Hot Topics in the Urgent Care

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SCPMG

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Hot topics in the Urgent Care

- Community Acquired Pneumonia
- Abdominal Pain
- HEART Score

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Community Acquired Pneumonia

Community Acquired Pneumonia

Learning Objectives
- Summarize the clinical criteria and appropriate testing for diagnosing community-acquired pneumonia (CAP).
- Describe the key decisions in CAP treatment.
- Describe diagnostic clues for a likely pulmonary fungal infection.
- Summarize the first-line treatment options for common pulmonary fungal pathogens.

Key Practice Recommendations

- Use an illness severity score to determine whether patients with community-acquired pneumonia should be treated in the inpatient rather than outpatient setting.
- Use empiric treatment with a respiratory fluoroquinolone or a beta-lactam and macrolide antibiotic combination in non-hospitalized noncritically ill patients as first-line community-acquired pneumonia treatment.

Community-Acquired Pneumonia

Case 1. Dan is a 60-year-old man who comes to the urgent care clinic with a 1-week history of fever, chills, and sputum production. He has a medical history of well-controlled diabetes, hypertension, and dyslipidemia. He takes metformin, an angiotensin-converting enzyme inhibitor, and a statin. He denies antibiotic use in the past 6 months and does not smoke, drink, or use alcohol. Oxygen saturation on room air is 93%, and blood pressure is 110/70 mm Hg. He is tachypneic and febrile, with rhonchi and decreased breath sounds in the right lower lung.

Question

A 57-year-old patient comes to your office with fever, chills, pleuritic chest pain, and a cough. Which one of the following is most useful in ruling in pneumonia in such a patient?

A. Asymmetric breath sounds or egophony.
B. Crackles.
C. Heart rate of 90 beats/min.
D. Wheezing.
E. All of the above.

Answer

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B. Crackles.
C. Heart rate of 90 beats/min.
D. Wheezing.
E. All of the above.

The correct answer is A. Signs and symptoms that support a diagnosis of pneumonia include asymmetric breath sounds, egophony, and increased tactile fremitus.

Community-Acquired Pneumonia Epidemiology

- Pneumonia and influenza represent the ninth leading cause of mortality in the United States, with 50,097 deaths in 2010 and an estimated crude mortality rate of 16.2 per 100,000 individuals

- As of 2010, the annual economic burden of pneumonia in the United States was estimated at greater than $17 billion.

- Worldwide, pneumonia is the leading cause of mortality among children, responsible for 1.1 million deaths annually among children younger than 5 years.

Community-Acquired Pneumonia
Risk Factors

- Factors that increase community-acquired pneumonia (CAP) risk include male sex, underweight status, age older than 65 years, smoking, and alcohol abuse

- Underlying conditions such as immune suppression, chronic obstructive pulmonary disease, HIV, and asplenia also increase risk

- Close contact with children, poor dental hygiene, and crowded living conditions (ie, more than 10 individuals in a household) are additional risk factors

- Drugs that increase risk include proton pump inhibitors, tumor necrosis factor-alpha inhibitors, amiodarone, *N*-acetylcysteine, oral or inhaled steroids, benzodiazepines, and eszopiclone.

Community-Acquired Pneumonia
Etiologies

Table 1
Causative Organisms in Community-Acquired Pneumonia

Common Bacterial	Viral
Streptococcus pneumoniae	*Influenza*
Haemophilus influenzae	*Respiratory syncytial virus*
Moraxella catarrhalis	Human metapneumovirus
Staphylococcus aureus	Parainfluenza
Methicillin-resistant *S aureus*	Coronavirus
Escherichia coli	Severe acute respiratory syndrome
Klebsiella pneumoniae	Middle East respiratory syndrome
Enterobacter sp	Adenovirus
Serratia marcescens	**Fungal**
Pseudomonas aeruginosa	*Histoplasma capsulatum*
Atypical Bacterial	*Coccidioides immitis*
Mycoplasma pneumoniae	*Blastomyces*
Legionella pneumophila	
Chlamydophila (*Chlamydophila pneumoniae* more commonly than	
Chlamydophila psittaci)	
Less Common Bacterial	
Coxiella burnetii (Q fever)	
Francisella tularensis	
Bordetella pertussis (whooping cough)	
Mycobacterium tuberculosis	

Community-Acquired Pneumonia
Diagnosis

Table 2
Clinical Signs and Symptoms of Pneumonia

Clinical Finding	Sensitivity (%)	Specificity (%)
Heart rate >100 beats/min	17 to 65	60 to 92
Temperature >37.8°C (100°F)	27 to 69	49 to 94
Respiration >28 breaths/min	7 to 36	80 to 99
Oxygen saturation <95%	33 to 52	80 to 86
Bronchial breath sounds	14	96
Crackles/rales	19 to 67	36 to 94
Decreased breath sounds	15 to 49	73 to 95
Dullness on lung percussion	4 to 26	82 to 99
Wheezing	15 to 36	50 to 85

Community-Acquired Pneumonia
Diagnosis

Case 1, cont'd. A chest x-ray shows a right lower lobe infiltrate. White blood cell count is elevated at 15,000 cells/mcL. Dan is mildly dehydrated, with a blood urea nitrogen level of 60 mg/dL and creatinine level of 1.8 mg/dL.

Community-Acquired Pneumonia
Diagnosis

Table 3
Recommended Diagnostic Testing for Patients With Probable Community-Acquired Pneumonia

Condition	Pneumococcal Urine Antigen Testing	*Legionella* Urine Antigen Testing	Blood Culture	Sputum Culture
Alcohol abuse (cirrhosis)	X	X	X	X
Asplenia	X		X	
Cavitary lesions			X	X
Chronic severe liver disease	X		X	
Unsuccessful outpatient antibiotic therapy	X	X		X
Intensive care unit admission	X	X	X	X
Leukopenia	X		X	
Pleural effusion	X	X	X	X
Recent travel		X		

Question

Which one of the following laboratory tests is recommended for routine use in patients with uncomplicated community-acquired pneumonia who can be treated as outpatients?

A. Blood biomarkers.
B. Blood cultures.
C. C-reactive protein.
D. Urine antigen testing for *Streptococcus pneumoniae* and *Legionella pneumophila*.
E. None of the above.

Answer

Which one of the following laboratory tests is recommended for routine use in patients with uncomplicated community-acquired pneumonia who can be treated as outpatients?

A. Blood biomarkers.
B. Blood cultures.
C. C-reactive protein.
D. Urine antigen testing for *Streptococcus pneumoniae* and *Legionella pneumophila*.
E. None of the above.

The correct answer is E. The Infectious Diseases Society of America (IDSA)/ American Thoracic Society (ATS) 2007 consensus guidelines recommend selective use of blood cultures and other laboratory tests for adults with community-acquired pneumonia (CAP); cultures are indicated if multiple risk factors for bacteremia are present. The IDSA/ATS guideline for managing CAP recommends use of the pneumococcal urine antigen test as an adjunct to blood cultures for hospitalized patients with severe CAP. Urine antigen testing for *Legionella* should be considered for patients with risk factors. Many patients with suspected CAP are treated with antibiotics and do not require extensive laboratory testing.

Question

You are providing care in the urgent care clinic for a 45-year-old patient with community-acquired pneumonia (CAP). Which one of the following should be used to determine treatment setting?

A. Allergy to macrolide antibiotics.
B. An illness severity score.
C. Mild dehydration.
D. Presence of diabetes.
E. None of the above.

Answer

You are providing care in the emergency department for a 45-year-old patient with community-acquired pneumonia (CAP). Which one of the following should be used to determine treatment setting?

A. Allergy to macrolide antibiotics.
B. An illness severity score.
C. Mild dehydration.
D. Presence of diabetes.
E. None of the above.

The correct answer is B. Several illness severity scores and prognostic models have been validated for making decisions about inpatient versus outpatient care of patients with community-acquired pneumonia and should be used to determine treatment setting.

Community-Acquired Pneumonia Treatment

Case 1, cont'd. Dan is monitored in the urgent care, and a CURB-65 (confusion, blood urea nitrogen, respiratory rate, blood pressure, age 65 years or older) risk assessment is performed. Because he has a score of 2 (tachypnea [ie, respiratory rate of 30 breaths/min or greater] and blood urea nitrogen level greater than 19 mg/dL), Dan is transferred to the hospital OTU to receive intravenous antibiotics. Because the presentation is straightforward, no additional diagnostic testing is warranted.

Community-Acquired Pneumonia Treatment

Table 1. CURB-65 Scoring

Clinical Feature	Points
Confusion (defined as a Mental Test Score of ≤8, or disorientation in person, place, or time)	1
Uremia: blood urea >7 mmol/L (~19 mg/dL)	1
Respiratory rate: ≥30 breaths/minute	1
Blood pressure: systolic <90 mm Hg or diastolic ≤60 mm Hg	1
Age ≥65 years	1
Total points	

Table 2. Treatment Options Based on CURB-65 Score

Score	Group	Treatment Options
0 or 1	Group 1; mortality low (1.5%)	Low risk; consider home treatment
2	Group 2; mortality intermediate (9.2%)	Consider hospital-supervised treatment (either short-stay inpatient or hospital-supervised outpatient)
≥3	Group 3; mortality high (22%)	Manage in hospital as severe pneumonia; consider admission to intensive care unit, especially with CURB-65 score of 4 or 5

Community-Acquired Pneumonia Treatment

Table 5
Risk Factors for Drug-Resistant *Streptococcus pneumoniae* Infection

Presence of comorbidities
Asplenia
Alcoholism
Chronic cardiac, pulmonary, hepatic, or renal disease
Diabetes
Immunosuppression due to illness or therapy
Underlying malignancy
Use of antibiotics within past 90 days
Exposure to infant or child in a day care center

Community-Acquired Pneumonia Treatment

Table 6
Empiric Antibiotic Recommendations for Treatment of CAP in Children

Treatment	Dosage	Comments
	Outpatient Setting	
First line (presumed bacterial): amoxicillin	80 to 90 mg/kg/day in 2 doses for 7 to 10 days	
Alternative: amoxicillin-clavulanate	Amoxicillin component: 90 mg/kg/day in 2 doses for 7 to 10 days	
First line (presumed atypical pneumonia): azithromycin	10 mg/kg on day 1, 5 mg/kg/day on days 2 to 5	
Alternatives:		
clarithromycin	15 mg/kg/day in 2 doses for 7 to 14 days	
erythromycin	40 mg/kg/day in 4 doses for 7 to 14 days	
Presumed influenza: oseltamivir	≥24 months: 4 mg/kg/day in 2 doses for 5 days	

Community-Acquired Pneumonia Treatment

Table 7
Empiric Antibiotic Recommendations for First-Line Treatment of CAP in Adults

Treatment	Duration	Comments
	Outpatient Setting	
Macrolide or doxycycline	5 to 7 days	Previously healthy; no antibiotic use in previous 3 months
Respiratory fluoroquinolone or high-dose penicillin or high-dose amoxicillin-clavulanate plus advanced macrolide (azithromycin, clarithromycin, or erythromycin)	5 to 7 days	Comorbidity or antibiotic use within past 3 months
	Inpatient Setting	
Respiratory fluoroquinolone or beta-lactam plus macrolide	5 to 7 days	No recent antibiotic use
	Inpatient ICU Setting	
Beta-lactam antibiotic (cefotaxime, ceftriaxone or ampicillin-sulbactam) plus azithromycin or respiratory fluoroquinolone	10 to 14 days	*Pseudomonas* infection should not be likely comorbidity; if so, use antipseudomonal beta-lactam plus ciprofloxacin or aminoglycoside plus respiratory fluoroquinolone or macrolide

Community-Acquired Pneumonia Treatment

Table 8
Risk Factors for Community-Acquired Methicillin-Resistant *Staphylococcus aureus* Pneumonia

Cavitary pneumonia
Concurrent influenza
Erythematous skin rash
Gross hemoptysis
Lung necrosis in pneumonic infiltrate
Neutropenia
Previously healthy patient
Prior pneumococcal vaccination
Rapidly increasing pleural effusion
Summer season

Question

You are providing care for an otherwise healthy 66-year-old man with community-acquired pneumonia. The CURB-65 (confusion, blood urea nitrogen, respiratory rate, blood pressure, age 65 years or older) score is 1 (for age). He is not hypoxic, has not taken antibiotics recently, and does not have risk factors for drug-resistant *Streptococcus pneumoniae*. You decide to treat him as an outpatient. Which one of the following drugs is appropriate as first-line therapy for this patient?

A. A beta-lactam antibiotic.
B. A beta-lactam-penicillin combination.
C. A macrolide antibiotic.
D. A respiratory fluoroquinolone.

Answer

You are providing care for an otherwise healthy 66-year-old man with community-acquired pneumonia. The CURB-65 (confusion, blood urea nitrogen, respiratory rate, blood pressure, age 65 years or older) score is 1 (for age). He is not hypoxic, has not taken antibiotics recently, and does not have risk factors for drug-resistant *Streptococcus pneumoniae*. You decide to treat him as an outpatient. Which one of the following drugs is appropriate as first-line therapy for this patient?
(read more)

A. A beta-lactam antibiotic.
B. A beta-lactam-penicillin combination.
C. A macrolide antibiotic.
D. A respiratory fluoroquinolone.

The correct answer is C. For patients with community-acquired pneumonia and without drug-resistant *Streptococcus pneumoniae* risk factors, consideration of atypical bacterial pathogens is important. Macrolides, such as azithromycin and clarithromycin, are good options, with doxycycline being a reasonable alternative.

Community-Acquired Pneumonia Treatment

Case 1, cont'd. Dan is treated with a respiratory fluoroquinolone and intravenous fluids. Oxygen saturation improves, and after a 3-day hospitalization, he is discharged to home in improved condition to complete a 10-day antibiotic course. His other drugs are continued, including the statin.

Question

A 52-year-old woman comes to your office with suspected community-acquired pneumonia. She is otherwise healthy. She reports a single episode of hemoptysis. She has an erythematous skin rash, and chest x-ray shows cavitary pneumonia. You suspect methicillin-resistant *Staphylococcus aureus* (MRSA) as the causative agent. Which one of the following antibiotics currently is the best option for treatment of MRSA pneumonia?

A. A beta-lactam or ampicillin-sulbactam.
B. A macrolide or doxycycline.
C. A respiratory fluoroquinolone.
D. Vancomycin or linezolid.

Answer

A 52-year-old woman comes to your office with suspected community-acquired pneumonia. She is otherwise healthy. She reports a single episode of hemoptysis. She has an erythematous skin rash, and chest x-ray shows cavitary pneumonia. You suspect methicillin-resistant *Staphylococcus aureus* (MRSA) as the causative agent. Which one of the following antibiotics currently is the best option for treatment of MRSA pneumonia?

A. A beta-lactam or ampicillin-sulbactam.
B. A macrolide or doxycycline.
C. A respiratory fluoroquinolone.
D. Vancomycin or linezolid.

The correct answer is D. Vancomycin and linezolid are the two current best options for treatment of methicillin-resistant *Staphylococcus aureus* pneumonia.
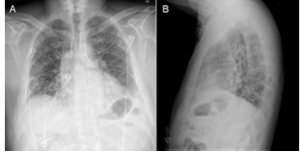
Fungal Infections
Coccidioidomycosis (Valley Fever)

- *Coccidioides* is a dimorphic organism existing as mold in the environment and spherules in tissue

- *Coccidioides immitis* is found in the central valley of Southern California and in desert areas

- *Coccidioides posadasii* is found in desert areas of Central and South America, Arizona, Utah, New Mexico, and West Texas.

- Individuals at greater risk include blacks, Asians, pregnant women, patients with diabetes, and patients taking corticosteroids.
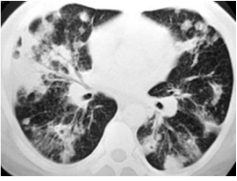
Fungal Infections
Coccidioidomycosis (Valley Fever)
Diagnosis

- X-rays often are nonspecific

- Computed tomography scans show effusions, micronodular infiltrates, hilar lymph nodes, and ground-glass infiltrates. Some patients develop chronic cavitary pneumonia

- Several diagnostic options are available, although in endemic areas of the Southwest, testing often is not performed

- Complement fixation and immunodiffusion tests are sensitive and specific.

Fungal Infections
Coccidioidomycosis (Valley Fever)

Fungal Infections
Coccidioidomycosis (Valley Fever)
Treatment

- Amphotericin B deoxycholate - 0.5-1.5 mg/kg/day IV
- Lipid formulations of amphotericin B - 2-5 mg/kg/day IV
- Ketoconazole - 400 mg/day orally
- Itraconazole - 200 mg 2-3 times/day orally
- Fluconazole - 400-800 mg/day orally or IV

- Newer azole drugs (ie, voriconazole, posaconazole) are indicated if first-line drugs are ineffective or for patients who cannot tolerate them. (This is an off-label use of these drugs.)

- Antifungal management typically is not required for asymptomatic small, thin-walled cavities and pulmonary nodules

Evaluation of Acute Abdominal Pain in Adults

	Right			Left
Gallstones Stomach Ulcer Pancreatitis		Stomach Ulcer Heartburn/ Indigestion Pancreatitis, Gallstones Epigastric hernia		Stomach Ulcer Duodenal Ulcer Biliary Colic Pancreatitis
Kidney stones Urine Infection Constipation Lumbar hernia		Pancreatitis Early Appendicitis Stomach Ulcer Inflammatory Bowel Small bowel Umbilical hernia		Kidney Stones Diverticular Disease Constipation Inflammatory bowel disease
Appendicitis Constipation Pelvic Pain (Gynae) Groin Pain (Ingsinal Hernia)		Urine infection Appendicitis Diverticular disease Inflammatory bowel Pelvic pain (Gynae)		Diverticular Disease Pelvic pain (Gynae) Groin Pain (Inguinal hernia)

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Evaluation of Acute Abdominal Pain in Adults

Learning Objectives

- Summarize the clinical criteria and appropriate testing for acute abdominal pain in adults.
- Describe the key decisions in treating abdominal pain.
- Describe diagnostic clues for the different etiologies of acute abdominal pain in adults.
- Summarize the first-line treatment options for common etiologies of acute abdominal pain.

Key Practice Recommendations

CLINICAL RECOMMENDATIONS	EVIDENCE RATING	REFERENCES
A normal white blood cell count does not rule out appendicitis.	C	12
Simultaneous amylase and lipase measurements are recommended in patients with epigastric pain.	C	13
Ultrasonography is the imaging study of choice for evaluating patients with acute right upper quadrant abdominal pain.	C	14
Computed tomography is the imaging study of choice for evaluating patients with acute right lower quadrant or left lower quadrant abdominal pain.	C	15, 16

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, see page 895 or http://www.aafp.org/afpsort.xml.

Differential Diagnosis

Differential Diagnosis

Table 1
Selected Differential Diagnosis of Abdominal Pain

PAIN LOCATION	POSSIBLE DIAGNOSES
Right upper quadrant	Biliary: cholecystitis, cholelithiasis, cholangitis
	Colonic: colitis, diverticulitis
	Hepatic: abscess, hepatitis, mass
	Pulmonary: pneumonia, embolus
	Renal: nephrolithiasis, pyelonephritis
Epigastric	Biliary: cholecystitis, cholelithiasis, cholangitis
	Cardiac: myocardial infarction, pericarditis
	Gastric: esophagitis, gastritis, peptic ulcer
	Pancreatic: mass, pancreatitis
	Vascular: aortic dissection, mesenteric ischemia

Differential Diagnosis

Table 1
Selected Differential Diagnosis of Abdominal Pain

PAIN LOCATION	POSSIBLE DIAGNOSES
Left upper quadrant	Cardiac: angina, myocardial infarction, pericarditis
	Gastric: esophagitis, gastritis, peptic ulcer
	Pancreatic: mass, pancreatitis
	Renal: nephrolithiasis, pyelonephritis
	Vascular: aortic dissection, mesenteric ischemia
Periumbilical	Colonic: early appendicitis
	Gastric: esophagitis, gastritis, peptic ulcer, small-bowel mass or obstruction
	Vascular: aortic dissection, mesenteric ischemia

Differential Diagnosis

Table 1
Selected Differential Diagnosis of Abdominal Pain

PAIN LOCATION	POSSIBLE DIAGNOSES
Right lower quadrant	Colonic: appendicitis, colitis, diverticulitis, IBD, IBS
	Gynecologic: ectopic pregnancy, fibroids, ovarian mass, torsion, PID
	Renal: nephrolithiasis, pyelonephritis
Suprapubic	Colonic: appendicitis, colitis, diverticulitis, IBD, IBS
	Gynecologic: ectopic pregnancy, fibroids, ovarian mass, torsion, PID
	Renal: cystitis, nephrolithiasis, pyelonephritis

Differential Diagnosis

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Selected Differential Diagnosis of Abdominal Pain

PAIN LOCATION	POSSIBLE DIAGNOSES
Left lower quadrant	Colonic: colitis, diverticulitis, IBD, IBS
	Gynecologic: ectopic pregnancy, fibroids, ovarian mass, torsion, PID
	Renal: nephrolithiasis, pyelonephritis
Any location	Abdominal wall: herpes zoster, muscle strain, hernia
	Other: bowel obstruction, mesenteric ischemia, peritonitis, narcotic withdrawal, sickle cell crisis, porphyria, IBD, heavy metal poisoning

IBD = inflammatory bowel disease; IBS = irritable bowel syndrome; PID = pelvic inflammatory disease

Question

In the evaluation of a patient with suspected irritable bowel syndrome, which one of the following suggests the possibility of an alternative diagnosis?

A. Symptom onset after age 50 years.
B. Family history of colorectal cancer.
C. Male sex.
D. Rectal bleeding.
E. All of the above.

Answer

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C. Male sex.
D. Rectal bleeding.
E. All of the above.

The correct answer is E. Symptom onset after age 50 years, family history of colorectal cancer, male sex, and rectal bleeding are all red flag symptoms/findings that warrant further evaluation of patients with irritable bowel syndrome.

Question

Which of the following statements is most accurate concerning nephrolithiasis in the United States?

A. The overall rate in the adult population is decreasing.
B. The highest rate currently is among individuals ages 60 to 69 years.
C. The overall incidence is now the same in women and men.
D. Approximately 20% of US adults experience at least 1 lifetime episode of nephrolithiasis.
E. Risk of recurrence peaks around 24 months after the initial episode.

Answer

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D. Approximately 20% of US adults experience at least 1 lifetime episode of nephrolithiasis.
E. Risk of recurrence peaks around 24 months after the initial episode.

The correct answer is B. A study conducted between 1970 and 2000 showed the highest rate of nephrolithiasis in the 60- to 69-year-old age group.

Question

Which one of the following conditions is diagnosed in a majority of patients with dyspepsia?

A. Functional dyspepsia.
B. Gastric cancer.
C. Gastric erosions caused by nonsteroidal anti-inflammatory drug use.
D. Gastroesophageal reflux disease (GERD) with esophagitis.
E. GERD without esophagitis.

Answer

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D. Gastroesophageal reflux disease (GERD) with esophagitis.
E. GERD without esophagitis.

The correct answer is A. Functional dyspepsia is the most common diagnosis among patients with dyspepsia, made in up to 60% of patients presenting with dyspepsia

Question

When *Helicobacter pylori* is present in a patient with functional dyspepsia, eradication sometimes results in significant improvement in symptoms.

A. True.
B. False.

Answer

When *Helicobacter pylori* is present in a patient with functional dyspepsia, eradication sometimes results in significant improvement in symptoms. (read more)

A. True.
B. False.

The correct answer is A. Studies show that at a population level, there is significant reduction in dyspepsia symptoms with *Helicobacter pylori* eradication compared with placebo, with a number needed to treat of 15.

Question

Which one of the following clinical findings is most consistent with the diagnosis of nephrolithiasis?

A. Pain is paroxysmal.
B. Patients typically lie still to minimize movement of the flank area.
C. Nausea and vomiting are rare.
D. Hematuria is always present.
E. Hematuria indicates the stone is in the lower urinary tract (eg, bladder, urethra).

Answer

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E. Hematuria indicates the stone is in the lower urinary tract (eg, bladder, urethra).

The correct answer is A. Patients with nephrolithiasis typically present with renal or ureteral colic with hematuria. The pain is paroxysmal and severe.

Differential Diagnosis

History

- History should be obtained from a nonsedated patient.

- Delineation of the pain's location, radiation, and movement (e.g., appendicitis-associated pain usually moves from the periumbilical area to the right lower quadrant of the abdomen).

- General information about onset, duration, severity, and quality of pain and about exacerbating and remitting factors.

- Associated symptoms often allow the physician to further focus the differential diagnosis. For bowel obstruction, constipation is the symptom with the highest positive predictive value.

History

- For appendicitis, right lower quadrant pain has the highest positive predictive value, although migration from periumbilical to right lower quadrant pain and fever also suggest appendicitis.

- Colic (i.e., sharp, localized abdominal pain that increases, peaks, and subsides) is associated with numerous diseases of hollow viscera.

- The mechanism of pain is thought to be smooth muscle contraction proximal to a partial or complete obstruction (e.g., gallstone, kidney stone, small bowel obstruction).

- The absence of colic is useful for ruling out diseases such as acute cholecystitis; less than 25 percent of patients with acute cholecystitis present without right upper quadrant pain or colic.

History

- Peptic ulcer disease is often associated with Helicobacter pylori infection (75 to 95 percent of duodenal ulcers and 65 to 95 percent of gastric ulcers)

- many patients with ulcer disease and serology findings negative for H. pylori report recent use of nonsteroidal anti-inflammatory drugs

- Other symptoms of peptic ulcer disease include concurrent, episodic gnawing or burning pain; pain relieved by food; and nighttime awakening with pain.

- Symptoms in patients with abdominal pain that are suggestive of surgical or emergent conditions include fever, protracted vomiting, syncope or presyncope, and evidence of gastrointestinal blood loss.

Physical

- The patient's general appearance and vital signs can help narrow the differential diagnosis

- Patients with peritonitis tend to lie very still, whereas those with renal colic seem unable to stay still.

- Fever suggests Infection; however, its absence does not rule it out, especially in patients who are older or immunocompromised.

- Tachycardia and orthostatic hypotension suggest hypovolemia

- The location of pain guides the remainder of the physical examination.

- Physicians should pay close attention to the cardiac and lung examinations in patients with upper abdominal pain because they could suggest pneumonia or cardiac ischemia.

Physical

- There are several specialized maneuvers that evaluate for signs associated with causes of abdominal pain

- These include Carnett's sign (i.e., increased pain when a supine patient tenses the abdominal wall by lifting the head and shoulders off the examination table) in patients with abdominal wall pain

- Murphy's sign in patients with cholecystitis (although it is only present in 65 percent of adults with cholecystitis and is particularly unreliable in older patients.

- Psoas sign in patients with appendicitis. Other signs such as rigidity and rebound tenderness are nonspecific Rectal and pelvic examinations are recommended in patients with lower abdominal and pelvic pain

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Physical

- A rectal examination may reveal fecal impaction, a palpable mass, or occult blood in the stool.

- Tenderness and fullness on the right side of the rectum suggest a retrocecal appendix.

- A pelvic examination may reveal vaginal discharge, which can indicate vaginitis.

- The presence of cervical motion tenderness and peritoneal signs increase the likelihood of ectopic pregnancy or other gynecologic complications, such as salpingitis or a tubo-ovarian abscess.

History and Physical Examination

Table 2
Useful Findings in the Evaluation of Abdominal Pain

FINDING	LR+	LR–	5% PRETEST PROBABILITY (%) FINDING PRESENT	FINDING ABSENT	25% PRETEST PROBABILITY (%) FINDING PRESENT	FINDING ABSENT
Appendicitis						
Right lower quadrant pain	8.4	0.2	31	1	74	6
Migration of pain from the periumbilical area to the right lower quadrant of the abdomen	3.6	0.4	16	2	54	13
Fever	3.2	0.4	14	2	51	12
Psoas sign	3.2	0.88	14	4	52	23
Rebound tenderness	2.03	0.54	10	3	40	15

History and Physical Examination

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Useful Findings in the Evaluation of Abdominal Pain

FINDING	LR+	LR–	5% PRETEST PROBABILITY (%) FINDING PRESENT	FINDING ABSENT	25% PRETEST PROBABILITY (%) FINDING PRESENT	FINDING ABSENT
Bowel obstruction						
Constipation	8.8	0.6	32	3	75	16
Abdominal distention	5.7	0.4	23	2	66	12
Pain decreases after vomiting	4.5	0.8	19	4	60	21
Colic	2.8	0.8	13	4	48	21
Previous abdominal surgery	2.7	0.4	12	2	47	12

History and Physical Examination

Table 2
Useful Findings in the Evaluation of Abdominal Pain

FINDING	LR+	LR–	5% PRETEST PROBABILITY (%)		25% PRETEST PROBABILITY (%)	
			FINDING PRESENT	FINDING ABSENT	FINDING PRESENT	FINDING ABSENT
Cholecystitis						
Murphy's sign	5.0	0.4	21	2	62	12
Right upper quadrant pain	2.5	0.3	11	2	45	9
Fever	1.8	0.8	8	4	37	21
Jaundice6	1.0	1.0	5	5	25	25

LR+ = positive likelihood ratio; LR– = negative likelihood ratio.
Information from references 3 through 6.

Diagnostic Testing
Laboratory Tests

- Appropriate diagnostic testing varies based on the clinical situation.

- A complete blood count is appropriate if infection or blood loss is suspected.

- One study of patients 15 to 83 years of age with suspected appendicitis found that a white blood cell count greater than 10,000 per mm³. (10 × 10⁹ per L) was 77 percent sensitive and 63 percent specific for the diagnosis.

- Nearly one in four patients with appendicitis does not have an elevated white blood cell count.

Diagnostic Testing
Laboratory Tests

- In patients with epigastric pain, simultaneous amylase and lipase measurements are recommended because an elevated lipase level with a normal amylase level is not likely to be caused by pancreatitis.

- Liver chemistries are important in patients with right upper quadrant pain.

- A urinalysis should be obtained in patients with hematuria, dysuria, or flank pain.

- A urine pregnancy test should be performed in women of childbearing age who have abdominal pain to narrow the differential diagnosis and to determine whether certain imaging studies are appropriate.

- Testing for chlamydia and gonorrhea is recommended for women at risk of sexually transmitted infections.

Diagnostic Testing
Imaging Studies

Table 3
Recommended Imaging Studies Based on Location of Abdominal Pain

LOCATION OF PAIN	IMAGING
Right upper quadrant14	Ultrasonography
Left upper quadrant	CT
Right lower quadrant15	CT with IV contrast media
Left lower quadrant16	CT with oral and IV contrast media
Suprapubic	Ultrasonography

CT = computed tomography; IV = intravenous.

Question

Your patient with a family history of pancreatic cancer presents with abdominal pain that radiates to the back, along with weight loss and slight scleral icterus. You both are concerned about the possibility of pancreatic cancer. Which one of the following is the best initial imaging test to obtain for this patient?

A. Abdominal ultrasound examination.
B. Endoscopic retrograde cholangiopancreatography.
C. Magnetic resonance imaging study.
D. Dual-phase helical computed tomography (CT) scan with contrast.
E. Noncontrast CT scan.

Answer

Your patient with a family history of pancreatic cancer presents with abdominal pain that radiates to the back, along with weight loss and slight scleral icterus. You both are concerned about the possibility of pancreatic cancer. Which one of the following is the best initial imaging test to obtain for this patient?

A. Abdominal ultrasound examination.
B. Endoscopic retrograde cholangiopancreatography.
C. Magnetic resonance imaging study.
D. Dual-phase helical computed tomography (CT) scan with contrast.
E. Noncontrast CT scan.

The correct answer is D. When pancreatic cancer is suspected, or a mass in the pancreas has been identified on ultrasound examination performed to evaluate hepatobiliary symptoms, a dual-phase helical computed tomography scan with contrast/pancreatic protocol is currently considered the best initial imaging test to help confirm the diagnosis.

Diagnostic Testing
Imaging Studies

- Recommendations for initial imaging studies are based on the location of abdominal pain.

- Ultrasonography is recommended when a patient presents with right upper quadrant pain.

- Radionuclide imaging is slightly better than ultrasonography for detecting acute cholecystitis but is more expensive, takes longer to perform, and cannot assess diagnoses outside of the biliary tract.

- Computed tomography (CT) with intravenous contrast media is recommended for evaluating adults with acute right lower quadrant pain.

- CT with oral and intravenous contrast media is recommended for patients with left lower quadrant pain.

Diagnostic Testing
Imaging Studies

- Sigmoid diverticulitis is the most common cause of left lower quadrant pain in adults, and CT has a reported sensitivity of 79 to 99 percent for detecting the condition.

- CT is better than ultrasonography for diagnosing appendicitis and can detect extracolonic causes of abdominal pain.

- Left upper quadrant pain is caused by a variety of clinical conditions; therefore, imaging recommendations are not clear-cut.

- If the patient's history and physical examination suggest esophageal or gastric pathology, endoscopy (or an upper gastrointestinal series) is recommended.

- In other patients with left upper quadrant pain, CT is useful because it provides imaging of the pancreas, spleen, kidneys, intestines, and vasculature.

Diagnostic Testing
Imaging Studies

- In general, CT is highly effective at identifying patients with nonspecific abdominal pain who need urgent intervention.

- Plain radiography of the abdomen is often more readily obtainable and less expensive than ultrasonography or CT and can be helpful in several circumstances.

- An upright radiograph of the chest or abdomen can detect free air under the diaphragm, which indicates a perforation of the gastrointestinal tract.

- Abnormal calcifications also can be seen on a plain radiograph; this includes 10 percent of gallstones, 90 percent of kidney stones, and appendicoliths in 5 percent of patients with appendicitis.

- Plain radiography of the abdomen may help diagnose bowel obstruction with multiple dilated loops of the bowel and air-fluid levels, although similar findings may occur with paralytic ileus.

Diagnostic Testing
Imaging Studies

- Women of childbearing age present a specific challenge when making decisions about diagnostic imaging.

- Gynecologic causes of abdominal pain are more common in these women, and radiation exposure should be avoided if pregnancy is likely.

- Therefore, abdominal or transvaginal ultrasonography is generally recommended for evaluating left lower quadrant pain in women of childbearing age and in pregnant patients with right lower quadrant abdominal pain.

- If ectopic pregnancy is suspected, transvaginal ultrasonography should be performed.

Diagnostic Testing
Imaging Studies

- The sensitivity of transvaginal ultrasonography for detecting ectopic pregnancy is 95 percent in a patient with a positive pregnancy test (human chorionic gonadotropin level greater than 25 mIU per mL [25 IU per L]) and any abnormal ultrasound finding, whereas a negative pregnancy test and normal ultrasound findings virtually exclude ectopic pregnancy.

- Transvaginal ultrasonography is also helpful for diagnosing other gynecologic pathology, such as fibroids, ovarian masses, ovarian torsions, and tuboovarian abscesses.

Question

Which one of the following imaging tests is most accurate for diagnosing common bile duct stones?

A. Endoscopic cholangiopancreatography.
B. Endoscopic ultrasound.
C. Magnetic resonance cholangiopancreatography.
D. Transabdominal ultrasound.
E. None of these imaging tests is clearly more accurate than the others.

Answer

Which one of the following imaging tests is most accurate for diagnosing common bile duct stones?

A. Endoscopic cholangiopancreatography.
B. Endoscopic ultrasound.
C. Magnetic resonance cholangiopancreatography.
D. Transabdominal ultrasound.
E. None of these imaging tests is clearly more accurate than the others.

The correct answer is E. Abdominal ultrasound can suggest the diagnosis of common bile duct stones, particularly if the ducts are dilated. But, a negative ultrasound result does not rule out common bile duct stones. Therefore, when the diagnosis is uncertain after abdominal ultrasound, consider additional studies to confirm the diagnosis. Confirmation can be obtained using endoscopic ultrasound, magnetic resonance cholangiopancreatography, or endoscopic cholangiopancreatography. All have similar sensitivity (80% to 100%) and specificity (90% to 100%).

Question

In which one of the following situations might ultrasonography be the diagnostic modality of choice for a patient with suspected nephrolithiasis?

A. Stone impacted in the lower ureter.
B. Small stones.
C. Struvite stones.
D. Pregnant patient.
E. Patient with sepsis.

Answer

In which one of the following situations might ultrasonography be the diagnostic modality of choice for a patient with suspected nephrolithiasis?

A. Stone impacted in the lower ureter.
B. Small stones.
C. Struvite stones.
D. Pregnant patient.
E. Patient with sepsis.

The correct answer is D. Ultrasonography should be used for imaging of kidney stones when radiation exposure must be avoided, such as in pregnant patients.

Special Populations
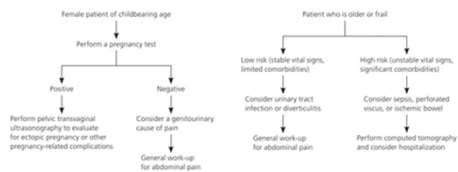
Evaluation of Abdominal Pain in Special Populations

Female patient of childbearing age
↓
Perform a pregnancy test
↓
Positive / Negative

Positive → Perform pelvic transvaginal ultrasonography to evaluate for ectopic pregnancy or other pregnancy-related complications

Negative → Consider a genitourinary cause of pain → General work-up for abdominal pain

Patient who is older or frail
↓
Low risk (stable vital signs, limited comorbidities) / High risk (unstable vital signs, significant comorbidities)

Low risk → Consider urinary tract infection or diverticulitis → General work-up for abdominal pain

High risk → Consider sepsis, perforated viscus, or ischemic bowel → Perform computed tomography and consider hospitalization

Figure 1.
Algorithm for the evaluation of abdominal pain in special populations.

Approach to Patients

Evaluation of Right Upper Quadrant Abdominal Pain

Patient history
↓
Pulmonary symptoms / Urinary symptoms / Colic

Pulmonary symptoms → Consider pulmonary embolus or pneumonia

Urinary symptoms → Consider urinary tract infection or nephrolithiasis

Colic → Consider a hepatobiliary cause or nephrolithiasis

↓ Physical examination

Tachypnea, hypoxia, or pulmonary findings → Chest radiography; if nondiagnostic, helical CT and D-dimer assay to evaluate for pulmonary embolism

Costovertebral or suprapubic tenderness → Perform a urinalysis → Pyuria / Hematuria

Pyuria → Consider urinary tract infection or pyelonephritis

Hematuria → Consider nephrolithiasis → CT

Perform ultrasonography of abdomen; if nondiagnostic, consider nephrolithiasis
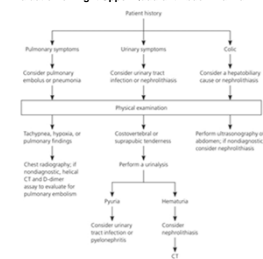
Figure 2.
Algorithm for the evaluation of right upper quadrant abdominal pain. (CT = computed tomography).

Approach to Patients

Evaluation of Right Lower Quadrant Abdominal Pain

Patient with a history of fever or pain that moves from the periumbilical area to the right lower quadrant of the abdomen
↓
Yes / No

Yes → Consider peritonitis or appendicitis

No → Assess for psoas sign, rigidity, rebound, guarding, or pain on the right side of the rectum → Positive findings / Negative findings

Positive findings → Consider computed tomography with intravenous contrast media

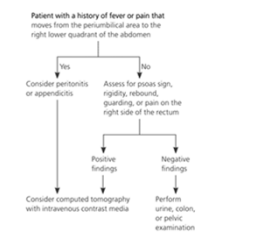Negative findings → Perform urine, colon, or pelvic examination

Figure 3.
Algorithm for the evaluation of right lower quadrant abdominal pain.

Approach to Patients
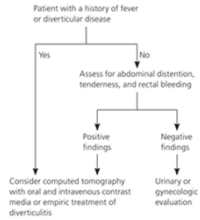
Evaluation of Left Lower Quadrant Abdominal Pain

Patient with a history of fever
or diverticular disease

Yes / No

Assess for abdominal distention,
tenderness, and rectal bleeding

Positive findings / Negative findings

Consider computed tomography
with oral and intravenous contrast
media or empiric treatment of
diverticulitis

Urinary or
gynecologic
evaluation

Figure 4.
Algorithm for the evaluation of left lower quadrant abdominal pain.

Hot Topics in the Urgent Care

What is the HEART Score?

HEART ♥

HEART score for chest pain patients		
History	Highly suspicious	2
	Moderately suspicious	1
	Slightly suspicious	0
ECG	Significant ST-deviation	2
	Non specific repolarisation disturbance / LBTB / PM	1
	Normal	0
Age	≥ 65 years	2
	> 45 and < 65 years	1
	≤ 45 years	0
Risk factors	≥ 3 risk factors or history of atherosclerotic disease*	2
	1 or 2 risk factors	1
	No risk factors known	0
Troponin	≥ 3x normal limit	2
	> 1 and < 3x normal limit	1
	≤ 1x normal limit	0
		Total

H = History

E = ECG

A = Age

R = Risk Factors

T = Troponin

*Risk factors for atherosclerotic disease:

Hypercholesterolemia   Cigarette smoking
Hypertension   Positive family history
Diabetes Mellitus   Obesity

thrive

What is the HEART Score?

Learning Objectives:

- Perform a complete evaluation of the patient (personal medical history, medications, social and relevant family medical history, accurate examination with an emphasis on cardiovascular and cardiovascular-related findings, etc.).

- Understand relevant screening and/or diagnostic tests appropriate for cardiovascular risk stratification.

- Ability to establish short- and long-term follow-up continuity plans (e.g. self-BP monitoring, weight monitoring, appropriate laboratory monitoring) and to establish appropriate intervals for outpatient clinic follow-up and outpatient telephone/email communication.

What is the HEART Score?

Key Practice Recommendations:

- **The HEART score offers an opportunity for those of us in acute care settings including the Urgent Care (UC) to coalesce around a single vehicle that is relatively intuitive and allow us to identify enough low risk patients to send home on a consistent basis.**

- **Not all the variables and risk factors used in the HEART score calculation are equally important and it is critical for providers to weigh this information as well as their gestalt when deciding the appropriate plan for patients. The HEART score should not be used as an algorithm to be followed blindly.**

Chest Pain and the HEART Score

- Chest pain is always a challenging chief complaint regardless of the clinical setting, but when it presents to the Urgent Care there are added challenges given the lack of available lab testing, imaging and many other variables.

- Very often patients who present to the UC with chest pain get sent to the ED immediately.

- The HEART Score is a new risk stratification decision tool, and as more UC's adopt point-of-care troponin testing, the two combined may allow for a more complete evaluation and disposition of some chest pain patients from the UC.

Chest Pain and the HEART Score

- Until just a few years ago, provider relied solely on their gestalt to decide which chest pain patients were at higher or lower risk, who needed a stress test vs admission, etc.

- **The HEART score provides an objective scoring system based on 5 variables that allows providers to make an informed decision about who needs to be admitted, who needs to be stressed, and who is okay for discharge from the UCC with referral back to their PCP or cardiologist to consider outpatient stress testing.**

- The HEART score is a prospectively studied scoring system to help acute care providers with access to troponin assays risk stratify chest pain patients and ultimately help predict who may be at high risk for having a major adverse cardiac event (MACE) within the next 6 weeks. Each of the 5 variables is scored 0, 1 or 2 depending on the level of concern.

Slide 1

HEART ♥

HEART score for chest pain patients		
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	Slightly suspicious	0
ECG	Significant ST-deviation	2
	Non specific repolarisation disturbance / LBTB / PM	1
	Normal	0
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	≤ 45 years	0
Risk factors	≥ 3 risk factors or history of atherosclerotic disease*	2
	1 or 2 risk factors	1
	No risk factors known	0
Troponin	≥ 3x normal limit	2
	> 1 and < 3x normal limit	1
	≤ 1x normal limit	0
		Total

*Risk factors for atherosclerotic disease:

Hypercholesterolemia   Cigarette smoking
Hypertension   Positive family history
Diabetes Mellitus   Obesity

thrive

Slide 2

HEART Score

Discriminative Power
This graph shows that the HEART score is a perfect predictor of MACE within six weeks after presentation at the emergency room. The X axis represents the increasing HEART score of a patient, while the Y axis indicates the increasing risk of a cardiac event. The S shaped curve represents a discrimination between low risk and high risk patients. Low HEART scores accompany a low likelihood of an ACS; high HEART scores predict high incidence of MACE.

Slide 3

HEART Score

HEART Score	Risk of MACE	Proposed Policy
0 - 3	1,6%	Discharge
4 - 6	13%	Admit for Clinical Observation and non-invasive Testing
7 - 10	50%	Aggressive Treatments Invasive Testing

Proposed Policy
Patients can be divided into three distinct groups. A score of 0-3 indicates a risk of 1.6% for reaching a MACE, and therefore supports a policy of early discharge.
In the case of a HEART score of 4-6 points, with a risk of MACE of 13%, immediate discharge is not an option. These patients should be admitted for clinical observation and subjected to non-invasive investigations such as repeated troponin or advanced ischemia detection. A HEART score ≥ 7 points, with a risk of 50% for a MACE, calls for early aggressive treatments possibly including invasive strategies without preceding non-invasive testing.

Risk Stratification

- Risk stratify the HEART score into 3 groups:
  - Low risk 0-2
  - Moderate risk 3-4
  - High risk >5

  - Not all risk factors are equal. For example:
    - ANY elevated troponin, particularly in the setting of a patient presenting with chest pain, deserves further work up.
    - A patient with a very ischemic looking EKG should be admitted for further work up, regardless of their HEART score.
    - A highly suspicious history should be listened to. This is your gestalt and it still matters.
    - Pay attention to the risk factors. A family history of MI in people in their 40s, or smokers with diabetes should scare you.

Recommendations for using the HEART Score

- Know your troponin. There are multiple different troponin assays with different values for normal.

- Every physician needs to know what generation assay they are using, what the abnormal value is and how soon it turns positive (the ultra-high sensitivity troponins are positive within 1 hour. These are being used in Europe, but not in the US).

- Most troponins in the US change within 2-3 hours. The current American Heart Association recommendations are at 0 and 3 hour repeat and this was the same time frame used in the HEART score study.

Question

A patient presents with typical symptoms of an acute coronary syndrome that have been present for about 1 hour, but troponin levels are normal. Which one of the following statements is correct about interpreting troponin levels in this patient?

A. Troponin levels quickly return to normal, so an elevated level might have been missed.
B. Troponin levels typically do not increase until 6 hours after cardiac damage, so myocardial infarction (MI) cannot be excluded.
C. Troponin levels typically do not increase until at least 24 hours after cardiac damage, so MI cannot be excluded.
D. Troponin levels are highly sensitive and MI can be excluded.
E. Troponins levels are highly specific and MI can be excluded.

Answer

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C. Troponin levels typically do not increase until at least 24 hours after cardiac damage, so MI cannot be excluded.
D. Troponin levels are highly sensitive and MI can be excluded.
E. Troponins levels are highly specific and MI can be excluded.

The correct answer is B. Troponin levels typically do not increase until approximately 6 hours after onset of chest pain, depending on when cardiac ischemia develops into necrosis.

Question

Your patient presents with acute onset of classic angina. No ST-segment elevations are found on electrocardiogram. You conclude the patient has either unstable angina or non-ST-segment elevation myocardial infarction (NSTEMI). Which one of the following is the key characteristic that distinguishes unstable angina from NSTEMI?

A. Angina at rest.
B. Normal electrocardiogram (ECG) results.
C. Previous angina that is now worsening.
D. ST-segment depression or T-wave inversion on ECG results.
E. Troponin level elevation.

Answer

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C. Previous angina that is now worsening.
D. ST-segment depression or T-wave inversion on ECG results.
E. Troponin level elevation.

The correct answer is E. Non-ST-segment elevation myocardial infarction and unstable angina (UA) cannot be distinguished until the troponin test results are known. If troponin levels do not rise, the diagnosis would be UA.

Cardiac Biomarkers

Nonischemic Etiologies of Troponin Level Elevation

Heart failure	Myocardial contusion
Pulmonary embolus	Extreme exertion
Myocarditis/pericarditis	Chemotherapy
Renal insufficiency	Cardioversion
Acute stroke/subarachnoid hemorrhage	Critical illness/sepsis
Severe pulmonary hypertension	Aortic dissection
Tachyarrhythmia's	Burns

Listed in approximate order of frequency.

Recommendations for using the HEART Score

- **If a patient has had chest pain or has been asymptomatic for 3+ hours, one troponin is sufficient.**

- **Time is of the essence with chest pain. If the patient is actively having chest pain, you cannot discharge them without a clear explanation for the pain.**

- Follow up recommendations. If a patient scores as low risk and you discharge them home, the American Heart Association recommends referral for stress testing within 3 days. In most systems, though, this does not happen.

Question

As a general rule, how soon should a low-risk patient who has been discharged from the hospital after an acute coronary syndrome be seen for a follow-up outpatient visit?

A. 1 to 2 days.
B. 1 week.
C. 2 to 6 weeks.
D. 2 months.

Answer

As a general rule, how soon should a low-risk patient who has been discharged from the hospital after an acute coronary syndrome be seen for a follow-up outpatient visit?

A. 1 to 2 days.
B. 1 week.
C. 2 to 6 weeks.
D. 2 months.

The correct answer is C. American College of Cardiology/American Heart Association guidelines recommend that low-risk patients who have been discharged from the hospital be seen in the outpatient setting at 2 to 6 weeks.

Question

A patient presents to your small rural hospital with symptoms and electrocardiographic findings of ST-segment elevation myocardial infarction. Your hospital does not have the capabilities to perform percutaneous coronary interventions (PCIs), such as angiography or stent placement. Which one of the following is the optimal treatment for this patient?

A. Admit to the hospital and administer fibrin specific fibrinolytic drug infusion.
B. Admit to the hospital and administer a nonfibrin-specific fibrinolytic drug infusion.
C. Transfer to a PCI center and administer fibrinolytic drug infusion during transport.
D. Transfer to a PCI center, assuming PCI can be performed within 90 minutes of first medical contact at your hospital.
E. Transfer to a PCI center regardless of the length of time it will take for transfer to be accomplished.

Answer

A patient presents to your small rural hospital with symptoms and electrocardiographic findings of ST-segment elevation myocardial infarction. Your hospital does not have the capabilities to perform percutaneous coronary interventions (PCIs), such as angiography or stent placement. Which one of the following is the optimal treatment for this patient?

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D. Transfer to a PCI center, assuming PCI can be performed within 90 minutes of first medical contact at your hospital.
E. Transfer to a PCI center regardless of the length of time it will take for transfer to be accomplished.

The correct answer is D. Patients with ST-segment elevation myocardial infarction should be transferred to a percutaneous coronary intervention (PCI) center if the PCI can be performed within 90 minutes of first medical contact.

Recommendations for using the HEART Score

- Use the HEART score in addition to your clinical judgement.

- Do not use the HEART score as the single algorithm that you use to evaluate chest pain.

- Calculate it, carefully study the EKG, use your gestalt, and talk with the patient to make the decision together.

- Give the patient the numbers and the choice: do they want to stay for more tests, do they want to follow up with their PCP, do they want a stress test now or later this week?

- There is more to come. The HEART score has been validated by 2 separate studies but is still in its infancy and is undergoing much more validation. In the coming years we will know more about how and when to use it, and which patients should fall out of the pathway.