.

Patients with peptic ulcers experience a classic sequence of burning or gnawing pain in the stomach that subsides or diminishes immediately after eating and then reemerges 2 to 3 hours later. The pain usually presents in the upper part of the abdomen but sometimes may be found below the sternum. With some patients, the pain occurs immediately after eating. Nausea, vomiting, belching, and heartburn are common symptoms. If the erosion is severe, gastric bleeding can occur, resulting in hematemesis and melena (black, tarry stools containing blood).

Some ulcers will heal without medical intervention, but often complications can occur from bleeding or perforation (a hole through the wall of the stomach). More serious ulcerative conditions can cause severe peritonitis and an acute abdomen.

Gallstones

The gallbladder is a storage pouch for digestive juices and waste from the liver. Gallstones can form and block the outlet from the gallbladder, causing pain. Sometimes the blockage will pass, but if not, it can lead to severe inflammation of the gallbladder, called cholecystitis. This is a condition in which the wall of the gallbladder becomes inflamed. In severe cases, the gallbladder may rupture, causing inflammation to spread and irritate surrounding structures such as the diaphragm and bowel. This condition presents as a constant, severe pain in the right upper or midabdominal region and may refer to the right upper part of the back, shoulder area, or flank. The pain may steadily increase for hours or may come and go. Cholecystitis commonly produces symptoms about 30 minutes after a particularly fatty meal and usually at night. Other symptoms include general GI distress such as nausea and vomiting, indigestion, bloating, gas, and belching.

Pancreatitis

The pancreas forms digestive juices and is also the source of insulin. Inflammation of the pancreas is called pancreatitis. **Pancreatitis** can be caused by an obstructing gallstone, alcohol abuse, and other diseases. Severe pain may present in the upper left and right quadrants and may often radiate to the back. Other signs and symptoms accompanying the pain are nausea and vomiting, abdominal distention, and tenderness. Complications like sepsis or hemorrhage can occur, in which case assessment may also reveal fever or tachycardia.

Appendicitis

The appendix is a small recess in the large intestine. Inflammation or infection in the appendix is called appendicitis and is a frequent cause of acute abdomen. This inflammation can eventually cause the tissues to die and/or rupture, causing an abscess, peritonitis, or shock. Initially, the pain caused by appendicitis is more generalized, dull, and diffuse and may center in the umbilical area. The pain later localizes to the right lower quadrant of the abdomen. Appendicitis can also cause referred pain. The patient may also report nausea and vomiting, anorexia (lack of appetite for food), fever, and chills. A classic symptom of appendicitis is **rebound tenderness**. Rebound tenderness is a result of peritoneal irritation. This can be assessed by pressing down gently and firmly on the abdomen. The patient will feel pain when the pressure is released. Women who are pregnant may not exhibit this symptom.

Gastrointestinal Hemorrhage

Bleeding within the GI tract is a symptom of another disease, not a disease itself. Gastrointestinal hemorrhage can be acute, which may be shorter term and more severe, or chronic, which may be of longer duration and less severe. All complaints of bleeding should be considered serious.

A GI hemorrhage can occur in the upper or lower GI tract. Bleeding in the upper GI tract occurs from the esophagus to the upper part of the small intestine. In the esophagus, problems might include esophagitis, esophageal varices, or Mallory-Weiss syndrome.

Lower GI bleeding occurs between the upper part of the small intestine and the anus. Bowel inflammation, diverticulitis, and hemorrhoids are common causes of bleeding in the lower GI tract.

Esophagitis

Esophagitis occurs when the lining of the esophagus becomes inflamed by infection or from the acids in the stomach (gastroesophageal reflux disease). The patient may report pain with swallowing and complain of feeling like an object is stuck in his or her throat. Additional symptoms include heartburn, nausea, vomiting, and sores in the mouth. In the worst cases, bleeding can occur from the small capillary vessels within the esophageal lining or the main blood vessels.

Esophageal Varices

Esophageal varices occur when the amount of pressure within the blood vessels surrounding the esophagus increases. The esophageal blood vessels eventually deposit their blood into the portal system. If the liver becomes damaged and blood cannot flow through it easily, blood begins to back up into these portal

vessels, dilating the vessels and causing the capillary network of the esophagus to begin leaking. If pressure continues to build, the vessel walls may fail, causing bleeding.

In industrialized countries, alcohol is the main cause of portal hypertension. Long-term alcohol consumption damages the interior of the liver (cirrhosis), leading to slower blood flow. In developing countries, viral hepatitis is the main cause of liver damage.

Presentation of esophageal varices takes two forms. Initially, the patient shows signs of liver disease—fatigue, weight loss, jaundice, anorexia, edema in the abdomen, abdominal pain, nausea, and vomiting. This very gradual disease process takes months to years before the patient reaches a state of extreme discomfort.

By contrast, the rupture of the varices is far more sudden. The patient will complain of sudden-onset discomfort in the throat. He or she may have severe difficulty swallowing, vomiting of bright red blood, hypotension, and signs of shock. If the bleeding is less dramatic, hematemesis (vomiting blood) and melena (black, tarry stools) are likely. Regardless of the speed of bleeding, damage to these vessels can be life threatening. Spontaneous rupture is often life threatening, and significant blood loss at the scene may be evident. Major ruptures can lead to death in a matter of minutes.

Mallory-Weiss Syndrome

Mallory-Weiss syndrome may lead to severe hemorrhage. In this condition, the junction between the esophagus and the stomach tears, causing severe bleeding and, potentially, death. Primary risk factors include alcoholism and eating disorders. Mallory-Weiss syndrome affects men and women equally but is more prevalent in older adults and older children.

Vomiting is the principal symptom. In women, this syndrome may be associated with severe vomiting related to pregnancy. The extent of the bleeding can range from very minor bleeding, resulting in very little blood loss, to severe bleeding and extreme fluid loss. In extreme cases, patients may experience signs and symptoms of shock, upper abdominal pain, hematemesis, and melena.

Gastroenteritis

Acute infectious gastroenteritis comprises a family of conditions revolving around a central theme of infection combined with diarrhea, nausea, and vomiting. Bacterial and viral organisms can cause this condition. These organisms typically enter the body through contaminated food or water. Patients may begin to experience an upset stomach and diarrhea as soon as several hours or several days after contact with the contaminated matter. The disease can then run its course in 2 to 3 days or continue for several weeks.

There are other types of gastroenteritis that are not infectious but have all of the hallmarks of acute infectious gastroenteritis. Patients with this condition experience nausea, vomiting, and diarrhea from a noninfectious cause, such as medications, toxins from shellfish, or chemotherapy.

Diarrhea is the principal symptom in both types of gastroenteritis. Patients may experience large dumping-type diarrhea or frequent small liquid stools. The diarrhea may contain blood and/or pus, and it may have a foul odor or be odorless. Abdominal cramping is frequently reported. Nausea, vomiting, fever, and anorexia are also present. If the diarrhea continues, dehydration will result. As the volume of fluid loss increases, the likelihood of shock increases.

Diverticulitis

Diverticulitis was first recognized around 1900, when the types of foods people ate began to change dramatically. In particular, the amount of fiber within the US diet plummeted as the amount of processed foods eaten increased.

As the amount of fiber consumed as part of the diet decreases, the consistency of the normal stool becomes more solid. This hard stool requires more intestinal contractions, subsequently increasing pressure within the colon. In this environment, small defects within the colonic wall that would otherwise never pose a problem now fail, resulting in bulges in the wall. These small outcroppings eventually turn into pouches, called diverticula. As feces travel through the colon, some may become trapped within these pouches. When bacteria grow there, they cause localized inflammation and infection.

The main symptom of diverticulitis is abdominal pain, which tends to be localized to the left side of the lower abdomen. Classic signs of infection include fever, malaise, body aches, chills, nausea, and vomiting. Bleeding is rare with this condition. Because of the local infections of these pouches, adhesions may develop, narrowing the diameter of the colon and resulting in constipation and bowel obstruction.

Hemorrhoids

Hemorrhoids are created by swelling and inflammation of the blood vessels surrounding the rectum. They are a common problem, with almost half the population having at least one hemorrhoid by age 50 years. Hemorrhoids may result from conditions that increase pressure on the rectum or irritation of the rectum. Pregnancy, straining at stool, and chronic constipation cause increased pressure. Diarrhea can cause irritation.

Hemorrhoids often result in bright red blood noted during defecation. This bleeding tends to be minimal and is easily controlled. In addition, patients may experience itching and a small mass on the rectum. Typically, this mass is a clot formed in response to the mild bleeding.

Urinary System

Diseases and problems of the renal and urologic system can cause acute abdominal pain. These conditions range from mild (urinary tract infections) to true emergencies (acute renal failure). Although the prehospital care for many urologic diseases is supportive, your ability to recognize the signs and symptoms of the true emergencies is critical to providing your patients with the best chance of a positive outcome.

Urinary tract infections (UTIs) usually develop in the lower urinary tract (urethra and bladder) when normal flora

bacteria, which exist naturally on the skin, or other bacteria enter the urethra and grow. These infections are more common in women owing to the relatively short urethra and the proximity of the urethra to the vagina and rectum. A UTI in the upper urinary tract (ureters and kidneys) occurs most often when a lower UTI goes untreated. Upper UTIs can lead to **pyelonephritis** (inflammation of the kidney and renal pelvis) and abscesses, which eventually reduce kidney function. In severe cases, untreated UTIs can lead to sepsis.

Common symptoms in patients with a lower UTI include painful urination, frequent urges to urinate, and difficulty in urination. The pain usually begins as a **visceral discomfort** but then converts to an extreme burning pain, especially during urination. The pain, which remains localized in the pelvis, is often perceived as bladder pain in women and as prostate pain in men. Sometimes the pain may be referred to the shoulder or neck. In addition, the urine will have a foul odor and may appear cloudy.

Renal System

Kidney stones originate in the renal pelvis and result when an excess of insoluble salts or uric acid crystallizes in the urine Figure 17-5. This excess of salts is typically due to water intake that is insufficient to dissolve the salts. The stones consist of different types of chemicals, depending on the precise imbalance in the urine.

The most common stones—calcium stones—occur more frequently in men than in women and may have a hereditary component. These stones also occur in patients with metabolic disorders such as gout or with hormonal disorders.

Patients who have kidney stones will almost always be in pain. (Many rate kidney stone pain as 11 on a scale of 1 to 10.) The pain usually starts as a vague discomfort in the flank but becomes very intense within 30 to 60 minutes. It may migrate forward and toward the groin as the stone passes through the system.

Some patients will be agitated and restless as they walk and move in an attempt to relieve the pain. Others will attempt to remain motionless and guard the abdomen. Either behavior makes palpation of the abdomen difficult. Vital signs will vary, depending on the severity of pain. The greater the pain, the higher will be the blood pressure and pulse.

If a stone has become lodged in the lower part of the ureter, signs and symptoms of a UTI (frequency and urgency of urination, painful urination, and/or **hematuria**) may be present, but the patient will not have a fever. If a kidney stone is suspected, be sure to obtain a patient history and a family history; both can supply important information.

Figure 17-5 A kidney stone.

Acute renal failure (ARF) is a sudden (possibly during a period of days) decrease in kidney filtration. It is accompanied by an increase of toxins in the blood. Patients with ARF have an overall mortality rate of 50%, but the disease is reversible if diagnosed and treated early.

If the urine output drops to less than 500 mL/d, the condition is called **oliguria**. If urine production stops completely, the condition is called **anuria**. Whenever ARF occurs, the patient may experience generalized edema, acid buildup, and high levels of waste products in the blood. If left untreated, ARF can lead to heart failure, hypertension, and metabolic acidosis.

Chronic renal failure (CRF) is progressive and irreversible inadequate kidney function. This disease develops over months or years. More than half of all cases are caused by systemic diseases, such as diabetes or hypertension. In addition, CRF can be caused by congenital disorders or prolonged pyelonephritis or can be a secondary effect of some infections, such as strep throat.

As the **nephrons** of the kidney become damaged and cease to function, scarring occurs. The tissue begins to shrink and waste away as the scarring progresses, leading to a loss of nephrons and renal mass. As kidney function diminishes, waste products and fluid build up in the blood. Systemic complications can develop, such as hypertension, congestive heart failure, anemia, and electrolyte imbalances.

Patients with CRF exhibit several signs and symptoms, beginning with an altered level of consciousness. In the late stages, seizures and coma are possible. The patients may also present with lethargy, nausea, headaches, cramps, and signs of anemia.

In a case of CRF, the patient's skin will be pale, cool, and moist, and the patient may appear jaundiced because of the buildup of wastes. A powdery accumulation of uric acid, called **uremic frost**, may also be present, especially on the face. The skin may appear bruised, and muscle twitching may be present.

Patients with CRF exhibit edema in the extremities and face because of fluid imbalances; they will also be hypotensive and have tachycardia. Pericarditis and pulmonary edema are also common and should be considered during auscultation of the chest.

Female Reproductive Organs

Gynecologic problems are a common cause of acute abdominal pain. Always consider that a woman with lower abdominal pain and tenderness may have a problem related to her ovaries, fallopian tubes, or uterus.

Pain may also be related to the normal menstrual cycle. A common lower abdominal pain, often confused with appendicitis but fairly short-lived, is called **mittelschmerz**. It is associated with the release of an egg from the ovary, characteristically occurring in the middle of the menstrual cycle between menstrual periods. Mittelschmerz may also be associated with lower abdominal tenderness. Some women experience painful cramps at the time of their menstrual periods. In some, the discomfort may be crippling and the menstrual flow severe.

A common cause of an acute abdomen in women is **pelvic inflammatory disease (PID)**, an infection of the fallopian

tubes and the surrounding tissues of the pelvis. With PID, acute pain and tenderness in the lower part of the abdomen may be intense and accompanied by a high fever.

Between 1% and 2% of all pregnancies are ectopic. The term **ectopic pregnancy** means that a fertilized egg has come to lie in an area outside the uterus, usually in a fallopian tube. A fallopian tube is simply not large enough to support the growth of a fetus and placenta for more than about 6 to 8 weeks. When the tube ruptures, it produces massive internal hemorrhage and acute abdominal pain, generally on one side. In this situation, the acute abdomen may be associated with the onset of hypovolemic shock.

Other Organ Systems

The aorta lies immediately behind the peritoneum on the spinal column. In older people, the wall of the aorta sometimes develops weak areas that swell to form an **aneurysm** (a swelling or enlargement of a part of an artery, resulting from weakening of the arterial wall). The development of an aneurysm, unless acutely dissecting, is rarely associated with symptoms because it occurs slowly, but if the aneurysm ruptures, massive hemorrhage may occur and, with it, the signs of acute peritoneal irritation. The patient may also experience severe back pain because the peritoneum can, at times, be rapidly stripped away from the wall of the main abdominal cavity by the hemorrhage. Pain can also be associated with the pressure of blood on the back itself. In such cases, bleeding usually leads to profound shock.

A **hernia** is a protrusion of an organ or tissue through a hole in the body wall covering its normal site. Virtually any organ or tissue in the body can herniate through its covering membranes in certain circumstances. Hernias can occur as a result of the following:

- A congenital defect, as around the umbilicus
- A surgical wound that has failed to heal properly
- Some natural weakness in an area such as in the groin

Hernias always produce a mass or lump that is usually easy to detect. Extreme obesity may interfere with the ability to detect the mass. At times, the mass will disappear back into the body cavity in which it belongs. In this case, the hernia is said to be *reducible*. If the mass cannot be pushed back within the body, it is said to be *incarcerated*.

Reducible hernias pose little risk; some people live with them for years. When a hernia is incarcerated, however, its contents may become seriously compressed by the surrounding tissue, eventually compromising the blood supply. This situation, called **strangulation**, is a serious medical emergency. Immediate surgery is required to remove any dead tissue and repair the hernia.

The following signs and symptoms indicate a serious hernia problem:

- The existence of the hernia itself
- A previously reducible mass that can no longer be pushed back inside the body
- Pain at the hernia site
- Tenderness when the hernia is palpated
- Red or blue discoloration of the skin over the hernia

YOU are the Provider PART 3

You explain your concerns to the patient, and he agrees to allow you to transport him to the emergency department, even though he says, "All I need is to get my dialysis." As you place the patient on the stretcher and secure him, he begins to become increasingly short of breath and starts to vomit. Your partner provides the patient with 100% oxygen via a nonrebreathing mask and gives him an emesis bag while you attempt to insert an intravenous (IV) line.

Recording Time: 10 Minutes	
Respirations	36 breaths/min, rales bilaterally
Pulse	Strong and regular, 140 beats/min
Skin	Warm, dry, and pink
Blood pressure	226/108 mm Hg
Oxygen saturation (Spo_2)	94% on 100% oxygen
Pupils	Equal and reactive to light

6. Does this patient need IV access?
7. What are your treatment options for this patient?
8. What could be a cause of this patient's shortness of breath?

Patient Assessment

Scene Size-up

Scene Safety

Scene safety is the paramount concern for all types of calls. Follow standard precautions, and use a minimum of gloves and eye protection. Consider donning a gown and covering your shoes with disposable, protective covers because there may be feces and urine on the floor and some patients may have active projectile vomiting. Examples of additional resources for a GI patient include extra gloves, mask, gowns, change of uniform, suction equipment, extra linens, blankets, wash cloths, towels, and adult and child diapers.

As you proceed to the patient, observe the scene for safety threats to yourself and your partner, and determine the number of patients at the scene. If your call involves going to the patient's home and he or she does not come to the door, the patient may have had a syncopal episode (fainted). Request police assistance to help you gain access to the patient. Consider the need for additional or specialized medical resources. Call for additional resources earlier rather than later.

Mechanism of Injury/Nature of Illness

The mechanism of injury or nature of illness, as with most medical complaints, will contribute to your initial impression. Early in the call, the only information available may have come from the dispatch center. Use this information to help choose the amount of equipment you will take into the scene. Acute abdomen can be the result of violence, such as blunt or penetrating trauma, so always be vigilant. Chapter 29, *Abdominal and Genitourinary Injuries*, discusses traumatic injuries in detail. Note that most calls for GI problems will not involve multiple patients. However, a call for assistance at an office building where several people are complaining about GI symptoms should lead you to suspect release of an agent. Biologic or chemical agents, for example, can cause people to have abdominal pain, nausea, vomiting, diarrhea, and other GI signs and symptoms.

Primary Assessment

Form a General Impression

The following is a checklist of common signs and symptoms of irritation or inflammation of the peritoneum that you can use to determine whether a patient has an acute abdomen:

- Local or diffuse abdominal pain and/or tenderness
- A quiet patient who is guarding the abdomen
- Rapid and shallow breathing
- Referred (distant) pain
- Anorexia, nausea, and vomiting
- Hematemesis (bright red or "coffee-ground" emesis)
- Tense, often distended, abdomen
- Sudden constipation or bloody diarrhea
- Dark, tarry stool (melena)
- Painful or frequent urination
- Discolored urine accompanied by a strong odor
- Tachycardia
- Hypotension
- Fever

A patient with urologic or renal problems may exhibit extremes of activity. Is the patient constantly changing positions in an attempt to find a comfortable position ("the kidney stone dance")? Or is the patient sitting very still with the knees drawn to the chest? Is the abdomen distended or rigid? If you find any life-threatening conditions, take immediate steps to correct them.

Special Populations

Use a hands-off assessment to establish a general impression when dealing with pediatric patients.

Remember, it is not critical for you to determine the cause of acute abdomen but to recognize potential causes and provide the correct supportive care.

In forming your general impression, closely examine the location where the patient is found because it can provide hints about what happened. Was the patient walking to the bathroom when he or she passed out? Has the patient been sick for several days and camped out on the couch? Was the patient at work when a sudden bout of pain doubled him or her over?

One aspect of the general impression that is different for GI patients is odor. What is the smell of the room or location of the patient? There are few EMS calls that rise to the level of noxious odor as those that involve upper GI bleeding. The foul-smelling stool that accompanies these calls can make even an experienced AEMT nauseous. When dealing with these strong odors, the key is to hold your ground. The sense of smell is the most acute for about 1 minute, but then more than 50% of the intensity of an odor is lost due to the olfactory nerve becoming tired of sending the same signal. If you are faced with a strong odor on a call, stay in the environment. After 2 to 5 minutes, the smell may be barely noticeable.

Airway and Breathing

Airway patency becomes a pertinent concern with a GI patient. A patient who is vomiting has a greater chance to aspirate. In patients who are awake and responsive, positioning is key to maintaining a patent airway. In patients who have an altered mental status, open the airway using the appropriate maneuvers, and closely inspect it for foreign bodies. Remove or suction any obstructions that are found. While evaluating the airway, notice any unusual odors emanating from the mouth. Patients who have extremely advanced bowel obstructions can have feculent breath, smelling of stool.

GI problems rarely affect breathing directly. If a breathing problem is encountered, it typically stems from a severe complication. Ensure that the airway is clear. In particular, if the patient

has aspirated, it can affect his or her ability to oxygenate and ventilate. Also, as a result of the abdominal pain, the patient may show shallow or inadequate respirations because deep breaths often intensify the pain.

Circulation

The assessment of the circulatory system is essential in understanding how the GI issue is affecting the body. As with all patients, assess skin color, temperature, and condition (that is, moist or dry and turgor). Determine the heart rate. Evaluate the peripheral pulses, and compare them with the central pulses. Remember to assess for major bleeding. The patient's pulse rate and quality, as well as skin condition, may indicate shock. Check the pulses in both arms because a difference in pulse strength may indicate an abdominal aortic aneurysm.

Many GI diseases involve pain and/or hemorrhage. As blood volume begins to drop, the body tries to compensate for this change by releasing catecholamines in the form of epinephrine and norepinephrine. These agents attempt to stabilize blood pressure through vasoconstriction, increased heart rate, and increased force of left ventricular contraction. Pain stimulates similar body responses. Either problem can leave the patient with tachycardia, diminished peripheral pulses, diaphoresis, and pale, cool, clammy skin.

Shock may be caused by hypovolemia or may be the result of a severe infection (sepsis). If evidence of shock (inadequate perfusion) is present, interventions should include high-flow oxygen, keeping the patient warm, and placing the patient in the position dictated by local protocol for shock patients. Ensure that you provide prompt treatment for life threats, and do not delay in providing transport.

Check the patient's blood pressure. To ensure the accuracy of this measurement, obtain a manual pressure before you use one of the automated blood pressure machines.

Orthostatic vital signs will help you determine the extent of bleeding that has occurred. First, have the patient assume a position of comfort, usually seated or lying down. Take an accurate blood pressure and heart rate. Next, have the patient change positions (that is, have the patient stand or sit up). Use caution, because the patient may lose consciousness with a positional change. Wait a minute or two, and then repeat the blood pressure and heart rate measurements. Normally, there should be little change in the blood pressure or heart rate with such a positional change. When a patient has a significant loss of fluid within the vascular space, however, there may be a 10-beat increase in the heart rate and/or a 10–mm Hg drop in blood pressure. A decrease in a patient's blood pressure while sitting up from a lying position or when standing up from a sitting position is called orthostatic hypotension.

When you examine a patient with a GI problem for gross bleeding, it is not unusual to find large amounts of blood. Take note of the amount of blood lost, focusing on being accurate. The emotional effects of seeing large amounts of blood could lead people to overestimate the volume lost. The amount of blood in a toilet is particularly difficult to estimate owing to dilution. To practice volume estimation, measure the amount of water in a glass, and then spill it on a carpet; note the size of the puddle. Spill another volume of water on a hard surface such as a tile floor; again note the size of the puddle.

Transport Decision

When making your transport decision, integrate the information obtained in the primary assessment. If the patient has positive orthostatic vital signs (that is, serial vital signs change with a change in position), thoughtfully consider how the patient will be moved. Can the patient sit up in a stair chair, or will he or she pass out? Is the patient in critical condition so that he or she needs to be moved urgently?

Certain patients should be transported quickly. Patients who have airway, breathing, or circulation problems, including problems with pulse and perfusion, and patients with suspected internal bleeding require rapid transport. Included in the group to package quickly and transport rapidly are patients who have a poor general impression, especially pediatric and geriatric patients. Pale, cool, diaphoretic skin; tachycardia; hypotension; and altered level of consciousness are all signs of significant illness.

Ensure that the ride during transport is as gentle as possible for the patient. Drive smoothly and steadily. Rapid driving can result in increased vehicle movement, potentially aggravating and possibly worsening the patient's abdominal pain.

Words of Wisdom

An acute abdomen is characterized by abdominal pain and tenderness.

History Taking

Investigate Chief Complaint

Pain is often a finding of importance in patients with GI problems because it can indicate trauma, hemorrhage, infection, or obstruction. As with the primary assessment, use OPQRST (**O**nset, **P**rovocation/palliation, **Q**uality, **R**egion/radiation, **S**everity, and **T**iming of pain) to elaborate on the chief complaint. Table 17-2 describes the types of pain that may be experienced with an abdominal problem.

In patients with a urologic problem, the patient history and physical examination will provide the information needed to successfully manage the patient. Determining that the pain actually started in the flank and not in its present location of the lower right quadrant could mean the difference between a correct field diagnosis of a kidney stone and an incorrect field diagnosis of appendicitis. Similarly, determining that the patient has a history of diabetes and hypertension along with signs of uremia can help confirm your impression of CRF.

SAMPLE History

The SAMPLE history will help elicit the relevant current and past medical history. When asking patients about their complaints, you often need to discuss subjects that are not commonly described with everyday language. It is important that you and

Table 17-2 Types of Abdominal Pain

Abdominal Pain Type	Origin	Description	Cause
Visceral discomfort	Hollow organs	Difficult to localize; described as burning, cramping, gnawing, or aching; usually felt superficially	Organ contracts too forcefully or is distended (stretched)
Parietal pain/rebound pain	Peritoneum	Steady, achy pain; easier to localize than visceral; increases with movement	Inflammation of the peritoneum (due to blood and/or infection)
Somatic pain	Peripheral nerve tracts	Well localized pain; usually felt deeply	Irritation or injury to tissue causing activation of peripheral nerve tracts
Referred pain	Peripheral nerve tracts	Pain originating in the abdomen and causing "pain" in distant locations; usually occurs after initial visceral, parietal, or somatic pain	Similar paths for the peripheral nerves of the abdomen and the distant location

your patient have a common frame of reference. For example, one person's "diarrhea" may be another person's "soft stool."

Ask the following questions specific to the signs and symptoms of a GI or urologic emergency:

- **Nausea and vomiting.** Do you feel nauseous? Have you vomited? How many times? In what period of time? Was there red blood? Did it look like coffee grounds?
- **Changes in bowel habits.** Has there been any change in your bowel habits? Have you been constipated? Did the stool look dark and tarry? Have you had diarrhea? Was there any red blood in it?
- **Urination.** Have you been urinating more or less often than usual? Is there pain when you urinate? Is the color of the urine dark or unusual? Is there an unusual odor?
- **Weight loss.** Have you lost weight recently? How many pounds?
- **Belching or flatulence.** Have you experienced belching or flatulence? For how long?
- **Pain.** What does the pain feel like? How long have you had this pain? Is the pain constant or intermittent?
- **Other.** Ask about any other signs or symptoms related to this complaint, such as "Are there any changes you have noted recently that may be contributing to your pain?"
- **Concurrent chest pain.** If the patient reports chest pain, use OPQRST.

Continue with the SAMPLE history. Does the patient have any allergies? What are the patient's current medications? Determine the patient's general state of health through the pertinent past history. Has the patient experienced this kind of abdominal pain before? If the patient is female and of childbearing age, determine the date of her last menstrual period. This will help determine if the patient could possibly be pregnant or raise the suspicion of an ectopic pregnancy. Has the patient had any surgery or recent hospitalizations?

Ask the patient about his or her last oral intake. It is important to determine whether the patient has ingested any substance that could be causing the acute abdomen. If eating causes pain, discomfort, vomiting, or diarrhea, the patient will eat less often or stop eating. Do not give the patient anything by mouth. Food or fluid may only aggravate many of the symptoms. Also, the presence of food in the stomach increases the risk of aspiration, especially if the patient needs emergency surgery.

Finally, determine the events that led up to the patient's present illness. It is important to determine whether this is a medical emergency or related to trauma. Therefore, you need to ask the patient about any recent trauma.

The SAMPLE history may not affect the interventions you perform, but it will help provide needed information for the physician in the emergency department to aid in determining the cause of the acute abdomen.

Secondary Assessment

If the secondary assessment is not performed at the scene, it is performed in the back of the ambulance en route to the hospital. However, there will be situations when you may not have time to perform a secondary assessment if you have to continually manage life threats that were identified during the primary assessment. If the patient is in stable condition and has an isolated complaint, the secondary assessment may be done at the scene.

In some situations, patients are comfortable only when lying in one particular position, which tends to relax muscles adjacent to the inflamed organ and thus lessen the pain. Therefore, the position of the patient may provide you with an important clue. For example, a patient with appendicitis may draw up the right knee. A patient with pancreatitis may lie curled up on one side.

Physical Examinations

A healthy or normal abdomen should be soft and should not be tender. An acute abdomen is characterized by abdominal pain and tenderness. The pain may be sharply localized or diffuse

Words of Wisdom

When you are palpating the abdomen, always begin on the side opposite from the site of pain.

Words of Wisdom

An acute abdomen may indicate peritonitis, in which generalized signs can make it challenging to determine exactly where the problem lies, even for physicians. Knowing abdominal assessment steps well and recording your findings in detail are important early components of the process that leads to diagnosis.

(widespread) and will vary in severity. Localized pain gives a clue to the problem organ or area causing it. Tenderness may be minimal or so great that the patient will not allow you to touch the abdomen. In some cases, the muscles of the abdominal wall become rigid in an involuntary effort to protect the abdomen from further irritation. This boardlike muscle spasm, called **guarding**, can be seen with major problems such as a perforated peptic ulcer or pancreatitis.

Remember, a patient with peritonitis usually has abdominal pain, even when lying quietly. The patient can be quiet but have difficulty breathing and may take rapid, shallow breaths because of the pain. Usually, you will find tenderness on palpation of the abdomen or when the patient moves. The degree of pain and tenderness is usually related directly to the severity of peritoneal inflammation.

Use the following steps to assess the abdomen:

1. Explain to the patient what you are going to do in terms of assessing the abdomen.
2. Place the patient in a supine position with the legs drawn up and flexed at the knees to relax the abdominal muscles, unless trauma is involved, in which case the patient will remain supine and stabilized. Determine whether the patient is restless or quiet and whether motion causes pain.
3. Expose the abdomen and visually assess it. Does the abdomen appear distended (enlarged)? Do you see any pulsating masses (indicates an aortic aneurysm)? Is there any bruising of the abdominal wall?
4. Ask the patient where the pain is most intense. You will need to palpate in a clockwise direction beginning with the quadrant *after* the one the patient indicates is tender or painful; end with the quadrant the patient indicates is tender or painful. If the most painful area is palpated first, the patient may guard against further examination, making your assessment more difficult and less reliable.
5. Remember to be very gentle when palpating the abdomen. Occasionally, an organ within the abdomen will be enlarged and very fragile and rough palpation could cause further damage. If you see a pulsating mass, do not touch it; doing so could cause the aorta to rupture.
6. Palpate the four quadrants of the abdomen gently to determine whether each quadrant is tense (guarded) or soft when palpated Figure 17-6.
7. Note whether the pain is localized to a particular quadrant or diffuse (widespread).

Figure 17-6 Check tenderness or rigidity by gently palpating the abdomen.

8. Palpate and wait for the patient to respond, looking for a facial grimace or a verbal "ouch." Do not ask the patient, "Does it hurt here?" as you palpate.
9. Determine whether the patient exhibits rebound tenderness (may be tender when direct pressure is applied, but very painful when pressure is released). This is an indicator of peritonitis. When you are palpating for rebound tenderness, you should use extreme caution.
10. Determine whether the patient can relax the abdominal wall on command.
11. Guarding and rigidity may be detected. Guarding is tensing of the abdominal wall muscles.

Vital Signs

Findings of a high respiratory rate with a normal pulse rate and blood pressure may indicate the patient is unable to ventilate properly because deep breathing causes pain. A high respiratory rate and pulse rate with signs of shock, such as pallor and diaphoresis (profuse sweating), may indicate septic or hypovolemic shock.

Monitoring Devices

Use pulse oximetry and noninvasive blood pressure devices when these monitoring devices are available. It is recommended that you always assess the patient's first blood pressure manually with a sphygmomanometer (blood pressure cuff) and stethoscope.

Reassessment

Because it is often difficult to determine the cause of an acute abdominal emergency, it is extremely important to reassess your patient frequently to determine whether the patient's condition has changed. Remember, the condition of a patient with an acute abdomen can change rapidly from stable to unstable.

Vital signs must be reassessed and compared with the patient's baseline vital signs. If anything changes en route to the hospital, manage the problem and document any changes or additional treatment.

Reassess the patient and then ask and answer the following questions (as appropriate):

- Has the patient's level of consciousness changed?
- Has the patient become more anxious?
- Have the skin signs begun to change?
- Has the pain gotten better or worse?
- Has bleeding become worse or better?
- Is current treatment improving the patient's condition?
- Has an already identified problem gotten better?
- Has an already identified problem gotten worse?
- What is the nature of any newly identified problems?

Interventions

The goal of reassessment is to monitor your patient for changes en route to the hospital. Routine monitoring should include heart rate, blood pressure, respiratory rate, and pulse oximetry. If the patient has GI bleeding, continue to assess for signs of shock. Equally important, you should determine what effect your treatment is having. Before giving additional fluid boluses, listen to the patient's lung sounds to determine whether acute pulmonary edema is developing. If the patient wants to lie on his or her side, try to make that possible. Be sure that you can observe and maintain the patient's airway because vomiting is common.

Remember to call for paramedic backup if the patient's condition is unstable. If transport time is extended and rapid transport is needed, consider air medical transport if available.

Patients with urologic emergencies, especially patients with signs and symptoms of renal failure, need reassessment. The electrolyte imbalances caused by the buildup of toxins can cause major, rapid changes in the functioning of the body's organs. Serial vital signs should be obtained and documented on the prehospital care report, at least every 5 minutes in cases of possible renal failure. Note any trends in the vital signs and level of consciousness because they can be indicators of disease progression. Patients with possible urologic disease should not be given anything by mouth because this may induce vomiting or complicate surgical procedures.

If the patient's condition undergoes a sudden, dramatic change, repeat the rapid and detailed assessments as if this were a new patient. This will give you the best chance of modifying your care to adequately manage this new development.

Special Populations

An older patient is just as susceptible as a younger adult to an acute abdomen. However, the signs and symptoms might be different. Because of altered pain sensation, a geriatric patient with an acute abdomen may not feel any discomfort or may describe the discomfort as mild, even in severe conditions. Chest pain may also be misinterpreted as abdominal pain.

Because an older patient has decreased body temperature regulation and response, conditions such as an acute abdomen, including peritonitis, may not present with fever. However, if fever is present, it can be minimal. Geriatric patients may not exhibit rigidity or guarding.

Owing to the older patient's response to an acute abdomen, a delay in identifying the condition and seeking medical attention may occur, putting the patient at risk for complications. You should ask about the patient's medical history, especially the history of recent illness, to identify a potential illness. Ask about abdominal discomfort, when the patient last had a bowel movement, whether she or he was constipated or had diarrhea, when the patient last ate, and whether he or she vomited. Asking these questions can help to rule out appendicitis, bowel obstruction, and ruptured bowel, but remember that history taking should not delay transport.

Special Populations

Abdominal injuries are the second leading cause of serious trauma in children (after head injuries). In pediatric patients, the intra-abdominal organs are relatively large, making them vulnerable to blunt trauma. For example, the abdomen in an infant or toddler often seems protuberant because of the large liver. The liver and spleen extend below the rib cage in young children and, therefore, do not have as much bony protection as they do in an adult. These organs have a rich blood supply, so injuries to them can result in large blood losses. The kidneys are also more vulnerable to injury in children because they are more mobile and less well supported than in adults. Finally, the duodenum and pancreas are likely to be damaged in handlebar injuries.

Owing to a smaller fluid volume, children dehydrate quickly from vomiting. Abdominal pain in children often is the result of constipation; however, appendicitis is also another frequent cause of abdominal pain. Remember to assess for GI bleeding as well. Management of pediatric patients with abdominal complaints is the same as that for adults. Use a hands-off approach to get a general impression of the patient before touching in order to adequately assess any signs of distress.

Communication and Documentation

Communicate with the receiving hospital early to allow hospital staff to recruit the resources necessary to treat your patient on arrival. Carefully document your findings in your patient care report, and relay all relevant information to the receiving physician or nurse. This information should include updated vital signs, changes in the patient's level of consciousness, and any new or worsening complaints.

Emergency Medical Care

The signs and symptoms of an acute abdomen signal a serious medical or surgical emergency. Ensure that you provide prompt,

gentle transport for the patient; do not delay transport. Carry out the following steps as quickly as possible before transport.

1. Do not attempt to diagnose the cause of the acute abdomen.
2. Clear and maintain the airway.
3. Anticipate vomiting. Place the patient in the recovery position or position of comfort. Most patients feel better in a lateral recumbent position with the knees pulled in toward the chest.
4. Administer 100% supplemental oxygen, and be prepared to assist ventilation if the patient has a reduced tidal volume (shallow breathing).
5. Do not give the patient anything by mouth. Food or fluid will only aggravate many of the symptoms because intestinal paralysis will prevent it from passing out of the stomach. In addition, the stomach will have to be emptied before surgery if it is required.
6. Document all pertinent information. Use OPQRST. Note the presence of abdominal tenderness, distention, or guarding.
7. Anticipate the development of hypovolemic shock. Monitor blood pressure. Treat the patient for shock when it is evident. Place the patient in the position dictated by local protocol for shock patients.
8. Establish IV access, and give a 20-mL/kg bolus of an isotonic crystalloid if the patient presents with signs of hypovolemia. Otherwise, maintain fluid at a keep-vein-open rate. If kidney function is present, administer a bolus of fluid to the patient with a UTI and to a patient with a kidney stone. The fluid will rehydrate the patient, and an increased volume of urine will help flush any infection from the system. For a patient with renal calculi, the increased urine formation will help move the stone through the system.
9. Make the patient as comfortable as possible for transport. Place in a position of comfort, usually with the legs bent. Patients are more comfortable with their legs pulled up toward the abdomen because this position takes the pressure off the abdominal wall and diminishes pain. Conserve body heat with blankets, as needed. Provide gentle but rapid transport and constant psychological support.
10. Monitor vital signs; these may change quickly.
11. Consider calling for additional paramedic backup if the patient's condition shows any signs of instability.

Remember that with PID, acute pain and tenderness in the lower part of the abdomen may be intense and accompanied by a high fever. If you suspect PID, promptly transport the patient to the emergency department for treatment.

The combination of acute abdominal pain and hypovolemic shock mandates immediate transport to the hospital. Consider an ectopic pregnancy in any female of childbearing age who presents with acute abdominal distress, especially in the presence of hypotension.

Pneumonia, especially in the lower parts of the lung, may cause both ileus and abdominal pain. In this case, the problem lies in an adjacent body cavity, but the intense inflammatory response can affect the abdomen. Treat and transport this patient as you would any patient with abdominal pain.

The association of acute abdominal signs and symptoms with shock could also signify an aneurysm and requires prompt transportation. Because this is a fragile situation with a large, leaking artery, avoid unnecessary and vigorous palpation of the abdomen. Remember to handle the patient gently during transport. Avoid fluid only if the patient is hypotensive *and* symptomatic. Increasing blood pressure could cause rupture of an aneurysm.

YOU are the Provider — PART 4

Venous access is difficult in this patient, but you are finally able to place a 22-gauge IV needle in the patient's right hand. You radio to medical control, advising of the patient's condition and are informed to withhold any IV fluid in this patient. You advise medical control that you have an approximately 7-minute estimated time of arrival.

Recording Time: 15 Minutes	
Respirations	36 breaths/min; rales bilaterally
Pulse	Strong and regular; 142 beats/min
Skin	Warm, dry, and pink
Blood pressure	210/102 mm Hg
Spo_2	95% on 100% oxygen

You continue monitoring the patient en route to the hospital. On arrival, you give your report to the emergency department nurse and complete your patient care report while your partner readies the ambulance for your next call.

9. Why did the medical control physician order that no IV fluid be administered to this patient?

Any signs and symptoms of a hernia are cause for prompt transport to the emergency department.

Finally, ARF and CRF can lead to life-threatening emergencies. Support of the ABCs is imperative. Be alert for the possibility of hypotension or pulmonary edema. Because of possible toxic buildup and electrolyte problems, medications to regulate acidosis and electrolyte imbalance and fluids for volume regulation may be required. Emergency transport and supportive care are often preferred over aggressive management in these patients.

Renal Dialysis

The only definitive treatment in cases of CRF is **renal dialysis**. This is a technique for "filtering" toxic wastes from the blood, removing excess fluid, and restoring the normal balance of electrolytes. Renal dialysis and problems associated with it may require prehospital interventions.

There are two types of dialysis—peritoneal dialysis and hemodialysis. In peritoneal dialysis, large amounts of specially formulated dialysis fluid are infused into (and back out of) the abdominal cavity. This fluid stays in the cavity for 1 to 2 hours, allowing equilibrium to occur. Peritoneal dialysis is very effective but carries a high risk of peritonitis; consequently, aseptic technique is essential. With proper training, however, peritoneal dialysis can be performed in the home.

In hemodialysis, the patient's blood circulates through a dialysis machine that functions in much the same way (albeit not as elegantly) as the normal kidneys. Most patients undergoing long-term hemodialysis have some sort of shunt, that is, a surgically created connection between a vein and an artery that is usually located in the forearm or upper arm. The patient is connected to the dialysis machine through this shunt, which allows blood to flow from the body into the dialysis machine and back to the body.

The only time you will most likely see a dialysis machine is if your service transports patients to and from dialysis centers. If there is a dialysis machine in a private residence, treatments will most likely be performed by a trained dialysis technician or possibly by the patient or family members.

Patients requiring long-term dialysis usually go "on the machine" every 2 or 3 days for a period of 3 to 5 hours. Many receive dialysis in the hospital or in community dialysis facilities, but a significant number have home dialysis units. Patients undergoing dialysis at home usually have extensive training in the procedures, and often someone else in the home has also been trained. If a problem with the machine occurs, the patient may know a lot more about it than you do, so always ask what the patient has done before your arrival!

There are many adverse effects and complications that can occur with dialysis. These are listed in Table 17-3.

A sudden drop in blood pressure is not uncommon during or immediately after dialysis, but it can lead to cardiac arrest if not promptly detected and treated. The patient may feel lightheaded or become confused, and often he or she yawns more than usual. Because dialysis alters the blood's chemistry, an electrolyte imbalance may develop. For this reason, you should consider the possibility of cardiac arrhythmias and the need for advanced life support backup. Shock secondary to bleeding is also possible from any number of causes. Patients with CRF, for example, are very prone to duodenal ulcers; bleeding from those ulcers is not unusual. Bleeding may also occur from the dialysis cannula.

Table 17-3 Complications and Adverse Effects of Dialysis

Hypotension
Muscle cramps
Nausea/vomiting
Hemorrhage, especially from the access site
Infection at the access site
Altered mentation, loss of consciousness
Air embolism
Electrolyte imbalance
Myocardial ischemia

Words of Wisdom

When assessing the blood pressure of a patient receiving dialysis, use the arm that does not have the shunt!

Also, if a patient misses a dialysis treatment, he or she may experience weakness, pulmonary edema, or excesses of electrolytes. If your call involves a patient receiving dialysis, start with the ABCs: assess and manage the airway, breathing, and circulation. Provide high-flow oxygen, and manage any bleeding from the access site. Position the patient sitting up in cases of pulmonary edema or supine if the patient is in shock and transport promptly.

When you find a shunt leaking during the dialysis cycle, see if you can tighten the connection. If it has become disconnected at the vein, clamp the cannula and disconnect the patient from the machine. In a suicide attempt, the patient may open up the cannula and allow himself or herself to exsanguinate. Keep in mind that patients receiving dialysis have often endured numerous medical interventions to simply survive. If you encounter this situation, immediately clamp off the cannula and apply direct pressure.

Many dialysis patients also have urinary catheters. The catheter is placed in the bladder so the urine can run into a bag. These catheters can often be a source of infection. The patient may report fever and general malaise (illness) in addition to any symptoms specific to kidney failure. Leave the device in place. Treat any signs and symptoms and transport the patient for further evaluation.

During transport, unless there is a life-threatening event, make all attempts to deliver the patient to a hospital with dialysis capability.

YOU are the Provider SUMMARY

1. What are some potential causes of altered mental status in a patient receiving dialysis?

Common causes of altered mental status in a patient receiving dialysis are the same causes of altered mental status in patients who do not receive dialysis. However, one of the common causes of altered mental status in a patient receiving dialysis, especially when the patient has missed a dialysis appointment or has gone longer than normal in between treatments, is an electrolyte imbalance that is the result of the buildup of toxins in the bloodstream.

2. On the basis of the information provided, what type of dialysis does this patient receive?

The two types of dialysis are peritoneal dialysis and hemodialysis. In peritoneal dialysis, large amounts of specially formulated dialysis fluid are infused into (and back out of) the abdominal cavity. With proper training, peritoneal dialysis is often performed in the home.

In hemodialysis, the patient's blood circulates through a dialysis machine that functions in much the same way as the normal kidneys. The patient is connected to the dialysis machine through a shunt, which allows blood to flow from the body into the dialysis machine and back to the body. Because of the large machines required for hemodialysis, this type of dialysis is almost exclusively found in dialysis centers. The patient or family will be able to tell you what type of dialysis the patient receives. Hemodialysis is the type of dialysis this patient is receiving.

3. What is anuria?

Anuria is the complete cessation of urine production. If the urine output drops to less than 500 mL/d, the condition is called oliguria.

4. The patient seems to be answering all questions appropriately, but more slowly than what is reported to be normal. Should you approach the dialysis staff and request that he undergo dialysis in an attempt to help improve his mental status?

This would be a possibility, however, it would probably not be recommended. Dialysis needs to be performed on a routine basis, and missing or delaying a treatment may have a major impact on the patient's well-being. The patient's slowness to respond to questions, coupled with the patient's statement that this is not normal for him, warrant a trip to the emergency department.

5. You note a "bump" in his left forearm. What is this bump and why is it important to AEMTs?

Some patients receiving dialysis have a shunt, which is a surgically created access port usually located in the forearm or upper arm. It is important for AEMTs to recognize the presence and location of this shunt because the arm without the shunt should be used, if at all possible, for blood pressure measurements and IV lines.

6. Does this patient need IV access?

This patient could benefit from IV access for multiple reasons. First, the patient has an altered mental status and shortness of breath. Those two conditions alone are reason enough to insert an IV line in this patient. Because this patient has a chronic medical condition, he may have poor venous access. If this is the case, it would be prudent to establish IV access in this patient while he is still in somewhat stable condition, before he starts to decompensate, when it will be difficult to establish access.

7. What are your treatment options for this patient?

There are multiple options for treatment in this patient, and some are better than others. This patient presents with rales bilaterally. Call for paramedic backup for administration of medications or to administer continuous positive airway pressure that may be beneficial in clearing up the rales also. Regardless of the treatment path you decide to take, 100% oxygen is indicated, but careful attention must be given to the patient in case of more emesis.

8. What could be a cause of this patient's shortness of breath?

Because there is a longer time frame between dialysis treatments over the weekend (2 days) as opposed to the more frequent treatments during the week, this patient's shortness of breath is probably caused by an accumulation of fluid inside of the body, exacerbated by the possibility of increased salt and sugar intake during the birthday party.

9. Why did the medical control physician order that no IV fluid be administered to this patient?

Owing to this patient's anuric state, hypertension, and unknown time until his next dialysis treatment, the medical control physician most likely thought that the patient was already fluid overloaded.

YOU are the Provider

SUMMARY, continued

EMS Patient Care Report (PCR)

Date: 9-3-13	**Incident No.:** 20090154657	**Nature of Call:** Unknown medical			**Location:** 512 E Main St
Dispatched: 0800	**En Route:** 0801	**At Scene:** 0809	**Transport:** 0832	**At Hospital:** 0839	**In Service:** 0903

Patient Information

Age: 52 **Sex:** M **Weight (in kg [lb]):** 82 kg (182.2 lb)	**Allergies:** Penicillin **Medications:** Insulin **Past Medical History:** End-stage renal failure, diabetes mellitus **Chief Complaint:** Altered mental status, SOB

Vital Signs

Time: 0819	**BP:** 226/108	**Pulse:** 140	**Respirations:** 36, rales	**Spo_2:** 94% on 15 L/min
Time: 0824	**BP:** 210/102	**Pulse:** 142	**Respirations:** 36, rales	**Spo_2:** 95% on 15 L/min
Time:	**BP:**	**Pulse:**	**Respirations:**	**Spo_2:**

EMS Treatment (circle all that apply)

Oxygen @ 15 **L/min via (circle one):** **NC** **(NRM)** **Bag-Mask Device**		**Assisted Ventilation**	**Airway Adjunct**	**CPR**
Defibrillation	**Bleeding Control**	**Bandaging**	**Splinting**	**Other**

Narrative

EMS called to above location for man who needed to go to the emergency department. On arrival, met by dialysis clinic staff who stated patient regularly receives dialysis on M, W, and F. Today patient came in for regularly scheduled treatment, but staff found him slow to answer questions and mildly short of breath. Patient is conscious, alert, and oriented x 3 but is slow to answer questions. Both patient and staff state this is abnormal for him. Patient has mild shortness of breath, with rales bilaterally. Assisted patient onto litter, secured x 3. As we were preparing patient for transport, patient vomited x 1. Gave patient oxygen, 15 L/min, via nonrebreathing mask. Transport nonemergency basis to Kittson Memorial Hospital. 22-gauge IV established to right hand on third attempt, normal saline infusing TKO. Patient remains moderately short of breath. Report called to emergency department with condition and ETA. On arrival, care and report given to nurse without incident. **End of report**

Prep Kit

Ready for Review

- The gastrointestinal (GI) system is also known as the digestive tract. It consists of the mouth and many organs and is divided into four quadrants.
- The main function of the GI system is to absorb resources for use by other cells in the body.
- The digestive process begins with saliva to lubricate food. Once food is swallowed, it moves through the esophagus via rhythmic contractions called peristalsis.
- Veins intertwine around the esophagus and join together to form the portal vein, which transports blood from the GI tract to the liver. If blood flow through the liver slows, blood may back up throughout the entire GI system.
- The stomach can stretch many times beyond its normal size. The stomach secretes hydrochloric acid to help break down food. The material then moves into the duodenum, the first part of the small intestine.
- The duodenum is where the active stage of absorption begins. The pancreas and liver secrete enzymes and bile, respectively, which ultimately assist digestion in the small intestine.
- The liver also converts glycogen into glucose, the essential and only fuel source for brain cells. The liver also detoxifies drugs, completes the breakdown of dead red and white blood cells, and stores vitamins and minerals.
- The small intestine is divided into the duodenum (mentioned earlier), the jejunum, and the ileum. The small intestine produces enzymes that turn digested food into substances that can be moved into the bloodstream.
- The large intestine, or colon, is the next step in the digestive process. The primary role of the large intestine is to complete the reabsorption of water. This process helps solidify the digested material into a formed stool. The colon is also the site of digestion by bacteria, which helps to finish the breakdown of chyme.
- The genitourinary system includes the kidneys, urinary bladder, ureters, urethra, male and female reproductive organs, and specific structures within the kidneys.
- Many abdominal organs are covered by a membrane called the peritoneum. Any condition that allows pus, blood, feces, urine, gastric juice, intestinal contents, bile, pancreatic juice, amniotic fluid, or other foreign material to lie within or adjacent to this membrane in the abdominal cavity can cause peritonitis and, thus, an acute abdomen.
- Nearly every kind of abdominal problem can cause an acute abdomen.
- Acute abdomen can be caused by GI or renal sources, diverticulitis, cholecystitis, appendicitis, perforated gastric ulcer, aortic aneurysm, hernia, cystitis, kidney infection, kidney stone, pancreatitis, urinary tract infection, and, in women, ectopic pregnancy and pelvic inflammation.
- Peritonitis typically causes ileus—paralysis of peristalsis—and ultimately abdominal distention. In this situation, nothing that is eaten can pass normally out of the stomach or through the bowel. The only way the stomach can empty itself, then, is by emesis, or vomiting. Therefore, peritonitis is almost always associated with nausea and vomiting.
- Peritonitis can lead to hypovolemic shock. When peritonitis is accompanied by hemorrhage, the signs of shock are much more apparent. Fever may or may not be present with peritonitis, depending on the cause.
- Symptoms of urinary tract infection include painful urination, frequent urges to urinate, difficulty urinating, and possibly referred pain to the shoulder or neck. The urine may have a foul odor and be cloudy.
- Kidney stones result when an excess of insoluble salts or uric acid crystallizes in the urine. Symptoms include severe pain in the flank that may migrate forward to the groin. The pain may cause an increased blood pressure and pulse rate.
- Acute renal failure is a sudden decrease in kidney filtration, resulting in a release of toxins into the blood. Chronic renal failure is progressive and irreversible inadequate kidney function.
- Gynecologic problems are a common cause of acute abdominal pain. Always consider that a woman with lower abdominal pain and tenderness may have a problem related to her ovaries, fallopian tubes, or uterus.

- Abdominal pain may stem from other organ systems. If an abdominal aortic aneurysm ruptures, massive hemorrhage may occur and signs of acute peritoneal irritation will present. A hernia (protrusion of an organ or tissue through a hole in the body) may eventually compromise blood supply, causing a serious emergency.
- Transport patients with an acute abdomen promptly but gently.
- Remember that GI complaints often involve body substances. Take extra gloves, masks, gowns, and other protective equipment and supplies with you to the scene.
- In a patient with an acute abdomen, the first priorities are to assess airway, breathing, and circulation and then apply oxygen. Assist ventilation if the patient is breathing inadequately.
- When taking the patient's history, ask when the symptoms began, how they have changed, the exact location of the pain, and how it feels. Also ask if there has been vomiting or diarrhea.
- Remember airway concerns with a patient who is vomiting. Open the airway using the appropriate maneuvers, and closely inspect it for foreign bodies. Remove or suction any obstructions that are found.
- Abnormal abdominal assessment findings include excessive nausea/vomiting or hematemesis, changes in bowel habits/stool, painful or frequent urination that is discolored or has a strong odor, weight loss, belching/flatulence, concurrent chest pain, and abdominal pain, tenderness, guarding, or distention.
- Pain is commonly located directly over the inflamed area of the peritoneum, or it may be referred to another part of the body. Referred pain occurs because of the connections between the two different nervous systems supplying the parietal peritoneum and the visceral peritoneum.
- A healthy or normal abdomen should be soft and not tender. The pain in an acute abdomen may be sharply localized or diffuse and will vary in severity. Localized pain gives a clue to the problem organ or area causing it. The abdominal muscles may have become rigid, called guarding.
- Take vital signs, and gently palpate the abdomen. If the abdomen is tender, the patient needs to be transported urgently.
- Note the degree of abdominal distention; this can also provide clues to the severity of the patient's condition.
- Patients with acute abdomen may be comfortable only when lying in one particular position, for example curled up on one side or with the right knee drawn up. Note the patient's position.
- Do not give the patient with an acute abdomen anything by mouth.
- Establish IV access. Consult with medical control to administer pain medication.
- Renal dialysis is a procedure for removing toxic wastes and excess fluids from the blood. Patients receiving dialysis usually have a shunt through which they are connected to the dialysis machine. They are vulnerable to problems such as hypotension, potassium imbalance, disequilibrium syndrome, and air embolism.

Vital Vocabulary

acute abdomen A condition of sudden onset of pain within the abdomen, usually indicating peritonitis; demands immediate medical or surgical treatment.

acute renal failure (ARF) A sudden decrease in filtration through the glomeruli of the kidneys.

aneurysm A swelling or enlargement of a part of an artery, resulting from weakening of the arterial wall.

anuria A complete stop in the production of urine.

appendicitis Inflammation of the appendix.

cholecystitis Inflammation of the gallbladder.

chronic renal failure (CRF) Progressive and irreversible inadequate kidney function as a result of permanent loss of nephrons.

colic Acute, intermittent, cramping abdominal pain.

diverticulitis Inflammation of a diverticulum, usually in the colon, creating abdominal discomfort; a diverticulum is an abnormal pouch or sac.

ectopic pregnancy A pregnancy in which the ovum implants somewhere other than the uterine endometrium.

emesis Vomiting.

esophageal varices A condition in which the amount of pressure within the blood vessels surrounding the esophagus increases, causing blood to back up into the portal vessels and ultimately causing the capillary network of the esophagus to leak.

esophagitis Inflammation of the lining of the esophagus.

gastroenteritis A family of conditions resulting in diarrhea, nausea, and vomiting; some have infectious causes.

guarding Involuntary muscle contractions (spasm) of the abdominal wall; an effort to protect the inflamed abdomen.

hematuria The presence of blood in the urine.

hernia The protrusion of a loop of an organ or tissue through an abnormal body opening.

hilus When used in the context of the kidneys, a cleft where the ureters, renal blood vessels, lymphatic vessels, and nerves enter and leave the kidney.

ileus Paralysis of the bowel, arising from any one of several causes; stops contractions that move material through the intestine.

kidneys Solid, bean-shaped organs located in the retroperitoneal space that filter blood and excrete body wastes in the form of urine.

kidney stones Solid crystalline masses formed in the kidney, resulting from an excess of insoluble salts or uric acid crystallizing in the urine; may become trapped anywhere along the urinary tract.

Mallory-Weiss syndrome A condition in which the junction between the esophagus and the stomach tears, causing severe bleeding and, potentially, death.

mittelschmerz Lower abdominal pain that is related to the normal menstrual cycle, associated with the release of an egg from the ovary, occurring in the middle of the menstrual cycle between menstrual periods.

nephrons The structural and functional units of the kidney that form urine; composed of the glomerulus, the glomerular (Bowman) capsule, the proximal convoluted tubule, loop of Henle, and the distal convoluted tubule.

oliguria A decrease in urine output to the extent that total urine output drops to less than 500 mL/d.

orthostatic hypotension A drop in systolic blood pressure when moving from a lying or sitting to a standing position.

orthostatic vital signs Assessing vital signs in two different patient positions to determine the degree of hypotension; also known as the tilt test.

pancreatitis Inflammation of the pancreas.

pelvic inflammatory disease (PID) An infection of the female upper organs of reproduction, specifically the uterus, ovaries, and fallopian tubes.

peristalsis Waves of alternate circular contraction and relaxation of the intestines or other tubular structure to propel the contents forward.

peritoneum The membrane lining the abdominal cavity (parietal peritoneum) and covering the abdominal organs (visceral peritoneum).

Prep Kit, continued

peritonitis Inflammation of the peritoneum.

pyelonephritis Inflammation of the kidney and renal pelvis.

rebound tenderness Parietal pain that occurs when pressure is removed rather than applied; suggestive of a serious and potentially life-threatening condition.

referred pain The pain felt in an area of the body other than the area where the cause of pain is located.

renal dialysis A technique for "filtering" the blood of its toxic wastes, removing excess fluids, and restoring the normal balance of electrolytes.

renal fascia Dense, fibrous connective tissue that anchors the kidney to the abdominal wall.

strangulation Complete obstruction of blood circulation in a given organ as a result of compression or entrapment, an emergency situation causing death of tissue.

ulcers Abrasions of the stomach or small intestine.

uremic frost A powdery buildup of uric acid, especially on the face.

ureters A pair of thick-walled, hollow tubes that transport urine from the kidneys to the bladder.

urethra A hollow, tubular structure that drains urine from the bladder, passing it outside of the body.

urinary bladder A hollow, muscular sac in the midline of the lower abdominal area that stores urine until it is released from the body.

urinary tract infections (UTIs) Infections, usually of the lower urinary tract (urethra and bladder), which occur when normal flora bacteria or other bacteria enter the urethra and grow.

urine Liquid waste products filtered out of the body by the urinary system.

visceral discomfort Crampy, aching pain deep within the body, the source of which is usually difficult to pinpoint; common with urologic problems.

Assessment in Action

You are dispatched to a well-kept, upscale residential home for a 46-year-old woman who is complaining of severe abdominal pain. On arrival you are met by the patient's husband who directs you to the back bedroom where you find the patient lying in bed, in the fetal position, moaning in pain.

The patient states that she has 10/10 severe abdominal pain, which started in the right upper quadrant. Nothing she does makes the pain any better or worse.

1. The medical term for inflammation of the gallbladder is:
   - **A.** acute cholecystitis
   - **B.** acute pertussis
   - **C.** acute pyelonephritis
   - **D.** acute bronchiolitis

2. Referred pain from acute cholecystitis is typically found in the:
   - **A.** jaw
   - **B.** groin
   - **C.** left shoulder
   - **D.** right shoulder

3. Which of the following types of pain is described as difficult to localize and as burning, cramping, gnawing, or aching and is usually felt superficially?
   - **A.** Visceral
   - **B.** Parietal
   - **C.** Somatic
   - **D.** Referred

4. Which of the following is the medical term for kidney stones?
   - **A.** Renal cortex
   - **B.** Renal calculi
   - **C.** Renal fascia
   - **D.** Renal hilus

5. Patients with urinary tract infections (UTIs) will typically present with a triad of symptoms. Which one of the following is *not* one of those symptoms?
   - **A.** Painful urination
   - **B.** Increased frequency of urination
   - **C.** Decreased frequency of urination
   - **D.** Difficulty in urination

6. When palpating the four quadrants of the abdomen, you should always start with the quadrant in which the patient complains of pain.
   - **A.** True
   - **B.** False

Additional Questions

7. Which membrane lines the walls of the abdominal cavity?
   - **A.** Visceral peritoneum
   - **B.** Parietal peritoneum
   - **C.** Potential peritoneum
   - **D.** None of the above

8. Where is pain commonly felt by a patient experiencing a ruptured or dissecting abdominal aortic aneurysm?
   - **A.** Right upper quadrant
   - **B.** Right lower quadrant
   - **C.** Left upper quadrant
   - **D.** Left lower quadrant