What Do You Do When No One is Watching?

NORTH CAROLINA DENTAL SOCIETY

1

Disclosure

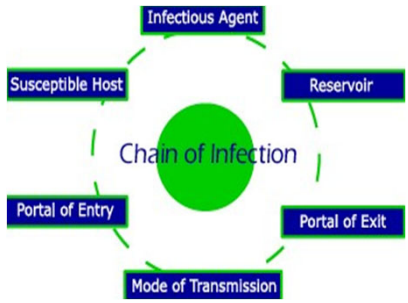
- Employed by Total Medical Compliance
- SciCan Consultant
- Hu-Friedy KOL

2

At the end of this session the attendee will:

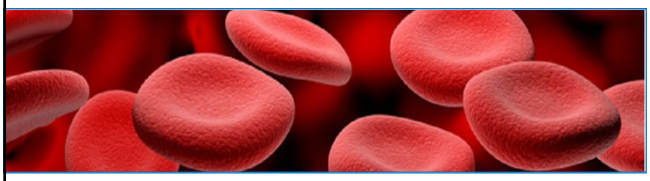
- Recall signs, symptoms and mode of transmission of HIV, Hepatitis B, and Hepatitis C.
- Discuss the risks of exposure specific to bloodborne pathogens and prevention methods.
- Discuss updates to the Hazard Communication standard to align with GHS as it relates to labels, pictograms, and SDS.
- Discuss basic infection control principles applicable to dental practices, including proper disinfection process for environmental surfaces, patient equipment and prevention of spread of respiratory illness.
- Recall four (4) critical steps in instrument processing.

3



Chain of Infection

4

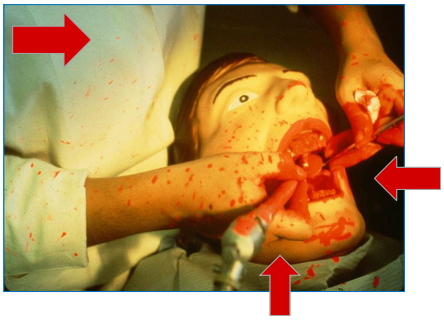


Bloodborne Pathogen Standard 1991

Employers must protect against blood exposures

5

Occupational Exposure Risk



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Bloodborne Pathogens

- Located in the blood or other body fluids
- Virus or bacteria
- Exposure may lead to infection
  - HIV
  - Hepatitis B
  - Hepatitis C

7

Signs and Symptoms

HIV: .23%
- Flu-like illness 2-4 weeks after exposure or no symptoms
- Treatments allow for undetectable virus status

Hepatitis B : 6 – 30%
- Joint and abdominal pain, dark urine, n/v, clay-colored stools within 90 days of exposure.
- Reported new cases stable over the last decade.
- Best protection: vaccine

Hepatitis C: .2%
- Joint and abdominal pain, dark urine, n/v, clay- colored stools 2 – 12 weeks after exposure or no symptoms
- Testing recommended for individuals 18 and older and during each pregnancy.

8

Core infection prevention practices

All patient care

Regardless of infection

- Hand hygiene.
- Use of personal protective equipment.
- Respiratory hygiene / cough etiquette.
- Sharps safety (engineering and work practice controls).
- Safe injection practices
- Sterile instruments and devices.

9

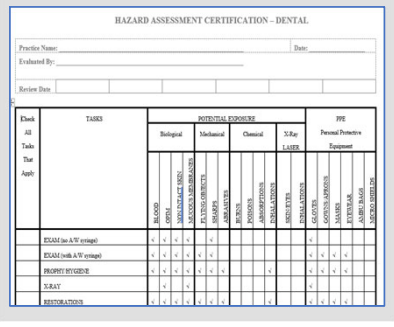
Soap and Water

Alcohol Hand Rub

HAND HYGIENE

10

Hazard Assessment



11

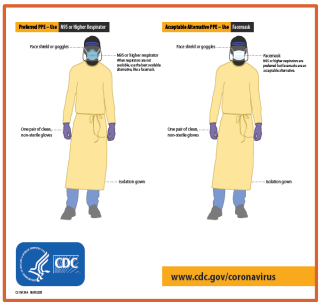
Personal Protective Equipment

- Use based on potential exposure risk
- Employer must provide
- Employer must launder reusable PPE

12

Personal Protective Equipment

Designate an area outside of the exam room for donning/doffing of PPE.



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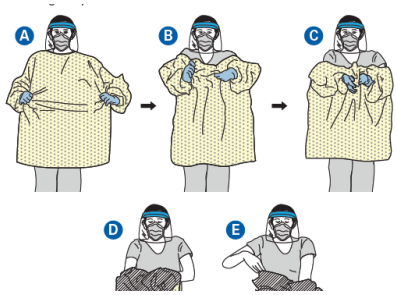
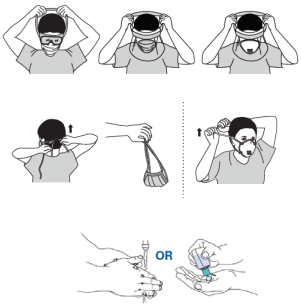


PPE Removal: In the Room

14

PPE Removal: Outside the Room

When respiratory protection is indicated



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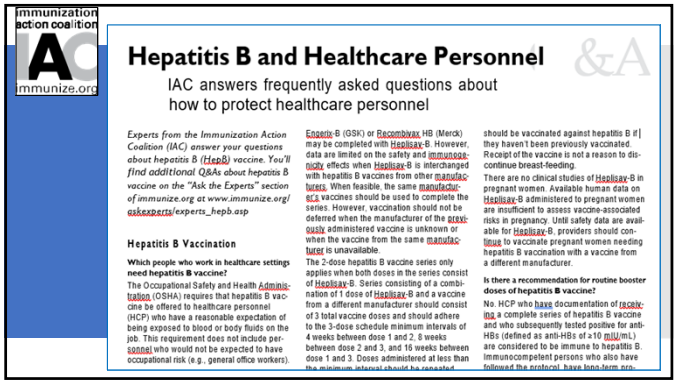
Hepatitis B Vaccine

- After training
- Within 10 working days of assignment
- Titer for at-risk employees

16



17

Heplisav- B

- 18 years or older
- Two doses separated by at least 4 weeks
- Can be used to revaccinate even if the first series was from a different manufacturer

18

How Would These New Employee Situations Be Handled?

- Reports hepatitis B vaccination in the past but no documentation.
- Brings vaccination records on the first day of employment.

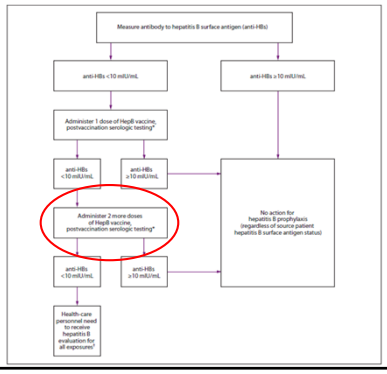
19

Hepatitis B Vaccine

- Vaccination series should be administered and postvaccination testing should be performed 1–2 months after the final dose of vaccine.
- Document vaccine series and postvaccination testing results.
- When documentation not found/available, repeat the series.
  - No harm in receiving extra doses of vaccine

20

Titer Process



21

Vaccine Non-responder

- A nonresponder is defined as a person with anti-HBs <10 mIU/mL after 2 complete series of HepB vaccine.
- Persons who do not have a protective concentration of anti-HBs after revaccination should be tested for HBsAg.
- If positive, the person should receive appropriate management.

22

Evaluation

- Vaccinated HCP whose anti-HBs remains <10 mIU/mL after revaccination (i.e., after receiving a total of 6 doses)
  - Tested for HBsAg and anti-HBc to determine infection status.
  - If not HBV infected (vaccine non-responders) should be considered susceptible to HBV infection.
  - No specific work restrictions are recommended for vaccine non-responders.

Hepatitis B surface antigen (HBsAg): The presence of HBsAg indicates that the person is infectious.

Total hepatitis B core antibody (anti-HBc):. The presence of anti-HBc indicates previous or ongoing infection with hepatitis B virus in an undefined time frame.

23

Work Practice Controls

- Employee behaviors
- Reduce exposure risk
  - Use of transport containers
  - No food, drink in areas where there is the potential for cross contamination
  - Do not bend or break needles
  - Hand hygiene
  - Do not reach into a container of contaminated sharps

24

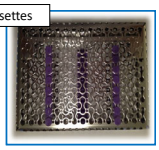
Cleaning and Disinfection

- After patient care
- Barrier use reduces areas to be disinfected
- Spray-wipe-spray
- Wipe-wait-wipe
- High touch surfaces throughout the practice

25

Engineering Controls

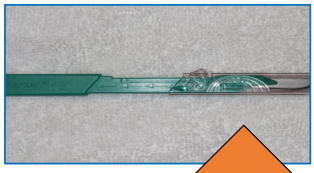
Reduce the risk of a sharps injury



26

Safer Sharps Devices

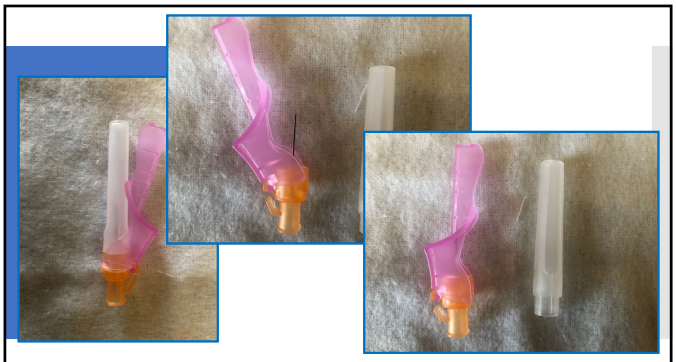
- Sharps device **with a built-in safety feature or mechanism that effectively reduces the risk of an exposure incident.**



Needlestick Safety and Prevention ACT

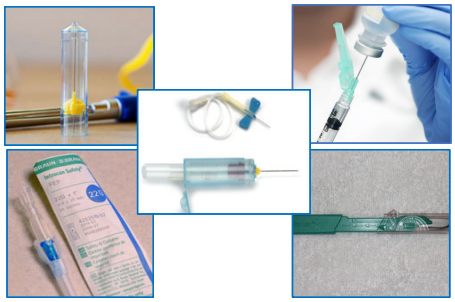
Part of the Device

27



28

- Oral mucosa
  - Aspirating syringe
  - Other types of injections
- Needles
  - IM
  - Sub-q (i.e., cosmetic procedures)
- Scalpels
- IV catheters
- Blood draw devices



29

Screening Safety Devices

- Entire dental team
- Manufacturer's instructions
- Handle device
- Test – Orange or Grapefruit
- Breakdown and disposal
- Document

30

An Exposure Has Occurred

- Splash to eyes, nose or the mouth
- Splash to non-intact skin
- Stick with a needle or sharp instrument

31

Exposure Next Steps

- ~~Clean~~
- Report IMMEDIATELY!
- Seek care
  - Patient must be notified
  - Immediate access to a qualified healthcare provider
  - Evaluation and counseling
  - Baseline Hepatitis C testing

32

Discussion Points

- Qualified healthcare provider
- Accredited laboratory for testing
- Establish the relationship in advance
  - Rapid HIV testing
  - Post exposure medication
  - Payment
  - Hours of operation
  - Wait times
  - Current with most recent guidance

33

Post Exposure Evaluation and Follow-up

(3) Following a report of an exposure incident, the employer shall make **immediately available** to the exposed employee a **confidential medical evaluation and follow-up**, including at least the following elements:

(i) Documentation of the route(s) of exposure, and the circumstances under which the exposure incident occurred;

(ii) Identification and documentation of the source individual, unless the employer can establish that identification is infeasible or prohibited by state or local law;

(iii) Collection and testing of blood for HBV and HIV serological status;

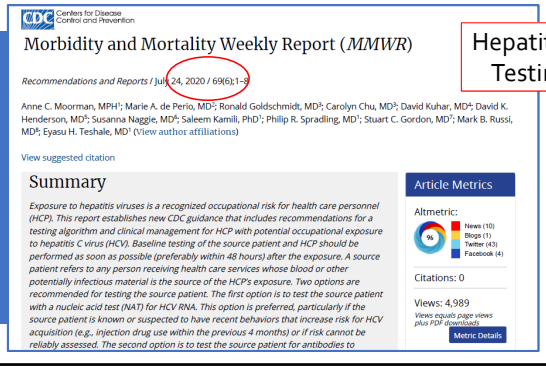
(iv) Post-exposure prophylaxis, when medically indicated, as recommended by the U.S. Public Health Service;

(v) Counseling; and

(vi) Evaluation of reported illnesses.

34

Hepatitis C Testing



CDC Centers for Disease Control and Prevention

Morbidity and Mortality Weekly Report (*MMWR*)

Recommendations and Reports / July 24, 2020 / 69(6);1–9

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View suggested citation

Summary

Exposure to hepatitis viruses is a recognized occupational risk for health care personnel (HCP). This report establishes new CDC guidance that includes recommendations for a testing algorithm and clinical management for HCP with potential occupational exposure to hepatitis C virus (HCV). Baseline testing of the source patient and HCP should be performed as soon as possible (preferably within 48 hours) after the exposure. A source patient refers to any person receiving health care services whose blood or other potentially infectious material is the source of the HCP's exposure. Two options are recommended for testing the source patient. The first option is to test the source patient with a nucleic acid test (NAT) for HCV RNA. This option is preferred, particularly if the source patient is known or suspected to have recent behaviors that increase risk for HCV acquisition (e.g., injection drug use within the previous 4 months) or if risk cannot be reliably assessed. The second option is to test the source patient for antibodies to

Article Metrics

Altmetric:

News (10)
Blogs (1)
Twitter (43)
Facebook (4)

Citations: 0

Views: 4,989

Views equals page views plus PDF downloads

Metric Details

35

Testing Definitions

- HCV NAT for HCV RNA
  - **HCV RNA** in blood, obtained by nucleic acid testing (**NAT**), is a marker for **HCV** viremia and is detected only in persons who are currently infected. Persons with reactive results after **HCV** antibody testing should be evaluated for the presence of **HCV RNA** in their blood.
  - Detected within 1 – 2 weeks after exposure.
- Anti—HCV
  - The **HCV** antibody **test**, sometimes called the **anti-HCV test**, looks for antibodies to the **hepatitis C** virus in blood. Antibodies are chemicals released into the bloodstream when someone gets infected.

36

Source Patient Testing

- Obtain patient consent based on state law
- HIV Antibody: Exposed to HIV
  - Rapid HIV test
  - If rapid HIV is not available, expedite the HIV test
- Hepatitis B Surface Antigen (HBsAG): *Currently infected*
  - Source patient testing is not indicated if exposed worker has documented immunity
- Hepatitis (HCV)
  - Nucleic acid test (NAT) for HCV RNA
  - Testing for anti-HCV with reflex to a NAT if positive

37

Therefore, an employer's failure to use rapid HIV antibody testing when testing as required by paragraph 1910.1030(f)(3)(ii)(A) *would usually be considered a violation of that provision.*

OSHA Standard Interpretation

"Rapid HIV testing of source patients facilitates timely decision making regarding the need for administration of HIV PEP after occupational exposure to sources whose HIV status is unknown."

Updated U.S. Public Health Service guidelines for the management of occupational exposures to HIV and recommendations for postexposure prophylaxis. 9.25.13

Availability of Rapid HIV Test

38

What if the Source Declines?

Have doctor explain.

Required by state law?

Focus on the worker.

39

Worker Testing

Test for the virus in the blood

- Baseline testing for anti-HCV with reflex to a NAT if positive should be conducted ASAP (preferably within 48 hours) after the exposure and may be simultaneous with source-patient testing.
- If follow-up testing of HCP is recommended based on the source-patient's status, test with a NAT at 3–6 weeks postexposure.
- If the HCP is NAT negative at 3–6 weeks postexposure, a final test for anti-HCV at 4–6 months postexposure is recommended

40

Testing Options

- Conduct baseline testing for all exposures:
  - HIV Antibody
  - Hepatitis B Surface Antigen (HBsAG)
    - Testing of employee is not indicated, if documented serologic evidence indicates immunity to hepatitis B.
  - Anti-Hepatitis C Virus (Anti-HCV)

Or

  - Anti-Hepatitis C Virus (Anti-HCV)
  - HIV/Hep B: Test only if source patient testing indicates disease or in an unknown exposure
- Follow-up for any indication of illness with additional testing for worker for up to 6 months.

41

Post Exposure Testing – CDC 2001

Known sources

- Test known sources for HBsAg, anti-HCV, and HIV antibody
  - Direct virus assays for routine screening of source - **not** recommended
  - Consider using a rapid HIV-antibody test
  - If the source person is **not** infected with a bloodborne pathogen, baseline testing or further follow-up of the exposed person is **not** necessary
- For sources with unknown infection status (e.g., the source person refuses testing), consider medical diagnoses, clinical symptoms, and history of risk behaviors
- Do not test discarded needles for bloodborne pathogens

Unknown sources

- For unknown sources, evaluate the likelihood of exposure to a source at high risk for infection
- Consider likelihood of bloodborne pathogen infection among patients in the exposure setting

Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis. MMWR 2001;50(No. RR-11): pp. 20.

Hep C!

42

POST EXPOSURE EVALUATION DECLINATION

I have been trained on the risk of being exposed to blood and/or other potentially infectious materials as required by OSHA's Bloodborne Pathogens Standard. I understand that I may have been exposed to an infectious disease including HIV, Hepatitis B or Hepatitis C because of the exposure incident. I also understand the risk of contracting these diseases. I have been offered, without charge, the opportunity for a medical evaluation which may include blood testing, counseling and if indicated evaluation of reported illnesses by a qualified healthcare professional.

I decline this post exposure evaluation, counseling, blood testing and any follow-up based on reported illnesses.

Signature: _____ Date: _____

Witness: _____ Date: _____

43

Written Letter of Opinion

PHYSICIAN WRITTEN OPINION

Patient Name: _____ Date of Birth: _____

Post-Exposure Evaluation and Treatment Date of visit: _____

☐ The employee has been informed of the results of the evaluation

☐ The employee has been told about any medical conditions resulting from exposure to blood or other potentially infectious materials which require further evaluation or treatment.

Hepatitis B Vaccination Date of visit: _____

☐ Hepatitis B vaccination is indicated

☐ Hepatitis B vaccination has been administered.

_____

Treating Physician Signature

44

Employee Confidentiality

- Exposed worker – source patient results
- Doctor is both the employer and the evaluating healthcare professional
- Medical information is not to be discussed with or revealed to others

45

Occupational Safety and Health Administration

ABOUT OSHA | WORKERS | EMPLOYERS | REGULATIONS | ENFORCEMENT | TOPICS | NEWS & PUBL

Report a Fatality or Severe Injury

- All employers are required to notify OSHA when an employee is killed on the job or suffers a work-related hospitalization, amputation, or loss of an eye.
- A fatality must be reported within 8 hours.
- An in-patient hospitalization, amputation, or eye loss must be reported within 24 hours.

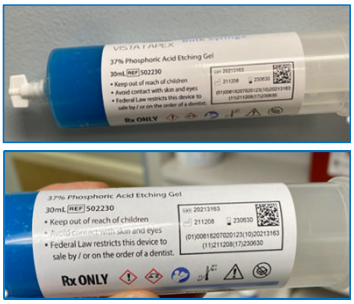
To Make a Report

- Call the nearest OSHA office.
- Call the OSHA 24-hour hotline at 1-800-321-6742 (OSHA).
- Report online

https://www.osha.gov/pls/ser/serform.html

46

Hazard Communication



47

48

Safe Handling of Chemicals

- Policies and procedure
- Proper identification
  - Original container labels not defaced
  - Secondary labels
- Review labels and SDS
- PPE, work practice and engineering controls
- Respond appropriately to an exposure or spill
  - Incident report
  - Appropriate access to and use of eyewash
  - Chemical spill kit and proper disposal

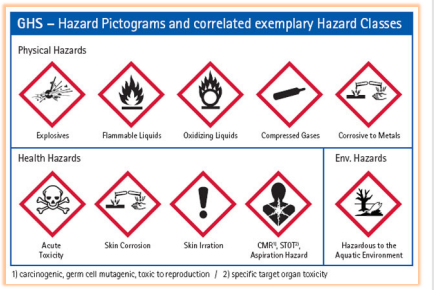
49

Manufacturer Labels

Symbols - Pictograms
Signal Words
Hazard Statements
Precautionary Statements

50

Pictograms



51

Safety Data Sheets

Section 2 - Hazard(s) identification

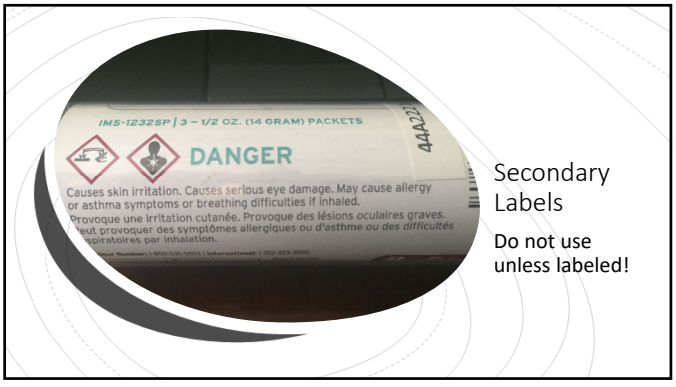
Section 4 - First-aid measures

Section 6 - Accidental release measures and spill clean-up

Section 8 - Exposure controls and personal protection

Does everyone know how to access SDS?

52



Secondary Labels

Do not use unless labeled!

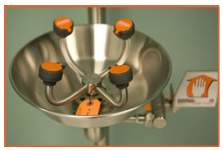
53

Eye Wash

54

Corrosives + OSHA

- 29 CFR 1910.151(c), specifies that "where the eyes or body of any person may be exposed to injurious corrosive materials
- Suitable facilities for quick drenching or flushing of the eyes and body shall be **provided within the work area for immediate emergency use**.
- ANSI Z358.1
  - Weekly checks
  - Flush capacity
  - Water temperature
  - Single step activation



https://blog.ansi.org/2018/07/emergency-eyewash-station-shower-ansi-z358-1/#gref

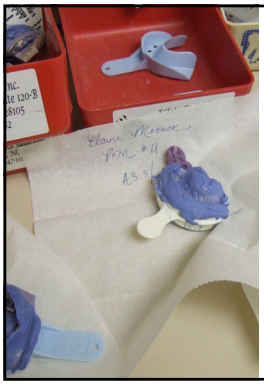
55

What is wrong with this picture?

56

Dental Lab Safety

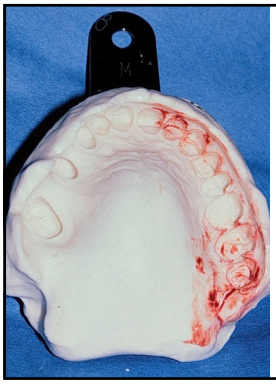
57



Risk of Cross-Contamination

- From the operatory to the lab
- From the laboratory to the operatory or DHCP
- Establish clean vs. dirty lab
  - Clean and disinfect in the operatory
  - Clean and disinfect in the lab area
- Decontamination process is a critical communication when handing off to an off-site lab

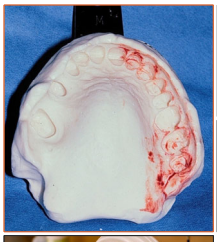
58



Cleaning + Disinfection Impressions

- Clean with camelhair brush and soap and water
- Product acceptable with impression material
- Longest contact time
- CLEAN first and then disinfect
- Immersion
  - Optimal coverage and less user error
  - More disinfect used
  - May be incompatible with some materials
- Spray impression
  - Place in sealed bag for contact time
  - Less distortion
  - Higher risk of missed area

59



Potential Cross Contamination

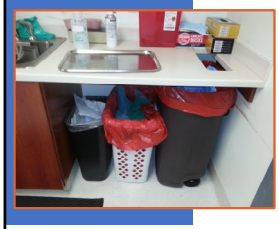
60

Cleaning + Disinfecting Prosthesis

Clean with brush and anti-microbial soap

61

Regulated Waste

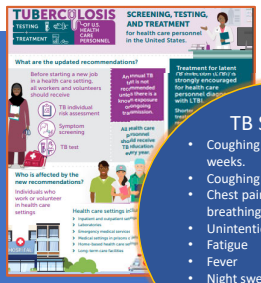


- Pathological and microbiological wastes containing blood or OPIM
- Liquid or semi-liquid blood or OPIM
- Contaminated items that would release blood or OPIM if compressed
- Items that are caked with blood or OPIM
- Contaminated sharps

Does not include:

bloody gloves, mask, gowns, lightly soiled gauze

62



TB Symptoms

- Coughing for three or more weeks.
- Coughing up blood or mucus.
- Chest pain, or pain with breathing or coughing.
- Unintentional weight loss.
- Fatigue
- Fever
- Night sweats.
- Chills

TB Infection Control Plan ensures:

❖Detection
❖Protection
❖Treatment

63

Fire Response Plan

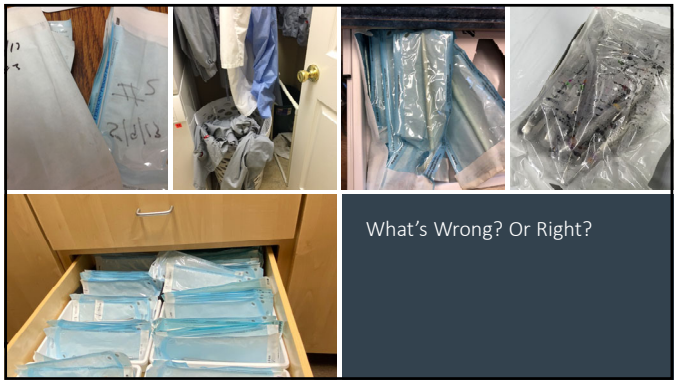
Evacuate

Meeting place?

Account for workers and patients

Two routes of escape

64



What's Wrong? Or Right?

65

I'm giving up eating chocolate for a month. Sorry, bad punctuation. I'm giving up. Eating chocolate for a month.

66

Dental Unit Waterlines

67

CDC Recommendations for Dental Water Quality

- Use water that meets the CDC recommended limit for dental procedural water (i.e., mL of heterotrophic water bacteria) for routine dental treatment.
- Consult with the dental unit manufacturer for appropriate methods and equipment to maintain the recommended quality of dental water.
- Follow recommendations for monitoring water quality provided by the manufacturer of the unit or waterline treatment product.
- Discharge water and air for a minimum of 20–30 seconds after each patient, from any device connected to the dental water system that enters the patient's mouth (e.g., handpieces, ultrasonic scalers, and air/water syringes).
- Consult with the dental unit manufacturer on the need for periodic maintenance of anti-retraction mechanisms.

68

Mycobacterium in Children

2015: 20 children admitted to hospitals in Georgia with infections caused by contaminated water in dental units.

2016: Laboratory testing confirmed positive results for Mycobacterium in an Anaheim Pediatric dental clinic's internal water system. **Over 70 children were hospitalized and treated** for Mycobacterium NTM)

Peralta G, Tobin-D'Angelo M, Parham A, et al. Notes from the Field. *Mycobacterium abscessus* Infections Among Patients of a Pediatric Dentistry Practice — Georgia, 2015. MMWR Morb Mortal Wkly Rep 2016;65:355–356. DOI: http://dx.doi.org/10.15585/mmwr.mm6513a5external icon.

69

Interesting Info

- Most organisms recorded from DUWL are naturally occurring in water environments
- Once biofilm is developed endotoxins can be created that can trigger or exacerbate asthma in patients and DHCPs.
- Skin rashes, GI reactions and may cause delayed wound healing.
- Heterotrophic pate count (HPC) and the CDC guidance does not provide a measure of health effects.
  - Analytic methods to measure the variety of bacteria that are common in water and to demonstrate how well the water system is maintained.

70

Treatment Must Occur

- Tablets
- Tablets and Shock
- Shock only
- Straws and Cartridges
- Daily liquid
- Central systems

71

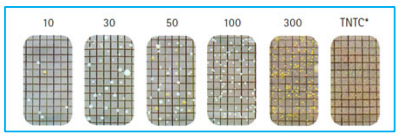
Dental Water Treatment Product Selection Guide

Treatment Category	Product Options	Pass Rate[1]	Estimated Use (operatories per year)	Annual Cost (per operatory)*	Tips for Safer Waterlines
Tablets with Separate Shock	BluTab, Benco, Z3, ICX, Citrisil, Patterson Brand	88%	65,000	$93-$179	· 2-liter tablets are the most economical. · You can premix a gallon with 2-liter tablets. · All tablet manufacturers recommend frequent shocking. · Frequency of shocking ranges from monthly to quarterly. · Test you water quality every quarter.
Tablets	BluTab, Benco, Z3, ICX, Citrisil, Patterson Brand	77%	65,000	$91-$170	· All tablet manufacturers recommend regular shocking. · Frequency of shocking ranges from monthly to quarterly. · Two liter tablets are the most economical. · You can premix a gallon with 2-liter tablets. · Test you water quality every quarter.
Cartridges & Straws	DentaPure, Sterisil	72%	68,000	$224-$279	· Shock your lines before installing each new straw. · Do not shock through straw or cartridge. This can ruin the straw. Request a "shock straw" from the manufacturer. · Test your water quality every quarter. · Cartridges for "municipal" waterlines that are installed in the junction box do not have an easy remedy for what to do if you fail a waterline test. · Some straws require certain water hardness. Verify compatibility before purchase.
Shock Treatment Only	Liquid Ultra, Bleach (Sodium Hypochlorite), Citrisil Shock, Mint-A-Kleen	60%	9,000	$3-$117	· Using a shock product by itself requires weekly use to be effective. · ProEdge recommends bleach or Liquid Ultra as they prove to be most effective in real-world dental settings. · Some shock product performance is very low.

72

Testing Options

- In office
- Mail-in or water laboratory testing services
- Aseptic technique
- Sample from each individual line or pooling from all water bearing lines on the unit



73

DENTAL UNIT MANUFACTURERS

Waterline IFUs / Recommendations	A-dec	Pelton & Crane	Midmark	Belmont	DCI Edge	DentalEZ / Forest
Shocking	After Failed Test	*Monthly	When Testing Reveals >200 CFU/mL	After Failed Test	Initial, then as Needed	When Testing Reveals >250 CFU/mL
Treatment	ICX Tablet	Tablet or Straw	Straw	-	Tablet	Tablet or Straw
Testing Frequency	Monthly, then Quarterly	*Monthly	Monthly, then Adjust	Monthly, then Quarterly	Monthly, then Adjust	Monthly, then Quarterly
Remediation	Shock & Retest	-	Shock	Shock & Retest	-	Shock

*Recommendation Based on Pelton & Crane Treatment Aqualant

Instructions for Use

74

No IFU from manufacturer utilize treatment product IFU or at least monthly on each dental unit or device.

If monitoring results indicate that water quality is acceptable for two consecutive monthly cycles, the frequency of testing may be reduced, but should not be less than every three months.

Actual biofilm images
Enlarged to show detail

DENTAL UNIT WATER QUALITY: ORGANIZATION FOR SAFETY, ASEPSIS AND PREVENTION
WHITE PAPER AND RECOMMENDATIONS–2018

75

Multi-dose Dispensers

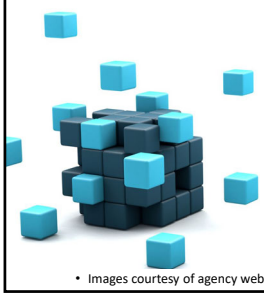
- Follow manufacturer's instructions
- Use barriers when placing in the mouth

76

Instrument Processing

77

Infection Control Program Building Blocks



- Images courtesy of agency websites

78

Disinfection and Sterilization EH Spaulding

- CRITICAL
- SEMI-CRITICAL
- NONCRITICAL

79

01 Clean and heat-sterilize critical instruments

02 Clean and heat sterilize semi-critical instruments

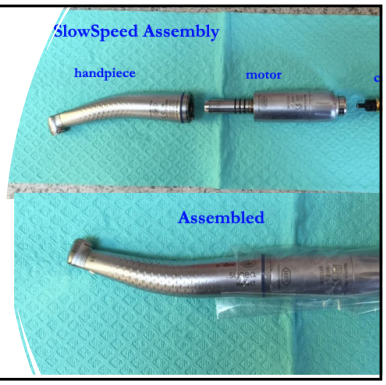
03 Allow packages to dry in the sterilizer

CDC Recommendations - Dental

80

Dental Handpieces Attached to Waterlines

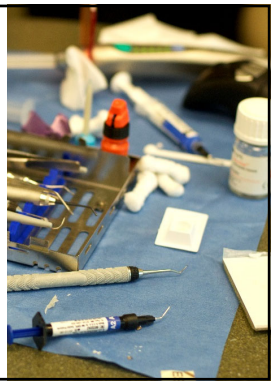
- Clean and heat-sterilize handpieces and motors that can be removed from the air and waterlines.



81

Steps in the Process

- Cleaning
- Packaging
- Sterilization or disinfection
- Monitoring
  - Physical
  - Chemical
  - Biological
- Storage



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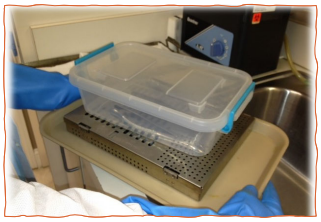


Operatory

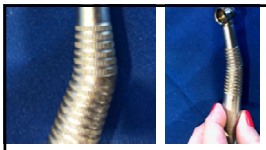
83

Divide and Conquer

84

Cleaning:
First Step

85



Handpiece Cleaning

86

Degassing

IV. Degassing Instructions

Degassing the solution eliminates large air bubbles that interfere with the cleaning process. Anytime a new solution is mixed in the holding tank, the Degas key should be utilized. *Degassing is necessary each time new solution is added to the tank.*

87

Cleaning
Chemicals

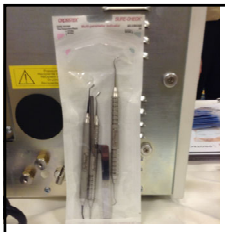
88

Packaging

The purpose of sterilization wraps is to keep sterile the medical supplies packed after the sterilization process, during storage, prior to use. The packaging and folding processes are therefore crucial.

Double Folding
The use of two wraps reinforces the strength of the packaging and offers a further guarantee of sterility.

89



Preparation
and Packaging

- Dry
- Hinged instruments opened and unlocked
- Wrap all instruments
- Place indicators

90

Labeling Packages

- Date
- Sterilizer number if more than one unit
- Load number
- Expiration date if applicable

91

Steam Sterilizers

- Photo courtesy of OSAP

92

Paper Side Up or Paper Side Down?

93

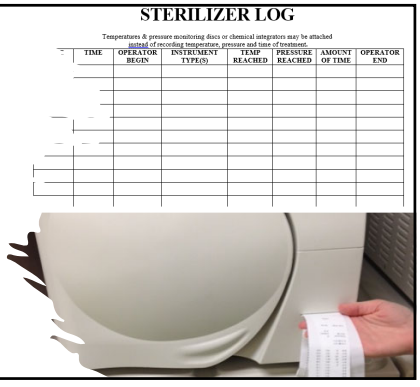
Sterilization Monitoring

- Physical
- Chemical
- Biological

94

Physical

- Time
- Temperature
- Pressure



STERILIZER LOG

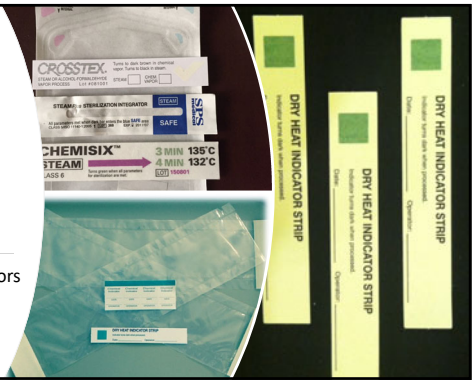
Temperatures & pressure monitoring discs or chemical integrators may be attached instead of recording temperature, pressure and time of treatment.

TIME	OPERATOR BEGIN	INSTRUMENT TYPE(S)	TEMP REACHED	PRESSURE REACHED	AMOUNT OF TIME	OPERATOR END

95

Chemical Indicators

Six classes of indicators

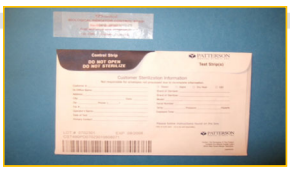


96

Steam:
Geobacillus stearothermophilus

Dry heat + ETO:
B. atrophaeus

Biological Monitors



97

Positive Spore Test: Steam

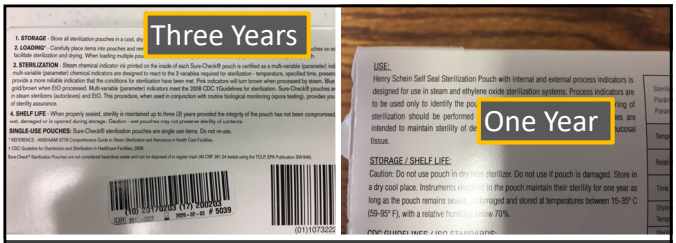
- Remove the sterilizer from service and troubleshoot
- Retest the sterilizer
- Spore test is negative put unit back in service
- Spore test positive recall all instruments since last negative test

98

Storage of Sterile Instruments

- Event related
- Time related

99



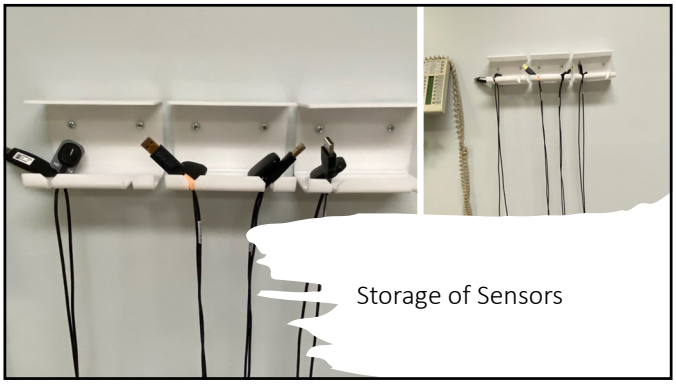
Manufacturer's IFU

100

Chemical Disinfectants/Sterilant

- Use according to manufacturer's instructions
- Record expiration date
- Clean, rinse and dry
- Soak for appointed time
- Remove and rinse
- Test strip solution according to manufacturer's instructions

101

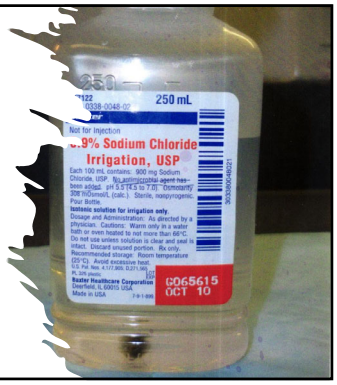


Storage of Sensors

102

Single-Use (Disposable) Solution/Devices

- One patient during a single procedure
- Solutions/medications usually without preservatives
- Instrumentation
  - Cannot be reliably cleaned
  - Usually not heat-tolerant
- FDA Law prevents reuse of "labeled" single use patient products or devices



103

Is This A Problem?

104

A NEVER Event!

Ensure instruments are safe for use:

- Packaging is sealed appropriately.
- External indicator has changed color.
- Internal indicator has changed color.
- Instruments show no visible evidence of contamination.

Check for Indicator Color Change

105

Final Thoughts

- All steps in instrument processing are equally important.
- Your patients will thank you ….

106

"In case of fire, exit building before tweeting about it."

Author Unknown

107

Thank You!

Karen Gregory, RN
Director of Compliance and Education
Total Medical Compliance
Karen@totalmedicalcompliance.com
888.862.6742

108

Resources/References

- OSHA Bloodborne Pathogens Standard website: https://www.osha.gov/bloodborne-pathogens/standards
- Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis. MMWR 2001;50(No. RR-11): pp. 20.
- NIOSH Website - Bloodborne Diseases https://www.cdc.gov/niosh/topics/bbp/emergnedl.html.
- Updated US Public Health Service guidelines for the management of occupational exposures to human immunodeficiency virus and recommendations for postexposure prophylaxis. Nov 2013.
- CDC Guidance for Evaluating Health-Care Personnel for Hepatitis B Virus Protection and for Administering Postexposure Management. Dec 2013.
- Moorman AC, de Perio MA, Goldschmidt R, et al. Testing and Clinical Management of Health Care Personnel Potentially Exposed to Hepatitis C Virus — CDC Guidance, United States, 2020. MMWR Recomm Rep 2020;69(No. RR-6):1–8. DOI: http://dx.doi.org/10.15585/mmwr.rr6906a1.
- CDC. National Institute for Occupational Safety and Health. Bloodborne Infectious Diseases website. HIV/AIDS, Hepatitis B, Hepatitis C: Preventing Needlesticks and Sharps Injuries
- A Guide to The Globally Harmonized System of Classification and Labeling of Chemicals (GHS): https://www.osha.gov/dsg/hazcom/ghsguideoct05.pdf
- OSHA Hazard Communication website: https://www.osha.gov/dsg/hazcom/

109

HAZARD ASSESSMENT CERTIFICATION – DENTAL

Practice Name: _____ **Date:** _____

Evaluated By: _____

Review Date						

Check All Tasks That Apply	TASKS	POTENTIAL EXPOSURE												PPE Personal Protective Equipment					
		Biological				Mechanical			Chemical				X-Ray LASER						
		BLOOD	OPIM	NON INTACT SKIN	MUCOUS MEMBRANES	FLYING OBJECTS	SHARPS	ABRASIVES	BURNS	POISONS	ABSORPTIONS	INHALATIONS	SKIN/EYES	INHALATIONS	GLOVES	GOWNS/APRONS	MASKS	EYEWEAR	AMBU BAGS	MICRO SHIELDS
	EXAM (no A/W syringe)	√	√	√	√		√								√					
	EXAM (with A/W syringe)	√	√	√	√	√	√								√	√	√	√		
	PROPHY/HYGIENE	√	√	√	√	√	√	√				√			√	√	√	√		
	X-RAY		√		√										√					
	RESTORATIONS	√	√	√	√	√	√	√				√			√	√	√	√		
	EXTRACTIONS	√	√	√	√	√	√	√				√			√	√	√	√		
	ENDODONTICS	√	√	√	√	√	√	√	√	√	√				√	√	√	√		
	PERIODONTICS	√	√	√	√	√	√	√							√	√	√	√		
	ORAL SURGERY	√	√	√	√	√	√	√							√	√	√	√		
	ORTHODONTICS	√	√	√	√	√	√								√	√	√	√		
	LAB PROCEDURES	√	√			√	√	√	√	√	√	√			√	√	√	√		
	INJECTIONS/PHLEBOTOMY	√	√	√	√		√								√					
	INSTRUMENT DECONTAMINATION	√	√	√		√	√		√	√	√	√			√	√	√	√		
	OPERATORY DECONTAMINATION	√	√	√			√			√	√				√					
	WASTE HANDLING	√	√	√			√	√	√	√	√				√					
	CPR (POTENTIAL)				√										√				√	√
	X-RAY – Mixing of Chemicals								√	√		√			√	√		√		

NOTE: Please review all categories that pertain to your practice to insure the proper fields are checked.

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EMPLOYEE MEDICAL RECORD - HEPATITIS B VACCINE

Name _____ Last 4 of SS# _____

Select the appropriate box:

- ☐ Hepatitis B vaccination series documentation and positive titer. Records attached.
- ☐ Never received a vaccination. Vaccine series and a follow-up titer offered.
- ☐ Official documentation of vaccination, but no documented titer. Hepatitis B titer offered.
- ☐ History of vaccination or incomplete vaccination series, but no official documentation:
  - ☐ Attempt to obtain official records by contacting previous employers, healthcare provider or the employee working with the health department to access records.
  - ☐ If records reveal an incomplete series, the missing doses will be provided, and a titer performed.
  - ☐ If records are not located, the worker is considered unvaccinated and will be offered vaccination series with titer.

Workers can accept or decline the vaccination(s) or a titer by signing one of the boxes below.

HEPATITIS B VACCINE CONSENT (No vaccination series or lack of documentation)

I consent to move forward with Hepatitis B Virus (HBV) vaccine and titer. I understand the injections are given over a period of several months before it is effective in preventing the disease.

The titer will provide documentation of immunity. If a titer reveals inadequate immunity, based on public health guidance, workers will be provided additional doses of the vaccine, not to exceed six (6) doses to obtain immunity.

Signature: _____ Date: _____

TITER CONSENT (Documentation of Hepatitis B vaccine series but no titer obtained)

I consent to move forward with Hepatitis B Virus (HBV) and titer. The titer will provide documentation of immunity. If a titer reveals inadequate immunity, based on public health guidance, workers will be provided additional doses of the vaccine, not to exceed six (6) doses to obtain immunity.

Signature: _____ Date: _____

TITER DECLINED

Signature: _____ Date:_____

HEPATITIS B VACCINE DECLINATION

I understand that due to my occupational exposure to blood or other potentially infectious material I may be at risk of acquiring a Hepatitis B Virus infection. I have been given the opportunity to be vaccinated at no charge to myself. I understand that by declining this vaccine I continue to have occupational exposure to blood or be at risk of acquiring Hepatitis B, a serious disease.

If in the future I continue to have occupational exposure to blood or other potentially infectious materials, and I want to be vaccinated with Hepatitis B vaccine, I can receive the vaccination series at no charge to me.

Signature: _____ Date: _____

Reference:
Hepatitis B and the Healthcare Personnel: CDC Answers Frequently Asked Questions
Centers for Disease Control and Prevention. CDC Guidance for Evaluating Health-Care Personnel for Hepatitis B Virus Protection and for Administering Postexposure Management. MMWR 2013;62(No.10)

Hepatitis B and Healthcare Personnel Q&A

IAC answers frequently asked questions about how to protect healthcare personnel

Experts from the Immunization Action Coalition (IAC) answer your questions about hepatitis B (HepB) vaccine. You'll find additional Q&As about hepatitis B vaccine on the "Ask the Experts" section of immunize.org at www.immunize.org/askexperts/experts_hepb.asp

Hepatitis B Vaccination

Which people who work in healthcare settings need hepatitis B vaccine?

The Occupational Safety and Health Administration (OSHA) requires that hepatitis B vaccine be offered to healthcare personnel (HCP) who have a reasonable expectation of being exposed to blood or body fluids on the job. This requirement does not include personnel who would not be expected to have occupational risk (e.g., general office workers).

At what anatomic site should hepatitis B vaccine be administered to adults? What needle size should be used?

For adults, administer hepatitis B vaccine intramuscularly (IM) in the deltoid muscle. A 22- to 25-gauge, 1–1½-inch needle should be used. The gluteus muscle should *not* be used as a site for administering hepatitis B vaccine. For optimal protection, it is crucial that the vaccine be administered IM, not subcutaneously.

Can Heplisav-B be used for vaccinating healthcare professionals?

Yes. Heplisav-B (Dynavax) was approved by the Food and Drug Administration in November 2017 for persons 18 years of age and older. Heplisav-B contains a novel immunostimulatory adjuvant (CpG 1018) that binds to Toll-like receptor 9 to stimulate a directed immune response to HBsAg. It is provided in a single dose 0.5 mL vial and given as a 2-dose schedule. The doses should be separated by at least 4 weeks.

Can Heplisav-B be used to complete a vaccination series started with Engerix-B or Recombivax HB?

A HepB vaccine series that was begun with Engerix-B (GSK) or Recombivax HB (Merck) may be completed with Heplisav-B. However, data are limited on the safety and immunogenicity effects when Heplisav-B is interchanged with hepatitis B vaccines from other manufacturers. When feasible, the same manufacturer's vaccines should be used to complete the series. However, vaccination should not be deferred when the manufacturer of the previously administered vaccine is unknown or when the vaccine from the same manufacturer is unavailable.

The 2-dose hepatitis B vaccine series only applies when both doses in the series consist of Heplisav-B. Series consisting of a combination of 1 dose of Heplisav-B and a vaccine from a different manufacturer should consist of 3 total vaccine doses and should adhere to the 3-dose schedule minimum intervals of 4 weeks between dose 1 and 2, 8 weeks between dose 2 and 3, and 16 weeks between dose 1 and 3. Doses administered at less than the minimum interval should be repeated. However, a series containing 2 doses of Heplisav-B administered at least 4 weeks apart is valid, even if the patient received a single earlier dose from another manufacturer.

If a person who works in a healthcare setting had one dose only of hepatitis B vaccine 1 year ago, should the series be restarted?

No. The hepatitis B vaccine series should not be restarted when doses are delayed; rather, the series should be continued from where it stopped.

Is it safe for HCP to be vaccinated during pregnancy?

Yes. Both Engerix-B [GSK] and Recombivax HB [Merck]) may be administered during pregnancy. Many years of experience with these two vaccines indicate no apparent risk for adverse events to a developing fetus. Current hepatitis B vaccines contain noninfectious hepatitis B surface antigen (HBsAg) and should pose no risk to the fetus. If not vaccinated, a pregnant woman may contract an HBV infection during pregnancy, which might result in severe disease for the newborn. Women who breastfeed their babies and are healthcare professionals can and should be vaccinated against hepatitis B if they haven't been previously vaccinated. Receipt of the vaccine is not a reason to discontinue breast-feeding.

There are no clinical studies of Heplisav-B in pregnant women. Available human data on Heplisav-B administered to pregnant women are insufficient to assess vaccine-associated risks in pregnancy. Until safety data are available for Heplisav-B, providers should continue to vaccinate pregnant women needing hepatitis B vaccination with a vaccine from a different manufacturer.

Is there a recommendation for routine booster doses of hepatitis B vaccine?

No. HCP who have documentation of receiving a complete series of hepatitis B vaccine and who subsequently tested positive for anti-HBs (defined as anti-HBs of ≥10 mIU/mL) are considered to be immune to hepatitis B. Immunocompetent persons who also have followed the protocol, have long-term protection against HBV and do not need further testing or vaccine doses. Some immunodeficient persons, including those on hemodialysis, may need periodic booster doses of hepatitis B vaccine.

We have a new employee with documentation of having received a series of hepatitis B vaccine as an adolescent. He now tests negative for hepatitis B surface antibody (anti-HBs). How should we manage him?

ACIP recommends that healthcare personnel with written documentation of having received a properly spaced series of hepatitis B vaccine in the past (such as in infancy or adolescence) but who now test negative for anti-HBs should receive a single "booster" dose of hepatitis B vaccine and be retested 1–2 months later (see Figure 1). Those who test positive following the "booster" dose are immune and require no further vaccination or testing. Those who test negative should complete a second series of hepatitis B vaccine on the usual schedule and be tested again 1–2 months after the last dose. Heplisav-B may be used to revaccinate new healthcare personnel (including the challenge dose) initially vaccinated with a vaccine from a different

CONTINUED ON THE NEXT PAGE ▶

immunization action coalition
IAC
immunize.org

Saint Paul, Minnesota • 651-647-9009 • www.immunize.org • www.vaccineinformation.org

www.immunize.org/catg.d/p2109.pdf • Item #P2109 (2/20)

manufacturer in the distant past who have anti-HBs less than 10 mIU/mL upon hire or matriculation. For more information, see www.cdc.gov/mmwr/volumes/67/rr/pdfs/rr6701-H.PDF, pages 21–22.

Post-vaccination Anti-HBs Testing

Which HCP need serologic testing after receiving a hepatitis B vaccine series?

All HCP, including trainees, who have a high risk of occupational percutaneous or mucosal exposure to blood or body fluids (for example, HCP with direct patient contact, HCP at risk of needlestick or sharps injury, laboratory workers who draw, test or handle blood specimens) should have postvaccination testing for antibody to hepatitis B surface antigen (anti-HBs). Postvaccination testing should be done 1–2 months after the last dose of vaccine. Postvaccination testing for persons at low risk for mucosal or percutaneous exposure to blood or body fluids (for example, public safety workers and HCP without direct patient contact) likely is not cost-effective; however, those who do not undergo post-vaccination testing should be counseled to seek immediate testing if exposed.

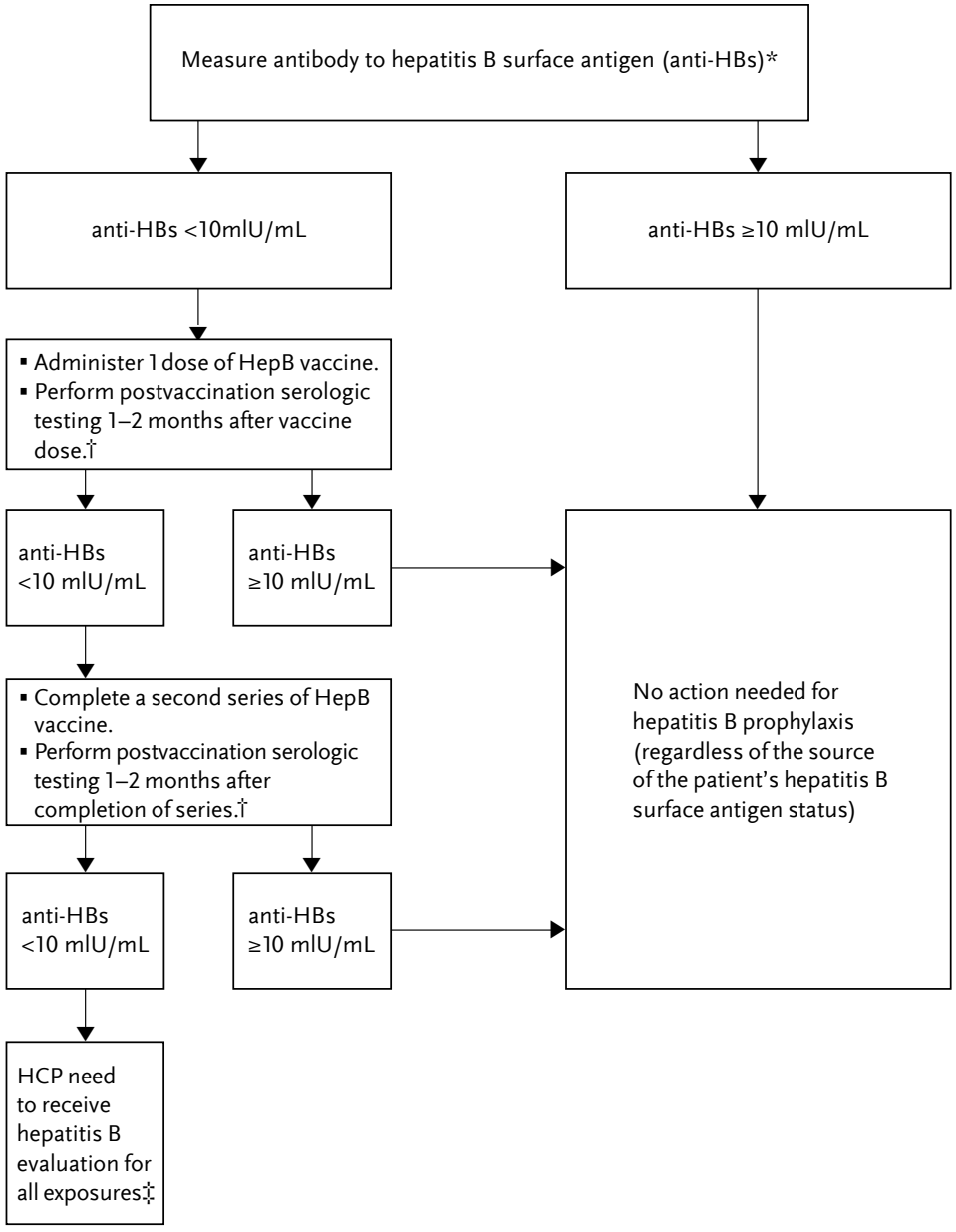
CONTINUED ON THE NEXT PAGE ▶

FIGURE 1.

Pre-exposure Management for Healthcare Personnel with a Documented Hepatitis B Vaccine Series Who Have Not Had Post-vaccination Serologic Testing

Healthcare personnel (HCP) with documentation of a complete series of HepB vaccine but no documentation of anti-HBs ≥10 mIU/mL who are at risk for occupational blood or body fluid exposure might undergo anti-HBs testing upon hire or matriculation. The algorithm at right will assist in the management of these people. It was adapted from CDC. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices, *MMWR* 2018; 67(RR-1), available at www.cdc.gov/mmwr/volumes/67/rr/pdfs/rr6701-H.pdf.

NOTE: Also available as stand-alone form at www.immunize.org/catg.d/p2108.pdf.



* Pre-exposure serologic testing may be recommended for all previously vaccinated HCP who were not tested 1 to 2 months after the third dose (such as people vaccinated as children or adolescents). Trainees, HCP in certain occupations, and HCP practicing in certain populations are at greater risk of exposure. Vaccinated HCP in these settings or occupations could benefit from pre-exposure serologic testing.

† Should be performed 1–2 months after the last dose of vaccine using a quantitative method that allows detection of the protective concentration of anti-HBs (≥10 mIU/mL) (e.g., enzyme-linked immunosorbent assay [ELISA]).

‡ A nonresponder is defined as a person with anti-HBs <10 mIU/mL after 2 complete series of HepB vaccine. Persons who do not have a protective concentration of anti-HBs after revaccination should be tested for HBsAg. If positive, the person should receive appropriate management. See *MMWR* 2018;67(RR-1) at www.cdc.gov/mmwr/volumes/67/rr/pdfs/rr6701-H.pdf for guidance on management of persons who do not respond to 2 complete series of HepB vaccine.

What should be done if a person's post-vaccination anti-HBs test is negative (less than 10 mIU/mL) 1–2 months after the last dose of vaccine?

Repeat the 2- or 3-dose series (depending on vaccine brand) and test for anti-HBs 1–2 months after the final dose of the repeat series. Heplisav-B may be used for revaccination following an initial hepatitis B vaccine series that consisted of doses of Heplisav-B or doses from a different manufacturer. Heplisav-B may also be used to revaccinate new healthcare personnel (including the challenge dose) initially vaccinated with a vaccine from a different manufacturer in the distant past who have anti-HBs less than 10 mIU/mL upon hire or matriculation.

If the test is still negative after a second vaccine series, the person should be tested for HBsAg and total anti-HBc to determine their HBV infection status. People who test negative for HBsAg and total anti-HBc should be considered vaccine non-responders and susceptible to HBV infection. They should be counseled about precautions to prevent HBV infection and the need to obtain hepatitis B immune globulin (HBIG) prophylaxis for any known or likely exposure to HBsAg-positive blood. Those found to be HBsAg negative but total anti-HBc positive were infected in the past and require no vaccination or treatment. If the HBsAg and total anti-HBc tests are positive, the person should receive appropriate counseling for preventing transmission to others as well as referral for ongoing care to a specialist experienced in the medical management of chronic HBV infection. They should not be excluded from work.

How often should I test HCP after they've received the hepatitis B vaccine series to make sure they're protected?

For immunocompetent HCP, periodic testing or periodic boosting is not needed. Post-vaccination testing (anti-HBs) should be done 1–2 months after the last dose of the hepatitis B vaccine series. If adequate anti-HBs (at least 10 mIU/mL) is present, nothing more needs to be done. This information should be made available to the individual and recorded in his or her health record. If postvaccination testing is less than 10 mIU/mL, the vaccine series should be repeated and anti-HBs testing should be completed 1–2 months after the last dose of the second series.

Does CDC now recommend routine pre-exposure anti-HBs testing for all HCP who were previously vaccinated but not tested?

In general, no, but the type of testing (pre-exposure or post-exposure) depends on the healthcare worker's profession and work setting. The risk for hepatitis B virus (HBV) infection for vaccinated HCPs can vary widely by setting and profession. The risk might be low enough in certain settings that assessment of hepatitis B surface antibody (anti-HBs) status and appropriate follow-up can be done at the time of exposure to potentially infectious blood or body fluids. This approach relies on HCP recognizing and reporting blood and body fluid exposures and might be applied on the basis of documented low risk, implementation, and cost considerations. Trainees, some occupations (such as those with frequent exposure to sharp instruments and blood), and HCP practicing in certain populations are at greater risk of exposure to blood or body fluid exposure from an HBsAg-positive patient. Vaccinated HCP in these settings/occupations would benefit from a pre-exposure approach.

At our facility we do routine pre-employment anti-HBs testing regardless of whether the employee has documentation of a hepatitis B vaccination series and consider those with a positive antibody to be immune. Is this the recommended strategy?

No. HCP with written documentation of receipt of a complete, properly spaced series of hepatitis B vaccine AND a positive anti-HBs can be considered immune to HBV and require no further testing or vaccination. Testing unvaccinated or incompletely vaccinated HCP (including those without written documentation of vaccination) is not necessary and is potentially misleading because anti-HBs of 10 mIU/mL or higher as a correlate of vaccine-induced protection has only been determined for persons who have completed a hepatitis B vaccination series. Persons who cannot provide written documentation of a complete hepatitis B vaccination series should complete the series, then be tested for anti-HBs 1 to 2 months after the final dose.

Several physicians in our group have no documentation showing they received hepatitis B vaccine. They are relatively sure, however, that they received the doses many years ago. What do we do now?

Because there is no documentation of vaccination, a vaccination series should be administered and postvaccination testing should be performed 1–2 months after the final dose of vaccine. There is no harm in receiving extra doses of vaccine. Postvaccination testing results should also be documented, including the date testing was performed. All healthcare settings should develop policies or guidelines to assure valid hepatitis B immunization.

I'm a nurse who received a documented series of hepatitis B vaccine more than 10 years ago and had a positive follow-up titer (at least 10 mIU/mL). At present, my titer is negative (<10 mIU/ mL). What should I do now?

Nothing. Data show that vaccine-induced anti-HBs levels might decline over time; however, immune memory (anamnestic anti-HBs response) remains intact following immunization. People with adequate anti-HBs concentrations that have declined to less than 10 mIU/mL are still protected against HBV infection. For HCP with normal immune status who have demonstrated adequate anti-HBs (≥10 mIU/mL) following full vaccination, booster doses of vaccine or periodic anti-HBs testing are not recommended.

Non-responders or HCP with Chronic HBV Infection

If an employee does not respond to hepatitis B vaccination (employee has had two full series of hepatitis B vaccine), does s/he need to be removed from activities that expose her/him to bloodborne pathogens?

No. There are no regulations that require removal from job situations where exposure to bloodborne pathogens could occur; this is an individual policy decision within an organization. OSHA regulations require that employees, in jobs where there is a reasonable risk of exposure to blood, be offered hepatitis B vaccine. In addition, the regulation states that adequate personal protective equipment be provided and that standard precautions be followed. Check your state OSHA regulations regarding additional requirements. If there are no state OSHA regulations, federal OSHA regulations should be followed. Adequate documentation should be placed in the employee record regarding non-response to vaccination.

HCP who do not respond after 2 complete series of vaccine should be tested for HBsAg and total anti-HBc to determine if they have chronic HBV infection. If the HBsAg and total

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anti-HBc tests are positive, HCP should receive appropriate counseling for preventing transmission to others as well as referral for ongoing care to a specialist experienced in the medical management of chronic HBV infection. People who are HBsAg-positive and who perform exposure-prone procedures should seek counsel from a review panel comprised of experts with a balanced perspective (e.g., infectious disease specialists and their personal physician[s]) regarding the procedures that they can perform safely. They should not be excluded from work.

Nonresponders who test negative for HBsAg should be considered susceptible to HBV infection. They should be counseled about precautions to prevent HBV infection and the need to obtain HBIG prophylaxis for any known exposure to blood that is HBsAg-positive or if the HBsAg status of the source is unknown (see Table 1 below).

Can a person with chronic HBV infection work in a healthcare setting?

Yes. HCP should not be discriminated against because of their hepatitis B status. All HCP should practice standard precautions, which are designed to prevent HBV transmission, both from patients to HCP and from HCP to patient. There is, however, one caveat concerning HBV-infected HCP. Those who have HBV levels 1000 IU/mL or 5000 genomic equivalents/mL or higher should not perform exposure-prone procedures (e.g., gynecologic, cardiothoracic surgery) unless they have sought counsel from an expert review panel

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TABLE 1. Post-exposure management of healthcare personnel after occupational percutaneous and mucosal exposure to blood and body fluids, by healthcare personnel HepB vaccination and response status

Healthcare personnel status	Postexposure testing		Postexposure prophylaxis		Postvaccination serologic testing†
	Source patient (HBsAg)	HCP testing (anti-HBs)	HBIG*	Vaccination	
Documented responder§ after complete series	No action needed				
Documented nonresponder¶ after 2 complete series	Positive/ unknown	Not indicated	HBIG x2 separated by 1 month	—	No
	Negative	No action needed			
Response unknown after complete series	Positive/ unknown	<10mIU/mL**	HBIG x1	Initiate revaccination	Yes
	Negative	<10mIU/mL	None		
	Any result	≥10mIU/mL	No action needed		
Unvaccinated/incompletely vaccinated or vaccine refusers	Positive/ unknown	—**	HBIG x1	Complete vaccination	Yes
	Negative	—	None	Complete vaccination	Yes

* HBIG should be administered intramuscularly as soon as possible after exposure when indicated. The effectiveness of HBIG when administered >7 days after percutaneous, mucosal, or nonintact skin exposures is unknown. HBIG dosage is 0.06 mL/kg.

† Should be performed 1–2 months after the last dose of the HepB vaccine series (and 6 months after administration of HBIG to avoid detection of passively administered anti-HBs) using a quantitative method that allows detection of the protective concentration of anti-HBs (≥10 mIU/mL).

§ A responder is defined as a person with anti-HBs ≥10 mIU/mL after 1 or more complete series of HepB vaccine.

¶ A nonresponder is defined as a person with anti-HBs <10 mIU/mL after 2 complete series of HepB vaccine.

** HCP who have anti-HBs <10mIU/mL, or who are unvaccinated or incompletely vaccinated, and sustain an exposure to a source patient who is HBsAg-positive or has unknown HBsAg status, should undergo baseline testing for HBV infection as soon as possible after exposure, and follow-up testing approximately 6 months later. Initial baseline tests consist of total anti-HBc; testing at approximately 6 months consists of HBsAg and total anti-HBc.

ABBREVIATIONS

HCP = healthcare personnel

HBsAg = hepatitis B surface antigen

anti-HBs = antibody to hepatitis B surface antigen

HBIG = hepatitis B immune globulin

Adapted from CDC. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices, *MMWR* 2018; 67(RR-1), available at www.cdc.gov/mmwr/volumes/67/rr/pdfs/rr6701-H.pdf.

and been advised under what circumstances, if any, they may continue to perform these procedures. For more information on this issue, see Updated CDC Recommendations for the Management of Hepatitis B Virus–Infected Health-Care Providers and Students, *MMWR,* 2012; 61(RR03):1-12. This document is available at www.cdc.gov/mmwr/pdf/rr/rr6103.pdf.

Post-exposure Management

How should a fully vaccinated employee with an unknown anti-HBs response be managed if they have a percutaneous or mucosal exposure to blood or body fluids from an HBsAg-positive or HBsAg-unknown source?

Management of the exposed HCP depends on both the anti-HBs status of the HCP and the HBsAg status of the source patient. The HCP should be tested for anti-HBs and the source patient (if known) should be tested for HBsAg as soon as possible after the exposure. Testing the source patient and the HCP should occur simultaneously; testing the source patient should not be delayed while waiting for the HCP anti-HBs test results, and likewise, testing the HCP should not be delayed while waiting for the source patient's HBsAg results. See Table 1 for management recommendations based on the results of testing.

If an employee receives both HBIG and hepatitis B vaccine after a needlestick from a patient who is HBsAg positive, how long should one wait to check the employee's response to the vaccine?

Anti-HBs testing for HCP who receive both hepatitis B immune globulin (HBIG) and hepatitis B vaccine can be conducted as soon as 6 months after receipt of the HBIG.

For more information on vaccination recommendations for healthcare personnel, see the following:

1 CDC. CDC Guidance for Evaluating Health-Care Personnel for Hepatitis B Virus Protection and for Administering Postexposure Management, *MMWR*, 2013; 62(10):1–19, www.cdc.gov/mmwr/pdf/rr/rr6210.pdf

2 CDC. Prevention of Hepatitis B Virus Infection in the United States: Recommendations of the Advisory Committee on Immunization Practices, *MMWR* 2018; 67(RR-1), available at www.cdc.gov/mmwr/volumes/67/rr/pdfs/rr6701-H.pdf.

3 Immunization Action Coalition. "Healthcare Personnel Vaccination Recommendations," www.immunize.org/catg.d/p2017.pdf

4 Immunization Action Coalition. "Pre-exposure Management for Healthcare Personnel (HCP) with a Documented Hepatitis B Vaccine Series Who Have Not Had Post Vaccination Serologic Testing," www.immunize.org/catg.d/p2108.pdf