Acute Flaccid Myelitis (AFM)

Summary

Acute flaccid myelitis (AFM) is a rare but serious neurological illness affecting the gray matter of the spinal cord. Over 90% of cases have occurred in young children. AFM is not contagious in itself, but can be caused by several viruses and etiologies. AFM is a subtype of acute flaccid paralysis (AFP), an umbrella term that also includes paralytic poliomyelitis, Guillain-Barre Syndrome, acute transverse myelitis, toxic neuropathy, and muscle disorders.

In the summer and fall of 2014, an apparent increase in AFM was noted in children in the United States, and standardized surveillance was established in 2015. AFM is clinically indistinguishable from polio, and therefore diagnostic testing (at CDC) must be done to rule out poliovirus as the cause.

Agent

There are several causes of AFM, although the cause is not identified for every case, and it is not clear why only certain children develop AFM. Viral causes include non-polio enteroviruses (EV-D68, EV-A71), flaviviruses (West Nile virus, Japanese encephalitis virus), herpesviruses, and adenoviruses.

Transmission

Reservoir**:**

N/A

Mode of transmission:

- N/A

Period of communicability:

- N/A

Clinical Disease

Incubation period:

Most AFM patients had preceding febrile illness 1-2 weeks before the onset of acute flaccid limb weakness. (The preceding illness is typically respiratory or gastrointestinal with fever, runny nose, cough, vomiting, or diarrhea.)

Illness:

The onset of weakness is rapid, within hours to a few days. Weakness is in one or more limbs and tends to be more proximal than distal. (In other words, weakness tends to be worse in the muscles of the upper arm(s) or upper leg(s), closer to the torso.) There is a loss of muscle tone and reflexes in the affected limb(s).

Patients may have cranial nerve abnormalities, which include facial or eyelid droop, difficulty swallowing or speaking, or a hoarse or weak cry. They may also have a stiff neck, headache, or pain in the affected limb(s). Less commonly, people have reported numbness or tingling. Severe cases can develop respiratory failure (requiring mechanical ventilation),

or serious neurologic complications such as life-threatening changes in blood pressure or body temperature.

The diagnosis of AFM is confirmed by experts at CDC using information from neurological examinations, laboratory testing, and MRIs of the spine and brain. Other diagnoses for flaccid limb weakness can include (but are not limited to) polio, synovitis, neuritis, limb injury, Guillain-Barre syndrome (GBS), transverse myelitis, stroke, tumor, acute cord compression, or conversion disorder.

Epidemiology

Since gaining national attention in 2014, significant increases in AFM cases would occur every two years during the late summer or early fall. There were 120 confirmed cases in 2014, 153 cases in 2016, and 238 cases in 2018 (with fewer than 50 cases in each odd-numbered year). This pattern, which was expected to continue with increases in 2020, was disrupted with the arrival of COVID-19, and has not yet resumed as of Fall 2023.

Over 90% of AFM cases have occurred in children younger than 18 years old, and nearly all cases are hospitalized. From 2018-2020, 51-59% of cases were admitted to an intensive care unit, and 16-28% required intubation and mechanical ventilation. Cases have occurred in 49 states and the District of Columbia. AFM is implicitly reportable in New Mexico as an “Other illness or condition of public health significance,” but is not currently explicitly listed as a notifiable condition.

Laboratory Diagnosis

All of the following specimens must be collected and sent to CDC for every suspected case of AFM, as early as possible in the illness, preferably on the day of onset of limb weakness:

- Cerebrospinal fluid (CSF)
- Nasopharyngeal (NP) or oropharyngeal (OP) swab
- Serum
- 2 stool specimens (collected 24 hours apart)

	CSF	NP or OP swab	Serum	2 Stools
Special Notes	Spun and processed; collect at same time or within 24 hours of serum if feasible	Store in viral transport medium (VTM)	Spun and processed; send aliquot; collect at same time or within 24 hours of CSF if feasible	Two samples total, collected at least 24 hours apart, both as early in illness as possible and ideally within 14 days of illness onset
Amount	At least 0.15 mL, preferably 0.5-2 mL	At least 0.5 mL, preferably 1 mL	At least 0.5 mL, preferably 1 mL	At least 1 gram, preferably 10-20 grams

Tube Type	Cryovial	N/A (any sterile cup or tube)	Tiger/red top for collection; separate tube for shipping	Sterile container; not a rectal swab
Storage	Freeze at ≤20°C			
Shipping	Ship overnight on dry ice so they arrive at CDC Tuesday-Friday			
Results	Results for EV/RV testing will be returned within 14 days; CSF will also be used for special studies	Results for EV/RV testing and typing will be returned within 14 days	Results for EV/RV testing will be returned within 14 days; Serum will also be used for special studies	Results for EV/RV and poliovirus testing will be returned within 14 days

If the patient has died, requested specimens include:

- Autopsy tissue blocks – only acceptable if embedded within 2 weeks (or within 4 weeks for brain) after being placed in formalin
- Autopsy wet tissue—only acceptable if the duration of formalin-fixation has been within 2 weeks (or within 4 weeks for brain) or if tissues have been transferred to 70% ethanol within 2 weeks (or within 4 weeks for brain) after initial placement in formalin

Store blocks and wet tissue at room temperature. Ship blocks at room temperature (but consider shipping with a frozen cold pack during hot weather to prevent melting). Ship wet tissue at room temperature in suitable leak-proof container(s).

For more information, visit the CDC Specimen Collection page.

Treatment

There is currently no treatment with sufficient evidence to recommend it for AFM. There is a document on the clinical management of patients from CDC that can be found here: https://www.cdc.gov/acute-flaccid-myelitis/hcp/clinical-management.html. Clinicians may also wish to schedule a peer-to-peer consultation with neurologists specializing in AFM through the AFM Physician Consult and Support Portal.

Surveillance

Case Definition (2022)

Clinical Criteria

- An illness with onset of acute flaccid* weakness of one or more limbs, **and**
- Absence of a clear alternative diagnosis attributable to a nationally notifiable condition**

* Low muscle tone, limp, hanging loosely, not spastic or contracted

** Cases with a clear alternative diagnosis attributable to a nationally notifiable condition (e.g., polio) should be reported only once, and under the correct condition code, to avoid duplicate reporting

Laboratory Criteria

Confirmatory laboratory/imaging evidence

- MRI showing spinal cord lesion with predominant gray matter involvement† and spanning one or more vertebral segments, **and**
- Excluding persons with gray matter lesions in the spinal cord resulting from physician-diagnosed malignancy, vascular disease, or anatomic abnormalities

Presumptive laboratory/imaging evidence

- MRI showing spinal cord lesion where gray matter involvement† is present but predominance cannot be determined, **and**
- Excluding persons with gray matter lesions in the spinal cord resulting from physician-diagnosed malignancy, vascular disease, or anatomic abnormalities

Supportive laboratory/imaging evidence

- MRI showing a spinal cord lesion in at least some gray matter† and spanning one or more vertebral segments, **and**
- Excluding persons with gray matter lesions in the spinal cord resulting from physician-diagnosed malignancy, vascular disease, or anatomic abnormalities

† Terms in the spinal cord MRI report such as “affecting 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.

Case Classification

Suspect

- Meets clinical criteria with supportive laboratory/imaging evidence, **and**
- Available information is insufficient to classify case as probable or confirmed

Probable

- Meets clinical criteria with presumptive laboratory/imaging evidence

Confirmed

- Meets clinical criteria with presumptive laboratory/imaging evidence, **or**
- Meets other classification criteria:
    - Autopsy findings that include histopathologic evidence of inflammation largely involving the anterior horn of the spinal cord spanning one or more vertebral segments, **and**

- Excluding persons with gray matter lesions in the spinal cord resulting from physician-diagnosed malignancy, vascular disease, or anatomic abnormalities, **and**
- Absence of a clear alternative diagnosis attributable to a nationally notifiable condition (e.g., polio)

Case Classification Comments:

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.

Reporting:

Report all suspected cases to the Epidemiology and Response Division (ERD) at 505-827-0006. Information needed includes: patient's name, age, sex, race, ethnicity, home address, home phone number, health care provider, and vaccination history if available.

Case Investigation:

Complete the Patient Summary Form and mail to the Epidemiology and Response Division, P.O. Box 26110, Santa Fe, New Mexico 87502-6110, or (preferably) fax to 505-827-0013. Investigation information should also be entered in NMEDSS per established procedures.

CDC will need the completed patient summary form, images from brain and spinal cord MRIs, notes from neurology consults, the history and physical (H&P), discharge summary if available, and all requested laboratory specimens (see above) to inform their case classification. Notify the VPD Epidemiologist as soon as possible to assist in sending these materials to CDC, or call 505-827-0006 to reach an epidemiologist 24/7, 365 days a year.

Control Measures

1. Case management
   1.1. Isolation: CDC recommends standard, contact, and droplet precautions, which are used for EV-D68 (one of the more commonly identified causes of AFM). However, AFM itself is not transmissible.
2. Contact management: N/A
3. Prevention: There are multiple possible causes of AFM, some of which are viruses. Strategies to prevent some of the causes of AFM include staying up-to-date on vaccinations; washing hands with soap and water after using the bathroom, coughing, sneezing, or blowing one's nose, and before eating or touching one's face; using insect repellent; and avoiding close contact with people who are sick.

Managing *AFM* in Childcare Centers

AFM is not contagious; however, increases in enterovirus outbreaks can be associated with increases in AFM. Staff should help children keep good hand hygiene habits and cough/sneeze etiquette, and ensure attendees are up-to-date on vaccinations as a general best practice.

References

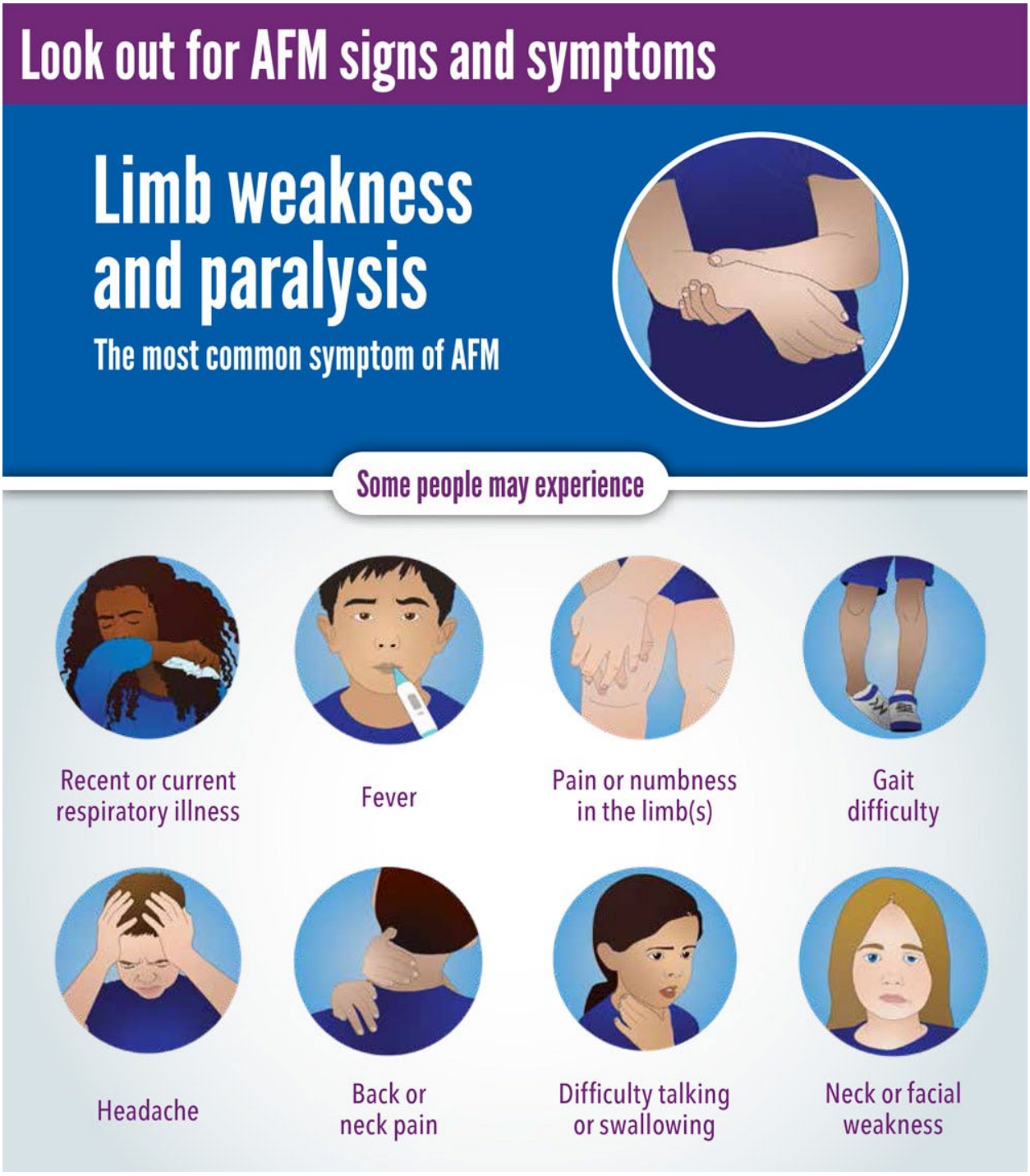
Centers for Disease Control and Prevention. Acute Flaccid Myelitis (AFM). Available at: https://www.cdc.gov/acute-flaccid-myelitis/index.html.

Kidd S, Yee E, English R, et al. National Surveillance for Acute Flaccid Myelitis — United States, 2018–2020. MMWR Morb Mortal Wkly Rep 2021;70:1534–1538. DOI: http://dx.doi.org/10.15585/mmwr.mm7044a2.

Centers for Disease Control and Prevention. Clinical Guidance for the Acute Medical Treatment of AFM. 2022 July. Available at: https://www.cdc.gov/acute-flaccid-myelitis/hcp/clinical-management.html.

Centers for Disease Control and Prevention. Enterovirus D68 for Healthcare Professionals. 2023 July. Available at: https://www.cdc.gov/non-polio-enterovirus/hcp/ev-d68-hcp.html.

Appendix A: CDC Vital Signs – AFM Signs and Symptoms Graphic



Appendix B: CDC Job Aid for Clinicians Reporting AFM

https://www.cdc.gov/acute-flaccid-myelitis/downloads/job-aid-for-clinicians-508.pdf

Reporting Patients Under Investigation for Acute Flaccid Myelitis

HEALTHCARE PROVIDERS SHOULD

IDENTIFY PUI

Identify patient under investigation (PUI) for acute flaccid myelitis (AFM); patient with:

- onset of acute flaccid limb weakness
- an MRI showing spinal cord lesions in at least some gray matter

CONTACT HEALTH DEPARTMENT

Contact your health department to coordinate submission of specimens and information, including copies of:

- Neurology consult notes
- MRI images and report

COLLECT SPECIMENS

Collect CSF, whole stool, respiratory, and serum specimens.

Collect specimens as close to onset of limb weakness as possible and store as directed (freeze as soon as possible after collection).

HEALTH DEPARTMENTS SHOULD

SEND TO CDC

Health department completes AFM Patient Summary Form, compiles medical records, and sends information to CDC.

COORDINATE WITH STATE LAB

Confirm shipping and documentation:

- Specimens should be shipped overnight to arrive at CDC Tuesday through Friday.
- Specimen submission form should be completed for each specimen submitted.
- Prior to shipping, contact CDC lab: AFMLab@cdc.gov

NOTIFY HEALTHCARE PROVIDER

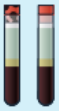
After a neurology expert panel reviews the information, CDC sends case classification to health department.

Health department notifies the treating healthcare provider.*

*Healthcare providers should not wait to receive the case classification to give a clinical diagnosis or to initiate treatment.

Specimens to collect for testing AFM PUIs at CDC

ALL submissions to CDC for diagnostic testing require pre-approval at this time.
Please contact AFMLab@cdc.gov before submitting AFM specimens to CDC.

SAMPLE	AMOUNT	TUBE TYPE	PROCESSING	STORAGE	SHIPPING
CSF	0.15 mL, 0.5-2 mL preferred (collect at same time or within 24hrs of serum if feasible)	Cryovial 	Spun and CSF removed to cryovial	Freeze at ≤-20°C	Frozen on dry ice.
Respiratory Nasopharyngeal (NP)/Oropharangeal (OP) swab	0.5 mL, 1 mL preferred (minimum amount)	N/A 	Store in vial transport medium	Freeze at ≤-20°C	Frozen on dry ice.
Serum	0.5 mL, 1 mL preferred (collect at same time or within 24hrs of CSF if feasible)	Tiger/red top for collection; separate tube for shipping 	Spun and serum aliquot removed to separate tube	Freeze at ≤-20°C	Frozen on dry ice.
Stool	1 gram, 10 – 20 grams preferred (2 samples collected 24hrs apart)	Sterile container 	N/A	Freeze at ≤-20°C	Frozen on dry ice. Rectal swabs should not be sent in place of stool.
Please, always include whole stool specimens to help identify pathogens and rule out poliovirus.					

For health department contact information, call the CDC Emergency Operations Center at 770-488-7100.

05/02/23

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

Appendix C: Patient Summary Form

Word

PDF

Instructions for Completing AFM Patient Summary Form