Healthcare Investigation Guide

Recommended Steps for Investigating Single Cases of Hepatitis B Virus (HBV) or Hepatitis C Virus (HCV) that are Suspected to be Related to Healthcare Delivery

PURPOSE
This toolkit provides a framework for use by state and local health departments to investigate possible healthcare-associated viral hepatitis transmission events, particularly those involving only a single patient. Investigation of these single cases is an important public health response as it can result in the identification of an outbreak or unsafe clinical practices that are putting additional patients at risk.

These steps are intended to address a variety of inpatient, outpatient, and long-term care settings but not specifically transplant or transfusion-related HBV or HCV transmissions, for which additional guidance is under development.

Summary Steps:

Step 1. Verify the diagnosis of acute hepatitis B or hepatitis C virus infection. Does the index patient meet any of the following criteria suggestive of a new infection?

A. Acute hepatitis B virus infection
B. Acute hepatitis C virus infection

Step 2. Use information obtained from patient interview and standard case investigation, conducted in step 1, to weigh the likelihood that the index patient's infection is due to healthcare versus non-healthcare exposures.

If warranted, continue with steps 3-5

Step 3. Enter information into the healthcare investigation database to identify future patterns.

Step 4. Assess healthcare encounters that occurred during the index patient's likely exposure period and look for additional related cases.

Step 5. Respond to information collected during assessment of healthcare encounters.

BACKGROUND
Outbreaks of healthcare-associated viral hepatitis infections in the United States demonstrate the transmission risk posed by breaches in infection prevention and control practices in healthcare settings. These outbreaks serve as a reminder that, in addition to traditional risk factors like injection drug use, healthcare encounters should be considered when evaluating potential sources of infection among new, acute cases of HBV or HCV infection.

The investigative steps described in this toolkit are not rigid or linear; some steps may need to occur simultaneously or in a sequence that varies during the course of an investigation. For example, several steps may have already been performed by health departments during their routine evaluation of reports of acute hepatitis infection. Further, evidence of a more widespread problem (e.g., additional cases) may emerge requiring urgent action (e.g., patient notification). Many of the steps described below rely on review of viral hepatitis surveillance data and chronic viral hepatitis disease registries maintained by the health department, which may vary based upon state or locality. Surveillance data, in addition to review of complaints captured by regulatory authorities (e.g., state survey agencies, medical and nursing boards) and information captured in the healthcare investigation database described in the algorithm, can serve as a helpful tool for prioritizing investigation steps and identifying infections potentially associated with specific healthcare providers, facilities, and/or other patients.

Ultimately, each investigation is unique and may require careful planning and periodic reassessments to determine the appropriate actions that should be taken with consideration to personnel, resources, or other competing priorities within the state or local health department. CDC is always available for consultation.

Detailed Steps:

Step 1. Verify the diagnosis of acute hepatitis B or hepatitis C virus infection. This should be accomplished through medical record review and interview of both the physician who made the diagnosis and the index patient using a standardized form [PDF - 6 pages].

This form evaluates exposures occurring in a defined time period prior to symptom onset. However, the majority of acute HBV and HCV infections are asymptomatic. The time periods for data collection should correspond to the time between exposure and the time in which symptoms or positive serologic laboratory markers for disease may appear. Typically this is:

- Acute HBV infection: 6 weeks to 6 months
- Acute HCV infection: 2 weeks to 6 months

In certain instances, this time period may need to be extended. For example, in the case of a documented seroconversion (e.g., anti-HCV negative to anti-HCV positive), the time period should include the 6 months prior to the most recent negative test result up until the time of the first positive test result.

A. Acute hepatitis B virus infection:

Presence of symptoms is a key factor in differentiating acute infections from chronic infections and should be assessed. Symptoms may include jaundice, dark urine, nausea, vomiting, abdominal pain, loss of appetite, fatigue, and joint pain. However, the

majority of acute HBV infections are asymptomatic. To consider a case as acute, health departments should rely on medical history and information obtained from case investigation along with serologic findings with or without symptom onset.

Serologic markers indicating acute infection:
positive hepatitis B surface antigen (HBsAg) **and**
positive hepatitis B IgM core antibody (IgM anti-HBc).

B. Acute hepatitis C virus infection:

There are no serologic markers to differentiate between acute and chronic hepatitis C infection. Presence of symptoms is a key factor in differentiating acute infections from chronic infections and should be assessed. Symptoms may include jaundice, dark urine, nausea, vomiting, abdominal pain, loss of appetite, fatigue, and joint pain. However, the majority of acute HCV infections are asymptomatic. Therefore, health departments should also consider medical history and information obtained from case investigation along with a new finding of hepatitis C antibody or RNA positivity in a person not previously known positive (whether or not symptoms or ALT elevation are present).

Step 2. Use information obtained from Step 1 to assess overall exposure history and weigh the likelihood that infection is due to healthcare versus non-healthcare exposures.

For example, a remote history of an STD, incarceration, or injection drug use would not necessarily outweigh a healthcare encounter occurring during the likely exposure period. If behavioral or household exposures are identified and determined to be likely modes of transmission, then investigation of healthcare encounters (steps 4 and 5) may not be warranted.

Examples that are concerning for healthcare transmission and deserve thorough investigation include diagnosis of acute hepatitis B or C (or documented seroconversion) occurring in a cancer, hemodialysis or transplant patient, long-term care resident, a child in the absence of infected household members, or routine blood donor.

Step 3. Enter data into healthcare investigation database to identify future patterns.

Whether or not investigation of healthcare encounters is pursued, health departments should consider entering relevant information into an electronic database in the event that additional cases with matching encounters are reported in the future.
At a minimum, the database should capture the following information:

- name of the healthcare facility and/or providers
- date investigation initiated
- disease

- county
- lead investigator
- identity of case being investigated
- status of the investigation

Step 4. Assess healthcare encounters that occurred during the index patient's likely exposure period and look for additional related cases.

A. Generate a chronologic listing of all healthcare encounters during the index patient's likely exposure period.
B. Determine the nature and types of procedures performed during each healthcare encounter, especially those involving percutaneous exposures (e.g., injections, infusions, skin puncture with a needle/lancet)

C. Review healthcare investigation database (see item 3) and regulatory/medical board reports/complaints to determine if the healthcare facility and/or providers have been under investigation. Enter the facility/provider(s) into the healthcare investigation database (step 3)

D. Contact the healthcare facility to inform them of the investigation and determine if they were aware of the current case(s) under investigation or any additional infections.

E. Evaluate the healthcare facility

1. **Steps to follow if a single healthcare encounter is identified:**
    a. **Conduct a site visit at the facility.**
        i. **Gather general information about the types of services/procedures provided by the facility.**
        ii. **Review facility records for the index patient.**
        Information to assess includes whether patient was previously known to be infected, how many visits occurred during the exposure period, procedures performed during visits including healthcare personnel involved in care, equipment used, medications administered, room(s) where procedure(s) were performed.
        iii. **Review infection prevention and control practices at the facility.**
        Observe the same procedures as those performed on the index patient, ideally by the same healthcare personnel. Focus on medication handling and equipment that is used for more than one patient (see infection prevention and control check-list). Evaluation of infection prevention and control practices should also assess the potential for facility staff to be the source of infection (e.g., through diversion of narcotics, sexual abuse of residents).

If actual procedures are not being performed during the site visit, consider having healthcare personnel perform mock procedures so typical practices can be observed and assessed.

b. **Obtain patient list**.
Obtain a list of patients seen on the same day and an appropriate time period before and after the index patient to develop a chronologic listing of patients who may represent additional cases or sources of infection for the index patient.
The appropriate time period before and after the index patient visit is typically 1-2 days, but the cohort selected will depend on a number of factors including number of visits the index patient had at the facility, the volume of patients seen at the facility, the types of procedures being performed, and the infection prevention practices observed during the site visit. For example, if the facility was a hospital, the list might only include patients from the relevant unit or patients who overlapped in the same operating room.

c. **Use appropriate methods to identify additional cases**
Cross-match patient list obtained from the facility with acute and chronic disease registries or hepatitis laboratory reports to identify additional cases and/or potential sources for the index patient's infection.
If the index patient's exposure was recent, cross-match might not be efficient as infected patients may not have been reported and entered into the system. Also, disease registries may be incomplete. In this circumstance, targeted testing of patients to identify additional cases may be preferable. CDC is available for assistance or consultation on best practices for conducting patient screening.

2. **If multiple healthcare encounters are identified, health departments should prioritize the investigation of encounters based on the following:**

- information obtained on the facilities/providers from review of their healthcare investigation database (step 3) and regulatory/medical board complaints
- types of procedures the facility performed on the index patient (prioritize those involving percutaneous exposures e.g., injections, infusions, skin puncture with a needle/lancet)
- timing of procedures the facility performed on the index patient in relation to symptom onset within the likely exposure period (see step 1 – Verify the diagnosis)
- settings and procedures where outbreaks have been previously documented [PDF - 8 pages].

If a complete investigation (e.g., site visit, cross-matching patient lists) of all healthcare encounters is not possible, then health departments should, at a minimum, consider the following for each of the healthcare facilities identified:

a. Send a follow-up letter to all healthcare facilities and/or providers identified during the investigation to remind them that this is an opportunity to review their infection prevention practices. A letter based upon one used by the New York State Department of Health has been provided as one example [DOC - 2 pages].
b. Continue to monitor state/local health department surveillance data for the next several months to ensure no additional cases are identified/reported which are linked to any of the facilities/providers in question.

Step 5. Responding to information identified during assessment of healthcare encounters

A. Site visit identifies major breaches in infection prevention and control that are high-risk for bloodborne pathogen transmission (e.g., syringe reuse from patient to patient or to reenter medication vials used for more than one patient). Health departments can consult these resources (Annals.org resource [PDF - 8 pages], CDC.gov resource) for information on high-risk breaches.

1. Facility should be immediately advised to stop unsafe practices.
2. A patient notification recommending bloodborne pathogen testing should be conducted.
   The scope of the patient notification will depend largely on how long the unsafe practice had been occurring in the facility. CDC is available for consultation on best practices for conducting a patient notification.
3. The facility/provider(s) should be reported to the appropriate regulatory authority (e.g., medical or state licensing board).

B. If the site visit does not identify major breaches in infection prevention and control, then results obtained from case finding, cross-matching, and record review to identify potential sources should guide next steps.

1. **Additional cases are identified**
   a. Evaluate cases' temporal and geographic overlap in the healthcare facility and use of shared medications and/or equipment as well as common exposures unrelated to healthcare.
   b. Pursue additional case finding through targeted notification and testing of patients. The time frame of targeted notification and testing will depend on findings/possible mechanism of transmission identified during the site visit.
   c. Consider obtaining blood specimens to allow for genotyping or viral sequencing of cases. However, depending on the mechanisms of transmission, viruses from cases may not be related to each other, despite transmission occurring in the facility. For example, there may be more than one source patient for the identified cases. In addition, source patients may not be identified for all cases. We recommend that these and other limitations be discussed with CDC before pursuing laboratory testing in this context.

2. **Potential source patient(s) identified but not additional cases**
    a. Assess relatedness of samples from index patient and potential source patient(s).
        i. If available, viral genotype information should be determined from available medical records.
        ii. Alternatively, attempt to arrange for testing of index patient and potential source patient samples, to be performed locally (e.g., by the state/local health department laboratory).
        iii. If genotypes match, consider the potential benefit of additional viral sequencing.

        If warranted, coordinate with the CDC Division of Viral Hepatitis or other laboratory capable of HBV/HCV viral sequencing to ship specimens for testing. If collecting new samples, aliquot into multiple 0.5ml aliquots. For potential long-term storage, store frozen between -20°C – -70°C. Serum and plasma (red top tubes) are generally acceptable, avoid heparinized (purple top) tubes.

    b. If test results indicate relatedness between the viruses from the potential source and index patient (either through genotype or viral sequencing) consider additional case finding through targeted notification and testing of patients.
    c. If either of the patients refuse or do not have sufficient sample available for additional testing, targeted notification and testing of patients can also be used to find additional cases.
    d. If test results indicate that the virus from the potential source(s) and index patient are not related,
        i. send a follow-up letter to all healthcare facilities and/or providers identified during the investigation to remind them that this is an opportunity to review their infection prevention practices. A letter based upon one used by the New York State Department of Health has been provided as one example [DOC - 2 pages].
        ii. Continue to monitor state/local health department surveillance data for the next several months to ensure no additional cases are identified/reported which are linked to any of the facilities/providers in question.
3. **If additional cases or potential source patients are not immediately identified**
   Consider sending a follow-up letter to the healthcare facilities and/or providers identified during the investigation and continue to monitor surveillance data.

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