Giardiasis Investigation Guideline

CONTENTS

Investigation Protocol:

- **Investigation Guideline**

Investigation Forms / Documentation Worksheets:

- **General Investigation Form(s)**
- **Enteric Supplemental Form**

Supporting Material:

- **Fact Sheet**

Version 4/2009

Giardiasis
Disease Management and Investigative Guidelines

CASE DEFINITION (CDC 1997)

A. Clinical Description for Public Health Surveillance:

- An illness caused by the protozoan *Giardia lamblia* and characterized by diarrhea, abdominal cramps, bloating, weight loss, or malabsorption. Infected persons may be asymptomatic.

B. Laboratory Criteria for Case Classification:

- Demonstration of *G. lamblia* cysts in stool, or
- Demonstration of *G. lamblia* trophozoites in stool, duodenal fluid, or small-bowel biopsy, or
- Demonstration of *G. lamblia* antigen in stool by a specific immunodiagnostic test (e.g., enzyme-linked immunosorbent assay).

C. Case Classification:

- Confirmed: A case that is laboratory confirmed.
- Probable: A clinically compatible case that is epidemiologically linked to a confirmed case.

D. Laboratory Testing:

- Collection: Parasite (O & P) Feces Mailer. The traditional two vial system is preferred but the commercially available one vial system is accepted.
- Specimen: Feces, marble size, mixed well in 10% formalin and PVA bottles
- Timing of specimens: Because parasites may be passed intermittently, the collection of three specimens within a 10-day period is recommended. This should occur while a person is symptomatic or within the 2 week period after the resolution of diarrheal symptoms.
- Specimens containing anti-diarrheal compounds, barium, bismuth, or mineral oil interfere with the parasite examination.
- Do not refrigerate the preserved samples. Once preserved, the specimens can be stored and transported at room temperature.
- If there is a delay in obtaining the preservatives, refrigerate untreated stool specimens at 4°C (do not freeze) for up to 48 hours.
- The State Public Health Laboratory will provide testing upon request.
- For additional information and/or questions concerning isolate submission, and laboratory kits call (785) 296-1620 or refer to online guidance at http://www.kdheks.gov/labs/lab_ref_guide.htm

E. Bioterrorism Potential: None.

F. Outbreak Definition:

- Two or more cases clustered in time and space with a common or suspected common source.
- Refer to Managing Special Situations - Public Drinking Water Supply for the definition of an outbreak associated to a public water supply.

INVESTIGATOR RESPONSIBILITIES

A. Investigation Related Tasks and Activities:

1) Confirm diagnosis with appropriate medical provider.
- Before contacting the patient, discuss what they have been told about his/her evaluation for disease.
- Obtain information that supports clinical findings in the case definition and information on the onset date of the symptoms.
- Obtain information on any laboratory tests performed and results.
- For hospitalization, obtain medical records, including admission notes, progress notes, lab report(s), and discharge summary.

2) Conduct case investigation to identify potential source of infection.

3) Conduct contact investigation to locate additional cases and/or contacts.
- Determine if case is involved in a high-risk occupation or if another special situation is involved (i.e. diapered child, daycare attendee, food handler).
- Assure proper examinations are completed for contacts (i.e., stool samples) if they exhibit symptoms

4) Identify sources of significant public health concern (i.e., recreational or public water supply, daycare facilities) and prevent further transmission.

5) Initiate control and prevention measures to prevent spread of disease.
- Follow-up on placement restrictions placed on daycare attendees and food handlers to assure compliance.
- Follow-up on treatment of water sources, if needed.

6) Report all confirmed and probable cases to the KDHE Office of Surveillance and Epidemiology, using established methods.

B. Notifications:

1) There are no special notifications or additional reporting requirements.

2) As appropriate, use the notification letter(s) and the disease fact sheet to notify the case, contacts and other individuals or groups.

EPIDEMIOLOGY

Giardiasis has a worldwide distribution. Children are infected more frequently than adults. Prevalence is higher in areas of poor sanitation and in institutions where children who are not toilet trained, especially daycare centers. In the United States, surveys have demonstrated prevalence rates of *G. lamblia* range from 1-30%, depending on location and age. Cases occur most frequently from July - October.

DISEASE OVERVIEW

A. Agent:

G. lamblia is a protozoan parasite that has 2 forms: trophozoites and cysts. The trophozoite is the active form of the parasite which causes symptoms. Cysts are the infectious form which sometimes develops in the lower intestine and is excreted but does not cause symptoms. Infected persons may shed both trophozoites and cysts in stool.

B. Clinical Description:
Clinical symptoms include: watery foul-smelling diarrhea, abdominal cramps and excess gas. The diarrhea may be chronic or intermittent and is often accompanied by fatigue and "fatty stools." Anorexia combined with malabsorption can lead to significant weight loss, failure to thrive and anemia. Asymptomatic cases may also occur.

C. Reservoirs:
Humans and other mammals including dogs, cats, rodents, beaver, and muskrats.

D. Mode(s) of Transmission:
Fecal-oral, including: person-to-person, animal-to-person, waterborne and foodborne. Contaminated water can be in streams, lake waters and swimming pools. Drinks and ice made from contaminated water may transmit infection.

E. Incubation Period:
Range 1-4 weeks; average 7-10 days.

F. Period of Communicability:
Persons are infectious as long as cysts are being shed, which may be days to years. Asymptomatic carrier rates are high.

G. Susceptibility and Resistance:
The nature of immunity is uncertain. Some people with regular exposure may develop some degree of resistance to illness.

H. Treatment:
Metronidazole, tinidazole, or nitazoxanide are the drugs of choice. A 3-day course of nitazoxanide oral suspension is as effective as metronidazole and has the advantage of treating multiple other intestinal parasites. Furazolidone and quinacrine are alternatives. Albendazole and mebendazole have been shown to be as effective as metronidazole for treating giardiasis in children and have fewer adverse effects. Paromomycin is not absorbed so it is useful for treatment of pregnant women. Treatment failure is not uncommon (approx. 10% of the time). A repeat course of the same or a different medication may be indicated.

STANDARD CASE INVESTIGATION AND CONTROL METHODS

Standard investigation activities include the following:
1) Confirmation of diagnosis using case definition.
2) Collection of demographic data (birth date, county, sex, race/ethnicity)
3) Collection of clinical data.
4) Determination of risk factors and transmission settings (i.e. travel outside of country, using unsafe water sources, further documented spread)
5) Investigation of epi-links among cases (cluster, household, co-workers, etc).

Standard investigation **includes** completion of the General Investigation Form and Enteric Supplemental Form. Further investigative activity should include:

A. Case Investigation - Identify Potential Source of Infection:

To help identify the source of the infection, the investigator should focus their investigation within the incubation period and on the following potential source(s) of infection.

- Travel history including location and time(s).
- Association with a childcare center or institution.
- Exposure to others with diarrhea in or outside of household.
- Consumption of untreated water from streams and/or lakes.
- Problems with well-water and/or septic tanks.
- Sexual orientation.
- History of colonic irrigation. When and where.
- Occupation of case and household members.

B. Contact Investigation – Identify Exposed Individuals / Populations:

- Household, intimate contacts and anyone sharing the same classroom in a daycare are considered contacts.

C. Isolation, Work and Daycare Restrictions

- Giardiasis is not a disease considered for quarantine or isolation under Kansas Administrative Code, but the following guidelines are suggested:
  - Children with diarrhea should not attend daycare until symptoms have resolved for 24 hours.
  - Food handlers are restricted from handling food, or are excluded from work when they serve high risk groups, until diarrhea has resolved for 24 hours.
  - Healthcare workers involved in direct patient care (feeding patients, handling or dispensing medications, ect.) are considered food handlers and are subject to food handling restrictions.
  - Cases should not swim or engage in other form of recreational water use until 2 weeks after symptoms resolve.

D. Case Management, Including Follow-up of cases:

- Generally not indicated unless the case works in a daycare and/or food service position (including direct patient care); in which case, follow-up is recommended to ensure compliance with control recommendations.

E. Contact Management, Including Protection of Contacts:

- Household members or persons who share a common-source exposure (including daycares) should be tested only if symptomatic. If positive, treat as a case. If negative or asymptomatic, no restrictions or treatment needed.
- Treatment of asymptomatic carriers is not effective for outbreak control of Giardiasis.

F. Environmental Measures:

- More than one case associated with a childcare facility requires an inspection of the facility. See Managing Special Situations for Childcare Settings.

- More than one case associated with an aquatic facility requires an inspection of the facility. Hyper-chlorination of water may be needed. See Managing Special Situations for Swimming Pools and Aquatic Facilities.
- For cases associated with a public water supply, see Managing Special Situation for Public Water Supplies.
- When using water for drinking, washing or cooking that may be unsafe; consider the following treatments:
  - Purify by boiling for 1 minute (at sea level) or distilled; or
  - Chemical disinfected with iodine using either tincture of iodine or tetraglycine hydroperiodide tablets.
  - Filter with filters that are labeled as able to remove Giardia or Crypto; reverse osmosis; absolute pore size of 1 micron or smaller; and/or tested and certified by NSF Standard 53 for cyst removal or cyst reduction.

G. Education:

- Provide basic instruction in fecal-oral modes of transmission, environmental disinfection, and personal hygiene with proper hand washing techniques.
- As relevant, discuss the risks of drinking untreated surface water while camping or hiking. Travelers, campers, and hikers should be advised of methods to make water safe for drinking, including boiling, chemical disinfection, and filtration.
- Persons should be educated about the risks of both giardiasis and cryptosporidiosis.

MANAGING SPECIAL SITUATIONS

A. Evaluating a Significant Increase in Giardia Cases for Community

- Determine the total number of giardia cases reported for the month.
- Create a 5 year history report, based on following variables:
  - For a 5-year period ending the previous year.
  - By month; from the current month; through the current month.
  - Case status = Confirmed, probable, and/or suspect
  - Disease = Giardiasis (Giardia lamblia)
  - For chosen geographic area (i.e., county or region)
- Determine the median number of cases for the previous five years.
- If the current number of cases is greater than 2x the median number of the previous 5 years (disease action threshold), investigate as a possible outbreak.

B. Outbreak (and Significant Increase in Disease) Investigation:

- Initial notifications:
  - Notify KDHE immediately, 1-877-427-7317.
  - Notify internal and local partners – including representatives from different disciplines (i.e. environmental health specialists, laboratories)
  - Notify and mobilize all community partners that may be impacted; instruct them to intensify control measures.

    - Aquatics operators/managers
    - Child care programs and schools
    - Nursing homes / extended care facilities
    - Restaurants and hotel/motels
    - Providers of public water supplies (PWSs)
    - Other important community partners that might be impacted
- Consult KDHE Foodborne Illness and Outbreak Investigation Manual for outbreaks involving food.
- Consult KDHE Control of Enteric Outbreaks in Child-Care Facilities for outbreaks involving child-care.
- Identify a team leader for local case investigators. The team leader is responsible for tracking of new cases in the jurisdiction; noting what needs to be done; and providing updates to local, regional and state partners.
- Communicate with other health departments and agencies:
  - Use periodic, regularly scheduled conference calls with key contacts to keep informed, plan next steps and share information.
  - Decide how to maintain and share information outside of the calls. (i.e., e-mail, fax, website). Make sure communication method is effective.
  - After reviewing resources and contingency plans, request assistance as needed from regional or state health department.
- Organize and maintain all data related to outbreak
  - Keep logs of phone calls regarding the outbreak.
  - Document the number of hours spent on outbreak for future reference.
  - Create and maintain a line listing of cases
    - KS-EDSS ID;
    - Name and DOB (or age);
    - Symptoms;
    - Onset date;
    - Source of exposure (i.e., setting; animal contact; recreational water; drinking water source; travel; restaurant);
    - Specimen collection date;
    - Lab results;
    - Case status (i.e., confirmed, probable, suspect)
- Evaluate findings and all relevant information to identify population(s) at risk of infection based on scope and intensity of the outbreak;
  - Use the information collected to define:
    - Person: who is getting ill (i.e., age, gender, immunocompromised, occupations); associations to drinking tap water, day cares, recreational water or animal exposure 2 weeks before onset
    - Place: where are the cases; to what settings are they associated; use plot maps
    - Time: when did it start and is it still going on; use epi curves
  - Establish an official case definition to assist with counting cases and

monitoring the outbreak

- Active case-finding and surveillance should be activated at the beginning of the outbreak to identify as many confirmed cases as possible to help identify the source of the outbreak.
  - Contact medical providers about need to consider O&P testing and reporting of all suspected cases with diarrheal symptoms
  - Survey hospitals, emergency departments, and physician's offices for suspect cases of watery diarrheal illness.
  - Examine records of patients with diarrhea at nursing homes.
  - Examine reports of school absenteeism for diarrheal illness.
  - Inquire about diarrheal illness in day-care facilities
  - If possible, establish a hotline for outbreak-related calls. (i.e., self reported cases)
- If no association is identified: consider the need for additional laboratory testing to rule out false-positive tests, as well as additional surveys and more intensive epidemiological studies to evaluate the situation.
- Engage media to help disseminate public health messages.
  - Establish contact points with media sources.
  - If needed, form a working group to establish a good relationship with media.
  - Use fact sheets and prepared press releases to reinforce educational efforts on health swimming and hand washing basics.
  - Send out frequent updates to keep media correctly informed.
- After increase in cases or outbreak is under control:
  - Active surveillance should continue for two incubation periods (i.e., 4-6 weeks) after the number of cases has fallen below the disease action threshold; any increases in disease should be examined to determine if new groups are being affected, if modifications are needed to control measures (i.e. more restrictive control measures) or if health messages need to be revised/redistributed.
  - Assist state in collecting data needed to complete the required reports of waterborne, foodborne or person-to-person disease to the CDC.
  - Contact all impacted community partners:
    - Notify that the significant increase in cases or outbreak has been controlled.
    - Debrief to identify barriers to control measures and brainstorm how to address.
    - Discuss how well communication worked between partners and
    - Examine the effectiveness of the distributed health messages to the public.
  - As needed, modify control strategies and revise/distribute health communication messages based on debriefings and the overall evaluation of response.
  - Share lessons learned with local, state, and national partners.

C. Public Drinking Water Supply:

- The National Primary Drinking Water Regulations (NPDWR) (141.2) define a waterborne disease outbreak as the significant occurrence of acute infectious illness, epidemiologically associated with the ingestion of water from a public water system which is deficient in treatment, as determined by the appropriate local or state agency.
- Upon learning of a waterborne disease outbreak, public water suppliers (PWSs) are required to issue a Tier 1 public notice as soon as practical or within 24 hours via radio, hand delivery, posting or other method specified by the state to reach all persons served by the PWS (not just billing customers). PWSs must initiate consultation with KDHE within 24 hours for all Tier 1 situations. PWSs may consult either with 1) KDHE District Office Staff; or 2) KDHE Bureau of Water, Public Water Supply Section staff in Topeka.
- When the source of the outbreak has not been identified but the association to the ingestions of water from a PWS has not been ruled out; the following steps are recommended:
  - Response should be determined by a task force that includes representatives from health departments, water regulation, water utilities and public information officers, who are supported, as needed, by advisory groups.
  - Information needed to evaluate risk; examined in cooperation with local water treatment plant and KDHE Public Water Supply Section:
    - Identify source(s) and types of water (i.e., spring, surface, well)
    - Determine type(s) of treatment.
    - Determine number of PWSs and coverage areas; compare to epidemiologic plot maps.
    - Review water quality data. Graph peak turbidity levels each day before and during the suspected outbreak period; compare to epidemiologic curves.
    - Any recent changes in treatment protocol, temporary malfunctions or treatment failures before cases began to be reported?
    - Any chronic filtration problems? (i.e., frequent turbidity spikes in the 0.3 – 1.0 NTU range.)
    - Any recent repairs to the plant or distribution system, vandalism or unauthorized access; examine case distribution with affected sites.
    - Determine whether system pressure recently fell to less than 5 psi.
    - Determine whether there have been any recent changes in the water shed (i.e., flood, drought, land use, sewage overflow) that may have increased chances for fecal contamination.
  - Response should be based upon risk:
    - Health risk no longer suspected: event determined not to be associated to drinking water source; no further action
    - Health risk indeterminate at current time: heighten water monitoring and surveillance activities for an agreed upon period and re-evaluate

situation as needed; notifications to immunocompromised persons may be considered.

- Health risk suspected (but epidemiological association is not strong and PWS is not deficient in treatment): considering releasing notifications based on local assessments of risk; modify notifications as needed based special populations at risk
- Health risk strongly suspected: issue Tier I notification and boil water advisories.

- Templates for notifications can be found in the following resources:
  - KDHE Public Water Supply Survival Guide for the Public Notification Rule. http://www.kdheks.gov/pws/download/public_notification_survival_guide.pdf
- After boil water advisories are rescinded; notices need to go out by proper media outlets to inform public water users how to restart and flush water-using fixtures. This includes private water lines, commercial ice makers, medical and dental equipment, and items in commercial establishments.

D. Child Care Settings:

Coordinate activities with school nurse and/or administration.

For a single case association in a child-care setting:

- Reinforce the practice of frequent and good hand washing techniques for all children and adults.
- Reinforce good diapering practices including keeping diaper changing areas separate from children's play areas and keeping diapering and food-handling areas and responsibilities separated.
- Educate staff and parents:
  - Inform all staff about the symptoms of giardia, how it is spread, and control measures to be followed.
  - Inform parents about the symptoms of giardia, how it is spread, outbreak control policies, and needed changes in hygiene and cleanliness.
  - Notify parents of children who have been in direct contact with a child or adult caregiver with diarrhea; informing them to contact the child's healthcare provider if their child develops diarrhea.
- Exclude any child with uncontrolled diarrhea, from the setting until the diarrhea has stopped for 24 hours. This includes children that have not been diagnosed with giardia.
  - Uncontrolled diarrhea: increased number of stools, increased stool water, and/or decreased form that is not contained by the diaper
- Children with or who had giardia that have no diarrhea (i.e., asymptomatic) may remain in the facility if extra precautions are taken for 2 weeks following the resolution of their diarrhea.
  - Observe all hand washing and assist when needed.
  - Ensure the child's hands are washed at appropriate times.
  - Adults should ensure that they wash their hands after helping a child use the toilet or after diapering a child and before handling food.
  - If the child requires diaper changes,
    - Use disposable gloves and disposable paper over the diaper

changing surfaces. Change gloves and papers after each use.
    - Ensure children wear clothing over their diapers to reduce opportunity for leakage.
    - If possible, those who change diapers should not prepare/serve food.
  - Handle soiled clothing appropriately. Do not rinse out, store in a labeled plastic container or bag before returning home with parents.
  - Disinfect surfaces and objects used by the child, including but not limited to bathrooms, diaper-changing areas, food-prep area, tabletops, high chairs and toys with an appropriate cleaner.
  - Depending on the facilities capabilities, recently returning children can be grouped together in one classroom to minimize exposure to uninfected children and should not participate in water-play activities for 2 week period following diarrhea resolution.
  - Move adults with diarrhea to jobs that minimize opportunities for spreading disease. (i.e., food or medicine handling; water-play)
- Establish, implement and enforce polices on water-play that:
  - Exclude children with diarrhea from water-play or swimming activities.
  - Discourage children from getting the water in mouths.
  - For swimming activities, have children shower with soap before entering the water or have staff wash younger children, particularly the rear end.
  - Take children on frequent bathroom breaks or check diapers often
  - Change diapers in a diaper changing area not by the water.
  - Do not use the fill and drain swimming pools.
- Active case-finding;
  - If the center includes diapered children, interview the operator and inspect attendance records to identify suspect cases among children or staff during the past month.
  - Request stool specimens for testing of <u>symptomatic</u> children, staff and/or household / close contacts of <u>symptomatic</u> individuals.
  - The day care operator should be instructed to call the health department immediately if new cases of diarrhea occur.
  - The facility should be called or visited once each week for 6 weeks after onset of the last case to verify that surveillance and appropriate preventive measures are being carried out.
  - Newly symptomatic children should be managed as outlined above.

<u>For more then one case association to a child-care setting</u>:

- Notify and mobilize operator
  - Along with recommendations “For a single case association…”, there will be a need to intensify control measures.
- A thorough inspection of the facility is needed. Examine situations that may encourage transmission and are not in line with recommendations.

<u>Intensified control measures in a child-care setting:</u>

- When enforcing good diapering practices, recommend the following:
  - Use of disposable gloves and paper over the diaper changing surfaces. Change gloves and papers after each diaper change.

  - Clothing should be worn over diapers to reduce the chance of leaks.
  - If possible, those who change diapers should not prepare or serve food.
- When educating the staff and parents, inform them about the outbreak.
- Encourage and educate on the need to exclude symptomatic children from child-care settings and that extra precautions are needed with asymptomatic children with giardia.
- Terminate all water play or swimming activities.
- Disinfect surfaces and objects with proper cleaners following label directions. Disinfection should occur to the following:
  - Bathrooms, diaper areas, food prep surfaces daily; including faucets and toilet handles.
  - Toys, tabletops, and high chairs more frequently (at least twice daily).
- Dishwasher-safe toys may be washed in a dishwasher with a dry cycle or a final rinse that exceeds 113°F for 20 minutes or 122°F for 5 minutes of 162°F for 1 minute.
- Cloth toys may be washed and heat-dried on the highest clothes dryer heat setting for 30 minutes.
- Put away toys that cannot be disinfected until the outbreak is over. Dispose of old play dough; use a new, individual container for each child.
- Cohorting or segregation of infected individuals together in separate rooms/site based on positive stool culture results will be implemented if cases continue to occur even after initial control measures are put into place or at the discretion of local health department.
  - Treated, asymptomatic, stool positive children can be released from cohorting 72 hours after the beginning of appropriate therapy.
  - Untreated, asymptomatic, stool positive children can be released from cohorting after the submission of three consecutive negative stool samples taken from the infected person and collected at least 24 hours apart and 24 hours after cessation of symptoms.
- Closing day-care centers temporarily or to the new admissions or readmissions is not recommended.
  - Permanent closure of revocation of license is necessary if determined by the Child-Care Licensing Program.
- Continue active case-finding. Instructing all day care operator(s) to inform health department of new cases and calling or visiting those facilities with associated cases weekly for 6 weeks after onset of the last case.
- Refer to the KDHE Control of Enteric Disease Outbreaks in Childcare Facilities for additional information.

E. Swimming Pools and Aquatic Facilities:

The following are standard activities that are recommended before an increase of waterborne disease is seen in your community; LHD's may perform these during National Recreational Water Illness (RWI) Week, the week before Memorial Day:

- Update e-mail, fax and/or phone list for aquatics operators/managers.
- Ensure that diarrhea-exclusion policies are implemented and enforced at

facilities, including:
  - Alerting swim coaches to suspend swimmers with diarrhea.
  - Reassignment of staff with diarrhea to duties that do not require them to enter the water.
- Ensure that a fecal incident response plan is in place at the facility and that all staff is well trained on the appropriate response.
- Proper filtration and chlorination of water will prevent giardia from spreading in aquatic settings.

For more then one case association to an aquatic setting:
- Notify and mobilize operator:
  - Review the standard activities (listed above) with operator.
  - Inform of the need to intensify control measures.
- A thorough inspection of the facility is needed, examining situations that encourage transmission and practices that are not in line with recommendations.
  - The CDC's "Environmental Health Outbreak Investigation Survey: Swimming Pool Venue" should be used to inspect the aquatic facility.
  - Ensure that operators maintain and monitor pH and free residual chlorine levels to prevent transmission of most waterborne pathogens.
  - Consult with the Office of Epidemiology on the need to collect water samples. Instructions on collection will be provided, as needed.
- If a period of possible contamination is identified, examine facility records during that period for events (i.e., swim meets) and other group activities, especially those involving high-risk groups (i.e., child care groups)
- Contact groups, as needed, to make them aware of signs of illness, to stop further transmission of disease and to identify new cases.

Intensified Giardia Control Measures for Aquatic Facilities include:
- Reinforce efforts to educate patrons about crypto, how it is spread in the water, and how they can protect themselves and others
- Reinforce diarrhea-exclusion policies for patrons and staff
  - Post diarrhea-exclusion messages that can be seen and understood.
  - Alert swim coaches to suspend swimmers who are ill with diarrhea.
  - Reassign staff ill with diarrhea to duties not requiring entry into water.
- Hyper-chlorinate the water (when not being used) to levels that will inactivate giardia (contact time of 45). See chart below for free chlorine levels needed in parts per million (ppm) based on the amount of time the chlorine levels are maintained (disinfection time).

Chlorine Levels (ppm)	Disinfection Time
1.0	45 minutes
2.0	25 minutes
3.0	19 minutes

  - If hyper-chlorination has not occurred since the cases were at the facility, instruct operator to perform hyper-chlorination immediately.
  - Recommend hyper-chlorinating weekly as a preventive measure.
  - Clean or dispose of materials used in water that may retain water (i.e.

porous mats or toys).

- Discuss with operator(s) other possible steps to prevent transmission such as suspending group events, closing “kiddie pools” and/or limiting access to diapered/toddler-aged children.
- Release information by an appropriate media outlet that those at risk for serious illness should consider not swimming during an outbreak.

F. Animals in Public Settings:

- Consult with the Office of Surveillance and Epidemiology.
- Refer to “Animals in Public Places Compendium.”

DATA MANAGEMENT AND REPORTING TO THE KDHE

A. Organize, collect and report data with the “General Investigation Form(s)” and ”Enteric Supplemental Form”.

B. Report data electronically via KS-EDSS or by fax, include:

- At a minimum, data collected during the investigation that helps to confirm or classify a case.
- All information collected on the General Investigation and supplemental form(s).

ADDITIONAL INFORMATION / REFERENCES

A. **Treatment / Differential Diagnosis:** American Academy of Pediatrics. 2006 Red Book: Report of the Committee on Infectious Disease, 27th Edition. Illinois, Academy of Pediatrics, 2006.

B. **Epidemiology, Investigation and Control:** Heymann. D., ed., Control of Communicable Diseases Manual, 18th Edition. Washington, DC, American Public Health Association, 2004.

C. **Case Definitions:** CDC Division of Public Health Surveillance and Informatics, Available at: http://www.cdc.gov/ncphi/disss/nndss/casedef/case_definitions.htm

D. **Kansas Regulations/Statutes Related to Infectious Disease:** http://www.kdheks.gov/epi/regulations.htm

E. **Kansas Primary Drinking Water Regulations:** http://www.kdheks.gov/pws/regs/drinking_water_regs.pdf

F. **KDHE Public Water Supply Survival Guide for the Public Notification Rule**. http://www.kdheks.gov/pws/download/public_notification_survival_guide.pdf

G. **KDHE Foodborne Illness and Outbreak Investigation Manual**: Available at: http://www.kdheks.gov/epi/download/kansas_foodborne_illness_manual.pdf

H. **KDHE Control of Enteric Disease Outbreaks in Childcare Facilities:** http://www.kdheks.gov/epi/download/Enteric_Disease_in_Day_care_centersver4.pdf

I. **Animals in Public Places Compendium:** http://www.kdheks.gov/epi/human_animal_health.htm

J. **Recreational Water Illness Outbreak Response Toolkit (CDC):** http://www.cdc.gov/healthyswimming/rwi_outbreak.htm

K. **Fecal Incident Response Recommendations for Pool Staff (Revised August 2008):** http://www.cdc.gov/healthyswimming/pdf/Fecal_Incident_Response_Recommendations_for_Pool_Staff.pdf

L. **Environmental Health Outbreak Investigation Survey: Swimming Pool Venue:** http://www.cdc.gov/healthyswimming/pdf/Environmental_Health_Investigation_form_07_2006.pdf

M. **Additional Information (CDC):** http://www.cdc.gov/health/default.htm

Kansas Disease Investigation Guidelines

General Investigation Form

Investigation Information

Case Type: ☐Human Case ☐Non-human Case ***Disease Name:*** _____

Classification: ☐Suspect ☐Probable ☐Confirmed ***KS-EDSS Investigation ID:*** _____

Outbreak: ☐Yes ☐No ***Outbreak Name:*** _____ ***Outbreak #:*** _____

Onset Date: _____ ***Diagnosis Date:*** _____ ***Report Date:*** _____

Assigned to (Investigator): _____ ***Patient Died:*** ☐Yes ☐No ☐Unknown

Patient Information

Name Type: ☐Default/Common ☐Legal ☐Maiden ☐Nickname

Last: _____ ***First:*** _____ ***Middle:*** _____

Street: _____ ***City/State:*** _____ ***Zip:*** _____

Evening Phone #: _____ ***Daytime Phone #:*** _____

Sex: ☐Failure to Report ☐Female ☐Male ☐Other ☐Transexual ☐Unknown

Race: ☐American Indian or Alaska Native ☐Asian ☐Black or African American ☐Native Hawaiian or Other Pacific Islander ☐White ☐Unknown

Hispanic / Latino Ethnicity: ☐Yes ☐No

Date of Birth: _____ ***Age:*** _____ ***Age Unit:*** ☐Days ☐Weeks ☐Months ☐Years

Parent Information (if under 18)

Last: _____ ***First:*** _____ ***Middle:*** _____

Street: _____ ***City/State:*** _____ ***Zip:*** _____

Evening Phone #: _____ ***Daytime Phone #:*** _____

Work / Occupation or School / Grade

Worksites / School: _____

Occupations / Grade: _____

Travel History

1st ***Destination:*** _____ ***Depart Date:*** _____ ***Return Date:*** _____

2nd ***Destination:*** _____ ***Depart Date:*** _____ ***Return Date:*** _____

3rd ***Destination:*** _____ ***Depart Date:*** _____ ***Return Date:*** _____

4th ***Destination:*** _____ ***Depart Date:*** _____ ***Return Date:*** _____

Reporting Source

Title: _____ *Last Name:* _____ *First Name:* _____

Facility: _____ *County:* _____

Street: _____ *City/State:* _____ *Zip:* _____

Phone #: _____ *E-mail:* _____

Primary or Attending Physician

Title: _____ *Last Name:* _____ *First Name:* _____

Facility: _____ *County:* _____

Street: _____ *City/State:* _____ *Zip:* _____

Phone #: _____ *E-mail:* _____

Hospital Information

Hospitalized: ☐Yes ☐No *Patient Status Date:* _____

Hospital Name: _____ *Hospital City:* _____

Date Hospitalized: _____ *Number of Days Hospitalized:* _____

Notes

Supplemental Laboratory Report Form

Lab Reports

Laboratory Name: _____ ***Lab Report Date:*** _____

Ordering Provider Name: _____ ***Phone:*** _____ ***Facility:*** _____

Specimen Accession Number: _____ ***Specimen Collection Date:*** _____

Organism Name: _____ ***Organism Species:*** _____

Organism Serogroup: _____ ***Organism Serotype:*** _____

PFGE Results

Pattern 1 ***KS:*** _____ ***Other State:*** _____ ***CDC:*** _____

Pattern 2 ***KS:*** _____ ***Other State:*** _____ ***CDC:*** _____

Pattern 3 ***KS:*** _____ ***Other State:*** _____ ***CDC:*** _____

Additional Results Information

Reported Test Name:	*Coded Result:*	*Text Result:*	*Numeric Result:*	*Comments:*

Supplemental Contact Form

Contacts

Last: _____ ***First:*** _____ ***Middle:*** _____

Street: _____ ***City/State:*** _____ ***Zip:*** _____

Evening Phone #: _____ ***Daytime Phone #:*** _____ ***E-mail:*** _____

Sex: ☐Failure to Report ☐Female ☐Male ☐Other ☐Transexual ☐Unknown

Race: ☐American Indian or Alaska Native ☐Asian ☐Black or African American ☐Native Hawaiian or Other Pacific Islander ☐White ☐Unknown

Hispanic / Latino Ethnicity: ☐Yes ☐No

Date of Birth: _____ ***Age:*** _____ ***Age Unit:*** ☐Days ☐Weeks ☐Months ☐Years

Worksites / School: _____

Occupations / Grade: _____

Exposure Information

Contact Type: ☐Household ☐Sexual ☐Other: _____ ***Partner / Cluster Code:*** _____

Date of First Exposure: _____ ***Date of Last Exposure:*** _____ ***Frequency:*** _____

Nature of Exposure: _____ ***Comments:*** _____

Testing and Treatment Information

Clinic Code: _____ ***Examination Date:*** _____

Examination Test: _____ ***Examination Result:*** _____

Prophylaxis/empiric treatment date: _____ ***Drug / Dosage:*** _____

Provider (Name / Facility): _____

Disposition and Diagnosis Information

Initiation Date: _____ ***Disposition Date:*** _____ ***Disposition:*** _____

Diagnosis: _____ ***Referral Type:*** ☐Patient ☐Provider ***Post-test Counseled :*** ☐Yes ☐No

Currently Assigned To: _____ ***Follow-up Date:*** _____

Risk Factors

Pregnant: ☐Yes ☐No ***If Yes, # of Weeks:*** _____

Risk factors for complications in contact: ☐None ☐Pregnant Woman ☐HIV Seropositive ☐Unimmunized ☐Index case is a super-spreader

☐Child younger than 5 ☐Age > 65 ☐Otherwise immunosuppressed (s/p transplant, high dose steroids, etc)

Enteric Disease Supplemental Form

Kansas Department of Health and Environment

Epidemiologic Case History

Condition

- ○ *Calicivirus/Norwalk-like virus (norovirus)*
- ○ *Campylobacter Infection (Campylobacter spp.)*
- ○ *Cryptosporidiosis (Cryptosporidium parvum)*
- ○ *Enterohemorrhagic Escherichia coli (EHEC)*
- ○ *Enterohemorrhagic Escherichia coli O157:H7*
- ○ *Enterohemorrhagic Escherichia coli shiga toxin positive (not serogrouped)*
- ○ *Enterohemorrhagic Escherichia coli shiga toxin positive (serogroup non-0157)*
- ○ *Giardiasis (Giardia lamblia)*
- ○ *Salmonellosis (Salmonella spp.)*
- ○ *Shigellosis (Shigella spp.)*
- ○ *Cyclosporiasis (Cyclospora cayetanensis)*
- ○ *Hepatitis A*
- ○ *Listeriosis (Listeria monocytogenes)*

* indicates required fields

Case Type*

○ *Human Case* ○ *Non Human Case*

Classification*

○ *Confirmed* ○ *Not a Case* ○ *Probable* ○ *Suspect* ○ *Deleted* ○ *Unknown*

Supplemental Form Status

○ *Not Done* ○ *Form Complete* ○ *Form in Progress* ○ *Form Approved* ○ *Form Sent to CDC*

Report Date*

mm/dd/yyyy

Date Investigation Started

mm/dd/yyyy

Patient Demographic Information

* indicates required fields

Last Name*	First Name*	Middle Name	Name Type*	Age

Age Unit

○ *Days* ○ *Weeks* ○ *Unknown* ○ *Months* ○ *Years*

Date of Birth
mm/dd/yyyy

Race*
(Check all that apply)

☐ *American Indian or Alaska Native* ☐ *Asian* ☐ *Black or African American*
☐ *Native Hawaiian or Other Pacific Islander* ☐ *White* ☐ *Unknown*

Ethnicity*

○ *Hispanic or Latino* ○ *Not Hispanic or Latino* ○ *Unknown*

Sex*

○ *Failure to Report* ○ *Female* ○ *Male* ○ *Other* ○ *Transexual* ○ *Unknown*

Street Address

City	County	State	Zip

Evening Phone
###-###-####

Daytime Phone
###-###-####

Occupation

High Risk Potential:
(Check all that apply)

☐ *Contact to a confirmed case*_____ ☐ *Contact to a suspected case*_____
☐ *Daycare attendee*_____ ☐ *Food handler*_____
☐ *Direct patient care worker*_____ ☐ *Institutional resident or staff*_____
☐ *Daycare worker*_____ ☐ *Animal handler*_____
☐ *Other*_____

If enrolled in day care, please complete the information below.

Name of Facility

Evening Phone
###-###-####

Street Address

City

County	State	Zip

Person Providing Report

Name of Reporting Facility*

Clinical and Laboratory Data

Individual diagnosed with

○ *Hemolytic Uremic Syndrome (HUS)* ○ *Thrombotic Thrombocytopenic Purpura (TTP)*

Was a stool specimen collected?

○ *Yes* ○ *No*

Diarrhea?	Number of Stools	Blood in Stool?	Vomiting?
○ *Yes* ○ *No* ○ *Unknown*	○ *0 - 2* ○ *3 - 10* ○ *11 and above*	○ *Yes* ○ *No* ○ *Unknown*	○ *Yes* ○ *No* ○ *Unknown*

Nausea?	Abdominal Cramps?	Muscle Ache?	Other Symptoms?
○ *Yes* ○ *No* ○ *Unknown*	○ *Yes* ○ *No* ○ *Unknown*	○ *Yes* ○ *No* ○ *Unknown*	○ *other*_____

What was the first Symptom	Date of Onset	Time of Onset
	mm/dd/yyyy	

Clinical and Laboratory Data cont.

Fever?
○ *Yes* ○ *No* ○ *Unknown*

If Yes, specify highest temperature:

Physician Information

Was a physician consulted for this illness?
○ *Yes (please complete the information below)* ○ *No*

Name of physician:

Evening Phone
###-###-####

Street Address

City

County

State

Zip

Antibiotic Information

Was case treated with antibiotics anytime in the 14 days prior to illness?
○ *Yes* ○ *No* ○ *Unknown*

Type of treatment/antibiotic

Reason for taking

Date started
mm/dd/yyyy

Date completed
mm/dd/yyyy

Was case treated with antibiotics for this illness?
○ *Yes* ○ *No* ○ *Unknown*

Type of treatment:

Date Started:
mm/dd/yyyy

Date completed:
mm/dd/yyyy

Was organism resistant to antibiotics?
○ *Yes* ○ *No* ○ *Unknown*

If yes, specify resistance pattern:

Is the patient on any medication or receiving any treatment which may suppress their immune system (i.e. Corticosteroids or Cancer Chemotherapy)?
○ *Yes* ○ *No* ○ *Unknown*

If yes please specify medication or treatment:

Did patient recover?
○ *Yes* ○ *No* ○ *Unknown*

Recover Date
mm/dd/yyyy

Recover Time

Exposure/Transmission

Did anyone else (in your family ..) recently have similar symptoms?
○ *Yes (please complete below)* ○ *No* ○ *Unknown*

Name	Age	Sex	Relationship to Case	Occupation	Symptoms	Date of Onset
						mm/dd/yyyy

Any restaurant, commercial food establishments, or group gatherings visited within the 7 days prior to onset of illness?
○ *Yes (please complete below)* ○ *No* ○ *Unknown*

Name of Establishment	City, County, State	Foods eaten	Date of Exposure
			mm/dd/yyyy

Travel History

Did the patient Travel prior to the onset of illness?

○ *Yes* ○ *No* ○ *Unknown*

If yes, please complete below:

Where:	**Departure Date:** mm/dd/yyyy	**Return Date:** mm/dd/yyyy
Where:	**Departure Date:** mm/dd/yyyy	**Return Date:** mm/dd/yyyy

Water Exposure

Possible water sources:

(Check all that apply)

☐ *Municipal Water System*_____ ☐ *Bottled Water*_____ ☐ *Private Well*_____

☐ *Rural Water System*_____ ☐ *Other (specify):*_____

Did patient drink water from other than a treated municipal system (i.e., stream, well)?

○ *Yes* ○ *No* ○ *Unknown*

Other Possible Exposure Information

Was there contact with pets or animals within 7 days prior to onset?

○ *Yes* ○ *No* ○ *Unknown*

If yes, please indicate below:

(Check all that apply)

☐ *Caged Birds* ☐ *Cats* ☐ *Cattle* ☐ *Chickens* ☐ *Dogs* ☐ *Ducks*
☐ *Frogs* ☐ *Goats* ☐ *Guinea Pigs* ☐ *Hamsters* ☐ *Horses* ☐ *Lizards*
☐ *Mice* ☐ *Parakeets* ☐ *Pigeons* ☐ *Pigs* ☐ *Poultry* ☐ *Rabbits*
☐ *Rats* ☐ *Sheep* ☐ *Snakes* ☐ *Turkeys* ☐ *Turtles* ☐ *Other*_____

Other Exposure Information

Other Birds? ○ *Yes* ○ *No* ○ *Unknown*	**If yes, please specify**	**Other Reptiles?** ○ *Yes* ○ *No* ○ *Unknown*	**If yes, please specify**
Other Animals? ○ *Yes* ○ *No* ○ *Unknown*		**If yes, please specify**	

Were any of these animals ill near the time of onset

○ *Yes* ○ *No* ○ *Unknown*

If yes, please describe:

Where were the animals located?

(Check all that apply)

☐ *Home* ☐ *Farm* ☐ *School* ☐ *Pet Store* ☐ *Zoo* ☐ *Petting Zoo* ☐ *Other*_____

Other Possible Exposure Information cont.

Within 7 days prior to onset of illness, did the patient participate in:

Activity	Participation	Date	Location
		mm/dd/yyyy	
Outdoor Activities			
Swimming			
Chlorinated Pool			
Wading Pool			
River/Lake/Pond			

Food History

Did case eat any of the following within 7 days prior to the onset of illness?

Food Product	Consumed	City, County, State	Variety or Brand(s)	Supplier	Supplier City
1. Chicken					
2. Hamburger					
3. Sausage					
4. Hot Dogs					
5. Lunch Meat					
6. Eggs					
7. Milk raw					
8. Milk past.					
8. Fresh juice					
10. Fresh berries					
11. Fresh melon					
12. Other fresh fruit					
13. Lettuce					
14. Alfalfa Sprouts					

Other fresh vegetables	Other Food Item 1	Other Food Item 2

At what store(s) do you regularly shop for groceries?

Public Health Fact Sheet
Giardiasis

What is giardiasis?
Giardiasis (GEE-are-DYE-uh-sis) is a diarrheal illness caused by a microscopic parasite, *Giardia intestinalis* (also known as *Giardia lamblia* or *Giardia duodenalis*). Once a person or animal has been infected with Giardia, the parasite lives in the intestine and is passed in feces. Because the parasite is protected by an outer shell, it can survive outside the body and in the environment for long periods of time (i.e., months).

How do you get giardiasis and how is it spread?
The giardia parasite lives in the intestine of infected humans or animals (e.g., cats, dogs, cattle, deer, and beavers). Millions of germs can be released in a bowel movement of an infected human or animal. Giardia is found on surfaces or in soil, food, or water that has been contaminated with the feces from infected humans or animals. You can become infected after accidentally swallowing the parasite that contaminates the food or water or is on the surfaces.

Who is most likely to get giardiasis?
Anyone can get giardiasis. Persons more likely to become infected include:

- Children in child care settings, including diaper-aged children.
- Close contacts (such as those in the same family or in the same household or child care setting) or caregivers of those infected with giardia.
- People who drink water or use ice made from contaminated sources (e.g., lakes, streams, shallow or poorly monitored or maintained wells). Contaminated water may include water that has not been boiled, filtered, or disinfected with chemicals.
- Backpackers, hikers, and campers who drink untreated or insufficiently treated water or who do not practice good hygiene (e.g., proper hand washing).
- People who swallow contaminated water while swimming, especially in lakes, rivers, springs, ponds, and streams. Several community-wide outbreaks of giardiasis have been linked to contaminated recreational or drinking water.
- International travelers.
- People exposed to human feces through sexual contact.

What are the symptoms of giardiasis?
Giardia infection can cause a variety of signs or symptoms, which include: diarrhea, gas or flatulence, greasy stools that tend to float, stomach or abdominal cramps and upset stomach or nausea. These symptoms may lead to weight loss and dehydration. In otherwise healthy individuals, symptoms may appear 7-10 days after exposure and last 2 to 6 weeks. Some people with giardia infection have no symptoms at all.

This fact sheet is for information only and is not intended for self-diagnosis or as a substitute for consultation. If you have any questions about the disease described above or think that you may have an infection, consult with your healthcare provider. This fact sheet is based on the Centers for Disease Control and Prevention's topic fact sheets.

Version 04/2009

How is a giardia infection diagnosed?
Your health care provider will likely ask you to submit stool samples to check for the parasite. Because giardia can be difficult to diagnose, your provider might ask you to submit multiple stool specimens collected over a few days.

What is the treatment for giardiasis?
Several prescription drugs are available to treat giardia infection. Although giardia can infect all people, young children and pregnant women might be more susceptible to dehydration resulting from diarrhea and should, therefore, drink plenty of fluids while ill. Rapid loss of fluids from diarrhea can be especially life threatening to infants. Therefore, parents should talk to their health care providers about fluid replacement therapy options for infants.

How can I prevent spreading giardia to others?
- Wash your hands with soap and water after using the toilet and before handling food.
- Do not swim in recreational water (pools, hot tubs, lakes, rivers, the ocean, etc.) while you have diarrhea and for 2 weeks after your diarrhea stops. You can pass giardia in your feces and contaminate the water after your symptoms have stopped. This has resulted in outbreaks of giardia infection among recreational water users.
- Avoid fecal exposure during sexual activity. This is especially important while experiencing diarrhea caused by giardiasis.
- Use a barrier during oral-anal sex.

If your child is diagnosed with giardiasis, follow these guidelines to help your child avoid spreading giardia infection to others:
- Wash your hands and your child's hands after changing the child's diapers or assisting your child with toileting.
- Do not allow your child to swim while he or she has diarrhea and for 2 weeks after your child's diarrhea stops.
- If your child receives child care with other children, keep your child out of group child care until diarrhea symptoms have resolved for 24 hours.

Are there any restrictions for people with giardiasis?
Yes. Because giardiasis is a disease that can easily spread to other people, health care providers are required by law to report cases to the health department. In order to protect the public, workers at food-related businesses who have diarrhea must not work with food until they don't have diarrhea for 24 hours. If they work in a food-related business that serves those who are at high risk for severe disease, they may not be allowed at work until they don't have diarrhea for 24 hours. Children with diarrhea may not attend daycare until diarrheal symptoms have resolved for 24 hours.

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What practices can prevent a giardia infection?

1. Practice good hygiene. Wash hands thoroughly with soap and water.
   - After using the toilet and before handling or eating food.
   - After changing a diaper or assisting with toileting, especially if you are caring for diaper-aged children, even if you are wearing gloves.
   - After touching something that could be contaminated.
   - After handling animals or their toys, leashes, or feces.
   - Supervise or assist with the hand washing of young children and others you are caring for, as needed.
2. Keep giardia and other germs out of pools, hot tubs, lakes, rivers, the ocean::
   - Do not swim in recreational water while you have diarrhea and for 2 weeks after your diarrhea stops.
   - Take children on frequent bathroom breaks or check their diapers often.
   - Change diapers in the bathroom or a diaper-changing area.
   - Shower with soap and water before entering recreational water.
   - Wash children thoroughly, especially their bottoms, after they use the toilet or their diapers are changed and before they enter the water.
3. Avoid water that might be contaminated.
   - Do not drink or use ice made from untreated water from shallow wells, lakes, rivers, springs, ponds, and streams.
   - Do not swallow recreational water.
   - Do not drink untreated water or use ice made from untreated drinking water in countries where the water supply might be unsafe.
4. If you are unable to avoid using or drinking water that might be contaminated, then you can make the water safer to drink by doing one of the following:
   - Heat the water to a rolling boil for at least 1 minute (at altitudes greater than 6,562 feet [>2,000 meters], boil water for 3 minutes); or
   - Use a filter that has an absolute pore size of 1 micron or smaller, or one that has been NSF rated for "cyst removal."
   - If you cannot heat the water to a rolling boil or use a recommended filter, try chemically treating the water by chlorination or iodination. Using chemicals may be less effective than boiling or filtering because the amount of chemical required is highly dependent on the temperature, pH, and cloudiness of the water.
5. Avoid food that might be contaminated.
   - Use safe, uncontaminated water to wash all food that is to be eaten raw.
   - Wash and/or peel all raw vegetables and fruits before eating.
   - Avoid eating uncooked foods when traveling in countries with minimal water treatment and sanitation systems.
6. Avoid fecal exposure during sexual activity.
   - Use a barrier during oral-anal sex.
   - Wash hands immediately after handling a condom used during anal sex or after touching the anus or rectal area.

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If my water comes from a well, should I have my well water tested?
It depends. You should consider having your well water tested if you can answer "yes" to any of the following questions:

- Are members of your family or others who use your well water becoming ill? If yes, your well may be the source of infection.
- Is your well located at the bottom of a hill or is it considered shallow? If so, runoff from rain or flood water may be draining directly into your well and causing contamination.
- Is your well in a rural area where animals graze? Well water can become contaminated with feces if animal waste seepage contaminates the ground water. This can occur if your well has cracked casings, is poorly constructed, or is too shallow.

Tests used to specifically identify Giardia are expensive, difficult, and usually require hundreds of gallons of water to be pumped through a filter. If you answered "yes" to the above questions, consider testing your well for fecal contamination by testing it for the presence of coliforms or E. coli instead of Giardia. Although tests for fecal coliforms or E. coli do not specifically tell you whether Giardia is present, these tests might show whether your well water has been contaminated by feces.

These tests are only useful if your well is not routinely disinfected with chlorine, since chlorine kills fecal coliforms and E. coli. If the tests are positive, it is possible that the water may also be contaminated with Giardia or other harmful parasites, bacteria and viruses. Contact your local health department or your county cooperative extension service to find out who offers water testing in your area.

If the fecal coliform test comes back positive, indicating that your well may be contaminated with feces, stop drinking the well water and contact your local water authority for instructions on how to disinfect your well.

Where can you get more information?

- Your Local Health Department
- Kansas Department of Health and Environment, Epidemiologic Services Section at (877) 427-7317
- A Guide to Water Filters: http://www.cdc.gov/crypto/factsheets/filters.html
- Well Water Testing: http://www.cdc.gov/healthywater/drinking/wells/testing.html
- http://www.cdc.gov/health/default.htm
- Your doctor, nurse, or local health center

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