US Virgin Islands Department of Health
Acute Flaccid Myelitis Investigation Guideline

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Acute Flaccid Myelitis (AFM)
Disease Management and Investigation Guidelines

CASE DEFINITION

Criteria for Public Health Surveillance:

An illness with onset of acute focal limb weakness AND

- a magnetic resonance image (MRI) showing spinal cord lesion largely restricted to gray matter and spanning one or more spinal segments, OR
- cerebrospinal fluid (CSF) with pleocytosis (white blood cell count >5 cells/mm^3)

Notes on MRI and CSF testing:

- *Spinal cord MRI Terms that are consistent with "restricted to gray matter and spanning…" include: "affecting mostly gray matter", "affecting the anterior horn or anterior horn cells", "affecting the central cord", "anterior myelitis" or "poliomyelitis. If a physician is still unsure if the case criterion is met, consider consulting with the neurologist or radiologist directly.*
- *If CSF has red blood cells present, the white blood cell count should be adjusted for the presence by subtracting 1 white blood cell for every 500 red blood cells present.*

Case Classification:

Confirmed:

- An illness with onset of acute focal limb weakness AND
- MRI showing spinal cord lesion largely restricted to gray matter and spanning one or more spinal segments.

Probable*:*

- An illness with onset of acute focal limb weakness AND
- CSF showing pleocytosis (white blood cell count >5 cells/mm3).

Comments on AFM Surveillance:

- *Purpose: to further understand the impact of AFM including potential causes and how often the illness occurs in the United States.*
- *To accomplish this, specimens, including cerebrospinal fluid, blood, and stool specimens from the children with AFM, are tested at the Centers for Disease Control and Prevention (CDC) Polio and Picornavirus Laboratory Branch.*
- *The testing that is done at the CDC is for investigational purposes, and it is unlikely that results would be available in a timely fashion to guide the clinical management of the patient.*
- *For testing done at CDC, CDC will not provide individual clinical reports of specific results as the testing done uses assays that are not CLIA-Approved and are not intended for clinical diagnosis. Results that indicate possible cause of AFM will be rapidly publicized.*

NOTIFICATION TO THE USVI DEPARTMENT OF HEALTH

1) Health care providers and hospitals shall report to VIDOH any confirmed or probable cases by completing the Notification of Infectious Disease form (EPI-1) and the AFM Patient Case Summary Form.

US Virgin Islands Department of Health (VIDOH)
Division of Epidemiology (EPID)
Dr. Esther Ellis, Territorial Epidemiologist
Phone: TBD
Cellphone/After Hours: (340) 626-1654
Fax: (340) 776-1506
*****Any emergency medical or clinical specimen collection questions can be directed at Dr. Tai Hunte, Territorial Infectious Disease Specialist/VIDOH Chief Medical Officer, (240) 472-4466*****

2) VIDOH-EPID must approve the laboratory testing prior to specimen submission and will serve as a consultant providing guidance on specimens to submit for testing through VIDOH.

3) VIDOH-EPID staff will prepare to pick-up and package the specimens for shipment to CDC and will email the CDC representatives on what is being shipped.

LABORATORY ANALYSIS

Please note, that testing done at CDC is not for clinical diagnosis. The CDC will not provide individual reports of specific tests. Results that indicate a possible cause of AFM will be rapidly publicized.

After approval of specimens for the AFM study at CDC**,** coordinate pick-up of a full set of specimens (listed under Specimen Collection) with the VIDOH-EPID. VIDOH-EPID staff must complete Form 50.34 to include with shipment.

Handling and Shipping

1) Samples should be refrigerated or frozen and shipped as soon as possible.
2) Shipment of approved samples should meet the following requirements:
   - Accompanied by a completed CDC Form 50.34.
   - Shipped in an insulated category B shipper with cold packs for refrigerated samples (or dry ice for frozen samples).
   - Confirmed pick-up or delivery to VIDOH in Saint Croix or Saint Thomas.
3) VIDOH-EPID will freeze those samples that CDC requests to be shipped frozen and will ship to the CDC on dry ice.
4) With each patient's specimen VIDOH-EPID will submit a hard copy of the following:
   - Page 1 of the completed Acute Flaccid Myelitis: Patient Summary Form.
   - A completed submission form 50.34.

5) Disease-specific guidance on proper collection and handling of specimens for viral testing can be found by disease at the CDC website, additional resources include:
   - Viral Culture Specimen Collection and Transport Guidelines
   - CDC General Specimen Collection Guidelines

Specimen Collection

1) Collect specimens as early as possible in the course of illness, preferably on the day of onset of limb weakness.
2) Specimens should be collected and sent even if testing for any other etiological agent such as EV-D68 occurred and were negative.
3) For currently hospitalized patients, collect all the specimens listed below.
   - If they have not been collected or no specimen is remaining, it is requested that repeat specimens be collected.
4) For patients discharged from the hospital:
   - If it has been less than 30 days since the hospital admission date, please send any stored specimens from the list below. If any were not collected or no longer available, consider obtaining the specimen from the patient.
   - If it has been more than 30 days since the hospital admission date, please send any stored specimens listed below.
5) EACH of the following specimens is requested:
   - CSF: 2mL unspun or 1mL if spun and processed
   - Serum: 2-3 cc collected in red top or tiger-top tubes prior to treatment with IVIG or plasmapheresis. (If treatment has already occurred, indicate date of therapy on the Acute Flaccid Myelitis: Patient Summary Form).
     - Acute: Collect as soon as possible.
     - Convalescent: Collected 10-14 days after first serum, or at the time of patient discharge, whichever comes first
   - Whole blood: 3-5 mL collected in a lavender/green top tube (with anticoagulant); collect at same time or within 24 hours of CSF
   - Two stools specimens collected 24 hours apart two quarter-sized amounts in sterile wide-mouth container or two rectal swabs in viral transport media.

   For additional information, including information on pathology specimens, review Table 1 and Table 2 extracted from the CDC webpage: www.cdc.gov/acute-flaccid-myelitis/hcp/instructions.html

EPIDEMIOLOGY

AFM is one of a number of conditions that can result in neurologic illness with limb weakness. Such illnesses can result from a variety of causes, including viral infections, environmental toxins, genetic disorders, and Guillain-Barre syndrome. From August 2014 to July 2015, CDC verified reports of 120 children in 34 states who developed AFM. The apparent increase in AFM in 2014 coincided with an outbreak of severe respiratory illness caused by enterovirus D68 (EV-D68). Despite the timing, a cause for the 2014 AFM cases has not been determined.

DISEASE OVERVIEW

A. Agent:

The specific causes of this illness are still under investigation. Additional laboratory testing at the will attempt to determine an etiological agent. The AFM cases are most similar to illnesses caused by viruses, including:

- Enteroviruses (polio and non-polio),
- Adenovirus,
- West Nile virus and similar viruses, and
- Herpesviruses

B. Clinical Description:

The condition affects the nervous system, specifically the spinal cord resulting in a sudden onset of limb weakness and loss of muscle tone and reflexes. Additional developments may include: facial droop/weakness, difficulty moving the eyes, drooping eyelids, or difficulty with swallowing or slurred speech. Numbness or tingling is rare, though some patients may have pain in arms or legs. Some patients may not be able to pass urine, and the most severe symptom is paralysis of the muscles of respiration.

C. Reservoirs:

Dependent upon agent, but may include humans and mosquitos

D. Mode(s) of Transmission:

Dependent upon agent, but may include person-to-person via fecal-oral and/or respiratory secretions, or vector-borne by bite of the arthropod

E. Incubation Period:

Dependent upon agent. For comparison, paralytic polio cases were reported with a range of 3 to possibly 35 days, commonly within 7-14 days.

F. Period of Communicability:

Not well defined, but as long as agent is excreted (body fluids/feces) or present in blood. For enteroviruses, fecal viral shedding can persist for several weeks or months after onset of infection, but respiratory tract shedding usually is limited to 1 to 3 weeks or less. Viral shedding can occur without clinical illness.

G. Differential Diagnoses:

Other etiologies of childhood acute flaccid paralysis, such as bacterial infections of the central nervous system, Guillain-Barré syndrome, transverse myelitis, or other immune-mediated etiologies should be considered, and if found, appropriate intervention should be rendered.

The following document provides interim considerations for clinical management of “Acute flaccid myelitis” when the alternative diagnosis has been explored and not found:

- Acute Flaccid Myelitis: Interim Considerations for Clinical Management (www.cdc.gov/acute-flaccid-myelitis/downloads/acute-flaccid-myelitis.pdf)

INVESTIGATOR RESPONSIBILITIES

1) Contact medical provider to collect additional information and confirm diagnosis using current case definition.
2) Obtain approval for testing at CDC, pertinent medical records and information. Coordinate specimen collection for shipment and ensure that an AFM Patient Case Summary Form is completed by provider.
3) Record data collected during the investigation in the VIDOH NEDSS.

STANDARD CASE INVESTIGATION AND CONTROL METHODS

Case Investigation

Standard case investigation will entail completion of the AFM Patient Case Summary Form utilizing CDC provided instructions and ensuring appropriate specimens are collected by VIDOH-EPID.

Contact Investigation

No routine contact investigation will be needed for sporadic cases.
Guidance will be provided by VIDOH-EPID depending upon the situation.

Isolation, Work and Daycare Restrictions

Restrictions are dependent upon the suspected etiological agent. Utilize the following resources:

- Requirements for Isolation and Quarantine of Specific Infectious and Contagious Diseases: Vaccine Preventable Diseases
- US Virgin Islands Classroom Handbook of Communicable Diseases
- Control of Communicable Diseases Manual

Education

Education measures will be influenced by the suspected etiological agent, but the general prevention messages may include:

- Following recommended vaccination schedules,
- Avoiding mosquitoes bites,
- Promoting respiratory and hand hygiene etiquette,
- Limiting contact of ill individuals with others, and
- Extra cleaning of contact surfaces with disinfectants.

ADDITIONAL INFORMATION / REFERENCES

A. Treatment / Differential Diagnosis: Red Book: 2015 Report of the Committee on Infectious Diseases. 30th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2015.

B. Epidemiology, Investigation and Control: Heymann. D., ed., Control of Communicable Diseases Manual (CCDM), 20th Edition. Washington, DC, American Public Health Association, 2015.

C. Case Definitions: CDC Division of Public Health Surveillance and Informatics, Available at: wwwn.cdc.gov/nndss

D. Additional Information (CDC): www.cdc.gov/acute-flaccid-myelitis/index.html

ATTACHMENTS

Table 1: Routine specimens to be collected from Suspect AFM Cases:

Specimen type		Minimum Amount	Collection	Storage	Shipping	Comments
Cerebrospinal fluid (CSF)		2 mL	Unspun; standard cryovial tube; collect at same time or within 24 hours as whole blood	Refrigerate at 4°C	Ship on cold pack overnight.	Insulate tubes to ensure they are not in direct contact with cold pack
		1 mL	Spun and processed; standard cryovial tube; collect at same time or within 24 hours as whole blood	Freeze at -20°C	Ship on dry ice.	
Serum		0.4 mL	Spun and processed; Tiger/red top tube	Freeze at -20°C	Ship on dry ice.	
Whole blood		3-5 mL	Lavender/green top tube (with anticoagulant); collect at same time or within 24 hours as CSF	Refrigerate at 4°C	Ship on cold pack overnight.	Insulate tubes to ensure they are not in direct contact with cold pack
Stool	Ranked below by first to last preference					
	1. Whole stool	≥1gram	Collect in sterile container, no special medium required	Freeze at -20°C	Ship on dry ice.	Two samples total, collected at least 24 hours apart, both collected as early in illness as possible and ideally within 14 days of illness onset
	2. Rectal swab [P]	≥1gram	Store in viral transport medium	Freeze at -20°C	Ship on dry ice.	Two samples total, collected at least 24 hours apart, both collected as early in illness as possible and ideally within 14 days of illness onset

[P]For rectal swabs please use only sterile dacron or rayon swabs with plastic shafts or if available, flocked swabs. DO NOT use calcium alginate swabs or swabs with wooden sticks, as they may contain substances that inactivate some viruses and inhibit some molecular assays. Sterile PBS or Hank's balanced salt solution (HBSS) (no antibiotics) can be used in lieu of viral transport medium.

*Convalescent sera should be collected 10-14 days after the first serum specimen, or at time of patient discharge, whichever comes first.

***Table 2* listing optional specimens (including tissue for death) found on the next page.**

Table 2: Non-routine specimens collected from Suspect AFM Cases:

Optional					
Respiratory – NP/OP swab	1 mL	Store in viral transport medium	Freeze at -20°C	Ship on dry ice.	Send only if specimen was EV/RV positive. Specimen can be typed by CDC.
In the event of death, please send the following specimens, if possible					
Fresh-frozen tissue		Place directly on dry ice or liquid nitrogen	Freeze at -70°C	Ship on dry ice	Representative sections from various organs are requested, but particularly from brain/spinal cord (including gray and white matter), heart, lung, liver, kidney, and other organs as available.
Formalin-fixed or formalin-fixed, paraffin-embedded tissue		Avoid prolonged fixation—tissues should have been fixed in formalin for 3 days, then transferred to 100% ethanol	Room temperature	Ship at room temperature with paraffin blocks in carriers to prevent breakage	See comment above regarding frozen tissue

Figure. Technique for collection of a nasopharyngeal swab. For more information on the proper technique, see the videos at Pertussis (Whooping Cough) Specimen Collection.

Image: Manual for the Surveillance of Vaccine-Preventable Diseases, 4th ed, 2008.

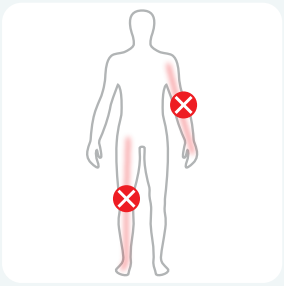
Job Aid for Clinicians

How to send information about a suspected AFM case to the VIDOH

Ensure that patient meets ***confirmed*** or ***probable*** case definition for acute flaccid myelitis (AFM).

Confirmed:

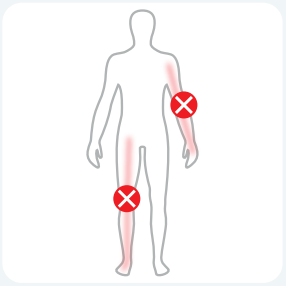
Patient with acute onset of focal limb weakness and an MRI showing a spinal cord lesion largely restricted to gray matter and spanning one or more spinal segments.



OR

Probable:

Patient with acute onset of focal limb weakness and cerebrospinal fluid (CSF) with pleocytosis [white blood cell (WBC) count >5 cells/mm^3]



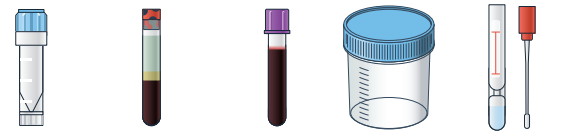
Contact VIDOH-EPID when you identify a suspect case of AFM.

Call Dr. Esther Ellis at (340) 626-1654 or Dr. Tai Hunte at (240) 472-4466

AND

SPECIMEN COLLECTION

Collect specimens as close to onset of limb weakness as possible and store as directed (see table on reverse side)



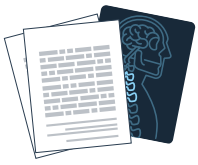
Work with VIDOH-EPID to coordinate specimen pick-up for testing at CDC.

- Specimens should be shipped overnight to arrive at CDC Tuesday through Friday.
- Specimens should be shipped within 24–48 hours of collection, if possible.

INFORMATION SHARING

Complete *AFM Patient Summary Form* available at: https://www.cdc.gov/acute-flaccid-myelitis/hcp/data.html.

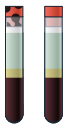
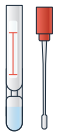
Send copies of *Patient Summary Form* and other clinical information to VIDOH-EPID for sharing with CDC.



TO

CDC
Centers for Disease Control and Prevention

Specimens to collect and send to CDC for testing for suspect AFM cases

SAMPLE	AMOUNT	TUBE TYPE	PROCESSING	STORAGE	SHIPPING**
CSF	1mL (collect at same time or within 24hrs of whole blood)	Cryovial 	Spun and CSF removed to cryovial	Freeze at -20°C	Ship on dry ice
CSF	2 mL (collect at same time or within 24hrs of whole blood)	Cryovial 	Unspun	Refrigerate at 4°C	Ship overnight on cold packs within **24–48 hours** of collection*
Serum	≥0.4mL	Tiger/red top 	Spun and serum removed to tiger/red top	Freeze at -20°C	Ship on dry ice
Whole blood	3 to 5mL (collect at same time or within 24hrs of CSF)	EDTA/ heparin tube (lavender or green top) 	Unspun	Refrigerate at 4°C	Ship overnight on cold packs within **24–48 hours** of collection*
Stool	≥1 gram (2 samples collected 24hrs apart)	Sterile container 	n/a	Freeze at -20°C	Ship on dry ice
Rectal swab	≥1 gram (2 samples collected 24hrs apart)	n/a 	Store in viral transport medium	Freeze at -20°C	Ship on dry ice
Respiratory NP or nasal (mid-turbinate [MT]+OP) swab	1ml (minimum amount)	n/a 	Store in viral transport medium	Freeze at -20°C	Ship on dry ice; send ONLY if EV/RV positive for typing

**If specimens cannot be shipped within 24-48 hours of collection, consider repeat collection, if feasible.*

***Shipping instructions for VIDOH-EPID staff only.*

Include a DASH form with each specimen

(https://www.cdc.gov/laboratory/specimen-submission/form.html)

- Select Test Order Name = 'Picornavirus Special Study'

VIDOH-EPID ship specimens to:

Dr. Will Weldon
Centers for Disease Control and Prevention
1600 Clifton Road, NE
Building 17, Room 6124
Atlanta, GA 30329

Office: 404-639-5485
Mobile: 404-216-6183
Email: wweldon@cdc.gov

www.cdc.gov/acute-flaccid-myelitis

National Center for Immunization and Respiratory Diseases (NCIRD)
Division of Viral Diseases

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

NCIRDig-608 | 03/03/17

Instructions for Completing the AFM Patient Summary Form

GENERAL. Clinicians should remain vigilant and send information to their state or local health department for all patients with acute onset of neurologic illness associated with limb weakness that meet the clinical criteria for AFM (as highlighted on page 3).

a. Clinicians should send information about patients who meet the clinical criteria regardless of any laboratory and MRI results.
b. The AFM *Patient Summary Form* should be completed by the state or local health department, in conjunction with a clinician who provided care to the patient during the neurologic illness.

CDC requests that state health departments send the *Patient Summary Form,* along with additional clinical information, to CDC for case classification and to help monitor these cases at the national level. AFM neurology experts will classify suspect cases of AFM according to the Council of State and Territorial Epidemiologists (CSTE) AFM case definition using the requested clinical information: admission and discharge notes, MRI report, MRI images, neurology consult notes, infectious disease consult notes, vaccination record, diagnostic laboratory results, and EMG report if done and available. When sending this information, please indicate the information included with the *Patient Summary Form* in the box at the top of the form.

Demographics

1. **TODAY'S DATE.** Date that completion of the patient summary form is initiated.
2. **STATE ASSIGNED ID**. Alpha/numeric
3. **SEX**. Indicate whether the case-patient is male or female.
4. **DATE OF BIRTH**. Case-patient birth date.
5. **RESIDENCE.** State in which case-patient resides.
6. **COUNTY.** County in which case-patient resides.
7. **RACE.** Self-reported race of case-patient; more than one option may be reported.
8. **ETHNICITY.** Self-reported ethnicity of case-patient.
9. **DATE OF ONSET OF LIMB WEAKNESS.** Limb weakness onset date of case-patients.
10. **HOSPITALIZED?** Was case-patient hospitalized?
11. **DATE HOSPITALIZED.** Date case-patient FIRST hospitalized.
12. **DATE DISCHARGED.** Date case-patient discharged from LAST hospital (indicate if still hospitalized).
13. **DIED?** Did case-patient die from this illness?
14. **DATE OF DEATH.** Case-patient's date of death.

Signs/symptoms/condition at ANY time during the illness

15. **WEAKNESS.** Specify for each limb (arms and or legs) if there was noted acute onset of weakness.

    15a. **TONE IN AFFECTED LIMB.** Specify for each limb (arms and or legs) the tone in the limb with weakness (select one option per limb)

16. **ICU?** Was case-patient admitted to the ICU?
17. **DATE ICU.** Date case-patient admitted to ICU.

Signs/symptoms/condition in the 4-weeks BEFORE onset illness

18. **RESPIRATORY ILLNESS?** Did case-patient have a respiratory illness within the 4-week period before onset of limb weakness?
19. **RESPIRATORY ILLNESS ONSET DATE.** Case-patient's respiratory onset date.
20. **GASTROINTESTINAL ILLNESS?** Did case-patient have a gastrointestinal illness (e.g., diarrhea or vomiting) within the 4-week period before onset of limb weakness?
21. **GASTROINTESTINAL ILLNESS ONSET DATE.** Case-patient's gastrointestinal illness onset date.
22. **FEVER?** Did case-patient have a fever (≥38°C/100.4°F), measured by parent or provider, within the 4-week period before onset of limb weakness?
23. **FEVER ONSET DATE.** Case-patient's fever onset date.
24. **TRAVEL OUTSIDE U.**S.? Did case-patient travel outside the U.S. within the 4-week period before onset of limb weakness?
25. **IF YES, LIST.** If any, list the country(s) visited by the case-patient.
26. **UNDERLYING ILLNESSES?** Does the case-patient have any underlying illnesses?
27. **IF YES, LIST.** List the case-patient's underlying illness(es).

Other patient information

28. **MRI OF SPINAL CORD PERFORMED?** Indicate whether case-patient had an MRI of the spinal cord performed.
29. **DATE SPINAL MRI PERFORMED.** Date of the case-patient's spinal cord MRI.
30. **MRI OF BRAIN PERFORMED?** Indicate whether case-patient had an MRI of the brain performed.
31. **DATE BRAIN MRI PERFORMED.** Date of the case-patient's brain MRI.

CSF examination

32. **LUMBAR PUNCTURE PERFORMED?** Indicate if there was a CSF examination done (option for up to two. If more than 2 CSF examinations performed, list the first 2 performed).
    32a. **CSF from LP1.** Complete findings for lumbar puncture 1.
    32b. **CSF from LP2.** Complete findings for lumbar puncture 1.

Acute Flaccid Myelitis Outcome

Follow-up of suspect AFM cases, conducted at least 60 days after onset of limb weakness, will help ascertain if there is any residual paralysis. Follow-up can be done by contacting the case-patient/family for answers to the questions, reviewing medical records, or contacting the case-patient's regular healthcare provider.

33. **DATE OF 60-DAY FOLLOW-UP.** Date that 60-day follow-up of the case-patient is initiated.
34. **SITES OF PARALYSIS.** Indicate the sites where the case-patient had paralysis.
35. **SPECIFIC SITES.** Specify the specific sites where the case-patient had paralysis.
36. **60-DAY RESIDUAL.** Indicate the status of the case-patient at the point of the 60-day follow-up.
37. **DATE OF DEATH.** Case-patient's date of death during 60-day follow-up.

Case Definition

In June 2015, the Council of State and Territorial Epidemiologists (CSTE) adopted a standardized case definition for AFM that is used by CDC to classify suspected cases as confirmed or probable. The case definition was updated in June 2017 and is presented below.

Acute Flaccid Myelitis case definition
(http://c.ymcdn.com/sites/www.cste.org/resource/resmgr/2017PS/2017PSFin al/17-ID-01.pdf)

Clinical Criteria
An illness with onset of acute flaccid limb weakness

Laboratory Criteria

- Confirmatory Laboratory Evidence: a magnetic resonance image (MRI) showing spinal cord lesion largely restricted to gray matter*† and spanning one or more vertebral segments
- Supportive Laboratory Evidence: cerebrospinal fluid (CSF) with pleocytosis (white blood cell count >5 cells/mm^3)

Case Classification
Confirmed:

- Clinically compatible case AND
- Confirmatory laboratory evidence: MRI showing spinal cord lesion largely restricted to gray matter*† and spanning one or more spinal segments

Probable:

- Clinically compatible case AND
- Supportive laboratory evidence: CSF showing pleocytosis (white blood cell count >5 cells/mm^3).

** Spinal cord lesions may not be present on initial MRI; a negative or normal MRI performed within the first 72 hours after onset of limb weakness does not rule out AFM. MRI studies performed 72 hours or more after onset should also be reviewed if available.*
† Terms in the spinal cord MRI report such as "affecting mostly gray matter," "affecting the anterior horn or anterior horn cells," "affecting the central cord," "anterior myelitis," or "poliomyelitis" would all be consistent with this terminology.

Comment
To provide consistency in case classification, review of case information and assignment of final case classification for all suspected AFM cases will be done by experts in national AFM surveillance. This is similar to the review required for final classification of paralytic polio cases.