

**Mc
Graw
Hill**

Medical

PEARLS
OF WISDOM

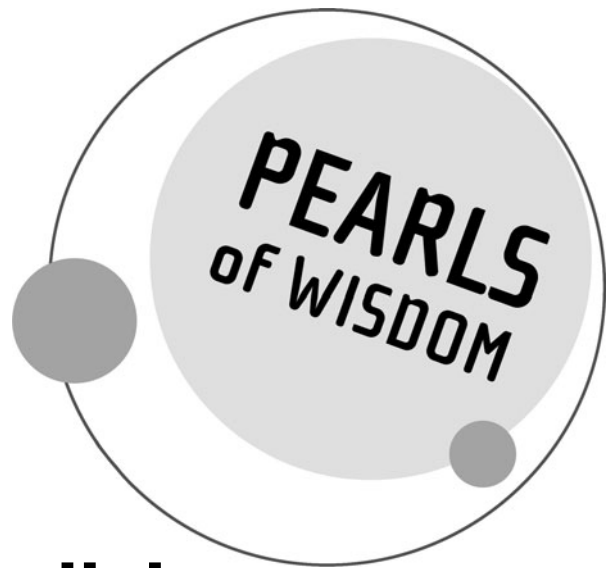
Emergency Medicine Q&A

**CONCISE
RAPID
EFFECTIVE**

● Third Edition

- 800+ board-style questions, answers, and explanations
- Completely revised content and design
 - Answers include must-know pearls
- Covers all topics on the emergency medicine written board exam
 - Great for certification and re-certification
- New chapter on the prehospital and administrative aspects of EM

Joseph Lex



Emergency Medicine

Q&A

Third Edition

Edited by
Joseph Lex, MD, FACEP, FAAEM
Associate Professor
Department of Emergency Medicine
Temple University School of Medicine
Philadelphia, Pennsylvania



New York Chicago San Francisco Lisbon London Madrid Mexico City Milan
New Delhi San Juan Seoul Singapore Sydney Toronto

Copyright © 2009, 2006 by The McGraw-Hill Companies, Inc. All rights reserved. Except as permitted under the United States Copyright Act of 1976, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written permission of the publisher.

ISBN: 978-0-07-154470-2

MHID: 0-07-154470-4

The material in this eBook also appears in the print version of this title: ISBN: 978-0-07-154469-6, MHID: 0-07-154469-0.

All trademarks are trademarks of their respective owners. Rather than put a trademark symbol after every occurrence of a trademarked name, we use names in an editorial fashion only, and to the benefit of the trademark owner, with no intention of infringement of the trademark. Where such designations appear in this book, they have been printed with initial caps.

McGraw-Hill eBooks are available at special quantity discounts to use as premiums and sales promotions, or for use in corporate training programs. To contact a representative please e-mail us at bulksales@mcgraw-hill.com.

Medicine is an ever-changing science. As new research and clinical experience broaden our knowledge, changes in treatment and drug therapy are required. The author and the publisher of this work have checked with sources believed to be reliable in their efforts to provide information that is complete and generally in accord with the standards accepted at the time of publication. However, in view of the possibility of human error or changes in medical sciences, neither the author nor the publisher nor any other party who has been involved in the preparation or publication of this work warrants that the information contained herein is in every respect accurate or complete, and they disclaim all responsibility for any errors or omissions or for the results obtained from use of the information contained in this work. Readers are encouraged to confirm the information contained herein with other sources. For example and in particular, readers are advised to check the product information sheet included in the package of each drug they plan to administer to be certain that the information contained in this work is accurate and that changes have not been made in the recommended dose or in the contraindications for administration. This recommendation is of particular importance in connection with new or infrequently used drugs.

TERMS OF USE

This is a copyrighted work and The McGraw-Hill Companies, Inc. ("McGraw-Hill") and its licensors reserve all rights in and to the work. Use of this work is subject to these terms. Except as permitted under the Copyright Act of 1976 and the right to store and retrieve one copy of the work, you may not decompile, disassemble, reverse engineer, reproduce, modify, create derivative works based upon, transmit, distribute, disseminate, sell, publish or sublicense the work or any part of it without McGraw-Hill's prior consent. You may use the work for your own noncommercial and personal use; any other use of the work is strictly prohibited. Your right to use the work may be terminated if you fail to comply with these terms.

THE WORK IS PROVIDED "AS IS." MCGRAW-HILL AND ITS LICENSORS MAKE NO GUARANTEES OR WARRANTIES AS TO THE ACCURACY, ADEQUACY OR COMPLETENESS OF OR RESULTS TO BE OBTAINED FROM USING THE WORK, INCLUDING ANY INFORMATION THAT CAN BE ACCESSED THROUGH THE WORK VIA HYPERLINK OR OTHERWISE, AND EXPRESSLY DISCLAIM ANY WARRANTY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. McGraw-Hill and its licensors do not warrant or guarantee that the functions contained in the work will meet your requirements or that its operation will be uninterrupted or error free. Neither McGraw-Hill nor its licensors shall be liable to you or anyone else for any inaccuracy, error or omission, regardless of cause, in the work or for any damages resulting therefrom. McGraw-Hill has no responsibility for the content of any information accessed through the work. Under no circumstances shall McGraw-Hill and/or its licensors be liable for any indirect, incidental, special, punitive, consequential or similar damages that result from the use of or inability to use the work, even if any of them has been advised of the possibility of such damages. This limitation of liability shall apply to any claim or cause whatsoever whether such claim or cause arises in contract, tort or otherwise.

CONTENTS

Contributors	v
Introduction	ix
1. Resuscitation	1
2. Abdominal and Gastrointestinal Emergencies	25
3. Cardiovascular Emergencies	45
4. Cutaneous Emergencies	63
5. Endocrine and Metabolic Emergencies	71
6. Environmental Emergencies	83
7. Head, Eye, Ear, Nose, and Throat Emergencies	99
8. Hematologic and Oncologic Emergencies	115
9. Immunologic Emergencies	123
10. Systemic Infectious Emergencies	131
11. Nontraumatic Musculoskeletal Emergencies	151
12. Neurologic Emergencies	161
13. Obstetric and Gynecologic Emergencies	175

14. Psychobehavioral Emergencies	187
15. Renal and Urogenital Emergencies	199
16. Thoracic and Respiratory Emergencies	211
17. Toxicologic Emergencies	233
18. Traumatic Emergencies	251
19. Pediatric Emergencies	283
20. Medical Imaging	309
21. Administrative Emergency Medicine, Emergency Medical Services, and Ethics	329
Bibliography	345

CONTRIBUTORS

Stephanie Barbetta, MD
Assistant Professor
Department of Emergency Medicine
Temple University School of Medicine
Philadelphia, Pennsylvania
Cutaneous Emergencies
Head, Eye, Ear, Nose, and Throat Emergencies

Jeffrey Barrett, MD, FAAEM
Assistant Professor
Department of Emergency Medicine
Temple University School of Medicine
Philadelphia, Pennsylvania
Traumatic Emergencies

Thomas B. Barry, MD
Department of Emergency Medicine
Temple University School of Medicine
Philadelphia, Pennsylvania
Obstetric and Gynecologic Emergencies

Colin M. Bucks, MD
Department of Emergency Medicine
Albert Einstein Medical Center
Philadelphia, Pennsylvania
Thoracic and Respiratory Emergencies

Thomas G. Costantino, MD
Assistant Professor
Department of Emergency Medicine
Temple University School of Medicine
Philadelphia, Pennsylvania
Medical Imaging

Manish Garg, MD, FAAEM
Assistant Professor and Associate Residency
Program Director
Department of Emergency Medicine
Temple University School of Medicine
Philadelphia, Pennsylvania
Environmental Emergencies
Psychobehavioral Emergencies

Liza D. Lê, MD
Clinical Instructor
Department of Emergency Medicine
Temple University School of Medicine
Philadelphia, Pennsylvania
*Administrative Emergency Medicine, Emergency
Medical Services, and Ethics*

Joseph Lex, MD, FACEP, FAAEM
Associate Professor
Department of Emergency Medicine
Temple University School of Medicine
Philadelphia, Pennsylvania
*Abdominal and Gastrointestinal
Emergencies*
Cardiovascular Emergencies
Endocrine and Metabolic Emergencies
*Nontraumatic Musculoskeletal
Emergencies*
Neurologic Emergencies

Raemma Paredes Luck, MD, MBA
Director of Research
Department of Emergency Medicine
St. Christopher's Hospital for Children
Associate Professor
Department of Pediatrics and Emergency
Medicine
Temple University School of Medicine
Philadelphia, Pennsylvania
Pediatric Emergencies

Richard Martin, MD, FAAEM
Assistant Professor
Department of Emergency Medicine
Temple University School of Medicine
Philadelphia, Pennsylvania
*Administrative Emergency Medicine, Emergency
Medical Services, and Ethics*

Scott H. Plantz, MD, FAAEM
Associate Clinical Professor of Emergency Services
Rosalind Franklin University of Medicine and Science
Chicago Medical School
Chicago, Illinois
Head, Eye, Ear, Nose, and Throat Emergencies
Administrative Emergency Medicine, Emergency
Medical Services, and Ethics

Jane M. Prosser, MD
Fellow, Medical Toxicology
New York City Poison Center
New York University Medical Center
New York, New York
Toxicologic Emergencies

Mark Saks, MD, MPH
Assistant Professor
Department of Emergency Medicine
Drexel University College of Medicine
Philadelphia, Pennsylvania
Systemic Infectious Emergencies
Renal and Urogenital Emergencies

Sachin J. Shah, MD, MBA, FAAEM
Assistant Professor
New York Medical College
Attending Physician
Emergency Medical Associates
Westchester Medical Center
Valhalla, New York
Hematologic and Oncologic Emergencies
Immunologic Emergencies

David A. Wald, DO
Associate Professor
Department of Emergency Medicine
Temple University School of Medicine
Philadelphia, Pennsylvania
Resuscitation

EDITORS, SECOND EDITION

Joseph Lex, MD, FACEP, FAAEM
Associate Professor of Emergency Medicine
Temple University School of Medicine
Philadelphia, Pennsylvania

Lance W. Kreplick, MD, MMM, FAAEM
Medical Director of Hyperbaric Medicine
Fawcett Wound Management and Hyperbaric
Medicine
Company Care Occupational Health Services
President and Chief Executive Officer
QED Medical Solutions, LLC
Port Charlotte, Florida

Scott H. Plantz, MD, FAAEM
Associate Clinical Professor of Emergency
Services
Rosalind Franklin University of Medicine and
Science
Chicago Medical School
Chicago, Illinois

Daniel Girzadas, Jr., MD
Department of Emergency Medicine
EHS Christ Hospital and Medical Center
Oak Lawn, Illinois

**CONTRIBUTING AUTHORS,
SECOND EDITION**

Stephanie Barbetta, MD
Tom Barry, MD, FAAEM
Leslie “Toby” Carroll, MD, FAAEM, ABMT
Michael DeAngelis, MD, FAAEM
Manish Garg, MD, FAAEM
Nina Gentile, MD, FAAEM
Sachin Shah, MD, FAAEM

**CONTRIBUTING AUTHORS,
FIRST EDITION**

Dirk H. Alander, MD
Sarah Alander, MD
Edward G. Arevalo, MD

Steven M. Barret, MD
Eric Benink, MD
Tina M.H. Blair, MD
Jack P. Campbell, MD
Robert Cates, MD
Steven G. Chilinski, MD
Woody Chung, MD
Jesse A. Cole, MD
Vernon Cook, Jr., MD
Wesley A. Curry, MD
Irving Danesh, MD
Terry Davis, MD, JD
Charles A. Denton, MD
Bernard J. Feldman, MD
Juan F. Fitz, MD
Denise Fligner, MD
Peter O. Fried, MD
Katherine M. Gillogley, MD
Daniel Girzadas, Jr., MD
William Gossman, MD
Robert C. Harwood, MD
Gabrial Haas, MD
Suchinta Hakim, MD
Bruce S. Heischober, MD
Harold Hirsh, MD, JD
N. Eric Johnson, MD, MPH
Robert Johnson, MD
Kevin M. Kavanaugh, MD
Jane Kreplick, BSN, JD
Jon R. Kroemer, MD
Gordon Larsen, MD
Paul G. Lehmitz, MD
A. S. Lorenzo, MD
Nicholas Y. Lorenzo, MD
Ronald B. Low, MD
Henry C. Maguire, Jr., MD
David L. McCarty, MD
Michael W. Mott, MD
Robert L. Muelleman, MD
Robert K. Nakamura, MD
Carol Newman, MD
Cliff O’Callahan, MD
Joyce O’Shaughnessy, MD
Robert G. Penn, MD
Brian Pierce, MD
Kent Reckewey, MD
Augusta Saulys, MD

Randolph P. Scott, PharmD, PhD, MD
Barbara Shufeldt, MD
Steven Smarcus, MD
Susan K. Sucha, MD
James Sullivan, MD

Peter C. Valco, MD
Richard A. Walker, MD
H. Neil Wigder, MD
Lyle W. Williams, MD
Thomas N. Wise, MD

INTRODUCTION

Emergency Medicine Q&A: Pearls of Wisdom has been designed to provide physicians with a comprehensive, relevant, and convenient instrument for self-evaluation and review. The question type is in accordance with the format of the American Board of Emergency Medicine certification examination. Although this book should be helpful to residents preparing for the certification examination, it should also be useful for physicians in practice who are interested in maintaining a high level of competence in emergency medicine. Study of this review book should help to (1) identify areas of relative weakness; (2) confirm areas of expertise; (3) assess knowledge of the sciences fundamental to emergency medicine; (4) assess clinical judgment and problem-solving; and (5) introduce recent developments in emergency medicine.

Each question in the book is accompanied by an answer and a paragraph of explanation. A bibliography listing the sources used in the book follows the last chapter.

Perhaps the most effective way to use this book is to allow yourself one minute to answer each question in a given chapter. As you proceed, indicate your answer beside each question. When you have finished answering the questions in a chapter, you should then spend time verifying your answers and carefully reading the explanations. Although you should pay special attention to the explanations for the questions you answered incorrectly, you should read every explanation. The authors of this book have designed the explanations to reinforce and supplement the information tested by the questions. If, after reading the explanations for a given chapter, you feel that you require more information regarding the material covered, you should consult and study the references listed in the bibliography.

Joseph Lex, MD, FACEP, FAAEM

This page intentionally left blank

David A. Wald, DO

1. **A previously healthy 54-year-old man presents to the emergency department complaining of chest pain. His EKG shows an acute inferior wall myocardial infarction. His blood pressure is 90/60 mm Hg. On physical examination, he has jugular vein distention and clear lungs. You should treat him immediately with which of the following:**
 - a. Intravenous fluids.
 - b. Norepinephrine.
 - c. Dopamine.
 - d. Nesiritide.
 - e. Nitroprusside.

The answer is a. This patient's presentation is consistent with a right ventricular infarction complicating an inferior myocardial infarction (MI). Approximately one-third of patients with acute inferior wall MIs are complicated by a right ventricular infarct. The appropriate initial treatment is to "fill the tank"—intravenous fluids.

2. **When considering the diagnosis of acute aortic dissection, which of the following statement is true:**
 - a. Associated syncope occurs in up to 15% of patients.
 - b. Neurologic symptoms occur in less than 5% of cases.
 - c. Proximal dissections involving left coronary artery are most common and occur in approximately 10% of cases.
 - d. Aortic dissection is rare in patients younger than 40 years.
 - e. An extremity pulse deficit occurs in up to 30% of cases.

The answer is d. The incidence of syncope in patients with aortic dissection occurs in up to 9% of cases. Neurologic symptoms including focal deficits and or altered mental status has been noted to occur in up to 17% of cases of aortic dissection. Proximal dissections involving the ostium of a coronary artery are rare, occurring in up to 3% of cases. When present, it most frequently involves the right coronary artery. An extremity pulse deficit (upper) has been known to occur in up to 15% of cases.

3. **A 54-year-old man presents with two episodes of hematemesis since yesterday. The most likely cause of this patient's upper gastrointestinal bleeding is:**

- a. Gastritis.
- b. Esophagitis.
- c. Esophageal varices.
- d. Peptic ulcer disease.
- e. Mallory-Weiss tear.

The answer is d. Listed in decreasing frequency, the causes of upper GI bleeding are peptic ulcer disease, gastric erosions, esophageal varices, Mallory-Weiss tear, esophagitis, and duodenitis.

4. **Regarding outcomes after resuscitation from prehospital cardiac arrest:**

- a. 60% of patients successfully resuscitated will survive to hospital discharge.
- b. Survival rates are the same in prehospital systems using only basic emergency medical technicians versus those systems using paramedics.
- c. Early in-hospital deaths are attributed to complications of sepsis.
- d. Late in-hospital deaths are attributed to complications of anoxic encephalopathy.
- e. Less than 10% of patients surviving to hospital discharge have persistent neurologic deficits.

The answer is d. Less than 50% of patients successfully resuscitated will survive to hospital discharge. Resuscitation and survival rates are the highest in prehospital systems that employ paramedics. Early in-hospital deaths are attributed to cardiogenic shock and dysrhythmias. Of patients surviving to hospital discharge, one-third have persistent neurologic deficits.

5. **Succinylcholine:**

- a. Is associated with catecholamine release leading to sinus tachycardia.
- b. Is associated with life-threatening hyperkalemia in patients with an acute burn injury.
- c. Exerts its effects by binding competitively with acetylcholine receptors on the motor end plate.
- d. Should be avoided in patients suspected of having reduced cholinesterase activity, such as in pregnancy or in liver disease.
- e. Retains more than 90% of its original activity when stored at room temperature for up to 3 months.

The answer is e. Although at times it is difficult to distinguish the effects of succinylcholine from the effects of laryngoscopy and intubation, it causes cardiac muscarinic receptor stimulation leading to bradycardia. Acute trauma such as burn injuries is not a contraindication to the use of succinylcholine. The effects of succinylcholine are exerted by its noncompetitive binding with acetylcholine receptors on the motor end plate. It is not necessary to avoid succinylcholine in any patient suspected of having reduced pseudocholinesterase activity.

6. **Shortly after delivery, a newborn was noted to have good muscle tone and movement of all extremities, a heart rate of 90/min, sneezing, coughing, a loud cry, and pink color over the entire body. Her Apgar score is:**

- a. 6.
- b. 7.
- c. 8.
- d. 9.
- e. 10.

Table 1–1 Apgar Scoring Method for Condition of a Newborn Infant

Sign	0 Points	1 Point	2 Points
Activity (muscle tone)	Absent	Arms and legs flexed	Active movement
Pulse	Absent	<100 bpm	>100 bpm
Grimace (reflex irritability)	None	Grimace	Sneeze, cough, pulls away
Appearance (color)	Blue-gray, pale	Normal, except for extremities	Normal over entire body
Respirations	Absent	Slow, irregular	Good, crying

The answer is d. Apgar scores (named after Virginia Apgar, who first described them) are taken at 1 minute and 5 minutes, and repeated every 15 minutes if the score is less than 7. Table 1–1 shows the scoring method.

7. The medication of choice to treat a patient in torsades de pointes is:

- a. Epinephrine.
- b. Flecainide.
- c. Calcium gluconate
- d. Magnesium sulfate.
- e. Procainamide.

The answer is d. Torsades de pointes is a form of polymorphic ventricular tachycardia. Most episodes are associated with an acquired form of QT prolongation. Many of these cases can be treated medically with intravenous magnesium sulfate. Class IA and IC antiarrhythmic agents are contraindicated, they may worsen the dysrhythmia by further prolonging ventricular repolarization.

8. A 45-year-old man is brought to the ED after suffering a 40% body surface area partial- and full-thickness burn. His estimated body weight is 80 kg. Using the Parkland fluid resuscitation formula, how much lactated Ringer’s (LR) solution would you administer to this patient in the first 8 hours postburn?

- a. 4400 mL.
- b. 5400 mL.
- c. 6400 mL.
- d. 7400 mL.
- e. 8400 mL.

The answer is c. The Parkland fluid resuscitation formula for burn patients is used as follows: LR solution (4 mL/kg/% total body surface area burned) is administered intravenously in the first 24 hours, half of the volume is to be given in the first 8 hours and the other half over the next 16 hours. In this case, $40\% \times 4 \text{ mL/kg} \times 80 \text{ kg} = 12,800 \text{ mL}$, half 6,400 mL over the first 8 hours.

9. You are caring for a patient with severe COPD who will require intubation and mechanical ventilation. To limit or prevent the development of dynamic hyperinflation, your next step should be:

- a. Increase the minute ventilation.
- b. Increase the expiratory flow rates of the ventilator.
- c. Increase the I–E ratio of the ventilator.
- d. Reduce the FIO₂.
- e. Intubate with a small diameter endotracheal tube.

The answer is c. Dynamic hyperinflation can occur in patients with COPD because of inadequate expiratory time leading to air trapping. This dynamic hyperinflation can result in an increased work of breathing for the patient. Ways to counteract this can include minimizing the tidal volume to reduce exhaled volume, increase the expiratory flow rates, increase the I–E ratio of the ventilator, the use of bronchodilators and corticosteroids may also be of help. Externally applied PEEP may also be of assistance in counteracting the intrinsic PEEP (auto PEEP).

10. A 4-year-old boy is in severe respiratory distress after a motor vehicle crash. He was ejected from the vehicle and has major facial and head trauma. When managing his airway, you should:

- a. Use an appropriately sized laryngeal mask airway to limit the likelihood of aspiration.
- b. Perform a needle cricothyrotomy rather than a formal surgical cricothyrotomy if you cannot intubate or ventilate.
- c. Extend the neck to improve visualization of the airway structures.
- d. Attempt blind nasotracheal intubation with an appropriate size endotracheal tube.
- e. Avoid succinylcholine because of the acute trauma.

The answer is b. Laryngeal mask airways may be used as a rescue device in this age, but they do not protect against aspiration of stomach contents. Needle cricothyrotomy is preferred over formal surgical cricothyrotomy in young children because of the size of the small cricothyroid membrane. The tracheal opening is located more anterior and superior than in adults. In this case, hyperextension of the neck is contraindicated because of the potential for cervical spine injury after trauma. Blind nasotracheal intubation is not performed in young children, especially in patients after head and facial trauma. Succinylcholine is not contraindicated in acute trauma.

11. A 32-year-old woman complains of near syncope and lightheadedness. Her heart rate is 186/min and her blood pressure is 132/76 mm Hg. She has a history of Wolff-Parkinson-White syndrome. Her EKG shows a wide complex irregular tachycardia with ventricular preexcitation. The medication of choice is:

- a. Adenosine.
- b. Propranolol.
- c. Diltiazem.
- d. Digoxin.
- e. Procainamide.

The answer is e. This patient is presenting with atrial fibrillation with WPW. All AV nodal blocking agents are contraindicated in this case, including beta-blockers, calcium channel blockers, digoxin, and adenosine. Use of these agents may accelerate conduction through the accessory pathway and increase the ventricular response, leading to ventricular fibrillation. The medication of choice is procainamide.

12. **A 6-month-old infant is brought to the ED because of poor feeding. The infant is listless, but responds to pain. There are no palpable pulses and the cardiac monitor shows a narrow complex tachycardia with a rate of 250. The child weighs 8 kg. Your next step should be:**
- Administer verapamil 0.1 mg/kg slow IV push.
 - Administer digoxin 0.02 mg/kg IV.
 - Cardiovert immediately with 16 J.
 - Cardiovert immediately with 8 J.
 - Defibrillate immediately with 16 J.

The answer is d. This unstable patient requires immediate cardioversion using 0.5–1 J/kg. In a stable child, you can try adenosine 0.05–0.1 mg/kg IV. Intravenous digoxin may be used to treat SVT in the nonemergent situation, as it may take hours to be effective. Verapamil is contraindicated in children younger than 2 years because it can cause irreversible cardiovascular collapse. Defibrillation with 2 J/kg and standard pharmacologic therapy are used for treatment of VT.

13. **A 62-year-old woman presents with an altered mental status. She is responsive to painful stimuli and has a Glasgow Coma Scale score of 11. Blood pressure is 100/60 mm Hg and heart rate is 100/min. Physical examination reveals poor skin turgor and dry mucus membranes. EKG shows QT interval shortening. Laboratory findings are serum calcium 14.2 mg/dL, serum phosphorus 2.9 mg/dL, serum potassium 3.9 mEq/L, and creatinine 1.9 mg/dL. Your initial treatment should include:**
- Magnesium sulfate 2 gm slow IV push.
 - Pamidronate 60 mg IV.
 - Calcitonin 4 IU/kg.
 - Furosemide 60 mg IV after saline resuscitation.
 - Immediate hemodialysis.

The answer is d. The initial treatment of choice in this patient with severe hypercalcemia and dehydration is aggressive administration of saline and furosemide diuresis. Subsequent therapy is dictated by the cause and severity. The biphosphonates (pamidronate) and calcitonin are also effective in treating hypercalcemia, but they are usually not used in the ED, and would not be instituted until after the patient is rehydrated with IV fluids. Patients with renal failure and hypercalcemia may require dialysis.

14. **Which of the following statement regarding the use of cardiac markers in the evaluation of a patient with an acute coronary syndrome is true:**
- Myoglobin levels are not affected by renal failure.
 - A single troponin measurement on presentation can effectively rule out myocardial infarction.
 - Cardiac troponins are the best markers for identifying myocardial cell injury.
 - Total CPK levels are as specific as cardiac troponins in identifying myocardial cell injury.
 - CPK-MB fraction is not associated with false-positive test results.

The answer is c. Myoglobin levels are often elevated in patients with renal failure because of decreased clearance. A single troponin measured on ED presentation of a patient has limited utility in excluding an acute MI. Cardiac troponins have no ability to exclude unstable angina without myocardial infarction because cell injury is required to elevate the troponin and because of the time delay associated with the rise in levels. Total CPK levels are not as specific as cardiac troponins for identifying myocardial cell injury. CPK-MB fraction is associated with false-positive test results, and may occur in certain clinical conditions such as pericarditis and myocarditis.

15. The initial management of a patient in hemorrhagic shock should consist of:

- a. Rapid infusion of isotonic crystalloid fluids.
- b. Ensuring adequate oxygenation and ventilation.
- c. Pharmacologic support to maintain stable hemodynamics.
- d. Stabilization of all long bone fractures.
- e. Immediate transfusion of uncrossmatched blood.

The answer is b. As in most patients, the initial management revolves around evaluating and ensuring that the patient has adequate oxygenation and ventilation. The rapid infusion of isotonic crystalloids is part of the standard management after the airway is managed. Pharmacologic agents to support hemodynamics play essentially no role in the face of hemorrhagic shock. Stabilization of all long bones fractures is a secondary priority. The transfusion of uncrossmatched blood is often used in the scenario of refractory hypotension after crystalloid resuscitation.

16. The Combitube airway device:

- a. Is an acceptable alternative to endotracheal intubation as a primary airway management device.
- b. Is the preferred method of airway management in the prehospital setting.
- c. Is one of several rescue devices to be considered in the difficult airway.
- d. Will pass blindly into the tracheal most of the time.
- e. Placement cannot be confirmed by end-tidal CO₂ detectors, as it is unreliable in this device.

The answer is c. The esophageal tracheal Combitube does have a role in emergency airway management. Its role is primarily a substitute for endotracheal intubation by non-ETT-trained personnel; however, it may have a role as a primary intubating device in the prehospital setting. The Combitube has been used as a rescue device or as a primary intubating device in difficult airways. In the emergency department, its use should be restricted to a rescue device after failed oral intubation. The Combitube has virtually no role in the emergency department as a primary airway management device except in cardiopulmonary arrest when expertise for endotracheal intubation is not available.

17. You are preparing to intubate an obese patient (body weight 127 kg) with a history of sleep apnea. What would be the approximate desaturation time (SaO₂ < 90%) for this patient after paralysis if he was fully preoxygenated with an FiO₂ of 1.0:

- a. 1 minute.
- b. 3 minutes.
- c. 5 minutes.
- d. 7 minutes.
- e. 9 minutes.

The answer is b. All patients undergoing rapid sequence intubation should undergo preoxygenation if possible. The administration of 100% oxygen for 3 minutes of normal, tidal volume breathing in a healthy adult results in the establishment of an adequate oxygen reservoir to permit approximately 8 minutes of apnea before oxygen desaturation to less than 90% occurs. However, the time to desaturation to less than 90% in children, obese adults, late-term pregnant women, and patients with significant comorbidity is considerably less.

18. The benefits associated with the use of nitroglycerin in patients with acute coronary syndromes result primarily from:

- a. Pulmonary artery vasoconstriction.
- b. Decreasing myocardial preload.
- c. Increasing afterload.
- d. Coronary vasoconstriction.
- e. Inotropic support.

The answer is b. Nitroglycerin provides benefit to patients with an acute coronary syndromes by decreasing myocardial preload and to a lesser extent afterload. Nitroglycerin increase venous capacitance leading to venous pooling, a decrease in preload and myocardial oxygen demand. Coronary vasodilation may improve blood flow to ischemic myocardium.

19. You are managing a patient who is hypotensive, refractory to intravenous fluids. You decide to use a pure alpha-adrenergic agent, so choose:

- a. Dopamine.
- b. Dobutamine.
- c. Amrinone.
- d. Isoproterenol.
- e. Phenylephrine.

The answer is e. Adrenergic agents are divided into pure alpha-agents (phenylephrine), mixed alpha- and beta-agents (epinephrine, norepinephrine), and pure beta- or primarily beta-agonists (isoproterenol, dobutamine, dopamine). The alpha-receptors are found primarily in blood vessels, where alpha stimulation causes vasoconstriction. Beta-agonists work primarily on the heart and promote increased heart rate, increased contractility, and increased myocardial oxygen consumption. Beta₂ receptors are in smooth muscle of the bronchi, blood vessels, and uterus.

20. While caring for a patient with suspected pericardial tamponade, you would expect to find:

- a. Equalization of right and left ventricular pressures.
- b. Isolated systolic hypertension.
- c. A hyperdynamic precordium.
- d. Poor R wave progression on the 12-lead electrocardiogram.
- e. Mitral regurgitation.

The answer is a. Findings of cardiac tamponade may be influenced by volume and rate of accumulation. The classic physical examination finding is Beck's triad of jugular venous distention, hypotension, and muffled heart sounds. Echocardiography can confirm the diagnosis when paradoxical systolic wall motion abnormalities are seen in a patient with a pericardial effusion. A Swan-Ganz catheter can also be diagnostic when demonstrating equalization of right and left ventricular pressures.

21. **The most common diagnosis identified by computed tomography (CT) of the thorax in patients undergoing an evaluation for pulmonary embolism is:**

- a. Pneumonia.
- b. Unsuspected pericardial effusion.
- c. Mass suggesting new carcinoma.
- d. Aortic dissection.
- e. Pneumothorax.

The answer is a. Frequency of potentially important non-PE diagnoses disclosed on computed tomography: pneumonia (6%), unsuspected pericardial effusion (1%), mass suggesting new carcinoma (1%), aortic dissection (0.5%), and pneumothorax (0.5%).

22. **A 49-year-old dialysis patient presents with generalized weakness. His EKG shows peaked T waves and a widened QRS complex. The most appropriate initial therapy should include:**

- a. Intravenous glucose and insulin.
- b. Intravenous sodium bicarbonate.
- c. Intravenous calcium gluconate.
- d. Nebulized albuterol.
- e. Oral or rectal sodium polystyrene sulfonate (Kayexalate).

The answer is c. While nebulized albuterol will reliably lower the serum potassium rapidly, calcium salts act immediately by stabilizing cell membranes and is the recommended first line agent in the setting of a wide QRS complex. The duration of action of the calcium is approximately 20–40 minutes. Bicarbonate should not be used unless the patient is acidemic. The other therapies will reduce the serum potassium level but have longer onsets of action.

23. **You are managing a patient who is in acute pulmonary edema, with cool clammy skin. His blood pressure is 84/56 mm Hg. The medication of choice in this patient would be:**

- a. Epinephrine.
- b. Dobutamine.
- c. Vasopressin.
- d. Phenylephrine.
- e. Norepinephrine.

The answer is b. This patient is presenting with cardiogenic shock. In this case, to improve myocardial contractility, dobutamine and dopamine are the agents of choice begun in order at the same doses used for septic shock.

24. **A 72-year-old man with a history of COPD presents to the emergency department with a complaint of progressive shortness of breath. His preintubation arterial blood gas analysis on a non-rebreather face mask shows a pH of 7.22, a PCO₂ of 71 mm Hg, and a PO₂ of 68 mm Hg. Suggested initial ventilator settings in this patient would be:**

- a. Tidal volume 6 mL/kg and respiratory rate 6/min.
- b. Tidal volume 8 mL/kg and respiratory rate 10/min.
- c. Tidal volume 10 mL/kg and respiratory rate 12/min.
- d. Tidal volume 12 mL/kg and respiratory rate 12/min.
- e. Tidal volume 12 mL/kg and respiratory rate 14/min.

The answer is b. This patient with COPD has arterial blood gas values that support the diagnosis of acute on chronic respiratory acidosis. Initial ventilator settings in patients with COPD should include tidal volume (5–10 mL/kg) and respiratory rate (10–12/min).

25. The vascular access which is least desirable in a patient of cardiac arrest is the:

- a. Peripheral antecubital vein.
- b. Subclavian vein.
- c. Internal jugular vein.
- d. Brachial vein
- e. Femoral vein.

The answer is e. A peripheral vein should be the first choice for IV access in patients with cardiac arrest. Central venous access is an alternative, and if performed, preferred site would be the internal jugular vein to limit interruption of CPR that at times occurs with the insertion of a subclavian line. Because subdiaphragmatic flow is minimal, femoral vein cannulation should be avoided.

26. The recommended initial therapy for a patient suffering a severe allergic reaction to a bee sting is:

- a. Albuterol.
- b. Cimetidine.
- c. Dopamine.
- d. Epinephrine.
- e. Norepinephrine.

The answer is d. Epinephrine is the hallmark of anaphylaxis management. Cold compresses, antihistamines, nonsteroidal anti-inflammatory agents, and corticosteroids are indicated in localized reactions from hymenoptera stings.

27. Prehospital caregivers can shorten door-to-balloon time for patients with an acute myocardial infarction by:

- a. Administering aspirin to patients with chest pain.
- b. Establishing intravenous access during transport.
- c. Determining prior allergy to lytic agents.
- d. Transmitting the ECG while en route to the ED.
- e. Using lights and siren while transporting the patient.

The answer is d. Transmitting the ECG has been shown to be the most effective way of reducing door-to-balloon time in a patient arriving from the prehospital setting.