

# Trichinellosis

*Trichinella Spiralis*  
(Also Known as Trichinosis)

## **DISEASE REPORTABLE WITHIN 24 HOURS OF DIAGNOSIS**

Per N.J.A.C. 8:57, healthcare providers and administrators shall report by mail or by electronic reporting within 24 hours of diagnosis, confirmed cases of invasive pneumococcal disease to the health officer of the jurisdiction where the ill or infected person lives, or if unknown, wherein the diagnosis is made. A directory of local health departments in New Jersey is available at

<http://www.state.nj.us/health/lh/directory/lhdselectcounty.shtml>.

If the health officer is unavailable, the healthcare provider or administrator shall make the report to the Department by telephone to 609.826.5964, between 8:00 A.M. and 5:00 P.M. on non-holiday weekdays or to 609.392.2020 during all other days and hours.



# 1 THE DISEASE AND ITS EPIDEMIOLOGY

### A. Etiologic Agent

Trichinosis is caused by *Trichinella spiralis*, a parasitic intestinal roundworm whose larvae migrate to and become encapsulated in the muscles. There are multiple species of *Trichinella* capable of causing infection in mammals, but *T. spiralis* is the most common cause of human infection.

### B. Clinical Description

Trichinosis can range from asymptomatic to fatal, depending on the infective dose. Most infections in the United States are asymptomatic. In the week following ingestion of infected meat, a patient may experience nausea, vomiting, diarrhea, and abdominal discomfort due to intraintestinal activities of the adult worms. A sudden onset of muscle soreness and pain, fever, edema of the upper eyelid, and urticarial rash two to eight weeks after ingestion can follow, as larvae migrate into muscle tissue. Eye pain, photophobia, thirst, profuse sweating, chills, and weakness may also occur. Recurring high fever (as high as 104°F) usually stops after one to six weeks. In the most severe infections, cardiac and neurologic complications, sometimes leading to death, may occur in the third to sixth week.

### C. Reservoirs

Swine, dogs, cats, horses, rats, and many wild animals, such as bear, wolf, wild boar, fox, and Arctic marine mammals, can serve as reservoirs for *Trichinella*.

### D. Modes of Transmission

Transmission occurs by ingestion of raw or undercooked meats containing *Trichinella* larvae. Pork and pork products have been the most common source of infection. Beef products, which may become inadvertently adulterated with raw pork during processing, may also be a source. As many as 30% of domestic cases of trichinosis are thought to be related to the ingestion of meat from wild game animals. There is no person-to-person spread of trichinosis.

## E. Incubation Period

Gastrointestinal symptoms may appear within a few days of infection; appearance of systemic symptoms ranges from five to 45 days. The usual incubation period is eight to fifteen days. If large numbers of cysts are ingested, symptoms may occur more rapidly.

## F. Period of Communicability or Infectious Period

Trichinosis is not transmitted directly from person to person. Animal hosts may remain infective for months, and meat from these animals remains infective until the larvae are killed by sufficient cooking, freezing, or irradiation.

## G. Epidemiology

Trichinosis occurs worldwide and affects people of all ages. Depending on local customs regarding eating pork or undercooked meats, the incidence of disease is variable. Infection was once common and usually caused by ingestion of undercooked pork; however, infection is now relatively rare. From 1997 to 2001, an average of 12 cases per year were reported. In the United States, the numbers of reported cases of trichinosis are declining in large part because of legislation prohibiting the feeding of raw-meat garbage to hogs, commercial and home freezing of pork, and the public awareness of the danger of eating raw or undercooked pork products. Cases are now less commonly associated with pork products and more often associated with eating raw or undercooked wild game meats. In New Jersey in the past 12 years, no cases were reported.

# 2 CASE DEFINITION

## A. New Jersey Department of Health and Senior Services (NJDHSS) Case Definition

### 1. Clinical Description

A disease caused by ingestion of *Trichinella* larvae. The disease has variable clinical manifestations. Common signs and symptoms among symptomatic persons include eosinophilia, fever, myalgia, and periorbital edema.

### 2. Laboratory Criteria for Diagnosis

Demonstration of *Trichinella* larvae in tissue obtained by muscle biopsy, or

Positive serologic test for *Trichinella*.

### 3. Case Classification

#### **CONFIRMED**

A clinically compatible case, AND

Demonstration of *Trichinella* larvae in tissue obtained by muscle biopsy, OR

Positive serologic tests for *Trichinella*.

**NOTE: In an outbreak situation, at least one case must be laboratory confirmed. Associated cases are defined as individuals who have shared the epidemiologically implicated meal or ate an epidemiologically implicated meat product and have either a positive serologic test for trichinosis or a clinically compatible illness.**

**PROBABLE**

Not used.

**POSSIBLE**

Not used.

**B. Differences from CDC Case Definition**

The NJDHSS and Centers for Disease Control and Prevention (CDC) case definitions are the same.

## **3 LABORATORY TESTING AVAILABLE**

Laboratory tests will show a rapid increase in eosinophil levels in blood. Serological tests and muscle biopsy can confirm the diagnosis. The NJDHSS Public Health and Environmental Laboratories (PHEL) will perform serological testing for the presence of antibodies for *T. spiralis*. For additional information, contact the Special Immunology Laboratory at 609.292.5819.

## **4 PURPOSE OF SURVEILLANCE AND REPORTING REQUIREMENTS**

**A. Purpose of Surveillance and Reporting**

- To identify sources of public health concern (e.g., undercooked *Trichinella*-infected pork being sold at a restaurant) and to stop transmission from such a source.
- To identify and control outbreaks.
- To provide education about reducing the risk of infection.

## **B. Laboratory Reporting Requirements**

The New Jersey Administrative Code (NJAC 8:57-1.6) stipulates that laboratories report (by telephone, by confidential fax, or over the Internet using the Communicable Disease Reporting and Surveillance System [CDRSS]) all cases of trichinellosis to the local health officer having jurisdiction over the locality in which the patient lives or, if unknown, to the health officer in whose jurisdiction the healthcare provider requesting the laboratory examination is located. The report shall contain, at a minimum, the reporting laboratory's name, address, and telephone number; the age, date of birth, gender, race, ethnicity, home address, and telephone number of person tested; the test performed; the date of testing; the test results; and the healthcare provider's name and address.

## **C. Healthcare Provider Reporting Requirements**

The New Jersey Administrative Code (NJAC 8:57-1.4) stipulates that healthcare providers report (by telephone, by confidential fax, or in writing) all cases of trichinellosis to the local health officer having jurisdiction over the locality in which the patient lives or, if unknown, to the health officer in whose jurisdiction the healthcare provider requesting the laboratory examination is located. The report shall contain the name of the disease; date of illness onset; and name, age, date of birth, race, ethnicity, home address, and telephone number of the person being reported. Additionally, name, address, institution and telephone number of reporting official, and other information as may be required by NJDHSS concerning a specific disease, should be required.

## **D. Health Officer Reporting and Follow-up Responsibilities**

The New Jersey Administrative Code (NJAC 8:57-1.7) stipulates that each local health officer must report the occurrence of any case of trichinellosis within 24 hours of receiving a report from a laboratory or healthcare provider to the NJDHSS, Infectious and Zoonotic Disease Program (IZDP). A report can be mailed or filed electronically over the Internet using the confidential and secure CDRSS.

# **5 CASE INVESTIGATION**

## **A. Forms**

It is the local health officer's responsibilities to investigate the case by interviewing the patient and others who may be able to provide pertinent information to rule out a possible outbreak. Much of the clinical information can be obtained from the patient's healthcare provider or the medical record. For confirmed cases, the "Trichinosis Surveillance Case Report" form should be completed.

- When asking about exposure history, use the incubation period range for Trichinosis (five to 45 days). Specifically focus on the period beginning a minimum of five days before the

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patient's symptom onset date back to no more than 45 days before onset for the following exposures:

- Food(s) derived from pork.
- Non-pork food(s), including beef, wild game, dried jerky, and other food(s).
- In a case of an outbreak, immediately notify the NJDHSS IZDP by telephone at 609.588.7500 during business hours and 609.392.2020 after business hours and on weekends and holidays.
- If there have been several unsuccessful attempts to obtain patient information, please fill out the report with as much information as possible. Please note on the report why it could not be completed as well as name and affiliation of the person submitting the report and the person reporting the illness.

After completing the investigation, mail the "Trichinosis Surveillance Case Report" (in an envelope marked "Confidential") to IZDP, or file the report electronically over the Internet using the confidential and secure CDRSS.

The mailing address is:

NJDHSS

Communicable Disease Service

Infectious and Zoonotic Diseases Program

PO Box 369

Trenton, NJ 08625-0369

### B. Entry into CDRSS

The mandatory fields in CDRSS include: disease, last name, county, municipality, gender, race, ethnicity, case status, report status.

The following table can be used as a quick reference guide to determine which CDRSS fields need to be completed for accurate and complete reporting of trichinellosis cases. The "Tab" column includes the tabs which appear along the top of the CDRSS screen. The "Required Information" column provides detailed explanations of what data should be entered.

CDRSS Screen	Required Information
<b>Patient Info</b>	Enter disease name ("TRICHINOSIS"), patient demographics, patient onset and date report was made to the local health department. There are no subgroups for Trichinosis.
<b>Addresses</b>	Use as needed for additional addresses (e.g., work address, school, temporary NJ address for out-of-state case). Use the <b>Comments</b> section in this screen to record any pertinent information about the alternate address (e.g., the times per week the case-patient attends daycare). Entering an alternate address will allow other disease investigators access to the case if the alternate address falls within their jurisdiction.

CDRSS Screen	Required Information
<p><b>Clinical Status</b></p>	<p>Clinical information such as past medical history, any treatment that the patient received, name of medical facility(s) including date of initial healthcare evaluation and dates of hospitalization, treating physician(s), and mortality status are entered here.</p> <p>(NOTE: If the patient received care from two or more medical facilities, be sure all are recorded in the case including admit/discharge dates so the case can be accessed by all infection control professionals (ICPs) covering these facilities).</p>
<p><b>Signs/Symptoms</b></p>	<p>Make every effort to get complete information by interviewing the physician, family members, ICP, or others who might have knowledge of the patient’s illness. Check appropriate boxes for signs and symptoms and indicate their onset and resolution.</p>
<p><b>Risk Factors</b></p>	<p>Enter complete information about risk factors including complete food history, travel history, any gatherings or outdoor activities attended, When asking about exposure history, use the incubation period range for trichinosis (five to 45 days). Specifically focus on the period beginning a minimum of five days before the patient’s symptom onset date back to no more than 45 days before onset for the following exposures:</p> <ul style="list-style-type: none"> <li>• Food(s) derived from pork.</li> <li>• Non-pork food(s), including beef, wild game, dried jerky, and other food(s).</li> </ul> <p>If possible, record any restaurants at which the patient ate, including food item(s) and date consumed in <b>Comments</b> section.</p>
<p><b>Laboratory Eval</b></p>	<p>Laboratory test name “TRICHINELLA SPIRALIS AB” or “HELMINTH+ARTHROPOD IDENTIFIED”, Lab Specimen ID, Specimen, Date specimen collected, Lab Name, Referring Physician Name, Referring Medical Facility name, Test Result i.e., Positive/reactive or Negative/no reactive.</p>

CDRSS Screen	Required Information
<p><b>Contact Tracing</b></p>	<p>All potentially exposed contacts are entered into the contact tracing tab for local, county and statewide surveillance efforts. CDRSS requires a “YES” response to one of the two trichinosis exposure questions in order to add case contacts.</p> <p>Contacts are added individually by selecting the Enter Contact By Name feature:</p> <p>Each contact record reflects the period of exposure, symptomatic or asymptomatic, contact demographics, telephone numbers, marital status, primary language, exposure risk i.e., close, casual, unknown, and LHD response activities are noted.</p> <p>An exposure setting is selected for each contact from the drop down to the right of the contact’s name.</p> <p>A summary reflecting the following contact details: total number, name, age, relationship, exposure specifics as well as all LHD recommendations to prevent further transmission of illness are entered into the contact tracing text box.</p>
<p><b>Case Comments</b></p>	<p>Any additional case investigation findings that can not be entered in discrete data fields are documented in the general comment section.</p>
<p><b>Epidemiology</b></p>	<p>Select the route of transmission route, import status of infection i.e., whether the case was imported and from where (another county, state, country), LHD notification of illness and association with high-risk venue type, name, location and last day of attendance.</p> <p>The NJDHSS assigned outbreak or investigation number is selected for all involved cases which automatically populates a summary of the initial report.</p>
<p><b>Case Classification Report Status</b></p>	<p>Case status options are:</p> <p>“REPORT UNDER INVESTIGATION (RUI),” “CONFIRMED,” “PROBABLE,” “POSSIBLE,” and “NOT A CASE.”</p> <ul style="list-style-type: none"> <li>• All cases entered by laboratories (including LabCorp electronic submissions) should be assigned a case status of “REPORT UNDER INVESTIGATION (RUI).”</li> <li>• Cases still under investigation by the LHD should be assigned a case status of “REPORT UNDER INVESTIGATION (RUI).”</li> <li>• Upon completion of the investigation, the LHD should assign a case status on the basis of the case definition. “CONFIRMED” and “NOT A CASE” are the only</li> </ul>



CDRSS Screen	Required Information
	<p>appropriate options for classifying a case of trichinosis.</p> <p>Report status options are: “PENDING,” “LHD OPEN,” “LHD REVIEW,” “LHD CLOSED,” “DELETE,” “REOPENED,” “DHSS OPEN,” “DHSS REVIEW,” and “DHSS APPROVED.”</p> <ul style="list-style-type: none"> <li>• Cases reported by laboratories (including LabCorp electronic submissions) should be assigned a report status of “PENDING.”</li> <li>• Once the LHD begins investigating a case, the report status should be changed to “LHD OPEN.”</li> <li>• The “LHD REVIEW” option can be used if the LHD has a person who reviews the case before it is closed (e.g., health officer or director of nursing).</li> <li>• Once the LHD investigation is complete and all the data are entered into CDRSS, the LHD should change the report status to “LHD CLOSED.”</li> <li>• “LHD CLOSED” cases will be reviewed by DHSS and be assigned one of the DHSS-specific report status categories. If additional information is needed on a particular case, the report status will be changed to “REOPENED” and the LHD will be notified by e-mail. Cases that are “DHSS APPROVED” cannot be edited by LHD staff.</li> </ul> <p>If a case is inappropriately entered as a case of trichinosis the case should be assigned a report status of “DELETE.” A report status of “DELETE” should NOT be used if a reported case of trichinosis simply does not meet case definition. Rather, it should be assigned the appropriate case status, as described above.</p>

**C. Other Reporting/Investigation Issues**

1. Case report forms (Trichinosis Surveillance Case Report, and/or labs) DO NOT need to be mailed to NJDHSS as long as mandatory fields in CDRSS indicated in section B are completed.
2. Once LHD completes its investigation and assigns a report status of “LHD CLOSED,” NJDHSS will review the case. NJDHSS will approve the case by changing the report status to “DHSS APPROVED.” At this time, the case will be submitted to CDC and the case will be locked for editing. If additional information is received after a case has been placed in “DHSS APPROVED,” you will need to contact NJDHSS to reopen the case. This should be done only if the additional information changes the case status of the report.

3. Every effort should be made to complete the investigation within three months of opening a case. Cases that remain open for three months or more and have no investigation or update notes will be closed by NJDHSS.

## 6 CONTROLLING FURTHER SPREAD

### A. Isolation and Quarantine Requirements (NJAC 8:57-1.10)

None.

### B. Protection of Contacts of a Case

None.

## 7 OUTBREAK SITUATIONS

If the number of reported cases of trichinellosis in a particular setting is higher than usual, or if an outbreak is suspected, investigate to determine the source of infection and mode of transmission. A common vehicle (e.g., food derived from pork or game meat) should be sought and applicable preventive or control measures should be instituted (e.g., removing an implicated food item from the environment). Consult with the NJDHSS IZDP at 609.588.7500. IZDP staff can help determine a course of action to prevent further cases and can perform surveillance for cases across jurisdictions that may be difficult to identify at a local level.

### A. Preventive Measures

#### 1. Environmental Measures

Implicated food items must be removed from the environment. A decision about testing implicated food items can be made in consultation with IZDP and the Food and Drug Safety Program (FDSP). FDSP can help coordinate pickup and testing of food samples. If a commercial product is suspected, FDSP will coordinate follow-up with relevant outside agencies (e.g., US Food and Drug Administration [FDA], US Department of Agriculture). FDSP may be reached at 609.588.3123.

**NOTE: The role of FDSP is to provide policy and technical assistance with the environmental investigation such as interpreting the New Jersey Food Code, conducting a hazardous analysis and critical control points risk assessment, initiating enforcement actions, and collecting food samples.**

## 2. Personal Preventive Measures/Education

To avoid future exposures, individuals should be made aware of the following:

- Thoroughly cook pork, pork products, and wild game until the meat is no longer pink. This can be achieved by allowing sufficient cooking time so that all parts of the meat reach an internal temperature of at least 160°F (71°C). Freezing pork less than six inches thick for 20 days at 5°F will kill the larvae, but freezing wild game meats may leave some larvae alive.
- Grind pork in a separate grinder and thoroughly disinfect the grinder between different products.
- Hunters should thoroughly cook all meats from wild animals. Meat products should be processed by heating, freezing, or irradiation before drying or smoking for jerky.
- Cook any meat fed to pigs or other animals.
- Hogs should not be allowed to eat uncooked carcasses of other animals, including rats, which may be infected with trichinosis.
- Be aware that curing (salting), drying, smoking, or microwaving meat does not consistently kill infective larvae.
- Individuals known to have recently ingested the same product as the patient being investigated should consult with their healthcare provider regarding treatment options.

## Additional Information

A Trichinosis Fact Sheet can be obtained at the NJDHSS Web site at [www.state.nj.us/health](http://www.state.nj.us/health).

Additional information can be obtained from the FDA's Center for Food Safety and Applied Nutrition Web site at [www.cfsan.fda.gov](http://www.cfsan.fda.gov).

## References

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