

TEACHING IMMUNIZATION

→ *for Medical Education*

REVISED BY

Richard Kent Zimmerman, MD, MPH
2006



SPONSORED BY

Association for Prevention Teaching and Research
Centers for Disease Control and Prevention



DEVELOPED BY

Richard K. Zimmerman, MD, MPH
W. Scott Schroth, MD, MPH
Frederick L. Ruben, MD
Janine E. Janosky, PhD
Ellen R. Ahwesh, MA
Tammy A. Mieczkowski, MA

From the Department of Family Medicine and Clinical Epidemiology, University of Pittsburgh School of Medicine (RKZ, JEJ, ERA, TAM); Division of Infectious Disease, University of Pittsburgh School of Medicine (FLR); Department of Health Care Sciences, George Washington University Medical Center (WSS).



FOR MORE INFORMATION

The Association for Prevention Teaching and Research (APTR) can be contacted at (202) 463-0550 for additional information.
For additional copies of materials, call 1-800-789-6737.



Copyright © 2006 by the Association for Prevention Teaching and Research

HEPATITIS B PREVENTION

Facilitator's Guide



DEPARTMENT OF FAMILY MEDICINE
UNIVERSITY OF PITTSBURGH

This project was supported by funding from the Centers for Disease Control and Prevention (CDC), National Center for Immunization and Respiratory Diseases, through Cooperative Agreement U50/CCU300860-10 to the Association for Prevention Teaching and Research.

TEACHING IMMUNIZATION

→ *for Medical Education*

ACKNOWLEDGMENTS

The following people have been invaluable to this project and their work is greatly appreciated.

ASSOCIATION FOR PREVENTION TEACHING AND RESEARCH

William H. Barker, MD, Chair, Immunization in Medical Education Advisory Committee
Rose Marie Matulionis, MSPH
Donna A. Page, MPH
Jennifer Hamborsky, MPH

CENTERS FOR DISEASE CONTROL AND PREVENTION

Patricia D. Brugliera, RN, MPH
Raymond A. Strikas, MD
William L. Atkinson, MD, MPH
Linda A. Moyer, RN, BS
Eric E. Mast, MD, MPH
Cynthia Sayers

UNIVERSITY OF PITTSBURGH

Daniel P. Morrison, MPhil
Steven L. Kanter, MD



IMMUNIZATION IN MEDICAL EDUCATION ADVISORY COMMITTEE

The following people have been invaluable to this project and their work is greatly appreciated.

William H. Barker, MD

Chair, Immunization in Medical Education Advisory Committee
Associate Professor of Community and
Preventive Medicine and Gerontology
University of Rochester School of Medicine
Association for Prevention Teaching and Research

James R. Allen, MD, MPH

Vice President, Science, Technology, and Public Health Standards
American Medical Association

M. Brownell Anderson, MEd

Associate Vice President, Educational Programs
Association of American Medical Colleges

Laurence A. Carr, PhD

Associate Dean for Curriculum
University of Louisville School of Medicine
Association of American Medical Colleges

Richard Clover, MD

Professor and Chairman, Family and Community Medicine
University of Louisville School of Medicine
Society of Teachers of Family Medicine

Suzanne Dandoy, MD, MPH

Virginia District Health Director
American College of Preventive Medicine

George D. Falus, PhD

Director of Program Development
Interamerican College of Physicians and Surgeons

J. Martin Kaplan, MD

Professor of Clinical Pediatrics
Hahnemann University
American Academy of Pediatrics

F. Marc LaForce, MD

Physician-in-Chief
The Genesee Hospital
University of Rochester School of Medicine
American College of Physicians

Kristin L. Nichol, MD, MPH

Acting Chief, Medical Service
Minneapolis Veterans Affairs Medical Center
Society of General Internal Medicine

John K. Podgore, DO, FAAP

Acting Chairman, Department of Pediatrics
University of North Texas Health Science Center at Fort Worth
American Osteopathic Association

Richard Schwarz, MD

Professor, Department of Obstetrics and Gynecology
State University of New York Health Science Center at Brooklyn
Past President, American College of Obstetricians and
Gynecologists

Jessie L. Sherrod, MD, MPH, FAAP

Director of Infectious Disease Control and Prevention
Assistant Professor Pediatric Infectious Disease
Charles R. Drew University of Medicine and Science
President, Pediatric Section, National Medical Association

CONSULTANTS

W. Scott Schroth, MD, MPH

Assistant Professor of Health Care Sciences and Medicine
George Washington University School of Medicine

Gail Povar, MD, MPH

Clinical Professor of Health Care Sciences and Medicine
George Washington University School of Medicine

PAST ADVISORY COMMITTEE MEMBERS

Hannah L. Hedrick, PhD

Director, Division of Medical Education Products
American Medical Association

Carlos J.M. Martini, MD, MPH, MSc

formerly of the American Medical Association

•

CONTENTS

| | |
|-----------------------------------------------------------------------|--------|
| Hepatitis B Nomenclature | page 5 |
| Other Terminology | page 5 |
| Module Organization | page 5 |
| The Teaching Immunization for Medical Education (TIME) Project | page 5 |

Information for Facilitators

| | |
|----------------------------------------------------------------------------|---------|
| • Background on the Multistation Clinical Teaching Scenarios (MCTS) Method | page 7 |
| • MCTS Module Development and Evaluation | page 8 |
| • Strategies for Using the MCTS Module | page 9 |
| • Preparation List for the Facilitator | page 10 |
| • Suggested Schedule for MCTS Session | page 10 |
| • Sources of Information on Hepatitis B Vaccine | page 11 |
| • References | page 12 |

| | |
|-------------------|---------|
| Objectives | page 13 |
|-------------------|---------|

Module Pages

| Facilitator's Version | Small Group Booklet |
|------------------------------|----------------------------|
| • Scenario 1 page 14 | page 8 |
| • Scenario 2 page 17 | page 10 |
| • Scenario 3 page 19 | page 11 |
| • Scenario 4 page 21 | page 12 |
| • Scenario 5 page 23 | page 13 |
| • Scenario 6 page 26 | page 14 |

| | |
|--------------------------------|---------|
| Hepatitis B Sample Test | page 28 |
|--------------------------------|---------|

| | |
|------------------------------------|---------|
| Hepatitis B Test Answer Key | page 30 |
|------------------------------------|---------|



HEPATITIS B NOMENCLATURE

| | | | |
|-------|-----------------------------|--------------|-----------------------------|
| HBV | Hepatitis B virus | Anti-HBs | Antibody to HBsAg |
| HBsAg | Hepatitis B surface antigen | Anti-HBe | Antibody to HBeAg |
| HBeAg | Hepatitis B e antigen | Anti-HBc | Antibody to HBcAg |
| HBcAg | Hepatitis B core antigen | IgM anti-HBc | IgM class antibody to HBcAg |
| HBIG | Hepatitis B immune globulin | | |

OTHER TERMINOLOGY

Commercial sex worker – used interchangeably with the word *prostitute*
 Injection-drug user – refers to persons who illegally use injectable drugs

MODULE ORGANIZATION

Multistation clinical teaching scenarios (MCTS) were developed to encourage active learning in a small-group setting with a modest amount of faculty time. The Hepatitis B Prevention MCTS module consists of two booklets:

Facilitator's Guide

This manual includes all contents of the *Small-Group Booklet*, as well as information about the development and history of the module, instructions for the facilitator, and suggested teaching points for each scenario.

Small-Group Booklet

Each small group of 3 to 5 students or residents should receive one *Small-Group Booklet*. Extra copies are available from the Association for Prevention Teaching and Research's website: www.atpm.org. The booklet contains a list of the session's objectives, the module pages (each presenting a case scenario and questions to answer), related learning aids, e.g., graphs, and abstracts.

THE TEACHING IMMUNIZATION FOR MEDICAL EDUCATION (TIME) PROJECT

The Teaching Immunization for Medical Education (TIME) Project is a collaboration of the Association for Prevention Teaching and Research (APTR) and the Centers for Disease Control and Prevention (CDC).¹ An Advisory Committee of representatives from professional and educational organizations* provides guidance on all activities of the project. A survey to assess the current teaching about immunization in medical schools and residency programs was conducted.^{2,3} In response to deficiencies revealed by the survey, the Advisory Committee envisioned a resource to assist the educator and to provide information to practicing physicians. From a framework of core curriculum objectives, the *TIME Resource* was created to offer a variety of educational modules for integration into existing curricula or for self-study by practicing physicians.

*The organizations include the American Academy of Pediatrics, the American College of Obstetricians and Gynecologists, the American College of Physicians, the American College of Preventive Medicine, the American Medical Association, the American Osteopathic Association, the Association of American Medical Colleges, the Association for Prevention Teaching and Research, the Centers for Disease Control and Prevention (CDC), the Interamerican College of Physicians and Surgeons, the National Medical Association, the Society of General Internal Medicine, and the Society of Teachers of Family Medicine.

**The TIME Resource includes:**

- Traditional didactic modules which present review articles for hepatitis B, influenza, and measles. These modules, the results of the medical school and residency surveys, and core curriculum objectives, were published as a supplementary issue to the *American Journal of Preventive Medicine*.^{4,7}
- Slide sets to accompany the modules for didactic presentation on hepatitis B, influenza, and measles.
- Case-based materials, in two formats, developed by a multidisciplinary team and widely field-tested:

Problem-Based Learning (PBL) Approach — intended for medical schools with the time and resources available for PBL and the desire for student-directed learning. PBL approach modules are available for hepatitis B, influenza, measles, and pertussis.⁸

Multistation Clinical Teaching Scenarios (MCTS) — encourages active, small-group learning, uses modest amounts of faculty and learner time, and is objective-driven. MCTS modules are available for hepatitis B, influenza, measles, pertussis, childhood vaccination, adult vaccination, and *Haemophilus influenzae* type b.^{9,10}

**INFORMATION FOR FACILITATORS****• BACKGROUND ON THE MULTISTATION CLINICAL TEACHING SCENARIOS (MCTS) METHOD**

The multistation clinical teaching scenarios were developed to encourage active small-group learning in a clinically relevant context with a modest amount of faculty time. The time commitment of both the facilitator and the student is typically 50 to 90 minutes, depending on the setting and goals. The MCTS teaching method may be readily used in medical pre-clinical and clinical years when students' or residents' time is limited. MCTS is well suited to objective-driven curricula. In the MCTS session, one facilitator can interact with groups ranging from 10 to 30 students or residents. The facilitator needs basic knowledge about the disease and immunization covered but does not need to be a content expert.

MCTS was developed at Harvard University to teach radiology.¹¹ Viewboxes were displayed around a room and small groups of students rotated between viewboxes. At each viewbox, a clinical history was given along with questions (e.g., What is the differential diagnosis?). W. Scott Schroth, MD, modified this approach to teach medical students during a primary care clerkship at George Washington University.¹² Students rotated between stations that consisted of microscopes (e.g., Gram stain and urine specimens), x-ray films, and brief histories. After all cases were completed, the facilitator led a discussion of the relevant teaching points. This approach was adapted by the authors for use with vaccine-preventable diseases.

Students and residents are assigned to small groups of 3 to 5 for an MCTS session. All of the small groups simultaneously address the first scenario. Each small group spends approximately 5 to 10 minutes attempting to solve the problem addressed in the scenario. The scenario is discussed in a large group. The facilitator calls on one of the small groups to present their answers, then the facilitator and large group discuss each small group's response to the scenario and summarize the teaching points. The facilitator should correct wrong answers and discuss the teaching points. Generally, the large-group discussion should not last more than 7 minutes per scenario. After the first scenario is discussed, each small group works on the second scenario. A large-group discussion follows. The process is repeated until all scenarios are completed or the allotted time expires.

↓

- **MCTS MODULE DEVELOPMENT AND EVALUATION**

A multidisciplinary team at the University of Pittsburgh, with expertise in preventive medicine, public health, family practice, pediatric infectious diseases, adult infectious diseases, and education evaluation, developed the MCTS materials in consultation with a general internist at George Washington University.^{9,10}

The curricular goals are to (1) increase learner knowledge about vaccine-preventable diseases, vaccines, indications for vaccinations, and methods to increase vaccine coverage; (2) foster problem-solving abilities; (3) stimulate learning in a clinical context; and (4) help learners gain familiarity with key references such as the recommendations of the Advisory Committee on Immunization Practices (ACIP).

The first step in developing the modules was the creation of specific learning objectives that used the spectrum of Bloom's taxonomy, when possible.¹³ After development and revision of the learning objectives, actual clinical cases were sought from hospital and medical office records and modified for teaching purposes. Additional scenarios were written to address objectives not covered by the clinical cases.

Following development, the scenarios were pilot-tested with students or residents from the University of Pittsburgh School of Medicine, George Washington University School of Medicine, and Saint Margaret Memorial Hospital Family Practice Residency (Pittsburgh, Pennsylvania). The materials were subsequently revised. Formative evaluation was used for modification, via pilot-testing, of the assessment tools. Subsequently, summative evaluation was done by field-testing the materials at other medical schools and residencies for an independent evaluation.*

The purposes of the field test were to (1) examine the degree to which the students and residents met the learning objectives, (2) assess their perceptions of the teaching method, and (3) examine the feasibility and acceptability of the curriculum to the institution. Mastery levels were defined using the modified Nedelsky procedure.^{14,15} Three experts rated the likelihood that a minimally competent learner would know whether each alternative answer in a multiple choice question was correct. Then, the mastery level was calculated using the Nedelsky formulas and rounded, with the result that third-year medical students and second-year residents needed to achieve scores of 50% and 60%, respectively, to pass the posttest.

Results of the field test revealed that, depending on the subject, 96% to 99% of MCTS learners achieved mastery on the posttest. Mean increases in scores from the 10-item pretest to the posttest were 1.9 items for adult vaccination, 1.9 items for childhood vaccination, 2.6 items for *Haemophilus influenzae* type b, 1.8 items for hepatitis B, 3.8 items for influenza, 3.1 items for measles, and 3.9 items for pertussis ($p < .01$ for each). Virtually all (98%) of the learners rated the MCTS sessions overall as very good or good. Furthermore, they found the sessions interesting (96%), agreed that the MCTS session made a valuable contribution to their learning (95%), rated the information learned in the session as applicable (99%), and liked MCTS as a learning method (93%).

*Field-test sites included Albert Einstein College of Medicine of Yeshiva University, George Washington University School of Medicine, Hahnemann University, Kirksville College of Osteopathic Medicine, Mayo Medical School-Mayo Clinic and Foundation, the Medical Center of Delaware, Medical University of South Carolina, Ponce School of Medicine (PR), Shadyside Hospital (Pittsburgh), Sutter Health Family Practice (Sacramento, CA), University of California at Irvine, University of Louisville, University of Maryland School of Medicine, University of Puerto Rico School of Medicine, West Side Family Practice Center (Akron, OH), and West Virginia University School of Medicine.

The facilitators generally rated the materials highly. All (100%) rated the facilitator's guide as sufficiently clear; and most (97%) rated the learner materials as clear. Most (97%) rated the session overall as very good or good. Conference calls were conducted with participants at the field-test sites for further evaluation. Following field-testing, and review by CDC, the materials were revised.

This material was developed using information from Centers for Disease Control and Prevention. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. 9th ed. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Immunization and Respiratory Diseases; January 2006: 207-231.

To download, go to <http://www.cdc.gov/nip/publications/pink/hepb.pdf>.

Recommended Adult Immunization Schedule, United States, October 2006 - September 2007 (MMWR. October 13, 2006;55(No. 40)).

<http://www.cdc.gov/mmwr/pdf/wk/mm5540-Immunization.pdf>

The facilitator should use the most recent version available. See <http://www.cdc.gov/nip/>

- **STRATEGIES FOR USING THE MCTS MODULE**

The content of the scenarios fits into the following categories: (1) description of a vaccine-preventable disease (usually the first scenario in a module), (2) missed opportunities to immunize, resulting in vaccine-preventable diseases, (3) outbreak investigation or control, (4) quality assessment and quality improvement of vaccination rates, and (5) vaccination decisions for a given clinical situation. The most pertinent scenarios can be selected or all can be used, at the discretion of the facilitator. If time is limited, the most important scenarios to cover for the Adult Vaccination module are scenarios 1, 2, and 3. We recommend that facilitators limit the small group time per scenario to approximately 8 minutes, depending on the complexity of the scenario and the education level of the learners.

- **Here are some possible settings for these materials:**

- 1) Noon conference or the equivalent — three or four of the scenarios can be covered within 45 to 60 minutes. Residents have enjoyed the change from lecture or seminar to small-group learning experience.
- 2) Small-group breakout sessions to complement lectures in pre-clinical microbiology, immunology, and epidemiology courses.
- 3) Curriculum of a primary care clerkship — the materials have been used successfully as part of primary care clerkships, including clerkships in family practice, internal medicine, and pediatrics. Several scenarios can be selected to fit within the allotted period.
- 4) Workshops for residents, fellows, or providers — a longer block of time can be devoted to covering in depth many or all of the scenarios in one or two modules.
- 5) Grand Rounds — materials have been used in multidisciplinary Grand Rounds, resulting in intriguing discussions.
- 6) A “mix and match” option allows representative adult or childhood vaccinations to be covered in any of the above settings within one session. For instance, two of the hepatitis B scenarios and two of the influenza scenarios could be covered in the same session.

**PREPARATION LIST FOR THE FACILITATOR**

- ___ 1) Obtain a location and date to meet (a comfortable room with tables surrounded by movable chairs is ideal).
- ___ 2) For each small group, print a copy of the *Hepatitis B Prevention Small-Group Booklet* from APTR's website. <http://www.aptrweb.org> Published copies are no longer available.
- ___ 3) Choose the scenarios to be discussed. Typically, a group can cover three to four scenarios within one hour (students are often slower than residents).
- ___ 4) Make one copy of the objectives from the *Hepatitis B Prevention Small-Group Booklet* for each student or resident.
- ___ 5) Have basic familiarity with the vaccine(s) addressed in this module, prevention strategies, and this MCTS module. Basic familiarity, rather than content expertise, is needed. See the section "Sources of Information on Hepatitis B Vaccine" for suggested resources.

• SUGGESTED SCHEDULE FOR MCTS SESSION

1. Arrange chairs in groups of 3 to 5, and separate students or residents into small groups.
2. Distribute copies of the objectives from the *Hepatitis B Prevention Small-Group Booklet* along with a copy of the learning aids listed for the scenarios to each small-group member.
3. Review the objectives briefly, focusing on the primary objectives.
4. Instruct the residents or students to start the first scenario by having one member of each small group read the scenario aloud. Subsequently, each small group should work on answering the questions. Instruct them to divide the resource materials since each individual may not have time to read all of the materials. Also instruct them to stay on the same page so everyone is working on the same scenario. To answer the questions, the learners should use their previous knowledge and experience, the resource materials (suggested parts are listed), and the abstracts included in selected scenarios.
5. Convene as a large group after 5 to 10 minutes, depending on the complexity of the scenario. Select one group to present their answers to the questions. Critique their answers and discuss the teaching points for 5 to 7 minutes.
6. Repeat steps 4 and 5 for the remaining scenarios that you have selected.



SOURCES OF INFORMATION ON HEPATITIS B VACCINE

- Centers for Disease Control and Prevention. A comprehensive immunization strategy to eliminate transmission of Hepatitis B virus infection in the United States: Recommendations of the Advisory Committee on Immunization Practices (ACIP). Part 1: Immunization of Infants, Children, and Adolescents. MMWR.2005. 54 (No. RR-16):1-39. <http://www.cdc.gov/mmwr/PDF/rr/rr5416.pdf>
- ACP Task Force on Adult Immunization and Infectious Diseases Society of America. *Guide for Adult Immunization*. 3rd ed. Philadelphia, PA: American College of Physicians; 1994.
- American Academy of Pediatrics. Hepatitis B. In: Pickering LK ed. *Red Book: 2003 Report of the Committee on Infectious Diseases*. 26th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2003.
- Chin J, ed. Control of Communicable Disease Manual. *An Official Report of the American Public Health Association*. 17th ed. Washington, DC: American Public Health Association; 2000.
- U.S. Preventive Services Task Force. *Guide to Clinical Preventive Services*, Third Edition. Available at <http://www.ahrq.gov/clinic/prevnew.htm>.
- Moyer LA, Mast EE. Hepatitis B: virology, epidemiology, disease, and prevention, and an overview of viral hepatitis. *Am J Prev Med*. 1994;10(suppl):45-55.
- Plotkin SA, Orenstein, WA, eds. *Vaccines*. 4th ed. Philadelphia, PA: W.B. Saunders Company; 2004.
- Hepatitis B in: Centers for Disease Control and Prevention. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. 9th ed. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Immunization and Respiratory Diseases; January 2006. To download, go to <http://www.cdc.gov/nip/publications/pink/hepb.pdf>. To purchase a copy of the textbook, order from the Public Health Foundation website at <http://bookstore.phf.org/prod154.htm> or call 1-800-418-7246.
- Centers for Disease Control and Prevention. Recommended childhood and adolescent immunization schedule — United States, 2006. MMWR. 2006;54(52);Q1-Q4. <http://www.cdc.gov/nip/recs/child-schedule.htm>
- Recommended Adult Immunization Schedule, United States, October 2005 - September 2006. MMWR. 2005;54:Q1-Q4. <http://www.cdc.gov/nip/recs/adult-schedule.htm>


REFERENCES

1. Barker WH. Overview: The APTR-CDC Immunization in Medical Education Project. *Am J Prev Med.* 1994;10(suppl):1-3.
2. Falter KH, Strikas RA, Barker WH, et al. Curriculum content on vaccine-preventable diseases in U.S. medical schools. *Am J Prev Med.* 1994;10(suppl):4-10.
3. Strikas RA, Falter KH, Barker WH, et al. Curriculum content on vaccine-preventable diseases in primary care and preventive medicine residency programs in the United States. *Am J Prev Med.* 1994;10(suppl):11-17.
4. The Immunization in Medical Education Advisory Committee. Vaccine-preventable diseases core curriculum objectives. *Am J Prev Med.* 1994;10(suppl):18-21.
5. Atkinson WL, Kaplan JM, Clover R. Measles: virology, epidemiology, disease, and prevention. *Am J Prev Med.* 1994;10(suppl):22-30.
6. LaForce FM, Nichol KL, Cox NJ. Influenza: virology, epidemiology, disease, and prevention. *Am J Prev Med.* 1994;10(suppl):31-44.
7. Moyer LA, Mast EE. Hepatitis B: virology, epidemiology, disease, and prevention, and an overview of viral hepatitis. *Am J Prev Med.* 1994;10(suppl):45-55.
8. Zimmerman RK, Ahwesh ER. Using problem-based learning to target public health problems. *Acad Med.* 1996;71:543.
9. Zimmerman RK, Barker WH, Strikas RA, et al. Developing curricula to promote preventive medicine skills: the Teaching Immunization for Medical Education (TIME) Project. *JAMA.* 1997;278:705-711.
10. Zimmerman RK, Janosky JE, Wald ER, et al. Development and multicenter evaluation of Multistation Clinical Teaching Scenarios on immunization: the APTR-CDC Teaching Immunization for Medical Education (TIME) Project. *Am J Prev Med.* 1997;13(2):78-83.
11. Wetzel M, Reid L. The Multistation Exercise: Accessible, Adaptable, Active-Learning. Washington, DC: Association of American Medical Colleges National Meeting; 1991.
12. Schroth WS, Carlson LG. Multistation office simulations [Abstract]. In: Schultz HJ, Thane MW, eds. *The Educational Clearing House for Internal Medicine.* 3rd ed. October 1994:2.
13. Bloom BS, Engelhart MD, Furst EJ, et al. *Taxonomy of Educational Objectives: The Classification of Educational Goals. Handbook 1: Cognitive Domain.* New York, NY: David McKay Co; 1956.
14. Gross LJ. Setting cutoff scores on credentialing examinations. A refinement of the Nedelsky procedure. *Eval Health Prof.* 1985;8(4):469-493.
15. Maguire T, Skakun E, Harley C. Setting standards for multiple-choice items in clinical reasoning. *Eval Health Prof.* 1992;15(4):434-453.



PRIMARY OBJECTIVES

- **At the end of this session, the learner should be able to do the following:**
 1. Given a patient with jaundice, identify possible diagnoses and interpret hepatitis B serological tests.
 2. Predict the likely source of transmission, given the patient's behavioral, occupational, and environmental background.
 3. Explain the rationale for routine hepatitis B vaccination.
 4. Given a patient scenario, recommend vaccination based upon appropriate indications, such as occupation, international travel, and infection with the human immunodeficiency virus (HIV).
 5. Given an office setting, describe procedures to a) improve identification of persons needing vaccination, and b) increase timely compliance with the second and third doses.
 6. Recall contact tracing needs for an infected person, including appropriate screening tests.

SECONDARY OBJECTIVES

1. Appraise the risk of HBV infection for the patient's contacts, based upon the type of contact, incubation period, and period of communicability.
2. Explain the general epidemiology of reported cases, including the high infectiousness of the virus and the percentage of cases whose source is unknown.
3. Identify serious complications (e.g., fulminant hepatitis, cirrhosis, and hepatocellular carcinoma) and prophylaxis.
4. Explain the appropriate site (e.g., anterolateral thigh in infants and deltoid in adults), interval between doses, and rationale for not administering the vaccine intradermally or intragluteally.
5. Recall that dose varies by age and that the two vaccines available have different dosages for different populations.
6. Recall that the infant schedule and use of hepatitis B immune globulin depends on the hepatitis B surface antigen status of the mother.
7. Recognize patient fears about vaccination, including fear of HIV infection.
8. Discuss information on general vaccine safety and adverse events following vaccination.
9. Explain the rationale for the second and third doses.

SCENARIO ONE

Mr. Banks is a 41-year-old male who complains of fatigue, gray-colored stools, and cough. He has a 3-week history of gray-colored stools and a 3- to 7- day history of dark-colored urine. He complains of persistent nausea and vomiting after meals. His sclera are icteric. His liver is tender and palpable 4 fingerbreadths below the right costal margin.

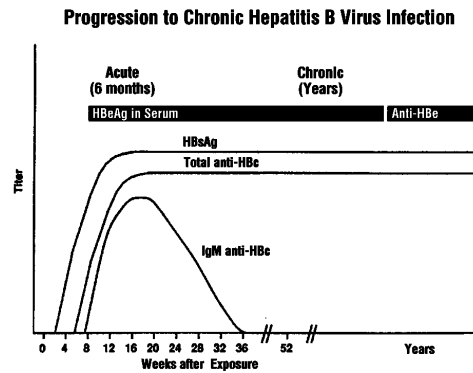
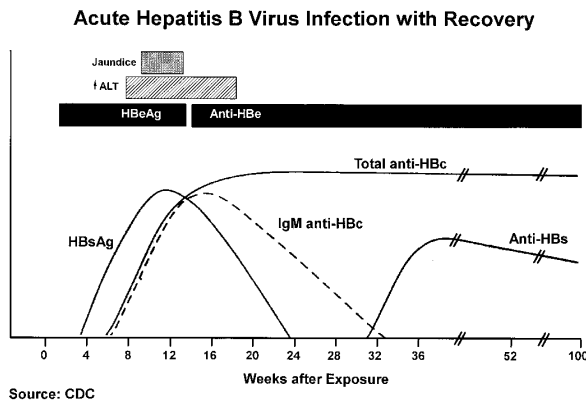
• **Laboratory Values**

- Total bilirubin, 5.8 mg/dL
- Direct bilirubin, 4.5 mg/dL
- AST (SGOT), 1,420 IU/L
- ALT (SGPT), 2,668 IU/L
- LDH, 867 mg/dL
- Alkaline phosphatase, 1,132 IU/L
- Total protein, 7.3 g/dL
- Albumin, 3.4 g/dL

IgM antibody to hepatitis A virus was negative but IgG was positive. Hepatitis B surface antigen (HBsAg) was present, as was IgM antibody to hepatitis B core antigen (anti-HBc). Hepatitis C ELISA was nonreactive. Abdominal CT revealed only hepatomegaly.

• **Learning Aids**

1. Top photo, on page 16 and graphs shown below



2. Hepatitis B in: Centers for Disease Control and Prevention. In *Epidemiology and Prevention of Vaccine-Preventable Diseases*. 9th ed. Atlanta, GA: Center for Disease Control and Prevention, National Immunization Program; January 2006. See sections: Hepatitis B Virus, Clinical Features, Chronic HBV Infection, Laboratory Diagnosis (pp. 207 - 211). See link: <http://www.cdc.gov/nip/publications/pink/hepb.pdf>



- **Questions for Learners**

1. What are the possible differential diagnoses for his chief complaint (before serological test results are available)?
2. What do the liver function test results suggest?
3. How do you interpret his hepatitis test results? What is the pattern for a chronically infected individual? What is the pattern for a person who has recovered?
4. Which hepatitis tests should have been ordered?
5. How likely is he to become chronically infected with HBV?

- **Answers to Questions for Learners**

1. Prior to laboratory test results, the differential diagnosis includes hepatitis (e.g., viral, toxic, ethanol, autoimmune) and biliary obstruction.
2. His liver function test results suggest non-alcoholic hepatitis. In alcoholic hepatitis, the level of AST is generally twice the level of ALT. In obstructive liver diseases, LDH and alkaline phosphatase are elevated out of proportion to other liver function tests.
3. He has acute HBV infection. A person chronically infected with HBV usually has HBsAg and IgG anti-HBc (rarely will a person have only the IgG anti-HBc and yet have a low-level of chronic infection). A person who has had HBV infection and recovered has IgG anti-HBc and usually anti-HBs.
4. IgM antibody to hepatitis A virus, HBsAg, and IgM anti-HBc are the most important tests; many physicians would add IgG (or total) anti-HBc and antibody to hepatitis C virus. For confirmation of positive test results for antibody to hepatitis C, polymerase chain reaction tests for hepatitis C virus are available.
5. He has a $\leq 5\%$ risk of becoming chronically infected with HBV.

Note: HBV DNA tests are most commonly used to manage patients on antiviral therapy.

This page corresponds to page 8 in the *Small-Group Booklet*.



Source: CDC



SCENARIO TWO

Jean recently noticed her skin turning yellow and appeared jaundiced on examination (see bottom photo, page 16). Her test result is positive for hepatitis B surface antigen (HBsAg) and IgM antibody to hepatitis B core antigen (IgM anti-HBc). She has a 3-year history of injection-drug use (IDU), including sharing of needles. Her HIV test result was negative. Her last IDU was 2 months ago. She is status-post laparotomy following multiple stab wounds 1 year ago, during which time she received a transfusion. She is sexually active with her boyfriend.

- **Learning Aids**

1. Hepatitis B in: Centers for Disease Control and Prevention. In *Epidemiology and Prevention of Vaccine-Preventable Diseases*. 9th ed. Atlanta, GA: Center for Disease Control and Prevention, National Immunization Program; January 2006. See sections: Laboratory Diagnosis (pp. 209 - 211), Epidemiology (pp. 211 - 214), Vaccination Schedule and Use/Adults (pp. 221 - 223), Postexposure Management (pp. 226 - 228), Susceptible Sexual Partners of Persons with Acute or Chronic HBV Infection (p. 229).
<http://www.cdc.gov/nip/publications/pink/hepb.pdf>

2. Bottom photo, page 16.

- **Questions for Learners**

1. What was the most likely source of hepatitis?
2. What are the contact tracing needs? Does her case need to be reported?
3. What is the risk to Jean's boyfriend? What should be done for him?
4. What is the risk for those with whom Jean has shared needles? Given that she is willing to identify them if their names will be treated confidentially, what should be done for them?
5. Jean was hospitalized approximately one year ago for treatment of stab wounds. Should she have received hepatitis B vaccine then?

- **Answers to Questions for Learners**

1. Jean most likely contracted hepatitis B virus infection through IDU. Transfusion is very unlikely as the source of her infection because (1) the incubation period for hepatitis B is 45 to 160 days (average, 120), whereas Jean received a transfusion 1 year ago, and (2) the risk from transfusion is now very small. Acquisition by sexual transmission is also possible.
2. The persons needing contact tracing include sex partners, persons with whom needles have been shared, and persons exposed as household contacts (e.g., persons exposed by sharing toothbrushes). If feasible, all unvaccinated household members should be vaccinated. Her case should be reported to health authorities.



3. Jean's boyfriend is at considerable risk of infection through sexual transmission, which is the most common form of HBV transmission in the United States. Unvaccinated persons whose sex partners have acute hepatitis B virus infection should receive a single dose of HBIG (0.06 mL/kg). They should also begin the first dose of the hepatitis B vaccination series and complete the series using the age-appropriate vaccine dose and schedule. Testing of sex partners for susceptibility to HBV infection may be considered at the time of administration of the first vaccine dose. If feasible, exposed persons who have previously completed the vaccine series should be tested for anti-HBs and provided immunoprophylaxis as indicated by testing results. Alternatively, a single booster may be provided for previously vaccinated persons.
4. The persons with whom Jean shared needles may be at risk and, if unvaccinated, should receive HBIG and begin the hepatitis B vaccine series. Their risk of HBV infection depends on whether or not she has used injection drugs during the last 2 months and when Jean became infected with HBV. If previously vaccinated, exposed persons should be tested for anti-HBs and provided immunoprophylaxis as indicated by testing results (HBIG and begin a revaccination series if antibody response is inadequate (<10 mIU/ml of anti-HBs).
5. Jean could have received hepatitis B vaccine before discharge from the hospital 1 year ago. Many authorities would consider this a missed opportunity for vaccination.

This page corresponds to page 10 in the *Small-Group Booklet*.



SCENARIO THREE

A nurse who started an IV on a jaundiced patient accidentally stuck herself with a needle contaminated by the patient's blood. She is frightened by the possibility of hepatitis. However, she is even more frightened by hepatitis B vaccine. She heard that it is manufactured from the plasma of persons who have been infected with HBV and is also concerned that she might get HIV from the vaccine.

- **Learning Aid**

1. Hepatitis B in: Centers for Disease Control and Prevention. In *Epidemiology and Prevention of Vaccine-Preventable Diseases*. 9th ed. Atlanta, GA: Center for Disease Control and Prevention, National Immunization Program; January 2006. See sections: Hepatitis B Vaccine (pp. 215 - 218), Postexposure Management (pp. 226 - 228), Adverse Reactions Following Vaccination (pp. 229 - 230). <http://www.cdc.gov/nip/publications/pink/hepb.pdf>

- **Questions for Learners**

1. If the patient has acute or chronic HBV infection, what is the risk to the nurse? Is the nurse at risk for HBV infection from the needlestick?
2. How is hepatitis B vaccine currently produced?
3. Can hepatitis B vaccine transmit HIV? What are the vaccine's adverse events?
4. What should be done for the nurse?
5. What office procedures can be taken to help the nurse finish the hepatitis B vaccine series, since more than 1 dose will be needed?

- **Answers to Questions for Learners**

1. The nurse is at risk for HBV infection if the patient is acutely or chronically infected. The magnitude of the risk depends on the infectiousness of the patient and the amount of blood transferred. If the patient is HBeAg-positive, the risk increases. The risk of becoming infected with HBV from the needlestick is approximately 6% to 30% (30% represents HBeAg-positive patients).
2. Hepatitis B vaccine in the United States is produced totally by recombinant DNA technology.
3. Neither the recombinant vaccine nor the older plasma-derived vaccine has been associated with transmission of HIV; the plasma-derived vaccine underwent sufficient chemical processes to inactivate HIV. The adverse events are pain at the injection site (3% to 29%) and temperature $>37.7^{\circ}\text{C}$ (1% to 6%); however, they do not occur more frequently than adverse events from placebo injection. Current data from reporting systems for adverse events do not indicate an association between receipt of recombinant vaccine and Guillain-Barré syndrome. Anaphylaxis occurs rarely after vaccination at a rate of 1 per 1.1 million doses distributed. In rare cases, vaccination might trigger alopecia.



4. All health care personnel and persons who have occupations that expose them to blood should be vaccinated; the fact that this nurse is unvaccinated is considered a missed opportunity. The nurse should receive HBIG and begin the hepatitis B vaccine series. Medical personnel should be tested for response to hepatitis B vaccine after 3 doses so that they can be treated appropriately if they are exposed. If they have developed protective antibody titers, there is no need for further hepatitis B vaccination, even if exposed. Post-vaccination testing should be done 1 to 2 months after completion of the vaccination series.
5. Reminders via telephone or postcard help inform patients of needed vaccinations. Employee health offices should consider using tracking systems to generate reminders for vaccination.

This page corresponds to page 11 in the *Small-Group Booklet*.



SCENARIO FOUR

Ms. Lai is the sex contact of a person who is acutely infected with HBV. She is asymptomatic, but her hepatitis B surface antigen test and total anti-HBc test results are positive. Old medical records indicate that Ms. Lai tested positive 13 years ago, when she immigrated to the United States from Southeast Asia. She is pregnant and babysits for two infants. Dr. Thomas, the physician to whom she plans to take her child for well-child care, does not have privileges at the hospital where the infant will be born.

- **Learning Aid**

1. Hepatitis B in: Centers for Disease Control and Prevention. In *Epidemiology and Prevention of Vaccine-Preventable Diseases*. 9th ed. Atlanta, GA: Center for Disease Control and Prevention, National Immunization Program; January 2006. See sections: Complications and Chronic HBV Infection (p. 209), Epidemiology (pp. 211 - 214), Vaccination Schedule and Use/Other Groups Who May Be Candidates for Hepatitis B Vaccine (pp. 223 - 224), Postexposure Management (pp. 226 - 228).
<http://www.cdc.gov/nip/publications/pink/hepb.pdf>

- **Questions for Learners**

1. Where was Ms. Lai most likely to have become infected with HBV?
2. What are the serious complications of her disease?
3. What is her child's risk for becoming infected with HBV at the time of delivery?
4. What should be done for her child following delivery? How soon should it be done? Where should the treatment be administered?
5. How likely is it that the records about the newborn's need for hepatitis B vaccine will be sent to the physician doing well-child care? How could this be facilitated?
6. What should be done for the two infants for whom she babysits?

- **Answers to Questions for Learners**

1. Most likely, Ms. Lai was infected with HBV at birth from her mother or during early childhood. Approximately 70% of immigrants from Southeast Asia have been infected with HBV and approximately 10% to 20% are chronically infected.
2. The serious complications of chronic HBV infection are cirrhosis and hepatocellular carcinoma. Persons chronically infected may also be at risk for hepatitis delta virus (HDV) superinfection. See the CDC Division of Viral Hepatitis Prevention's website for additional discussion of complications: <http://www.cdc.gov/ncidod/diseases/hepatitis/index.htm>
3. The child's risk of infection at time of delivery is 10% to 90%, depending on the mother's hepatitis B e antigen status; HBeAg is a marker of increased infectivity. The risk is 70% to 90% if she is HBeAg positive, and 10% to 40% if she is HBeAg negative.



4. The child should receive hepatitis B vaccine and 0.5 mL of HBIG within 12 hours of birth. Hepatitis B vaccine is administered IM in the anterolateral thigh in infants.
5. It is unlikely that the vaccination records will be sent; therefore, special effort is needed to communicate to Dr. Thomas the information about the chronically infected status of the mother and the treatment the child received. The child needs additional doses of vaccine at 1-2 months of age and 6 months of age. Alternatively, combination vaccines that contain hepatitis B vaccine can be used at 2, 4, and 6 (PEDIARIX) or 12-15 months (COMVAX) of age. This is the recommended schedule for infants born to chronically infected mothers. In this situation, the child should receive postvaccination screening for HBsAg between 9 to 15 months of age. The more permissive schedule for routine infant vaccination against hepatitis B should not be used. (e.g., not 6-18 months for dose 3.)
6. It is prudent to treat the infants as household contacts. If they have not already been vaccinated, they should be vaccinated. Persons not fully vaccinated should complete the vaccine series. Testing of unvaccinated persons for susceptibility to HBV infection may be considered at the time of administration of the first vaccine dose.

This page corresponds to page 12 in the *Small-Group Booklet*.

SCENARIO FIVE

Dr. Thomas, a primary care physician, recently read a journal article that discussed the amount of suffering from hepatitis B in the United States. The article recommended a comprehensive immunization strategy to eliminate transmission of hepatitis B virus infection in the United States. Dr. Thomas' practice is in a suburban area. Dr. Thomas wonders if this strategy is justified in a suburban practice.

Learning Aids

1. A comprehensive immunization strategy to eliminate transmission of hepatitis B virus infection in the United States. Recommendations of the Advisory Committee on Immunization Practices (ACIP). Part 1: Immunization of Infants, Children and Adolescents MMWR 2005; 54(No RR-16) p 1-30. See sections: Strategy to eliminate hepatitis B virus transmissions, Background: Clinical Features and Natural History of HBV Infection Epidemiology. <http://www.cdc.gov/mmwr/PDF/rr/rr5416.pdf>
2. Table on page 24.

Questions for Learners

1. Is a comprehensive strategy justified? Why or why not? List reasons.
2. What are the components of such a strategy?

Hepatitis B and Other Selected Diseases of Children in the Years Before Vaccines Were Routinely Used

| Disease | Year* | # of Cases | # of Deaths |
|---------------------------------------------------------------------------|-------|------------|-------------|
| Hepatitis B | 1989 | 132,700 | 5,820† |
| <i>Haemophilus influenzae</i> type b (Invasive disease and meningitis) | 1986 | 21,690 | 885 |
| Paralytic poliomyelitis | 1954 | 18,308 | — |
| Measles | 1964 | 458,083 | 380 |
| Rubella | 1970 | 57,686 | — |
| Congenital rubella | 1970 | 77 | — |

* Preceding major use of vaccine.


† Figure includes an estimated 320 deaths from acute HBV infection and an estimated 5,500 deaths from chronic HBV infection.

Adapted from West DJ, Margolis HS. Prevention of hepatitis B virus infection in the United States: a pediatric perspective. *Pediatr Infect Dis J* 1992;11:866-874. In Mahoney FJ, Burkholder BT, Matson CC. Prevention of hepatitis B virus infection. *American Family Physician* 1993;47(4):867.



- **Answers to Questions for Learners**

1. Rationale for the comprehensive strategy to eliminate transmission of hepatitis B virus infection in the United States.
 - a. An estimated 300,000 cases of hepatitis B virus infection occurred per year in the United States in the 1970s and 1980s, before widespread use of hepatitis B vaccine in the United States. (In a population of 260 million, this was approximately 1 in 1000.)
 - b. An estimated 1.5 million persons are chronically infected, all of whom are potentially infectious (1 in about 185 persons in the United States). These persons are at risk for cirrhosis, delta hepatitis, and hepatocellular carcinoma.
 - c. Of reported hepatitis B cases, 16% have no known source of infection.
 - d. Previous strategies to identify and vaccinate high-risk persons have had limited success. Vaccination of injection drug users and commercial sex workers (prostitutes) by using a 3-dose schedule is problematic because such persons may not complete the second and third doses.
 - e. A person is at a higher risk for becoming chronically infected if he or she became infected with HBV early in life (90% for infants, 30% for children < 5 years, <5% for persons infected at ≥ 5 years). Child-to-child transmission has been documented within families and in school settings.
 - f. Comprehensive hepatitis B vaccination has been successful in Alaska. After successful implementation of a comprehensive program to vaccinate susceptible Alaska Natives, including all newborns, the incidence of acute symptomatic HBV infection fell by over 90% [*Lancet* 1987;2:1134-1136].
 - g. The vaccine costs less than many other preventive measures. In some cases, the vaccine is even cost-saving.
 - h. On the basis of studies conducted to date, long-term protection appears to exist for at least 15-20 years after hepatitis B vaccination. In persons who initially respond to vaccination, anti-HBs titers may decline over time; however, loss of anti-HBs after vaccination does not imply loss of protection. In vitro studies have demonstrated intact immunologic memory in B lymphocytes obtained from vaccine responders who had low or undetectable anti-HBs levels 7 to 8 years after vaccination. Moreover, natural exposure to HBV long after primary vaccination results in an anamnestic increase in anti-HBs that protects against both clinically significant acute and chronic HBV infection. Routine booster doses of hepatitis B vaccine are therefore not currently recommended.
 - i. Generally, simultaneous vaccination with other vaccines is believed to be safe.
 - j. Since implementation of routine childhood immunization, an estimated 6,800 perinatal infections and 18,700 other infections in the first 10 years of life have been prevented annually.

- 
2. Components of a comprehensive strategy:
 - a. Universal vaccination of infants, beginning at birth.
 - b. Prevention of perinatal HBV infection through
 - routine screening of all pregnant women for hepatitis B surface antigen (HBsAg), and
 - immunoprophylaxis of infants born to HBsAg-positive women and infants born to women with unknown HBsAg status.
 - c. Routine vaccination of previously unvaccinated children and adolescents
 - d. Vaccination of previously unvaccinated adults at increased risk for infection

This page corresponds to page 13 in the *Small-Group Booklet*.


SCENARIO SIX

Dr. Ruffa realizes the amount of suffering from hepatitis B in the United States and wants to help. However, Dr. Ruffa's practice consists almost entirely of adults; furthermore, Dr. Ruffa does not practice obstetrics.

- **Learning Aid**


1. Hepatitis B in: Centers for Disease Control and Prevention. In *Epidemiology and Prevention of Vaccine-Preventable Diseases*. 9th ed. Atlanta, GA: Center for Disease Control and Prevention, National Immunization Program; January 2006. See sections: Hepatitis B Vaccine/Immunogenicity and Vaccine Efficacy (pp. 216 - 218), Vaccination Schedule and Use/Adults (pp. 221 - 223), Vaccination Schedule and Use/Other Groups Who May Be Candidates for Hepatitis B Vaccine (pp. 223 - 224).
<http://www.cdc.gov/nip/publications/pink/hepb.pdf>

- **Questions for Learners**

1. Who in Dr. Ruffa's practice should receive hepatitis B vaccine? (List)
2. How can Dr. Ruffa systematically identify which patients need hepatitis B vaccine?
3. How should hepatitis B vaccine be administered to adults?
4. What can Dr. Ruffa do to encourage compliance with the second and third doses of hepatitis B vaccine?
5. When should the second and third doses of hepatitis B vaccine be given if the schedule is interrupted?

- **Answers to Questions for Learners**

1. The ACIP recommends catch-up vaccination of all adolescents who have not previously received hepatitis B vaccine. Persons with occupational indications include health care workers, students in health care fields, public safety workers, staff of correctional institutions, and staff of institutions for the developmentally disabled. Persons with indications according to place of residence include clients of institutions for the developmentally disabled, household contacts of chronically infected individuals, and inmates who receive medical evaluation in prisons. Persons who have medical indications include those who receive dialysis, have end-stage renal disease, and recent diagnosis of an STD. Persons with lifestyle indications include injection drug users, men who have sex with men, commercial sex workers (prostitutes), heterosexuals with more than one sex partner in the preceding 6 months, and inmates of long-term correctional institutions who have a history of high-risk behaviors. In addition, international travelers who will have close contact with the local population in areas with high or intermediate HBV endemic infection should be vaccinated. Finally, vaccination is indicated for victims of sexual assault.
2. To complete the patient history, Dr. Ruffa should question each patient about occupation, sexual history (including sexual orientation and STDs), and drug history. Dr. Ruffa should revisit these issues during each periodic history and physical. The problem list in the medical record can be checked for medical indication. These areas of the chart should be updated periodically, and charts of vaccine indications should be prominently displayed. The office computer can be used to search diagnoses (e.g., STDs) to identify patients with medical indications.

- 
3. For adults, hepatitis B vaccine is given by the intramuscular route in the deltoid muscle using a 1" - 2" needle, depending on the recipient's weight. (1.5 - 2" for males weighing > 120kg and females > 90kg. A fine gauge needle (22 - 25 gauge) can be used.
 4. Methods to encourage compliance include the following:
 - a. Reminding patients by postcard or telephone.
 - b. Educating patients about disease severity, the immunization schedule, and the importance of the second and third doses.
 - c. Having office staff ask immunization status at registration or during vital signs. Colored stickers, checklists, or inked rubber stamps can communicate the information.
 - d. Having the computer generate "tickler" reminders that determine and track any needed immunizations.
 5. If the vaccination series is interrupted after the first dose, the second dose should be administered as soon as possible. The second and third doses should be separated by an interval of at least 2 months. If only the third dose is delayed, it should be administered when feasible. There is never a need to restart the series if intervals are prolonged.

This page corresponds to page 14 in the *Small-Group Booklet*.

**HEPATITIS B SAMPLE TEST**

This test was developed using expert knowledge and classical psychometric statistics, such as item difficulty and item discrimination, during the pilot phase of development. It may be used as a sample examination.

- 1. Chris, a radiology technician, is chronically infected with HBV. Who does not need contact tracing?**
 - a. Current sex partner
 - b. Roommate
 - c. Co-worker who had an accidental needlestick contaminated with Chris' blood.
 - d. "Drinking friends"
 - e. Sex partner from 1 year ago

- 2. Which of the following is true?**
 - a. If the hepatitis B vaccination series is stopped, it must be restarted
 - b. The second dose is recommended 1 to 2 months after the first
 - c. The third dose is recommended 1 month after the second
 - d. The third dose is recommended 6 to 20 months after the second
 - e. None of the above

- 3. Common reasons that persons refuse hepatitis B vaccine include all of the following except**
 - a. Fear of contracting HIV
 - b. Cost
 - c. Desire to donate blood
 - d. Concern about systemic adverse events
 - e. Belief that they are unlikely to be exposed

- 4. The most common sources, in descending order, of HBV infection in the United States are**
 - a. Sexual, medical, injection drug use (IDU)
 - b. Sexual, unknown, IDU
 - c. IDU, sexual, medical, unknown
 - d. IDU, sexual, household contact
 - e. IDU, sexual, unknown

- 5. The rationale for routine infant hepatitis B immunization includes**
 - a. The failure of previous immunization strategies in the United States
 - b. The burden of hepatitis B in the United States
 - c. The difficulty in vaccinating persons who are engaged in high-risk behaviors
 - d. The proportion of persons who become infected with HBV but have no known risk factors
 - e. All of the above



6. Which of the following is most likely to lead to chronic infection with HBV?

- a. Unprotected sex with a commercial sex worker (prostitute)
- b. Experimentation with injection drugs
- c. Birth to a mother who is chronically infected
- d. A contaminated needlestick to a medical professional
- e. None of the above

7. Which of the following characteristics is not an indication for hepatitis B vaccine?

- a. Occupation of food handler in seafood restaurant
- b. Multiple sex partners in the last 6 months
- c. Travel overseas to an endemic area
- d. Occupation of emergency medical technician
- e. 1 month old and unvaccinated

8. Which of the following methods is least likely to increase hepatitis B immunization levels in a family physician's office?

- a. Have the office staff place stickers about the need for vaccination on patient charts
- b. Provide information pamphlets in the waiting room about hepatitis B and hepatitis B vaccination
- c. Use the office computer to search for diagnosis codes for sexually transmitted diseases and send postcards offering hepatitis B vaccination
- d. Record occupation on the history form and assess the need for occupational vaccinations
- e. Color posters about hepatitis B disease in elementary schools in the area served by the physician's office

9. All of the following statements about hepatitis B vaccine are true except

- a. More long-term data about the duration of immunity are available for the plasma-derived vaccines than for recombinant vaccines
- b. Immunity is known to last at least 13 years in most adult recipients
- c. The dose needed varies by the age of the recipient
- d. If immunity wanes below 500 mIU/mL, then protection is lost

10. Which of the following tests is/are appropriate?

- a. Hepatitis B IgM core antibody in a person with multiple sex partners and jaundice
- b. Hepatitis B surface antigen in a pregnant woman
- c. Hepatitis B surface antibody in a physician who completed the hepatitis B vaccine series 1 month ago
- d. Total anti-HBc in a developmentally delayed person who has been in an institution for 15 years and has not been vaccinated against hepatitis B
- e. All of the above



HEPATITIS B TEST ANSWER KEY

1. D
2. B
3. C
4. B
5. E
6. C
7. A
8. E
9. D
10. E