

13-ID-06

**Committee:** Infectious Disease

**Title:** Revised Surveillance Case Definition for Trichinellosis (Trichinosis) (*Trichinella* spp.)

### I. Statement of the Problem

The current (1996/2009) case definition for trichinellosis is problematic for several reasons. First, asymptomatic persons are counted as “confirmed” in an outbreak setting based on a positive laboratory result, which may not reflect recent exposure. Second, persons with signs and symptoms compatible with trichinellosis who ate a food product found to contain *Trichinella* parasites, but for whom no biologic specimens are available for testing, cannot be classified as having cases of illness. These situations could be addressed by adding the categories of “suspect” and “probable” to the case definition.

### II. Background and Justification

Trichinellosis, previously known as trichinosis, is caused by eating raw or undercooked meat of animals infected with the larvae of roundworms of the *Trichinella* genus. Infection occurs in certain wild animals, mostly omnivores, but may also occur in domestic pigs.

Nausea, diarrhea, vomiting, fatigue, fever, constipation, and abdominal discomfort are the first symptoms of trichinellosis in humans, which correspond to the enteral phase of acute illness, in which the ingested *Trichinella* larvae invade the intestinal mucosa. The enteral phase symptoms can occur 1-2 days after infection and usually last from 2-7 days, but they can persist for weeks. Headaches, fevers, chills, cough, eye swelling (periorbital edema), aching joints and muscle pains, itchy skin, or continued gastrointestinal symptoms follow the first symptoms and correspond to the parenteral phase of acute illness, in which muscle invasion by the larval parasites stimulates inflammatory and allergic responses.

The acute phase can last approximately 1 to 8 weeks, although muscular pain and weakness can persist for months after the resolution of other symptoms. Infection can also be asymptomatic, especially if the number of infective larvae ingested is low. If the infection is heavy, patients may experience difficulty coordinating movements, and have heart and breathing problems due to larvae invading the heart or lung tissue, respectively. In severe cases, death can occur. For mild to moderate infections, most symptoms subside within a few months. Often, mild cases of trichinellosis are not specifically diagnosed. The suspicion of trichinellosis, based on clinical symptoms and eosinophilia, can be confirmed by specific diagnostic tests, including serum antibody detection and identification of *Trichinella* larvae in tissue collected by biopsy.

To address the aforementioned problems with the case definition, the following revisions are proposed:

1. Clarify the classification of an asymptomatic person.

Re-classify an asymptomatic person with a positive laboratory finding in an outbreak setting as a suspect case if the patient shared an epidemiologically implicated meal or ate an epidemiologically implicated meat product.

2. Clarify the classification of symptomatic persons with no laboratory confirmation of disease.

Reclassify cases in persons with clinically compatible illness but no laboratory confirmation of disease as probable if they shared an epidemiologically implicated meal or ate an epidemiologically implicated meat product, or if they consumed meat or another food item in which *Trichinella* was identified.

3. Add identification of the parasite in food as a laboratory criterion for diagnosis.

Add “presence of *Trichinella* spp. larvae in the epidemiologically implicated meat product or meal” to the list of laboratory criteria for diagnosis of probable cases with clinically compatible illness for which no human specimens were tested.

**III. Statement of the desired action(s) to be taken**

1. Utilize standard sources (e.g., reporting\*) for case ascertainment for trichinellosis. Surveillance for trichinellosis should use the following recommended sources of data to the extent of coverage presented in Table III.

**Table III. Recommended sources of data and extent of coverage for ascertainment of cases of trichinellosis.**

Source of data for case ascertainment	Coverage	
	Population-wide	Sentinel sites
Clinician reporting	X	
Laboratory reporting	X	
Reporting by other entities (e.g., hospitals, veterinarians, pharmacies, poison centers)	X	
Death certificates	X	
Hospital discharge or outpatient records	X	
Extracts from electronic medical records	X	
Telephone survey		
School-based survey		
Other _____		

2. Utilize standardized criteria for case identification and classification (Sections VI and VII) for trichinellosis and add this condition to the *Nationally Notifiable Condition List*.

- 2a. Immediately notifiable, extremely urgent (within 4 hours)
- 2b. Immediately notifiable, urgent (within 24 hours)
- 2c. Routinely notifiable

CSTE recommends that all States and Territories enact laws (statute or rule/regulation as appropriate) to make this disease or condition reportable in their jurisdiction. Jurisdictions (e.g. States and Territories) conducting surveillance (according to these methods) should submit case notifications\*\* to CDC.

3. CDC should publish data on trichinellosis as appropriate in *MMWR* and other venues (see Section IX).

CSTE recommends that all jurisdictions (e.g. States or Territories) with legal authority to conduct public health surveillance follow the recommended methods as outlined above.

Terminology:

\* Reporting: process of a healthcare provider or other entity submitting a report (case information) of a condition under public health surveillance TO local or state public health

\*\*Notification: process of a local or state public health authority submitting a report (case information) of a condition on the Nationally Notifiable Condition List TO CDC.

**IV. Goals of Surveillance**

To provide more uniform and interpretable surveillance data for a significant parasitic condition that is amendable to public health intervention.

**V. Methods for Surveillance: Surveillance for trichinellosis should use the recommended sources of data and the extent of coverage listed in Table III.**

It is unknown how long antibodies to *Trichinella* spp. remain detectable in sera (but it is likely antibody production can persist for years), which is one of the reasons for the recommended revisions. Background levels of antibodies from prior exposure might be higher in some populations; therefore, detectable antibodies may not always signal an acute exposure to the parasite.

**VI. Criteria for case identification**

**A. Narrative: A description of suggested criteria for case ascertainment of a specific condition.**

1. A person with demonstration of *Trichinella* larvae in tissue obtained by biopsy and any of the following: fever, myalgia, periorbital edema, or eosinophilia.
2. A person with a positive serologic test for *Trichinella* and any of the following: fever, myalgia, periorbital edema, or eosinophilia.
3. A person who shared an epidemiologically implicated meal, or ate an epidemiologically implicated meat product, and has a clinically compatible illness, without laboratory confirmation.
4. A person with a clinically compatible illness associated with an epidemiologically compatible exposure for which no human serum/tissue is available, but for which the parasite can be demonstrated in the epidemiologically implicated meat or meal.

**B. Table of criteria to determine whether a case should be reported to public health authorities**

**Table VI-B. Table of criteria to determine whether a case should be reported to public health authorities.**

Criterion	1	2	3	4
<i>Clinical Evidence</i>				
Fever	O	O	O	O
Myalgia	O	O	O	O
Periorbital edema	O	O	O	O
Eosinophilia	O	O	O	O
<i>Laboratory Evidence</i>				
Positive serologic test for <i>Trichinella</i>		N		
Demonstration of <i>Trichinella</i> larvae in tissue obtained by muscle biopsy	N			
<i>Trichinella</i> larvae detected in epidemiologically implicated meat product or meal				N
<i>Epidemiological Evidence</i>				
Consumption of an epidemiologically implicated meat product or meal			N	N

Notes:

S = This criterion alone is Sufficient to report a case.

N = All “N” criteria in the same column are Necessary to report a case.

O = At least one of these “O” (Optional) criteria in each category (e.g., clinical evidence and laboratory evidence) in the same column—in conjunction with all “N” criteria in the same column—is required to report a case.

\* A requisition or order for any of the “S” laboratory tests is sufficient to meet the reporting criteria.

### C. Disease-specific data elements

Disease-specific data elements to be included in the initial report are listed below.

#### *Epidemiological risk factors*

- History of recent consumption of raw or undercooked pork or wild game meats
- History of consumption of an epidemiologically implicated meat product

## VII. Case Definition for Case Classification

### A. Narrative: Description of criteria to determine how a case should be classified.

A disease caused by ingestion of *Trichinella* larvae, usually through consumption of *Trichinella*-containing meat—or food contaminated with such meat—that has been inadequately cooked prior to consumption. The disease has variable clinical manifestations. Common signs and symptoms among symptomatic persons include eosinophilia, fever, myalgia, and periorbital edema.

#### Laboratory Criteria for Diagnosis (Human specimens)

- Demonstration of *Trichinella* larvae in tissue obtained by biopsy, OR
- Positive serologic test for *Trichinella*

#### Laboratory Criteria for Diagnosis (Food specimens)

- Demonstration of *Trichinella* larvae in the food item (probable)

### Case Classification

#### Confirmed

A clinically compatible illness that is laboratory confirmed in the patient.

#### Probable

A clinically compatible illness in a person who shared an epidemiologically implicated meal or ate an epidemiologically implicated meat product.

A clinically compatible illness in a person who consumed a meat product in which the parasite was demonstrated.

#### Suspect

Instances where there is no clinically compatible illness should be reported as suspect if the person shared an epidemiologically implicated meal, or ate an epidemiologically implicated meat product, and has a positive serologic test for trichinellosis (and no known prior history of *Trichinella* infection).

#### Comment(s)

Epidemiologically implicated meals or meat products are defined as a meal or meat product that was consumed by a person who subsequently developed a clinically compatible illness that was laboratory confirmed.

Negative serologic results may not accurately reflect disease status if blood was drawn less than 3-4 weeks from symptom onset (Wilson et. al, 2006).

**Epidemiologic Linkage**

Persons who shared the implicated meat/meal should be investigated and considered for case status as described above.

**Criteria to distinguish a new case of this disease or condition from reports or notifications which should not be enumerated as a new case for surveillance**

Serial or subsequent cases of trichinellosis experienced by one individual should only be counted if there is an additional epidemiologically compatible exposure. Because the duration of antibodies to *Trichinella* spp. is not known, mere presence of antibodies without a clinically-compatible illness AND an epidemiologically compatible exposure may not indicate a new infection especially among persons with frequent consumption of wild game that is known to harbor the parasite.

**B. Classification Tables**

**Table VII-B. Criteria for defining a case of trichinellosis.**

Criterion	Confirmed	Probable		Suspect
		1	2	
	1	1	2	1
<i>Clinical Evidence</i>				
Fever	O	O	O	A
Myalgia	O	O	O	A
Periorbital edema	O	O	O	A
Eosinophilia	O	O	O	A
<i>Laboratory evidence</i>				
Positive serologic test for <i>Trichinella</i>	O	A	A	N
Demonstration of <i>Trichinella</i> larvae in tissue obtained by muscle biopsy	O	A	A	
<i>Trichinella</i> larvae detected in epidemiologically implicated meat product or meal			N	
<i>Epidemiologic evidence</i>				
Consumption of an epidemiologically implicated meat product or meal		N	N	N
<i>Criteria to distinguish a new case:</i>				
No prior history of trichinellosis, unless separate epidemiologically compatible exposures can be documented.				N

Notes:

S = This criterion alone is Sufficient to classify a case.

N = All "N" criteria in the same column are Necessary to classify a case. A number following an "N" indicates that this criterion is only required for a specific disease/condition subtype (see below).

A = This criterion must be absent (i.e., NOT present) for the case to meet the classification criteria.  
O = At least one of these “O” (Optional) criteria in each category (e.g., clinical evidence and laboratory evidence) in the same column—in conjunction with all “N” criteria in the same column—is required to classify a case. (These optional criteria are alternatives, which means that a single column will have either no O criteria or multiple O criteria; no column should have only one O.) A number following an “O” indicates that this criterion is only required for a specific disease/condition subtype.

### VIII. Period of Surveillance

Surveillance should be ongoing.

### IX. Data sharing/release and print criteria

Notification to CDC of all cases of trichinellosis prior to classification is recommended.

- NNDSS data are used by staff in CDC’s Division of Parasitic Diseases and Malaria, Parasitic Diseases Branch (PDB) to monitor the occurrence of the conditions, identify populations or geographic areas at high risk, plan prevention and control programs and policies, allocate resources appropriately, and evaluate the effectiveness of programs and policies. Information is also shared with jurisdictions. Ad-hoc analyses occur for both internal use or upon request from other government agencies, including the U.S. Department of Agriculture and the World Organization for Animal Health (OIE). To protect confidentiality of private information, CDC follows the CDC policy on releasing and sharing data and the CDC-CSTE data release guidelines and procedures for re-release of state-provided data.
- A surveillance summary of the NNDSS data will be written by PDB staff approximately every 5 years and published in the *MMWR*.
- Data are published weekly in the *MMWR*, and yearly case counts are given in the *MMWR Summary of Notifiable Diseases*.

### X. References

CDC. Trichinellosis surveillance -- United States, 2002-2007. *MMWR Surveill Summ* 2009;58(9):1-7. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5809a1.htm>

CSTE Position Statement 09-ID-64 available at:

<http://c.ymcdn.com/sites/www.cste.org/resource/resmgr/PS/09-ID-64.pdf> (Accessed March 21, 2013).

Wilson M, Schantz P, Nutman T, 2006. Molecular and immunological approaches to the diagnosis of parasitic infection. Detrick B, Hamilton RG, Folds JD, eds. *Manual of Molecular and Clinical Laboratory Immunology*. Washington, DC: American Society for Microbiology, 557-568.

### XI. Coordination

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