

Ascariasis rev Apr 2017

BASIC EPIDEMIOLOGY

Infectious Agent

Ascariasis is caused by the soil transmitted helminths *Ascaris lumbricoides* and *Ascaris suum*. Both are roundworm intestinal nematodes. *Ascaris lumbricoides* is found in humans and dogs, while *Ascaris suum* is most commonly found in pigs, but can infect humans via consumption of contaminated meat. *Ascaris lumbricoides* is the most prevalent of all human intestinal nematodes worldwide.

Transmission

Transmission is primarily via ingestion of fecal contaminated soil. Eggs are shed in an infected person's feces but do not become infectious until they have incubated in soil for 2-3 weeks. Once they become infectious they can be transmitted via contaminated water, agriculture products, fingers, or other fomites.

Incubation Period

Eggs must incubate in soil for 2-3 weeks before they become infectious to humans. Once ingested it takes approximately 8 weeks for the eggs to develop into an egg-laying adult female worm although symptoms may manifest earlier.

Communicability

Human to human transmission of *Ascaris* spp. does NOT occur because part of the worm's life cycle must be completed in soil before becoming infectious. Soil contamination is perpetuated by fecal contamination from infected humans or dogs for *Ascaris lumbricoides* and humans (rarely) or pigs for *Ascaris suum*. An infected person may shed eggs for as long as they are infected with an egg-laying adult which may be several years.

Clinical Illness

Most infections with *Ascaris* spp. are asymptomatic. Heavier infections may result in gastrointestinal issues, malnutrition, or intestinal obstruction. Severe infections in children resulting in nutrient deficiencies can lead to growth retardation and cognitive impairment. During larval migration through respiratory passages, acute transient pneumonitis and eosinophilia may occur. Adult worms may migrate under stressful conditions (fever, anesthesia, etc.) which may lead to intestinal wall perforation, appendicitis, peritonitis, pancreatitis, cholangitis, or biliary colic. In very rare instances, intestinal obstructions may cause gangrene and if untreated result in death.

DEFINITIONS

Clinical Case Definition

Early symptoms of ascariasis occur during larval migration and include cough, wheezing, pneumonitis and eosinophilia. Minor infections may manifest as minor abdominal discomfort or loss of appetite. Major infections may result in obstruction and/or inflammation of intestinal organs (appendicitis, pancreatitis etc.), vomiting (possibly accompanied by expulsion of adult worms), weight loss, and fatigue. In children, nutrient deficiency, growth retardation, and cognitive impairment may also be present.

Laboratory Confirmation

- Microscopic identification of *Ascaris* eggs in feces, **OR**
- Microscopic identification of ascid larvae in sputum or gastric washings, **OR**
- Identification of adult worms passed from the anus, mouth or nose

Case Classifications

- **Confirmed:** A case that is laboratory confirmed
- **Probable:** A clinically compatible case with evidence of infection such as
 - An ultrasound showing worms in the pancreas or liver or
 - CT scans or MRI showing worms present in the ducts of the liver or pancreas.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should promptly investigate all reports of ascariasis. Investigations should include an interview of the case or a surrogate to get a detailed exposure history. Please use the Ascariasis Investigation Form available on the DSHS website: <http://www.dshs.state.tx.us/idcu/investigation/>.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors, and describe course of illness.
- ☐ Interview the case to get detailed exposure history and risk factor information.
 - Use the **Ascariasis Investigation Form** to record information from the interview.
 - If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
 - Provide education to the case or his/her surrogate about effective hand washing, food safety practices, and avoidance of soil contamination. See Prevention and Control Measures.
- ☐ Fax completed forms to DSHS EAIDB at **512-776-7616**
 - For lost to follow-up (LTF) cases, please complete as much information as possible obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and fax/e-mail securely to DSHS EAIDB and indicate the reason for any missing information.
- ☐ If case is part of an outbreak or cluster, see Managing Special Situations section.
- ☐ All confirmed case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- Routine hand washing with soap and warm water.
- Proper disposal of human waste products such as feces is necessary to prevent contamination of soil.
- Avoid areas where human waste contamination of soil or water is likely.
- Proper removal and disposal of pet waste from outdoor areas.
- Thoroughly wash fruits and vegetables to remove soil/fertilizer residue.
- Thoroughly cook all fruits and vegetables that may have been in contact with soil produced from human and animal waste.
- Cook all pork products to the appropriate temperature prior to consumption and wash hands thoroughly before and after handling raw meat.

Exclusions

There is no human-to-human transmission of ascariasis therefore no exclusion from work, school or daycare is required for disease control purposes unless the individual has diarrhea. If the individual has diarrhea, the standard exclusion until diarrhea free for 24 hours without the use of diarrhea suppressing medications applies. Diarrhea is defined as 3 or more episodes of loose stools in a 24 hour period.

MANAGING SPECIAL SITUATIONS

Outbreaks/Clusters

If an outbreak or cluster is suspected, notify the DSHS Emerging and Acute Infectious Disease Branch (EAIDB) at **(800) 252-8239 or (512) 776-7676**.

The local/regional health department should:

- Interview all cases suspected as being part of the outbreak or cluster.
- Request medical records for any case in your jurisdiction that died, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and risky exposures, such as inadequate waste disposal near the home or work, recreational activities in areas with inadequate waste disposal, or travel to an endemic country reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Risks	Notes
1	NT	34	F	White/non-Hispanic	12/4/16	Diarrhea, Anemia	Travel to Vietnam, lives in same neighborhood as ID 2	Brother ill
2	PR	4	M	Unknown	11/30/16	Anemia, bloody stool	Poor sanitation near home, lives in same neighborhood as ID 1	Lost to follow up (LTF)

- If the outbreak was reported in association with an apparent common risk factor (e.g., work or live near a possible site of soil contamination, members of the same household with similar travel), recommend that anyone displaying symptoms seek medical attention from a healthcare provider.
- If several cases in the same family or geographic area are identified and there is a possibility for similar exposures (e.g., travel to the same country, poor sanitation), testing of potentially exposed persons or mass de-worming treatment may be warranted.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Confirmed, probable and clinically suspected cases are required to be reported **within 1 week** to the local or regional health department or the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Branch (EAIDB) at **(800) 252-8239** or **(512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed and probable** cases.
 - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
 - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Fax completed forms to DSHS EAIDB at **512-776-7616** or email securely to an EAIDB neglected tropical disease epidemiologist.

When an outbreak is being investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDB at **512-776-7676**.

LABORATORY PROCEDURES

Fecal Ova and Parasite testing for ascariasis is widely available from most private laboratories however, specimen submission to DSHS laboratory is advised. Adult worm specimen identification may not be available at private laboratories therefore submission to the DSHS laboratory is available and highly recommended. Contact an EAIDB neglected tropical disease epidemiologist to discuss further if needed.

Specimen Collection

- Submit a stool specimen in a sterile, leak-proof container.
 - Required volume: Stool 15 g solid or 15 mL liquid.
- Specimens that cannot be received by the lab in less than 5 hours should be placed in formalin and PVA immediately.
- Adult worms should be submitted in either 5-10% formalin or 70% ethanol.

Submission Form

- Use DSHS Laboratory G-2B form for specimen submission.
- Make sure the patient's name and date of birth or social security number match exactly what is written on the transport tubes.
- Fill in the date of collection, date of onset, and diagnosis/symptoms.

Specimen Shipping

- Transport temperature: May be shipped at ambient temperature.
- Ship specimens via overnight delivery.
- DO NOT mail on a Friday unless special arrangements have been pre-arranged with DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health Services
Attn. Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Possible Causes for Rejection:

- Specimen not in correct transport medium.
- Missing or discrepant information on form/specimen.
- Unpreserved specimen received greater than 5 hours after collection– specimen should still be submitted as an attempt will be made to complete testing.
- Transport media was expired.

UPDATES

April 2017

- Basic Epidemiology: revised the Transmission, Incubation Period, and Communicability sections to provide clarity.