

Teaching Immunization

for Medical Education (TIME)



MULTISTATION CLINICAL TEACHING SCENARIOS

Hepatitis B Prevention: Small Group Booklet

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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 residents or students. The facilitator needs basic knowledge about the disease and immunization covered but does not need to be a content expert.

Students and residents are assigned to small groups of 2 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 then discussed in a large group. The facilitator calls on one of the small groups to present their answers, then the facilitator and the 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.

SUGGESTED SCHEDULE FOR MCTS SESSION

1. Arrange chairs in groups of 3 to 5, and separate students or residents into small groups.
2. Distribute one copy of the *Hepatitis B Prevention Small-Group Booklet* to each group along with a copy of the learning aids listed for the scenarios to be discussed. A major learning aid is needed: appropriate chapter from the CDC's Pink Book, www.cdc.gov/vaccines/pubs/pinkbook/pink-chapters.htm and/or slide set www.cdc.gov/vaccines/pubs/pinkbook/pink-slides.htm, or a shortened version of the same slide set available at http://www.aptrweb.org/resources/curriculum_time.html, SHOTS software from www.immunization.org, and/or internet access to CDC's website www.cdc.gov/vaccines. Review the objectives briefly, focusing on the primary objectives.
3. The students or residents are 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 for that scenario. To answer the questions, the learners should use their previous knowledge and experience, the resource materials/internet, and the abstracts included in selected scenarios. They should divide the resource materials since each individual may not have time to read all of the materials.
4. Convene as a large group after 5 to 10 minutes, depending upon the complexity of the scenario. Select one group to present their answers to the questions. Critique answers and discuss the teaching points for 5 to 7 minutes.
5. Repeat steps 3 and 4 for the remaining scenarios that have been selected.

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

Objectives

At the end of this session, every learner should be able to accomplish the following core set of objectives:

Primary Objectives

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, chronic illness (e.g., human immunodeficiency virus (HIV)), and lifestyle.
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. Recall that the infant schedule and use of hepatitis B immune globulin depends on the hepatitis B surface antigen status of the mother.
5. Discuss information on general vaccine safety and adverse events following vaccination.

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.

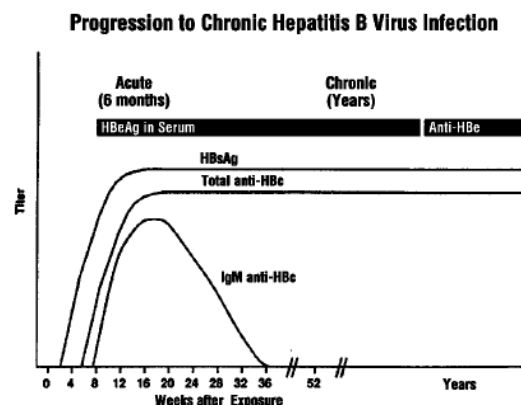
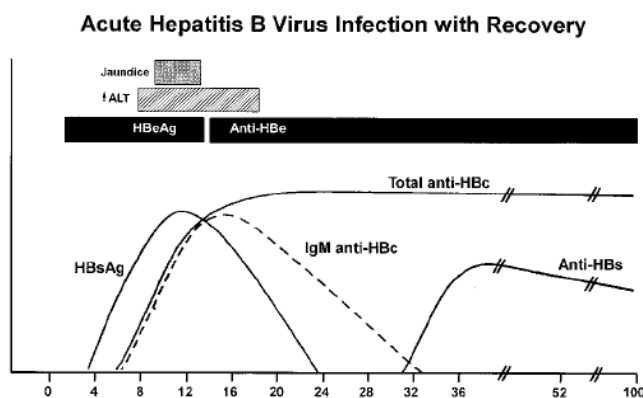
Laboratory Values

- 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, page 8, and graphs shown below



2. Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Atkinson W, Wolfe S, Hamborsky J, McIntyre L, eds. 11th ed. Washington DC: Public Health Foundation, 2009. See slide set: <http://www.cdc.gov/vaccines/pubs/pinkbook/pink-slides.htm>, or a shortened version of the same slide set available at http://www.aptrweb.org/resources/curriculum_time.html.

3. Table 1, page 7

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. List a brief, initial set of diagnostic tests that should be ordered.
5. How likely is he to become chronically infected with HBV?

Table 1- Interpretation of Hepatitis B Serologic Tests

Test	Results	Interpretation
HBsAg	Negative	Susceptible
anti-HBc	Negative	
anti-HBs.	Negative	
HBsAg	Negative	Immune due to vaccination
anti-HBc.	Negative	
anti-HBs.	Positive with $\geq 10\text{mIU/mL}^*$	
HBsAg	Negative	Immune due to natural infection
anti-HBc.	Positive	
anti-HBs.	Positive	
HBsAg	Positive	Acutely affected
anti-HBc	Positive	
IgM anti-HBc.	Positive	
anti-HBs.	Negative	
HBsAg	Positive	Chronically Infected
anti-HBc.	Positive	
IgM anti-HBc.	Negative	
anti-HBs.	Negative	
HBsAg	Negative	Four interpretations possible [†]
anti-HBc.	Positive	
anti-HBs	Negative	

*Postvaccination testing, when it is recommended, should be performed 1-2 months following dose #3

- †
1. May be recovering from acute HBV infection.
 2. May be distantly immune and the test is not sensitive enough to detect a very low level of anti-HBs in serum.
 3. May be susceptible with a false positive anti-HBc.
 4. May be chronically infected and have an undetectable level of HBsAg present in the serum.

Source: Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. 11th ed., 2009, p. 102. <http://www.cdc.gov/vaccines/Pubs/pinkbook/downloads/hepb.pdf>



SCENARIO TWO

Jean recently noticed her skin turning yellow and appeared jaundiced on examination (see bottom photo, previous page). 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. Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Atkinson W, Wolfe S, Hamborsky J, McIntyre L, eds. 11th ed. Washington DC: Public Health Foundation, 2009. See slide set: <http://www.cdc.gov/vaccines/pubs/pinkbook/pink-slides.htm>, or a shortened version of the same slide set available at http://www.aptrweb.org/resources/curriculum_time.html.
2. Bottom photo, previous page.

Questions for Learners

1. What was the most likely source of hepatitis?
2. Which of Jean's contacts need to be informed of possible exposure? 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?

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 Aids

1. Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Atkinson W, Wolfe S, Hamborsky J, McIntyre L, eds. 11th ed. Washington DC: Public Health Foundation, 2009. See slide set: <http://www.cdc.gov/vaccines/pubs/pinkbook/pink-slides.htm>, or a shortened version of the same slide set available at http://www.aptrweb.org/resources/curriculum_time.html.
2. Table 2, page 11.

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?

Table 2 - Recommended Postexposure Prophylaxis for Occupational Exposure to Hepatitis B Virus

Vaccination and antibody status of exposed person*		Treatment		
		Source of HBsAg** Positive	Source of HBsAg** Negative	Source unknown or not available for testing
Unvaccinated		HBIG [†] X 1 and initiate HB vaccine series	Initiate HB vaccine series	Initiate HB vaccine series
Previously Vaccinated	Known Responder [§]	No treatment	No treatment	No treatment
	Known nonresponder [‡]	HBIG X 1 and initiate revaccination or HBIG X 2 ^{††}	No treatment	If known high-risk source, treat as if source were HBsAg positive
	Antibody response unknown	Test exposed person for anti-HBs [¶] - If adequate [§] , no treatment is necessary - If inadequate [‡] , administer HBIG X 1 and vaccine booster	No treatment	Test exposed person for anti-HBs [¶] - If adequate [§] , no treatment is necessary - If inadequate [‡] , administer vaccine booster and recheck titer in 1-2 months

* Persons who have previously been infected with HBV are immune to reinfection and do not require postexposure prophylaxis

** Hepatitis B surface antigen

† Hepatitis B immune globulin: dose is 0.06 mL/kg administered intramuscularly

§ A responder is a person with adequate levels of serum antibody to HBsAg (ie., anti-HBs ≥10 mIU/mL)

‡ A nonresponder is a person with inadequate response to vaccination (i.e., serum anti-HBs < 10 mIU/mL)

†† The option of giving one dose of HBIG and reinitiating the vaccine series is preferred for nonresponders who have not completed a second 3-dose vaccine series. For persons who previously completed a second vaccine series but failed to respond, two doses of HBIG are preferred.

¶ Antibody to HBsAg

Source: MMWR 2001; 50(RR-11) pg 22.

SCENARIO FOUR

Ms. Lai is a sexual 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

Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Atkinson W, Wolfe S, Hamborsky J, McIntyre L, eds. 11th ed. Washington DC: Public Health Foundation, 2009. See slide set: <http://www.cdc.gov/vaccines/pubs/pinkbook/pink-slides.htm>, or a shortened version of the same slide set available at http://www.aptrweb.org/resources/curriculum_time.html.

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?
At what anatomical site 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?

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. Immunization strategy to eliminate transmission of hepatitis B virus (HBV) infection in the United States

- Universal vaccination of infants beginning at birth
- Prevention of perinatal HBV infection through: 1) routine screening of all pregnant women for hepatitis B surface antigen (HBsAg), and 2) immunoprophylaxis of infants born to HBsAg positive women and infants born to women with unknown HBsAg status
- Routine vaccination of previously unvaccinated children and adolescents
- Vaccination of previously unvaccinated adults at increased risk for infection

Source: 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(RR-16), p.2 (see Box 1).

2. Table 3, page 14

3. Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Atkinson w, Wolfe S, Hamborsky J, McIntyre L, eds. 11th ed. Washington DC: Public Health Foundation, 2009. See slide set: <http://www.cdc.gov/vaccines/pubs/pinkbook/pink-slides.htm>, or a shortened version of the same slide set available at http://www.aptrweb.org/resources/curriculum_time.html.

Questions for Learners

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

Table 3 - 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.

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. Centers for Disease Control and Prevention. Epidemiology and Prevention of Vaccine-Preventable Diseases. Atkinson W, Wolfe S, Hamborsky J, McIntyre L, eds. 11th ed. Washington DC: Public Health Foundation, 2009.. See slide set: <http://www.cdc.gov/vaccines/pubs/pinkbook/pink-slides.htm>, or a shortened version of the same slide set available at http://www.aptrweb.org/resources/curriculum_time.html.
2. Shots immunization software or Shots On-line: <http://www.immunizationed.org/ShotsOnline.aspx> .

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. What is the vaccine administration route and site?
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?
6. For whom is post-vaccination serologic testing indicated?