HEPATITIS B OUTBREAK

RESPONSE CHECKLIST

- ☐ Determine whether a hepatitis B outbreak is occurring. (See Outbreak Detection and Outbreak Investigation).
- ☐ Determine the type of response and level of response needed based on the Tiered Response Plan
- ☐ Review criteria for establishing an incident management team (IMT)
- ☐ Identify internal and external stakeholders (See Internal Partners and External Partners).
- ☐ Develop a communications plan and develop messages for populations at risk, general public, the media, and health department leadership and local and state government partners (see Communications)
- ☐ Determine the populations affected
    - High-Risk Populations: in person-to-person hepatitis B outbreaks, populations at risk for HBV infection or severe outcomes typically include:
        - People at risk for infection by sexual exposure: persons with multiple sex partners, persons with sexually transmitted infections (STIs), men who have sex with men (MSM)
        - People who inject drugs
        - Residents and staff of facilities for developmentally disabled persons
        - Hemodialysis patients
        - People who are currently or were recently incarcerated
        - People with diabetes
        - People with HIV or HCV
        - Persons with chronic liver disease (e.g., cirrhosis, fatty liver disease, alcoholic liver disease, and autoimmune hepatitis)
- ☐ Estimate affected populations' size (See Estimating Vaccine Doses).
- ☐ Define a targeted vaccination strategy (See Postexposure Prophylaxis)
    - Procure adequate supplies of HBV vaccine and immune globulin and facilitate distribution
    - Identify staff and infrastructure to support pop-up vaccination of high-risk populations
    - Ensure a culturally competent and trauma-informed approach to working with high-risk and hard-to-reach populations
- ☐ Post outbreak activities
    - Define the end of the outbreak
    - Plan to continue vaccination of high-risk populations
    - After action evaluation

Hepatitis B Outbreak
Investigative Guidelines
November 2022

1. BACKGROUND

1.1 Transmission

Hepatitis B virus (HBV) is transmitted through percutaneous (i.e., puncture through the skin) or mucosal (i.e., direct contact with mucous membranes) exposure to infectious blood or body fluids. HBV is highly infectious, can be transmitted in the absence of visible blood, and remains viable on environmental surfaces for at least seven days. The clinical course of acute HBV is indistinguishable from that of other types of acute viral hepatitis. Clinical signs and symptoms occur more often in adults than in infants or children. Infants and young children usually are asymptomatic and more likely to progress to chronic infection than adults. Persons with chronic infection (e.g., those with persistent hepatitis B surface antigen [HBsAg] in the serum for at least 6 months following acute infection) serve as the main reservoir for HBV transmission.

1.2 Health Complications

While most acute HBV infections in adults result in complete recovery, fulminant hepatitis occurs in about 1% to 2% of acutely infected persons. Although the consequences of acute HBV infection can be severe, most of the serious complications associated with HBV infection are due to chronic infection. These sequelae include chronic hepatitis, cirrhosis, liver failure, and liver cancer. Approximately 25% of persons who become chronically infected during childhood, and 15% of those who become chronically infected after childhood will die prematurely from cirrhosis or liver cancer.

1.3 Vaccination

A plasma-derived HBV vaccine was first licensed for use in the United States in 1981. The vaccine was safe and effective but was not well accepted, possibly because of unsubstantiated fears of transmission of live HBV and other blood-borne pathogens. Recombinant HBV vaccines replaced plasma-derived HBV vaccines beginning in 1986. The rate of reported acute HBV infections declined approximately 90% since recommendations for HBV vaccination were first issued, from 9.6 cases per 100,000 population in 1982 to 1.0 cases per 100,000 population in 2018. In contrast to hepatitis A virus (HAV), widespread community outbreaks of HBV have been rare in the U.S. The current indications for use of HBV vaccine are listed in Appendix A.

1.4 Current rates and epidemiology

In recent years, however, several outbreaks of HBV have occurred in healthcare settings. Between 2008 and 2019, 66 outbreaks of viral hepatitis, of which 25 involved HBV, were reported to CDC. Considering the differences between the risk factors, methods of case investigation, personnel, and partnerships needed to successfully investigate and control healthcare-associated outbreaks of viral hepatitis, OHA has published separate guidelines for management of those outbreaks.

According to the CDC between 2009 to 2013, the incidence of acute HBV increased 114% in Kentucky, Tennessee and West Virginia, largely due to increasing injection drug use. This increase has paralleled the increasing incidence of acute hepatitis C virus (HCV) in the U.S. associated with injection drug use, pointing to the need to prepare for outbreaks of HBV and HCV in this risk group. Table 1 includes quick facts about HBV.

Table 1. Hepatitis B Quick Facts	
Causative agent	Small, double-stranded DNA virus in Hepadnaviridae family
Signs and symptoms	Fever, headache, fatigue, loss of appetite, nausea, vomiting, diarrhea, abdominal pain, dark urine, grey-colored stools, joint pain, jaundice
Symptom duration	Usually less than two months, sometimes up to six months
Transmission	• Predominantly by parenteral or mucosal exposure to HBsAg-positive body fluids; the highest concentrations of virus are in blood and serous fluids, with lower levels present in saliva, tears, urine, and semen • Perinatal transmission is an important route of transmission • Infectious for at least 7 days on surfaces.
Infectious Period (time from exposure to symptoms)	One to two months before and after the onset of symptoms
Incubation period (time from exposure to symptoms	60–90 days
Laboratory Diagnosis	Hepatitis B surface antigen (HBsAg) appears in the blood a few weeks before symptoms begin, followed by IgM core antibody (IgM-antiHBc) at the time of symptom onset
Prevention	• Safe and effective vaccines are available and require 2–3 doses, depending on the product used • Hepatitis B immune globulin (HBIG) should be given along with HBV vaccine to infants born to mothers who are HBsAg-positive. HBIG is additionally recommended after occupational exposures to blood, or sexual exposure in susceptible individuals • Condom use for high-risk sexual activities that may lead to the exchange of blood, serous fluids, or semen
Treatment	• Primarily supportive care for the acute infection • Chronically infected individuals with high viral loads and signs of active inflammation (as indicated by elevated liver function tests) should receive antiviral therapy to reduce the risk of liver-related morbidity (AASLD)

2. OUTBREAK DETECTION

2.1 Outbreak Criteria

To determine whether more than routine case investigation and control methods are required, the OHA will consider several criteria. The Viral Hepatitis Program (VHP) Medical Director, Hepatitis Epidemiologist, and Viral Hepatitis Prevention Coordinator (VHPC) of will review acute cases of HBV that have been reported to Orpheus, ACDP's surveillance database every month. The occurrence of a rise in the number of reported cases in a jurisdiction more than two standard deviations above the monthly average from the previous three years will trigger a more intense response. Additionally, any cluster of three or more related cases will be considered an outbreak and merit more detailed investigation and evaluation of need for more intensive vaccination response (i.e., beyond postexposure prophylaxis).

2.2 Outbreak Database

Orpheus is linked to Oregon's Outbreak database, a secure database primarily used to track foodborne illnesses in Oregon. ACDP staff can enter a cluster into the Outbreak database to create an autogenerated Outbreak ID number. When this Outbreak ID is entered for a case in Orpheus, it creates a list of all cases involved in a cluster, allowing ACDP and LPHA staff to search for cases in a respective cluster.

2.3 Outbreak response

Table 2 provides details of the response needed for three different levels of transmission:

1) Tier 1: Baseline levels of disease transmission
2) Tier 2: Initial response to an identified cluster
3) Tier 3: Large outbreak requiring more extensive resources from partners outside of ACDP and the affected LPHA

Table 2. Tiered response plan based on surveillance data

Tier	Level of Response	Need for IMT	Communications plan
I. Sporadic cases (baseline)	Routine case investigation and follow-up with exposed contacts	None	Routine posting of surveillance data on OHA website
II. Any cluster of three cases **Or** **A single case in high-risk setting (such as homeless shelter or other residential setting)**	Aggressive prophylaxis of exposed contacts, consider offering pre-exposure prophylaxis to affected populations if resources allow	VHP program manager notifies ACDP section manager, Health Security, Preparedness and Response Program (HSPR) and Oregon Immunization Program (OIP)	OHA public information officer (PIO) assigned to the response establishes contact with local public health authority (LPHA) PIO, disseminates plain language information about HBV to cases and contacts in affected settings as applicable
III. High case counts, multiple cases in vulnerable populations	Aggressive follow-up of cases and prophylaxis of exposed contacts, pre-exposure prophylaxis of high-risk populations or affected settings, and increased hygiene measures	VHP program manager consults with ACDP section manager, HSPR, and OIP on need for and scope of IMT response	OHA PIO activates communications plan, prepares press releases, plans social media campaign, and provides updates to OHA leadership and other key stakeholders

3. OUTBREAK INVESTIGATION

3.1 Case Definition

The case definition for HBV (See Appendix B) requires both laboratory evidence and acute onset of symptoms or symptoms of acute hepatitis combined with a history of exposure to a confirmed case. In the setting of an outbreak, it is also useful to further specify which cases are considered part of an outbreak by defining a particular time frame, geographic area, or risk group. For instance, an isolated case residing in a county outside the geographic area affected by an outbreak would not be included in cases counts for the outbreak and would not impact whether an outbreak is considered "over."

3.2 Case Finding

Following investigative guidelines, all electronic laboratory reports (ELRs) consistent with acute HBV require investigation by the LPHA within one working day. LPHA staff will complete the standard acute and submit all case data electronically to Orpheus.

During an outbreak investigation, OHA and LPHA staff may also implement more active case finding methods by notifying local clinicians, hospitals, emergency departments, and locations where cases have been identified (i.e., carceral settings, homeless shelters or camps, agencies providing harm reduction services to people who inject drugs [PWIDs]) to alert the LPHA of suspected cases prior to laboratory confirmation.

3.3 Case Characterization and Interviews

The standard case report form (Appendix C) will always be used as a starting point for interviews during outbreaks and includes demographic factors (including collection of REALD), complications of hepatitis such as hospitalization and death, history of vaccination, and risk factors such as the following:

- Pregnancy
- Sexual exposures
- History of injection drug use
- Healthcare exposures such as hospitalization or surgery
- Receipt of blood transfusion or other blood products
- Use of renal dialysis
- Use of shared blood glucose monitor
- Residence in a congregate setting
- Occupational exposures, or
- Recent incarceration

Interviews with the initial cases may suggest additional risk factors or locations associated with the outbreak that should be incorporated into subsequent interviews. For example, it will be important to collect additional information about cases residing in congregate settings and whether PWIDs share injection supplies. ACDP informatics or epidemiology staff will add supplemental questions to the HBV disease module in Orpheus, enabling LPHA and OHA staff to immediately begin asking these questions and entering the data into Orpheus.

3.4 Case Reporting

To improve case ascertainment, OHA will employ such methods as the Health Alert Network (HAN) to notify providers and LPHAs of an outbreak of HBV and encourage prompt reporting. Notifications may also be sent through CDC's Epidemic Information Exchange (Epi-X) if the Oregon outbreak involves cases residing in other states. OHA will also disseminate information about the outbreak to and encourage reporting from settings indicated by the epidemiology of the initial cases, such as congregate living facilities, correctional facilities, syringe service programs (SSPs), substance use disorder (SUD) treatment centers, or healthcare settings.

3.5 Contact Tracing

LPHA investigators should identify and arrange for postexposure prophylaxis (see Appendix D and Appendix E) for unvaccinated close contacts within 2 weeks after exposure to prevent illness. Close contacts include household contacts, drug-using partners, and sexual contacts. If a patient is unwilling or unable to provide the name or contact information for a close contact, consider asking the patient to convey the importance of postexposure prophylaxis and to share the health department's contact information with his/her/their close contacts. LPHA and ACDP epi staff should contact Oregon Immunization Program for assistance with procuring vaccines and HBIG.

3.6 Lab Testing

Serological testing for HBV can be performed at the Oregon State Public Health Laboratory (OSPHL) but is also widely available in clinical labs. Although the interpretation of HBV serological tests is a complicated subject (and confusing to many clinicians), we offer a few tips here. More guidance can be found in the investigative guidelines (Appendix F).

There are four key tests to know about:

1) Hepatitis B surface antigen (HBsAg) is a protein found on the surface of the virus that can be found during either an acute infection or chronic infection. A positive result means the individual is infectious.
2) Hepatitis B surface antibody (HBsAb or anti-HBs)) is produced as someone responds and recovers from an acute HBV infection, usually 3-4 months after

infection as HBsAg wanes. It is only found in people who have either recovered from infection or in response to vaccination.
3) Total hepatitis B core antibody (HBcAb or anti-HBc) appears at the same time of symptoms, usually 1-2 weeks after HBsAg appears, and persists for life. It only occurs after infection and never after vaccination.
4) IgM antibody to hepatitis B core antigen (IgM anti-HBc) appears after HBsAg, at the same time as core antibody, and indicates recent infection with HBV. It is the best test for ruling in acute infection, since it typically declines within 6 months and would not be present in a chronic infection.

In diagnosing ***acute infection***, the presence of HBsAg and IgM anti-HBc together are strong evidence of an acute infection. HBsAg appears first, often before the onset of symptoms, and declines a few months after symptoms begin. IgM anti-HBc doesn't appear until after symptom onset and stays elevated longer than HBsAg; this creates a 1–2 month "window" period after surface antigen has disappeared and IgM is still present. Total anti-HBc typically stays elevated for two years and may be detectable for much longer.

To diagnose ***chronic infection*** (for example, in the setting of testing pregnant persons), the typical screening test most often used is HBsAg. A positive surface antigen signals that the individual is infectious, and in the absence of symptoms they have a high likelihood of having a chronic infection. The presence of IgM anti-HBc can be used to distinguish between acute and chronic infection.

Testing for total core antibody and surface antibody is also useful as part of the initial screening of an exposed person. A positive anti-HBc confirms that the person has been previously infected, while a contact who is negative for both HBsAg and HBsAb is susceptible and should be vaccinated (if surface antibody is positive, they are considered immune and don't need vaccination).

The other important marker of chronic HBV infection is HBV DNA, which is more sensitive than HBsAg and can be detected before the appearance of HBsAg during acute infection. In chronic infections, the presence of HBV DNA in the absence of HBsAg is termed an occult infection; an individual with measurable HBV DNA should be considered infectious.

Ten HBV genotypes, designated A through J, have been described and vary geographically. HBV genotypes are associated with the modes of HBV transmission (vertical versus horizontal) and with the risk of certain outcomes of chronic infection, such as cirrhosis and hepatocellular carcinoma (HCC). For example, in Alaska, HBV genotype F is associated with HCC in children as well as adults younger than age 30 years, In Asia as well as Alaska, HBV genotype C has been associated with a significantly higher risk of HCC than other genotypes. Based on consultation with the Division of Viral Hepatitis at CDC, it may be useful to consider collecting blood specimens for genotyping and viral sequencing to identify transmission networks that can facilitate targeted public health interventions.

Testing is widely available in clinical labs around the state, and OSPHL conducts serological testing for the four key markers: HBsAg, HBsAb, IgM anti-HBc, and

anti-HBc total. They can be ordered using the Virology/Immunology request form by checking off the appropriate box under "Tests Requested." OSPHL can perform these tests on any working day and generally provides results in three days. Make sure to use OSPHL's Specimen Transport Manifest to ensure that OSPHL receives all of the specimens sent.

4. OUTBREAK RESPONSE

4.1 Roles

LPHA communicable disease staff and OHA VHP staff in ACDP will likely be the first public health staff aware of the outbreak. They will take the initial steps in determining whether the criteria for an outbreak have been met and decide on a preliminary course of action. As needed, additional staffing will be drawn from the list of internal partners provided in Table 3.

Table 3. Internal Partners
Public Health Division partners involved in HBV outbreak responses

• LPHA health officer, administrator, communicable disease staff
• ACDP VHP staff and members of Urgent Epi Response Team (UERT) as needed
• Immunization Program
• HSPR: Health Security, Preparedness and Response Program
  ○ Serv-OR volunteers
  ○ Public Information Officer
• OSPHL
• Office of Equity and Inclusion
• HIV/STI/Tuberculosis Program

Other OHA or Department of Human Services (DHS) divisions or offices
• OHA Behavioral Health • OHA Medicaid program • Public Health Division Community Engagement Team • HSPR Regional Emergency Coordinators (RECs)

4.2 Community Partners

In Oregon's Public Health Modernization Plan, Oregon recognizes that culturally and linguistically appropriate responses to complex public health problems requires investment in communities, partnership across state agencies, and local and regional strategies to address community priorities. The Oregon Legislature has provided significant support to local public health, tribal agencies, and healthcare partners to fully integrate public health, health care and community-level health improvement efforts. Potential external partners that could be involved in the response to an outbreak of HAV are listed below in Table 4.

Table 4. External Partners

- Tribal public health authorities
- Community-based organizations serving populations at high risk for HBV
- Homeless service providers
- Mental or behavioral health service providers
- Syringe service programs (SSPs) and other sites providing harm reduction services
- Peer Recovery in Medical Establishment (Prime+) partners, and other agencies employing peer support specialists
- Coordinated care organizations (CCOs), federally qualified health centers (FQHCs), emergency departments, other community healthcare and academic partners
- Serv-OR volunteers
- Emergency medical services (EMS)
- County-level Office of Emergency Management
- Retail pharmacies
- Corrections, including state corrections, community-corrections, local/municipal jails and youth detention facilities
- Faith-based organizations
- Law enforcement
- State and local government

4.3 Incident Management Team

Once criteria for an outbreak have been met, the VHP Medical Director or VHP Hepatitis Epidemiologist will notify the ACDP section manager and the OIP. The VHP Medical Director, the VHP Hepatitis Epidemiologist, the VHPC and Oregon Immunization Program (OIP) will attend all LPHA cluster response meetings.

The VHP will update the Health Security, Preparedness and Response (HSPR) Program of the current situation. This is generally conveyed to the Public Health Duty Officer or the HSPR manager. The Public Health Duty Officer, in consultation with ACDP and HSPR leadership, may be asked to convene a Health Intelligence Briefing (HIB). Present at this briefing are internal partners

and OHA leadership. The status and predicted outcomes and actions will be evaluated. If the outbreak can be managed by ACDP and the LPHA, no further action will be taken. If additional resources and oversight are required to manage the outbreak an Incident Management Team (IMT) will be activated. For example, if the threshold for an outbreak (above the monthly average from the previous three years) is met and the magnitude or morbidity/mortality associated with the outbreak dictates the need for a large, coordinated response, an IMT will be activated.

Typically, decisions about the need, size, and scope of the IMT will be made by OIP and HSPR in consultation with the VHP Medical Director at the HIB. A PIO will also be assigned to the cluster response and coordinate communication between the LPHA, ACDP, and public health leadership. Multiple staff members in ACDP, along with partners in Immunization, HSPR, and other OHA programs, are trained in incident management and will staff an IMT. In addition to VHP staff, ACDP's urgent epidemiologic response team (UERT) will provide epidemiologic and IT staff, and the IMT may recruit additional assistance from OIP, PHP, or HST staff as needed. The Incident Manager will take a lead role in coordinating the planning and logistics of an IMT.

4.4 Local Public Health Authority (LPHA)

In Oregon, the LPHA is the health authority. Unless the LPHA defers responsibility to OHA or more than one county is involved, the LPHA will be tasked with organizing an incident command team and coordinating the cluster response. Oregon Health Authority staff will work closely with the LPHA Health Officer and communicable disease staff to provide technical assistance and support the response.

The respective LPHA(s), with the support and guidance of ACDP, OHA staff, will be responsible for enlisting the assistance of local stakeholders, organizations, and community groups to aid in a culturally respectful response. If requested, OHA staff will be available to assist LPHA needs with case investigations and contact tracing, media communications, and prevention and control efforts (i.e., vaccination, sanitation, and hygiene).

4.5 Epidemiologic Support

Key responsibilities of OHA epi staff include revising the hepatitis disease module in Orpheus (as needed), analyzing, and summarizing data, editing investigative guidelines, drafting additional guidance, and providing technical assistance for management of special situations and settings (homeless shelters or encampments, healthcare settings, as well as outbreaks involving food handlers).

Although case and contact investigations are the primary responsibility of the LPHA, the magnitude of the outbreak or competing priorities may require OHA epi staff to assist with case and contact investigations.

4.6 Communications

A PIO will take the lead in developing a communications plan for keeping key stakeholders informed of developments in the outbreak. The target audiences for a risk communication strategy will be include populations at risk, the public, the media, health department leadership, and local and state government partners. The basic list of products includes the following:

- Templates for press releases for OHA, LPHAs or other community partners
- Plain language materials for the general public
- Plan for social media campaign

We may also use the following communication tools to inform community and healthcare partners of the outbreak:

- Oregon's Health Alert Network
- Dear Colleague letter to clinicians
- PHD Office of LPHA Liaisons for LPHA Communications
- The *CD Summary* – a publication of the OHA, Public Health Division. Its intended audience are licensed health care providers, public health and health care agencies, media representatives, medical laboratories, hospitals, and others with an interest in epidemiology and public health
- Basecamp for the Viral Hepatitis Collective, a network of stakeholders engaged in viral hepatitis elimination planning

5. PREVENTION AND CONTROL MEASURES

5.1 Postexposure Prophylaxis

The OIP will take the lead role in assuring that both HBV vaccine and HBIG are available for pre- and post-exposure prophylaxis (See Appendix D for guidelines on non-occupational postexposure prophylaxis and Appendix E for recommended doses and schedules for HBV vaccines). OIP and VHP staff will consult on the preferred vaccines to use in outbreak settings. In cases where an exposed contact does not have a primary care provider, the LPHA Health Officer (HO) or VHP Medical Director may make recommendations as to use of vaccine or HBIG.

The OIP will ensure HBIG access by working with local healthcare systems to rapidly acquire HBIG and work out delivery-to-site logistics (LPHA, community-based organization, pop-up site, etc.). For vaccine, the initial step will be for the LPHA to assess their current stocks, which would be the first source utilized. Secondly, OHA stores some vaccine in-house for use and can deliver vaccine the same day to LPHA or other sites.

Additional resources, such as staffing and infrastructure for on-the-ground pop-up vaccination, may be requested as needed from external partners listed

above, as well through collaboration with the DHS-OHA CRRU field operations division.

5.2 Defining High Risk Populations for Preexposure Prophylaxis

In addition to providing vaccination or HBIG to exposed contacts of cases, preexposure vaccination of high-risk groups identified by the epidemiology of the outbreak will be critical to prevention of further transmission. Individuals at risk include:

- People at risk for infection by sexual exposure: persons with multiple sex partners, persons with sexually transmitted infections (STIs), and men who have sex with men (MSM)
- PWID
- Residents and staff of facilities for developmentally disabled persons
- Hemodialysis patients
- People who are currently or were recently incarcerated
- People with diabetes
- People with HIV or HCV
- Persons with chronic liver disease (e.g., cirrhosis, fatty liver disease, alcoholic liver disease, and autoimmune hepatitis)

Although people with chronic liver disease do not have an increased risk of HBV infection, this population is at increased risk of severe morbidity and mortality should they become infected. Therefore, people with chronic liver disease are an important risk group for preexposure prophylaxis vaccination.

5.3 Estimating Vaccine Doses

Estimating the number of high-risk individuals will be helpful to plan vaccination needs and to monitor the effectiveness of public health interventions. There are no data for the level of vaccine coverage needed to control a community HBV outbreak. In Oregon, due to 80% vaccination rates in two-year old children for the past two decades, acute cases of HBV are very rare in children and adolescents.

In the event of a large outbreak affecting PWIDs, it would be helpful to estimate the current numbers. Based on a meta-analysis of studies published in Lancet between 2008–2017, the prevalence of injection drug use in North America was estimated to be 1.06%, with 95% confidence intervals ranging from 0.62% to 1.83%. In a large community outbreak primarily associated with injection drug use, post-exposure prophylaxis may be recommended for up to 2% of the population (using city, county, or region as the denominator) impacted by the outbreak.

5.4 Hard-to-Reach Populations

The populations at highest risk for HBV infection during these ongoing outbreaks can be difficult to reach with traditional vaccination and education efforts due to a

variety of factors including behavioral health issues, lack of engagement with the healthcare system and other institutions, and lack of transportation. LPHAs and healthcare providers will need to employ additional measures to reach these populations.

Potential measures include:

- Involve partners in the outbreak response who regularly interact with the at-risk population such the following: SSPs, corrections, hospitals, community clinics, homeless providers, substance use programs, faith organizations, law enforcement, local governments, professional associations, and others.
- Plan field vaccination events in areas frequented by individuals most at risk for HAV infection.
- To identify areas for vaccination events, collaborate with partners who can provide expertise in:
    - Local epidemiology (i.e., identify areas where cases have been found to prioritize location of vaccination events)
    - People who use drugs (PWUDs) (i.e., identify areas where PWUDs access services)
    - People who are homeless (i.e., identify areas where homeless individuals congregate for shelter and gain trust of residents)

Potential partners and sites that can host vaccination events include the following: SSPs; correctional facilities; emergency departments; substance use disorder treatment providers; homeless services providers; mental health programs that serve PWIDs or houseless populations; faith-based organizations; facilities or businesses frequented by people who are houseless or use drugs, parks, libraries, facilities that issue social service benefits, and facilities serving veterans.

6. POST OUTBREAK ACTIVITIES

6.1 Define the End of the Outbreak

Decisions about de-escalating the response will be based on declining case rates in affected populations and meeting vaccination targets in high-risk populations identified during the outbreak.

6.2 Plan for Continued Vaccination of At-Risk Populations

- Continue to promote vaccination of high-risk populations among community providers, including retail pharmacists
- Leverage resources for vaccination by CRRU, regional response teams that provide both COVID-19 and other adult vaccines (influenza, HAV and HBV, pertussis, tetanus) to high-risk populations, and other non-traditional vaccine providers (i.e., opioid treatment programs, naturopaths)

6.3 After-Action Evaluation and Report

VHP staff will survey local and community partners who assisted in the response regarding:

- The structure of the response
- Communication between the LPHA(s), community partners and IMT
- What went right?
- What could have gone better?
- What service gaps exist?
- Which goals were achieved?

VHP and HSPR staff will convene a meeting (a hotwash) with key partners to solicit feedback around the strengths and challenges of response related to:

- Components of the cluster investigation that yielded the most useful information
- Data sources that were the most useful
- Staffing/resource needs for the investigation and intervention activities
- Partnerships that were the most effective, and which could benefit from additional development
    - Costs associated with cluster investigation
    - Costs associated with the interventions

Findings from the partner survey and hotwash meeting will be used to compile an after-action report. This report will include a list of recommendations outlining areas of improvement in response planning and execution, the impact of any short-term changes to policies or protocols during the response, and whether changes should be adopted as standard practice.

7. RESOURCES

OHA

- Acute hepatitis B Investigative Guidelines, 2021
- Chronic hepatitis B Investigative Guidelines, 2018
- Perinatal hepatitis B Investigative Guidelines, 2018
- Acute hepatitis B case report form
- Chronic hepatitis B case report form
- Pediatric HBV vaccination standing orders
- Pharmacy Protocol for pediatric hepatitis B vaccination
- Pharmacy Protocol for adult hepatitis B vaccination
- Hepatitis B Vaccine Information Sheet
- OSPHL Virology/Immunology Request Form
- OSPHL Specimen Transport Manifest

CDC resources

- Hepatitis B Chapter from CDC's Pink Book
- CDC. Increases in acute hepatitis B virus infections—Kentucky, Tennessee, and West Virginia, 2006-2013. MMWR
- CDC. Healthcare-associated hepatitis B and C outbreaks reported to the CDC 2008-2019. MMWR
- Recommendations for routine testing and follow-up for chronic hepatitis B virus infection, CDC
- CDC. Prevention of HBV infection in the U.S: Recommendations of the Advisory Committee on Immunization Practices. MMWR, 2018.

UPDATE LOG

November 2022 Created. (Thomas)

ACRONYMS

ACDP: Acute and Communicable Disease Program
CCO: Coordinated Care Organization
CRRU: Covid-19 Recovery and Response Unit
ELR: Electronic Laboratory Report
EMS: Emergency Medical Services
FQHC: Federally Qualified Health Center
HAV: Hepatitis A Virus
HBcAb, anti-HBc: Total Hepatitis B Core Antibody
HBIG: Hepatitis B Surface Antigen
HBsAb, anti-HBs: Hepatitis B Surface Antibody
HBsAg: Hepatitis B Surface Antigen
HBV: Hepatitis B Virus
HCV: Hepatitis C Virus
HIB: Health Intelligence Briefing
HSPR: Health Security, Preparedness and Response Program
IgM anti-HBc: IgM Core Antibody
IMT: Incident Management Team
LPHA: Local Public Health Authority
MSM: Men Who Have Sex with Men
OHA: Oregon Health Authority
OIP: Oregon Immunization Program
OSPHL: Oregon State Public Health Laboratory
PIO: Public Information Officer
PRIME+: Peer Recovery in Medical Establishment
PWID: People Who Inject Drugs
REC; Regional Emergency Coordinator

SSP: Syringe Service Program
STI: Sexually Transmitted Infection
UERT: Urgent Epi Response Team
VHP: Viral Hepatitis Program
VHPC: Viral Hepatitis Prevention Coordinator

APPENDICES

Appendix A. Categories of persons with increased risk for HBV infection or severe disease from HBV infection

Type of Risk	Risk Category	Examples
Increased risk for HBV infection	Sexual exposures	Individuals with > 1 sex partner in the previous six months
		Individuals seeking evaluation or treatment for STIs
		Sexual contacts of known cases
		Men who have sex with men
	Occupational risk	Staff of facilities for developmentally disabled persons
		Healthcare workers and public safety personnel with exposure to blood or blood-contaminated fluids
	Persons who inject drugs	Persons with a current or recent history of injection drugs
	Other percutaneous or mucosal exposures	Group settings for persons with developmental disabilities
		Persons who are incarcerated
		Household contacts of HBsAg+ persons
		Hemodialysis, peritoneal and home dialysis persons
		Persons with diabetes mellitus
	International travelers	Persons traveling to or working in countries with high or intermediate HBV endemicity
	Other common co-morbid conditions	Persons with HIV or HCV
Increased risk for complications of HBV	Chronic liver disease	Cirrhosis
		Fatty liver disease
		Alcoholic liver disease
		Autoimmune hepatitis

Appendix B. Hepatitis B case definition from OHA Investigative Guidelines

Confirmed Case Definition

An individual with:

1. A documented negative HBsAg laboratory test results within 6 months prior to a positive test (either HBsAg, HBeAg, or hepatitis B virus NAT (HBV PCR, including genotype); OR

2. An illness with discrete onset of any sign or symptom consistent with acute viral hepatitis (e.g., fever, headache, malaise, anorexia, nausea, vomiting, diarrhea and abdominal pain); and
3. Jaundice or elevated serum alanine aminotransferase (ALT) levels >100 IU/L; and
4. HBsAg positive and IgM anti-HBc positive (if done)

Presumptive Case Definition

1. An illness with discrete onset of any sign or symptom consistent with acute viral hepatitis (e.g., fever, headache, malaise, anorexia, nausea, vomiting, diarrhea and abdominal pain); and
2. Jaundice or elevated serum alanine aminotransferase (ALT) levels >100 IU/L; and
3. An epidemiological link with a person who has confirmed hepatitis B (i.e., household or sexual contact with an infected person during the 45 – 180 days before the onset of symptoms).

Suspect Case (not reportable to OHA)

Anyone with discrete onset of symptoms or elevated liver enzymes without epi-linkage to a confirmed case, and no available laboratory information or lab confirmation.

Apppendix C

Hepatitis B - Acute

ORPHEUS ID

☐ confirmed
☐ presumptive
☐ suspect
☐ no case

Name _____ County_____
LAST, first, initials (a.k.a.)

Address _____
Street City

Phone number _____ / _____
home (H), work (W), cell (C), message (M) home (H), work (W), cell (C), message (M)

E-mail _____

ALTERNATE CONTACT

Name _____ Phone(s)_____
LAST, first, initials home (H), work (W), cell (C), mes-

Special housing

☐ Nursing home/ Asst Living
☐ Homeless
☐ Prison/jail
☐ Foster home
☐ Hospital
☐ Nursing home
☐ Other institution
☐ Drug treatment/ shelter
☐ Women's shelter
☐ YES house
☐ Homeless shelter
☐ Job Corps
☐ Treatment center
☐ Chemawa Indian School
☐ Pacific Univ.
☐ No address on file

DEMOGRAPHICS

DOB ___/___/___ if DOB unknown, AGE _____ Sex ☐ Female ☐ Male Preg ☐ Y ☐ N ☐ unk

Language _____ Country of birth _____ ☐ refugee

Worksites/school/day care center _____ Occupation/grade_____

CONTACT MANAGEMENT AND FOLLOW-UP

Amer Indian/ Alaska Native
☐ American Indian
☐ Alaska Native
☐ Canadian Inuit, Metis First Nation
☐ Indigenous Mexican Central American South American

HISPANIC or Latino/a
☐ Hispanic or Latino/a Central American
☐ Hispanic or Latino/a Mexican
☐ Hispanic or Latino/a

ASIAN
☐ Asian Indian
☐ Chinese
☐ Filipino/a
☐ Hmong
☐ Japanese
☐ Korean
☐ Laotian
☐ South Asian
☐ Vietnamese
☐ Other Asian

Native Hawaiian/ Pacific Islander
☐ Guamanian or Chamorro
☐ Micronesian
☐ Native Hawaiian
☐ Samoan
☐ Tongan
☐ Other Pacific Islander

Black or African American
☐ African American
☐ African (Black)
☐ Caribbean (Black)
☐ Other Black

Middle Eastern Northern African
☐ Northern African
☐ Middle Eastern

White
☐ Eastern European
☐ Slavic
☐ Western European
☐ Other White

Other Categories
☐ Other (please list)
_____
☐ Don't know/Unknown
☐ Don't want to answer/ Decline

PROVIDERS, FACILITIES AND LABS

Reporter Type (circle one)	Reporter Name/Phone
PMD Lab ELR	_____
MDx Lab Fax	_____
UC Lab Phn	_____
ER Lab Other	_____
HCP 2nd Prov	_____
ICP	_____

Reporter Type (circle one)	Reporter Name/Phone
PMD Lab ELR	_____
MDx Lab Fax	_____
UC Lab Phn	_____
ER Lab Other	_____
HCP 2nd Prov	_____
ICP	_____

☐ Ok to contact patient (only list once)
Local epi_name_____
Date report received by LHD ___/___/___LHD completion date ___/___/___

Basis of diagnosis next page

CASE'S NAME

BASIS OF DIAGNOSIS

CLINICAL DATA

DIAGNOSIS DATE ____/____/____

Symptomatic? ☐ yes ☐ no ☐ unk

if yes, ONSET DATE (first s/s) ____/____/____

Jaundiced ☐ yes ☐ no ____/____/____

Pregnant ☐ yes ☐ no ____/____/____ due date

Hospital Name:_____

Hospitalized from hepatitis ☐ yes ☐ no ____/____/____ admit date

Died from hepatitis ☐ yes ☐ no ____/____/____ date

REASON FOR TESTING (check all that apply)

☐ Symptoms of acute hepatitis
☐ Screening of asymptomatic patient with reported risk factors
☐ Screening of asymptomatic patient with no risk factors (e.g., patient requested)
☐ Prenatal screening
☐ Evaluation of elevated liver enzymes
☐ Blood/organ donor screening
☐ Followup testing for previous marker of viral hepatitis
☐ Born between 1945-1965
☐ Unknown ☐ Other _____

LABORATORY TESTS

Lab Name:_____ Date of blood draw ____/____/____

		positive.	negative	not. done	unk
A	IgM anti-HAV	☐	☐	☐	☐
	total anti-HAV	☐	☐	☐	☐
B	HBsAg	☐	☐	☐	☐
	IgM anti-HBc	☐	☐	☐	☐
	total anti-HBc	☐	☐	☐	☐
	anti-HBs	☐	☐	☐	☐
	HBV DNA (PCR)	☐	☐	☐	☐
	HBeAg	☐	☐	☐	☐
C	anti-HCV	☐	☐	☐	☐

_____

Anti-HCV signal-to-cutoff ratio _____

HCV RNA (PCR) ☐ ☐ ☐ ☐

HCV genotype

Upper limit normal *(list reference value from lab slips)*

ALT (SGPT) _____ _____

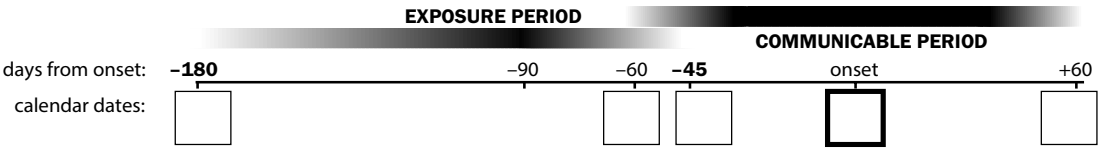
AST (SGOT) _____ _____

Bilirubin _____ _____

CASE'S NAME

INFECTION TIMELINE

Enter onset date (first sx) in heavy box. Count forwards and backwards to figure probable exposure and communicable periods.



(infectious until clearance of HBsAg—about 60 days for most adults—indefinitely for carrlers

Interviewed ☐ yes ☐ no Interview date(s) _____ Interviewed by _____

Wno ☐ patient ☐provider ☐ parent ☐ other

Reason not interviewed (choose one)

☐ not indicated ☐ unable to reach ☐ out of jursdiction ☐ deceased
☐ refused ☐ physician interview ☐ medical record review

RISKS

Check all that apply. any of the situations below apply to case in 6 weeks to 6 months prior ot onset of symptoms

yes no ref unk

☐ ☐ ☐ ☐ Was the patient a close contact of an infectious confirmed or presumptive case?
if yes, type of contact
☐ sexual
☐ needle
☐ household (non-sexual)
☐ other _____

☐ ☐ ☐ ☐ organ transplant/artificial insemination

☐ ☐ ☐ ☐ IG recipient (any kind: IVIG, TIG, HBIG, etc.)

☐ ☐ ☐ ☐ hemodialysis patient

☐ ☐ ☐ ☐ diabetes
if yes, use a blood glucose monitor ☐ yes ☐ no
if yes, share a blood glucose monitor ☐ yes ☐ no
if yes, inject insulin ☐ yes ☐ no
if yes, share syringes or needles ☐ yes ☐ no

☐ ☐ ☐ ☐ needlestick or similar injury

☐ ☐ ☐ ☐ had exposure to someone else's blood specify that is_____

☐ ☐ ☐ ☐ transfusion/or other blood product recipient
if yes, date (m/d/y) ____/ ____ /____

☐ ☐ ☐ ☐ receive any infusions in outpatient setting

☐ ☐ ☐ ☐ dental work or oral surgery

☐ ☐ ☐ ☐ other surgery

☐ ☐ ☐ ☐ hospitalized

☐ ☐ ☐ ☐ employed in medical/dental field having contact with human blood
if yes, frequency of direct blood contact
☐ frequent (several times weekly)
☐ infrequently

☐ ☐ ☐ ☐ employed as a public safety worker (fire, police, corrections) having direct contact with human blood
if yes, frequency of direct blood contact
☐ frequent (several times weekly)
☐ infrequent

☐ ☐ ☐ ☐ resident of long-term care facility

☐ ☐ ☐ ☐ body piercing (other than ear)
if yes, where was it done
☐ commercial parlor/shop
☐ correctional facility
☐ self

Check all that apply.

yes no ref unk

☐ ☐ ☐ ☐ tatooing
if yes, where was it done
☐ commercial parlor/shop
☐ correctional facility
☐ self
☐ other _____

☐ ☐ ☐ ☐ incarcerated more than 24 hours
if yes, what type of facility
☐ prison
☐ jail
☐ juvenile facility

☐ ☐ ☐ ☐ any sexual contact
if yes, number of male sexual partners
☐ 0 ☐ 1 ☐ 2–5 ☐ >5 ☐ unk
if yes, number of female sexual partners
☐ 0 ☐ 1 ☐ 2–5 ☐ >5 ☐ unk

☐ ☐ ☐ ☐ uses street drugs, but does not inject

☐ ☐ ☐ ☐ injects drugs not prescribed by doctor
if yes, primary drug injected (select 1)
☐ methamphetamine/speed
☐ cocaine
☐ speedball (cocaine and heroin together)
☐ other _____
if yes, year of most recent drug use
_____

During his/her lifetime was patient EVER

☐ ☐ ☐ ☐ incarcerated more than 6 months
if yes, year of most recent incarceration
_____
for how many months _____

☐ ☐ ☐ ☐ treated for sexually transmitted disease
if yes, year of most recent treatment

CASE'S NAME

FOLLOW-UP

Check all that apply.

yes no ref unk

☐ ☐ ☐ ☐ Case education provided?
if yes, date ___/___/___

☐ ☐ ☐ ☐ Did the case have a documented negative hepatitis C test in the previous 6 months (includes: anti-HCV, HCV RNA PCR)?
if yes, date of test (if exact date unknown, give best estimate) ___/___/___

☐ ☐ ☐ ☐ Does the case have a medical provider?

☐ ☐ ☐ ☐ Did the case have HCW performing invasive procedures?

How was data collected for this case?

☐ fax ☐ phone ☐ fax ☐ in person ☐ medical record ☐ other ☐ unknown

CONTACT MANAGEMENT AND FOLLOW-UP

Ask about other potential contacts (sexual, needle-sharing, etc.) within the period of communicability.

☐ no other contacts identified ☐ contacts identified and individual case report forms file

HOUSEHOLD ROSTER

Name	DOB/Age	Sex	Relation to case	Occupation	Education provided	Last exposure	Onset date	Interview date	Sick
		☐ M ☐ F	☐ daycare ☐ friend ☐ household ☐ sexual			___/___/___	___/___/___	___/___/___	☐Y ☐N
		☐ M ☐ F	☐ daycare ☐ friend ☐ household ☐ sexual			___/___/___	___/___/___	___/___/___	☐Y ☐N
		☐ M ☐ F	☐ daycare ☐ friend ☐ household ☐ sexual			___/___/___	___/___/___	___/___/___	☐Y ☐N

ADMINISTRATION

Orpheus March 2023

Remember to copy patient's name to the top of this page.

Case report sent to OHA on ____/____/____

Completed by _____ Date _____ Phone _____

Investigation sent to OHA on ____/____/____

Appendix D. Recommended postexposure prophylaxis[1] for non-occupational exposure[2] to HBV.		
Exposure	**Unvaccinated person[3]**	**Vaccinated person[4]**
HBsAg positive source	Administer hepatitis B vaccine series and hepatitis B immune globulin (HBIG). HBIG dose is 0.06 mL/kg intramuscularly	Administer hepatitis B vaccine booster dose
Perinatal exposure to HBsAg-positive mother	Initiate hepatitis B vaccine series and hepatitis B immune globulin (HBIG) within 12 hours of birth	Not applicable
HBsAg status unknown for source	Administer hepatitis B vaccine series	No prophylaxis

1. When indicated, prophylaxis should be initiated as soon as possible, preferable within 24 hours. Studies are limited on the maximum interval after exposure during which postexposure prophylaxis is effective, but the interval is unlikely to exceed 7 days for percutaneous exposures or 14 days for sexual exposures. The hepatitis B vaccine series should be completed.
2. Examples of such exposures include bites or needlesticks, mucosal exposures to HBsAg-positive blood or body fluids; sex or needle-sharing contact; or the victim of sexual assault/abuse.
3. A person who is in the process of being vaccinated but who has not completed the vaccine series should complete the series and receive treatment as indicated.
4. A person who has written documentation of a complete hepatitis B vaccine series and who did not receive post-vaccination testing.

Appendix E. Hepatitis B vaccines: recommended doses and schedules			
Vaccine and Group	**Dose(µg)**	**Dose (ml)**	**Schedule/Notes**
Recombivax HB (single antigen vaccine)			
0 – 19 years	5	0.5	0, 1, 6 months
11 — 15 years	10	1	0, 4 months
≥ 20 years	10	1	0, 1, 6 months
Hemodialysis and other immunocompromised patients ≥ 20	40	1	0, 1, 2, 6 months
Engerix-B (single antigen vaccine)			
0 – 19 years	10	0.5	0, 1, 6 months
≥ 20 years	20	1	0, 1, 6 months
Hemodialysis and other immunocompromised patients ≥ 20	40	2	0, 1, 6 months
HEPLISAV-B (single antigen vaccine)			
≥ 18 years	20	0.5	0, 1 month
Pediarix (combination HBV, DTap, and IPV vaccine)			
6 weeks – 6 years	10	0.5	2, 4, 6 months. A single antigen hep B dose should be given at birth
Vaxelis (combination DTap-IPV-Hib-HBV))			
Twinrix (combination HBV and HAV vaccine)			
18 years and older	20	1	0, 1, 6 months
Accelerated	20	1	0, 7, 21-30 days, 12 months

Appendix F. Hepatitis B Diagnostic Testing (from the Acute HBV Investigative guidelines)

Marker	Abbreviation	Significance/Interpretation
Surface antigen	HBsAg	• Marker of infectivity • Persists indefinitely in chronic carriers
Surface antibody	anti-HBs	• Usually indicates the development of immunity, either from past infection or immunization • Most carriers never develop anti-HBs (but if they do, they remain HBsAg positive as well) • Anti-HBs levels may decline to undetectable levels over time (years), especially if resulting from immunization and not infection
Viral DNA	HBV DNA/HBV NAT	• Marker of infectivity • Rises to high concentrations during incubation and falls with the onset of hepatic disease in transient infection • Detectable in about 50% of chronic carriers; can be present when HBsAg is undetectable
Core antibody (total)	anti-HBc total anti-HBc core anti-HBc	• Marker of past infection • Generally, remains elevated for at least two years after transient infection and may remain elevated for life • Vaccination does not produce anti-HBc
Core antibody (IgM)	IgM anti-HBc	Indicative of infection in the recent past (usually < 6 months)
e antigen	HBeAg	• Marker of enhanced infectivity. Seen transiently in most infections and persists in some carriers indefinitely • Needlestick exposure data suggest that HBeAg-positive individuals are 3-5x more infectious than HBeAg-negative counterparts
e antibody	HBeAb	Antibody to HBeAg