Polio
Investigation Guideline

CONTENT:	**VERSION DATE:**
Investigation Protocol:	
• **Investigation Guideline**	**02/2012**
Supporting Materials found in attachments:	
• **Fact Sheets**	**03/2009**
• **Physician Notification, Sample Letter**	**03/2009**

Revision History:

Date	Replaced	Comments
02/2012	03/2009	Revised format. Replaced BSE with BEPHI. Removed references to KS-EDSS. Replaced Supplemental Form with Suspected Case Worksheet. Added notification section. Replaced case definition with CDC 2010 version.

Poliovirus Infection
Disease Management and Investigative Guidelines

CASE DEFINITION – Poliomyelitis, Paralytic (CDC 2010)

Case Classification:

- **Confirmed:** Acute onset of a flaccid paralysis of one or more limbs with decreased or absent tendon reflexes in the affected limbs, without other apparent cause, and without sensory or cognitive loss; AND in which the patient:
  - has a neurologic deficit 60 days after onset of initial symptoms; or
  - has died; or
  - has unknown follow-up status.
- **Probable:** Acute onset of a flaccid paralysis of one or more limbs with decreased or absent tendon reflexes in the affected limbs, without other apparent cause, and without sensory or cognitive loss

Comment: *All suspected cases of paralytic poliomyelitis are reviewed by a panel of expert consultants before final classification occurs. Confirmed cases are then further classified based on epidemiologic and laboratory criteria.*[1]

CASE DEFINITION – Poliovirus Infection, Nonparalytic (CDC 2010) *

Confirmed: Any person without symptoms of paralytic poliomyelitis in whom a poliovirus isolate was identified in an appropriate clinical specimen, with confirmatory typing and sequencing performed by the CDC Poliovirus Laboratory, as needed.

LABORATORY ANALYSIS

Isolation of wild poliovirus constitutes a public health EMERGENCY.

- To determine whether virus is wild type- or vaccine-associated polio may require that isolates or specimens be sent to the KDHEL

Specimens for culture that may yield poliovirus:

- Stool: likelihood is highest, contributes to diagnostic evaluation but does not constitute proof of causal association
- Pharyngeal swabs: intermediate probability of isolation
- Blood or spinal fluid: very low probability of isolation but is diagnostic

Serological testing (Complement Fixation (CF) or Neutralization (N)):

- Helpful in supporting or ruling out the diagnosis of paralytic polio
- May be falsely negative in immunocompromised persons
- Neutralizing antibodies appear early and may be at high levels by the time the patient is hospitalized – so a fourfold titer cannot be demonstrated
- Vaccinated persons would also have measurable titers
- Serology cannot differentiate between wild and vaccine-related polio virus.

[1] Sutter RW, Brink EW, Cochi SL, et al. A new epidemiologic and laboratory classification system for paralytic poliomyelitis cases. Am J Public Health 1989;79:495-8.

Testing at the Kansas Health and Environment Laboratory (KHEL):

- Contact the KDHE-BEPHI (1-877-427-7317) and the KHEL Virology Laboratory (785-296-1644) before sending specimens or isolates to the KHEL.
- Collection kits provided by KHEL: Viral culture kit for swabs; sterile, screw-capped container for stool or CSF; Infectious Disease Mailer for isolates in cell culture.
- Timing and collection:
    - Collect two stool specimens and two throat swabs
    - 24 hours apart as early in the course of disease as possible,
    - As soon as possible but ideally within the first 15 days after onset of paralytic disease.
- Shipping: DO NOT FREEZE. Ship specimens refrigerated as soon as possible after collection. Ship isolates in cell culture at ambient temperature.
- Test method: Viral culture for isolation; neutralization; and/or immunofluorescence.
- For additional information and/or questions concerning isolate collection, sample transport and laboratory kits, call KHEL at (785) 296-1620 or refer to online guidance at www.kdheks.gov/labs/lab_ref_guide.htm

EPIDEMIOLOGY

Since the introduction of the of polio vaccine, most of the world's population is considered polio-free. In the United States, cases of paralytic poliomyelitis are extremely rare. In1980-94, an average of 8 cases of paralytic polio were reported annually; all of which were related to vaccine-associated paralytic poliomyelitis (VAPP). To reduce the risk of VAPP, a new polio vaccination schedule (i.e., inactivated polio vaccine (IPV) for doses 1 and 2, oral polio vaccine (OPV) for doses 3 and 4) was recommended in 1997 and then an all-IPV immunization schedule was initiated in 2000. Risk factors for paralytic poliomyelitis include larger inocula of poliovirus, increasing age, pregnancy, strenuous exercise, tonsillectomy, and intramuscular injections administered while the patient is infected with poliovirus. Today in the U.S., polio can occur when under-immunized travelers and immigrants import the virus from areas of the world where it is still prevalent (i.e., Sub-Saharan Africa and southern Asia).

Worldwide, the number of polio cases has fallen from an estimated 350,000 in 1988 to fewer than 1300 in 2010—a decline of more than 99% in reported cases. Three regions of the world are certified polio free—the Americas, Europe, and the Western Pacific. Only four polio-endemic countries (countries that have never interrupted the transmission of wild poliovirus) remain—Afghanistan, India, Nigeria, and Pakistan.

DISEASE OVERVIEW

A. Agent:
Polio is caused by poliovirus, with antigenic types 1, 2, and 3. Type 1 is most often the agent in paralytic illnesses. Type 2 is most often associated with vaccine-associated cases.

B. Clinical Description:
Poliomyelitis is an acute illness ranging in severity from inapparent infection to paralytic disease. The fatality rate ranges between 2-10%. Symptoms include fever, headache, nausea and vomiting, stiffness in neck and back, with or without paralysis. Paralysis is typically flaccid, asymmetric and most commonly affects the lower extremities. Any recovery from paralysis usually begins within 1 month. Between 25 - 40% of persons who contracted paralytic poliomyelitis in childhood may develop "post-polio syndrome" 30 - 40 years later. This syndrome is characterized by muscle pain, exacerbation of existing weakness, and/or development of new paralysis or weakness. In children, 90% of all infections are asymptomatic.

Vaccine-associated poliomyelitis can occur in a recipient 7 to 21 days after oral polio vaccine administration or in susceptible contacts of the vaccine recipient 20 to 29 days after vaccine administration. Adults have a slightly increased risk of vaccine-associated paralytic poliomyelitis.

C. Reservoirs:
Humans.

D. Mode(s) of Transmission:
Transmission is primarily through the fecal-oral route. However, the virus can be transmitted by indirect contact with infectious saliva or feces, or by contaminated sewage or water.

E. Incubation Period:
Range 3-35 days; usually 7-14 days for paralytic poliomyelitis.

F. Period of Communicability:
Infectivity is greatest 7-10 days before and after onset of symptoms. In symptomatic and asymptomatic cases, poliovirus is found in pharyngeal secretions 36 hours and in the feces 72 hours after exposure. Poliovirus can remain present in the stool from 3 to 6 weeks.

G. Susceptibility and Resistance:
Persons who are immunodeficient are at increased risk for acquiring polio. Lifelong, type specific immunity follows natural infection.

H. Treatment: Supportive only.

I. Vaccines:
- IPV, a killed polio vaccine, is administered via injection and is used as part of the routine all-IPV immunization schedule in the U.S.
- OPV, a live polio vaccine, is used in many parts of the world. When the risk of wild-type polio transmission is greater than the risk of possible VAPP, it is the vaccine of choice for polio outbreak control.

NOTIFICATION TO PUBLIC HEALTH AUTHORITIES

As infectious or contagious in their nature, all confirmed or ***suspected*** polio cases shall be reported within **4 hours by phone**:

1. Health care providers and hospitals: report to the local public health jurisdiction or KDHE-BEPHI (see below)
2. Local public health jurisdiction: report to KDHE-BEPHI (see below)
3. Laboratories: report to KDHE-BEPHI (see below)
4. KDHE-BEPHI will contact the local public health jurisdiction by phone within one hour of receiving a report.

Kansas Department of Health and Environment (KDHE)
Bureau of Epidemiology and Public Health Informatics (BEPHI)
Phone: 1-877-427-7317

Further responsibilities of state and local health departments to the CDC:

As a nationally notifiable condition, polio cases require an IMMEDIATE, EXTREMELY URGENT or IMMEDIATE, URGENT report to the Center of Disease Control and Prevention (CDC), depending on the case's clinical presentation.

1. PARALYTIC Polio requires **IMMEDIATE, EXTREMELY URGENT** reporting.
   - KDHE epidemiologist must call the CDC EOC at 770-488-7100 within 4 hours of a being notified of the confirmed case.
   - KDHE-BEPHI will notify the **Local public health jurisdiction** immediately to coordinate on follow-up for the report information needed to complete the electronic form(s) before the next business day.
   - KDHE-BEPHI will file an electronic case report the next business day.

2. NON-PARALYTIC Polio cases requires **IMMEDIATE, URGENT** reporting.
   - KDHE epidemiologist will call the CDC EOC at 770-488-7100 within 24 hours of a case meeting the confirmed criteria.
   - **Local public health jurisdiction** will report information requested on the disease reporting forms as soon as possible, completing the forms within 7 days of receiving a notification of a polio report.
   - KDHE-BEPHI will file an electronic case report the next regularly scheduled electronic transmission.
     (KDHE-BEPHI files electronic reports weekly with CDC.)

INVESTIGATOR RESPONSIBILITIES

1) Use current case definition, to confirm diagnosis with the medical provider.
2) Conduct a case investigation to identify potential source of infection.
3) Conduct contact investigation to identify additional cases.
4) Identify whether the source of infection is major public health concern.
- Possibility of wild poliovirus or vaccine-related cause
- Under-immunized population within the community.
- Distinguish between failure to vaccinate and vaccine failure.

5) Initiate control and prevention measures to prevent spread of disease.
6) Complete and report information requested in the Kansas electronic surveillance system.
7) As appropriate, use the disease fact sheet to educate individuals or groups and the notification letter to alert physicians and emergency rooms.

STANDARD CASE INVESTIGATION AND CONTROL METHODS

Case Investigation

1) Contact the medical provider who reported or ordered testing of the case.
   - Obtain information from the provider or medical chart.
     - With hospitalization, obtain medical records, including admission notes, progress notes, lab report(s), and discharge summary.
   - Collect clinical data:
     - First symptoms with date of onset
     - Paralysis: onset date and site of paralysis (spinal, blulbar, spino-bulbar)
     - Clinical course of illness
     - Outcomes
   - Examine the laboratory testing that was done.
   - Determine if further laboratory testing is needed.
     - If not done, coordinate testing for symptomatic, highly suspected cases.
   - Collect case's demographic data and contacting information (birth date, county, sex, race/ethnicity, address, phone number(s))
   - Record hospitalizations: location and duration of stay
   - Record any injections received 30 days prior to onset, include:
     - Date of injection,
     - Type (antibiotic, vaccine, other) and description (specify)
     - Site of injection (left/right deltoid, left/right thigh, left/right gluteal, other)
   - Record outcomes: survived or date of death, with postmortem examination results and death certificate diagnoses

2) Through a credible immunization registry or medical record:
   - Obtain information on history of polio vaccine: dates of vaccination, type, manufacturer, number of doses or if not vaccinated or fully vaccinated, why.
   - Note: any exposure to OPV 30 days prior to onset

3) Interview the case or proxy to determine source and risk factors, focus period <30 days before case's onset for activities and contacts.

- Travel: (note location, departure date, return date)
  - Case or household members travel to epidemic or endemic area
  - Case or household member exposed to person(s) from or returning to endemic areas
- Case or household member with contact with a known case
  - Name of possible source, location of exposure, date of contact
- Case with contact with an OPV recipient: Household or other close contacts (of last 30 days) who received OPV ≤ 75 days before onset of case's symptoms, note:
  - Contact's age and relationship to case.
  - Date when OPV recipient was in contact with case.
  - Vaccination date and person or agency administering. Work to collect information on manufacturer, lot number and dose of vaccine
- Information on any polio-like illness in the community or population.

4) Collect information from case for the Contact Investigation. (See below).
5) Investigate epi-links among cases (clusters, household, co-workers, etc).
   - For suspected outbreaks to Managing Special Situations section.

Contact Investigation

1) Inquire about case's activities and occupations during the communicable period 10 days prior to and after onset of symptoms.
   - Daycare association: record any dates, location, and activities as attendee, employee or household contact to attendee or employee.
   - Record occupations and any other at-risk activities, i.e. food handling, childcare and direct patient care with dates, descriptions, and locations.
2) Consider case's occupation and activities, identify the contacts.
   - Exposure is defined as contact with the stool or oral secretions (e.g. saliva) of an infectious person.
   - Susceptible contacts have no written record of a complete polio immunization series.
     - A complete polio immunization series includes three primary doses and a single booster dose of IPV or OPV in any combination, when doses are received after 6 weeks of age and at intervals ≥ 4 weeks apart.
3) Create a line listing of contacts.
   - Obtain name, address, and telephone of contacts
   - Collect contact's immunization status and any symptoms
   - Collect information on the contact's occupation.
   - Note any school or daycare attendance. (Facility name and location.)
   - Note any susceptible contacts.
4) Follow-up symptomatic contacts as suspect cases.
5) Define potential transmission setting(s):
   - Identify possible transmission settings through information on contacts' polio vaccination status, immune status, and recent significant illnesses.
   - Define each setting by age, vaccination and immune status.
6) Institute control measures for school or day-care contacts as indicated under Isolation, Work and Daycare Restrictions.

7) Follow-up with contacts (especially susceptible contacts) as recommended under Contact Management.

Isolation, Work and Daycare Restrictions

K.A.R 28-1-6 for Poliomyelitis:

- Each infected person shall remain in isolation for 10 days from the onset of illness. Enteric precautions shall be followed for six weeks.
- Standard precautions for hospitalized case-patients, with contact precautions indicated for hospitalized infants and young children.

Case Management

1) Follow-up to assure compliance with control measures (i.e., isolation).
2) In 60 days, follow-up to see if there is any residual paralysis

Contact Management

1) Maintain a listing of all contacts log information on symptoms screenings, immunization histories, testing, recommendations, and the disposition of the contact until 35 days after exposure.
2) Consult with local Health Officer, BEPHI, and Kansas Immunization Program to make decisions on the proper strategies for the effective use of OPV and/or IPV. The following guidelines are presented:
   - The epidemiological data, which defines the community at risk by immunization coverage, age and immune status, will be used to determine whether OPV should be used in certain situations
     - OPV should never be administered to immunodeficient patients or their household contacts; IPV is recommended in such situations.
   - If the evidence indicates vaccine-associated disease, no outbreak control program is needed.
   - If evidence indicates wild-type poliovirus, an outbreak control program with vaccination planning is required.
     - Communities at risk of low vaccination coverage should be assessed for current vaccination status and offered vaccine, as needed.
     - All susceptible contacts 6 weeks of age and older with an incomplete or undocumented vaccination series or booster should be vaccinated on an accelerated schedule. (4-week intervals)
     - A booster dose of vaccine is recommended for all adults (>18 years of age) in susceptible communities and health-care workers at high risk for exposure who have completed a primary series but have not received an adult booster dose.
3) Report number of susceptible contacts receiving recommended vaccination(s).
4) Report any adverse event that occurs after the administration of a vaccine to Vaccine Adverse Events Reporting System at http://vaers.hhs.gov/index
5) Active surveillance community-wide should be initiated for 2 incubation periods (i.e., 70 days) beyond the onset of the last case in the area.

- Surveillance should be initiated for the following conditions:
  - Acute Flaccid Paralysis (AFP);
  - Guillain-Barre Syndrome (GBS) ;
  - Transverse myelitis;
  - Viral or aseptic meningitis
- Physicians should be aware of and vigilant for poliomyelitis and other causes of AFP in patients. Encourage, immediate reporting all suspect cases, and the collection of necessary laboratory specimens for testing.

Environmental

- None.

Education

1) Persons in communities with low vaccination coverage should be warned of the potential risk for poliomyelitis and informed of vaccine availability.
2) If a situation calls for the use of OPV, those exposed to the vaccine or to the recipient should be made aware of the risks of VAPP.

MANAGING SPECIAL SITUATIONS

A. Outbreak Investigation:

- An outbreak is one or more case(s) of confirmed polio in a community. The situation should be treated as a public health emergency with appropriate resources allocated until additional cases have been ruled out.
- Notify KDHE immediately, 1-877-427-7317.
- Implement active surveillance:
  - Maintain for two incubation periods (70 days) following onset of the last case to identify any transmission from a subclinical case.
- Additional activities that may be required for case finding include:
  - Collection of stool and serum samples from the household members and other contacts associated with possible transmission settings.
  - Retrospective surveys of hospitals that serve the community at risk for diagnoses consistent with poliovirus infection, including acute flaccid paralysis (AFP), Guillain-Barré Syndrome (GBS), transverse myelitis, and viral or aseptic meningitis.
- Document measures that have been taken so far in the response and attempt to identify reasons for the outbreak.
  - All epidemiologic data will be reported and managed through the Kansas outbreak module of the electronic surveillance system.

B. OPV Recipient in Settings with Immunodeficient Contacts:

- The OPV recipient should avoid close contact with the immunodeficient person for approximately 4-6 weeks after vaccination.
- If this is not feasible, rigorous hygiene and hand washing after contact with feces (e.g., after diaper changing) and avoidance of contact with saliva (e.g., sharing food or utensils) can be used but may be less effective.
- Maximum excretion of vaccine virus occurs within 4 weeks after oral vaccination.

C. School or Child Care Settings:

- Coordinate activities with school nurse and/or administration.

DATA MANAGEMENT AND REPORTING TO THE KDHE

A. Organize, collect, and report data.

B. Report data via the state electronic surveillance system.

- Especially data that collected during the investigation that helps to confirm or classify a case. (For epi-linked cases, please include the Record Number of the related case.)

ADDITIONAL INFORMATION / REFERENCES

A. Treatment / Differential Diagnosis: American Academy of Pediatrics. 2009 Red Book: Report of the Committee on Infectious Disease, 28th Edition. Illinois, Academy of Pediatrics, 2009.

B. Epidemiology, Investigation and Control: Heymann. D., ed., Control of Communicable Diseases Manual, 19th Edition. Washington, DC, American Public Health Association, 2008.

C. Case Definitions: CDC Division of Public Health Surveillance and Informatics, At: www.cdc.gov/osels/ph_surveillance/nndss/casedef/case_definitions.htm

D. Quarantine and Isolation: Kansas Community Containment Isolation/ Quarantine Toolbox Section III, Guidelines and Sample Legal Orders www.kdheks.gov/cphp/download/CDCSOG_Attachment1.0.0.pdf

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

F. Pink Book: Epidemiology and Prevention of Vaccine-Preventable Diseases. Available at: www.cdc.gov/vaccines/pubs/pinkbook/default.htm

G. Manual for the Surveillance of Vaccine-Preventable Diseases: Available at: www.cdc.gov/vaccines/pubs/surv-manual/default.htm .

H. Poliomyelitis Prevention in the United States. MMWR 2000; 49(RR05); 1-22. Available at: www.cdc.gov/mmwr/preview/mmwrhtml/rr4905a1.htm

I. Poliovirus Infections in Four Unvaccinated Children – Minnesota, August –October 2005. MMWR 2005; 54(41): 1035-1055. Available at: www.cdc.gov/mmwr/preview/mmwrhtml/mm54d1014a1.htm

J. Additional Information (CDC): www.cdc.gov/health/default.htm

Supporting Materials

Supporting Materials are available under attachments:

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