

National Overview of Acute Flaccid Myelitis — United States, 2014–2018

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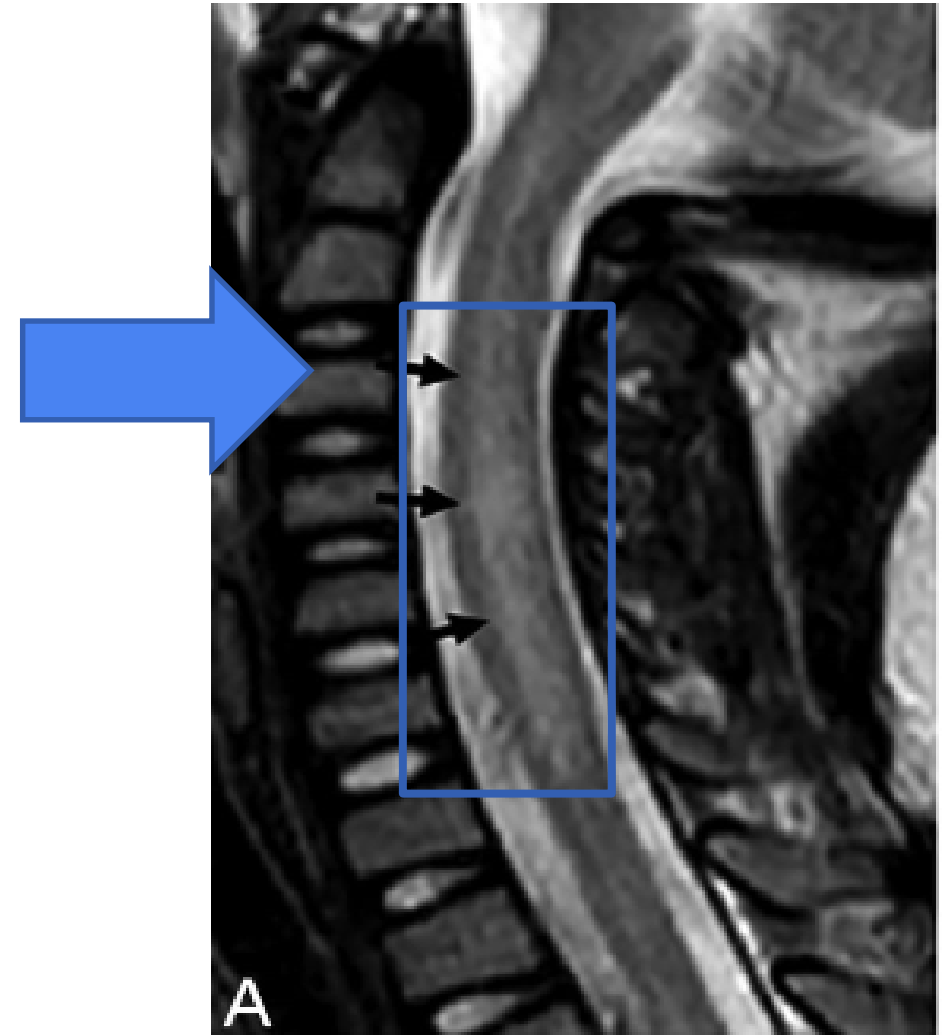
Measles, Mumps, Rubella, Herpesvirus and Domestic Polio Epidemiology Team Lead

Board of Scientific Counselors

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Acute Flaccid Myelitis (AFM)

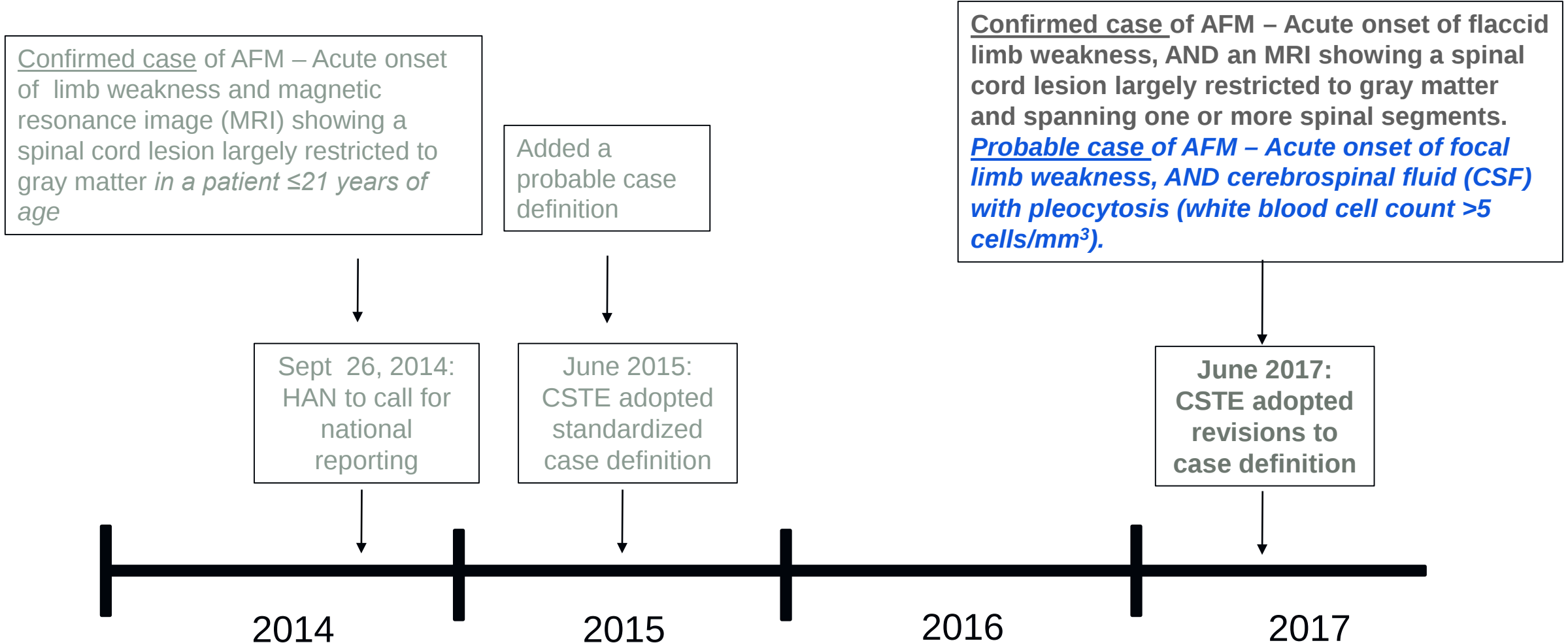
- Sudden onset of limb weakness within hours to a few days
- MRI findings demonstrate spinal cord lesions largely restricted to gray matter
- Risk factors unknown, most cases among children with preceding respiratory or febrile illness
- No proven treatment; management of AFM patients in consultation with neurology and infectious disease experts



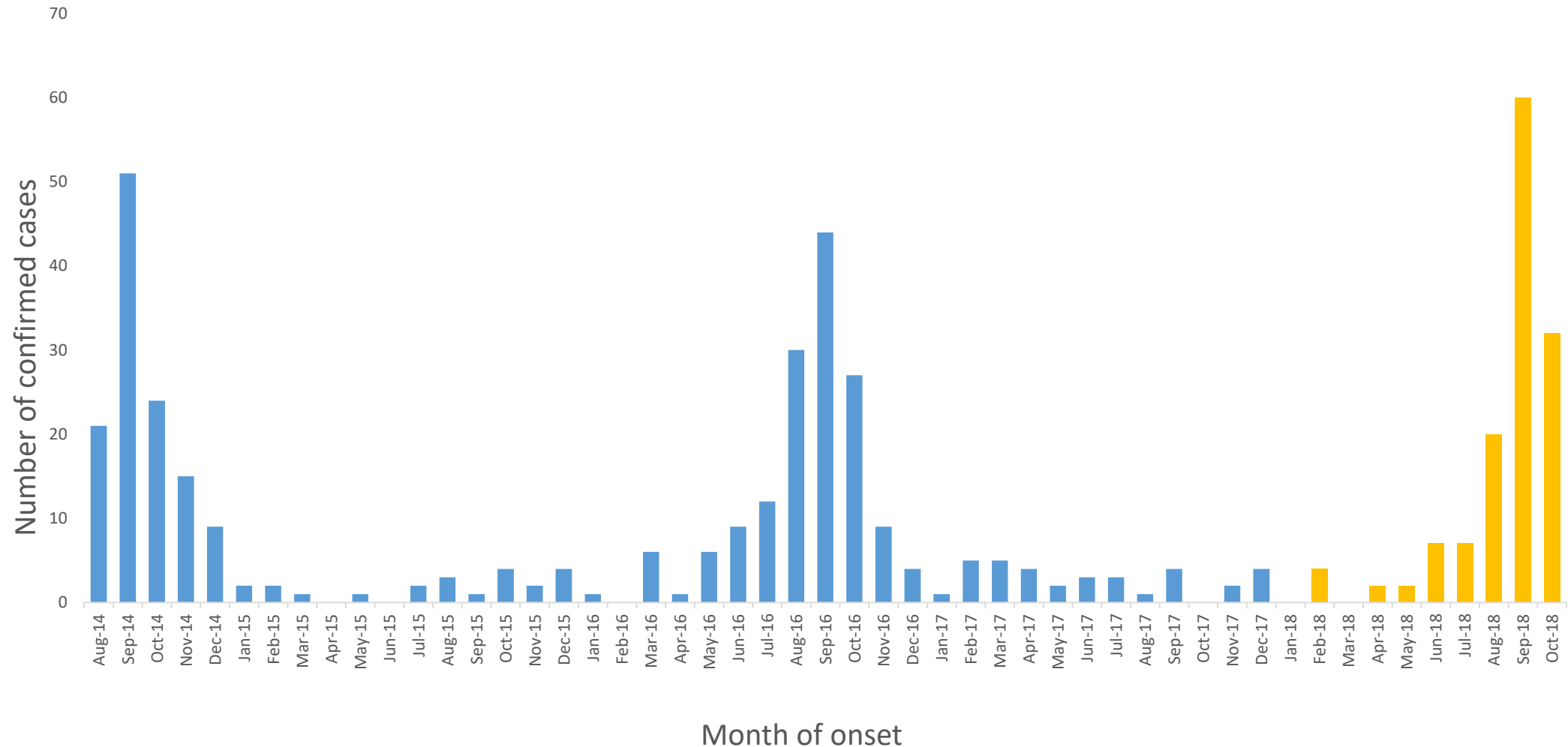
Initial investigations of AFM in the United States

- 2012, CA: Three patients with limb weakness and anterior myelitis on MRI within 1 month
 - Total of 23 patients identified from 2012–2014
- 2014, CO: Nine patients with limb weakness and spinal cord gray matter lesions with onset dates August–September
- 2014: A national call for additional cases confirmed 120 cases in 34 states from Aug–Dec
 - >5 cases reported from CA, CO, MA, PA and UT

Evolution of the case definition for AFM



Number of confirmed AFM cases reported to CDC by month of onset, Aug 2014–Oct 2018 (n=460)*



*Updated figure can be found at: <https://www.cdc.gov/acute-flaccid-myelitis/afm-cases.html>

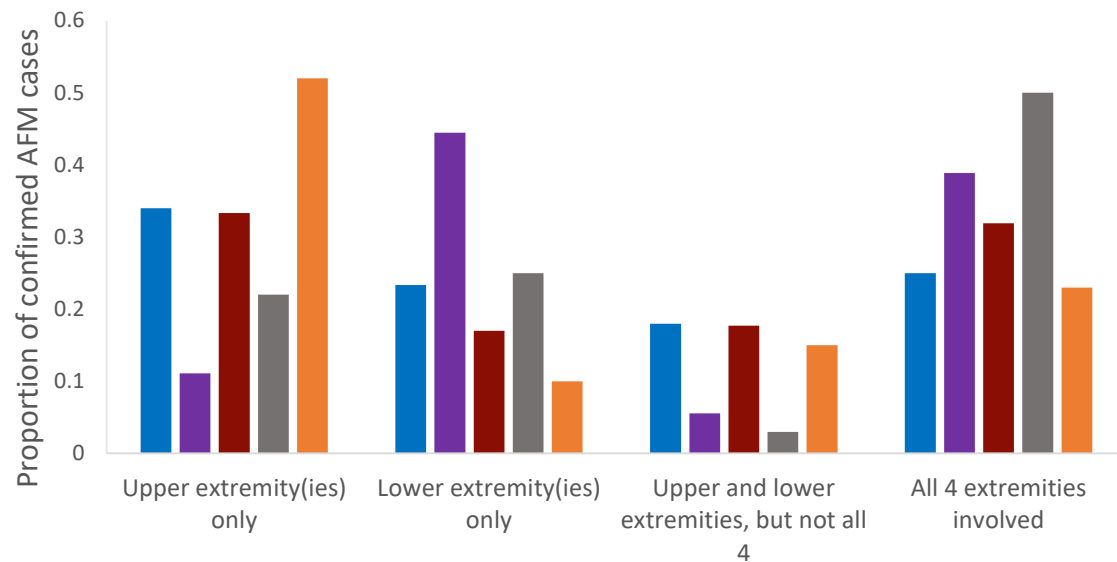
Demographic characteristics of confirmed pediatric AFM cases, Aug 2014–Oct 2018 (N=442)

Year	2014	2015	2016	2017	2018	Total
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Number of Cases	120	18	143	32	129	442
Age in years, median (IQR)	7 (5–12)	6 (3–12)	5 (3–9)	9 (3–12)	4.5 (2–7)	6.3 (2–12)
Sex						
Male	71 (59)	13 (72)	86 (60)	19 (59)	79 (61)	268 (61)
Female	49 (41)	5 (28)	57 (40)	13 (41)	50 (39)	174 (39)
Race						
AI/AN	1 (1)	0 (0)	3 (2)	0 (0)	0 (0)	4 (1)
Asian	8 (7)	2 (11)	8 (6)	0 (0)	3 (2.3)	21 (5)
Black or African American	8 (7)	6 (33)	24 (17)	7 (22)	13 (10)	58 (13)
White	79 (83)	8 (44)	78 (55)	17 (53)	85 (66)	267 (60)
Ethnicity						
Hispanic or Latino	29 (24)	1 (6)	26 (18)	6 (19)	21 (16)	83 (16)
Not Hispanic or Latino	59 (49)	5 (28)	56 (39)	6 (19)	58 (45)	184 (36)

Clinical characteristics among confirmed pediatric AFM cases, Aug 2014–Oct 2018

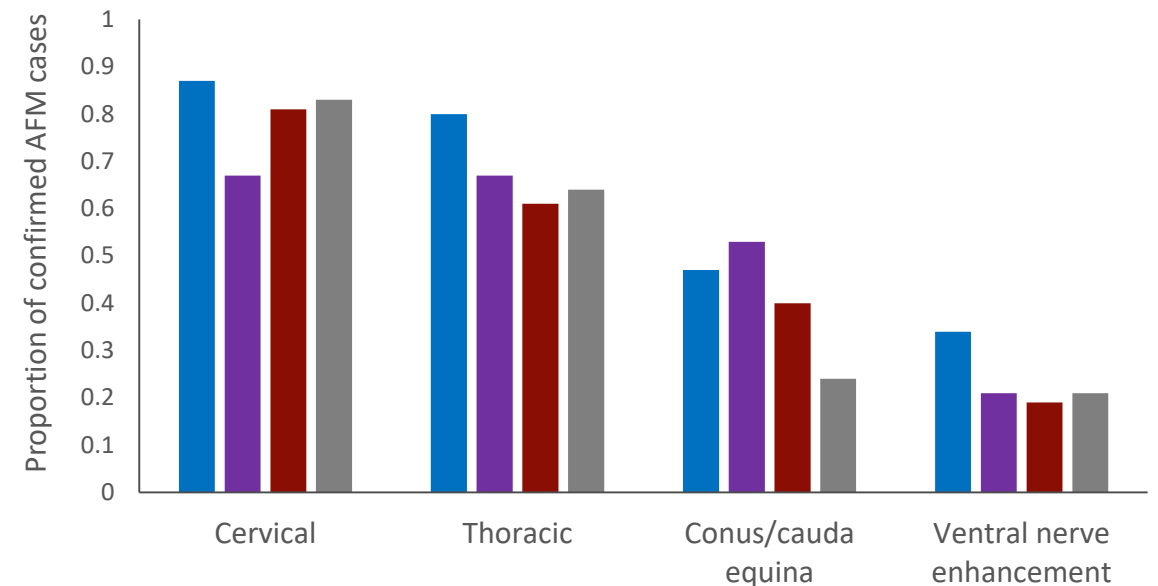
■ 2014 ■ 2015 ■ 2016 ■ 2017 ■ 2018

Limb involvement among confirmed AFM cases



Overall (n=442): 37% upper limb weakness only
18% lower limb weakness only

Spinal MRI lesions in AFM cases



Overall: 80% cervical lesions
68% thoracic lesions
41% conus lesions

Preceding illness of pediatric confirmed AFM cases, Aug 2014–Oct 2018

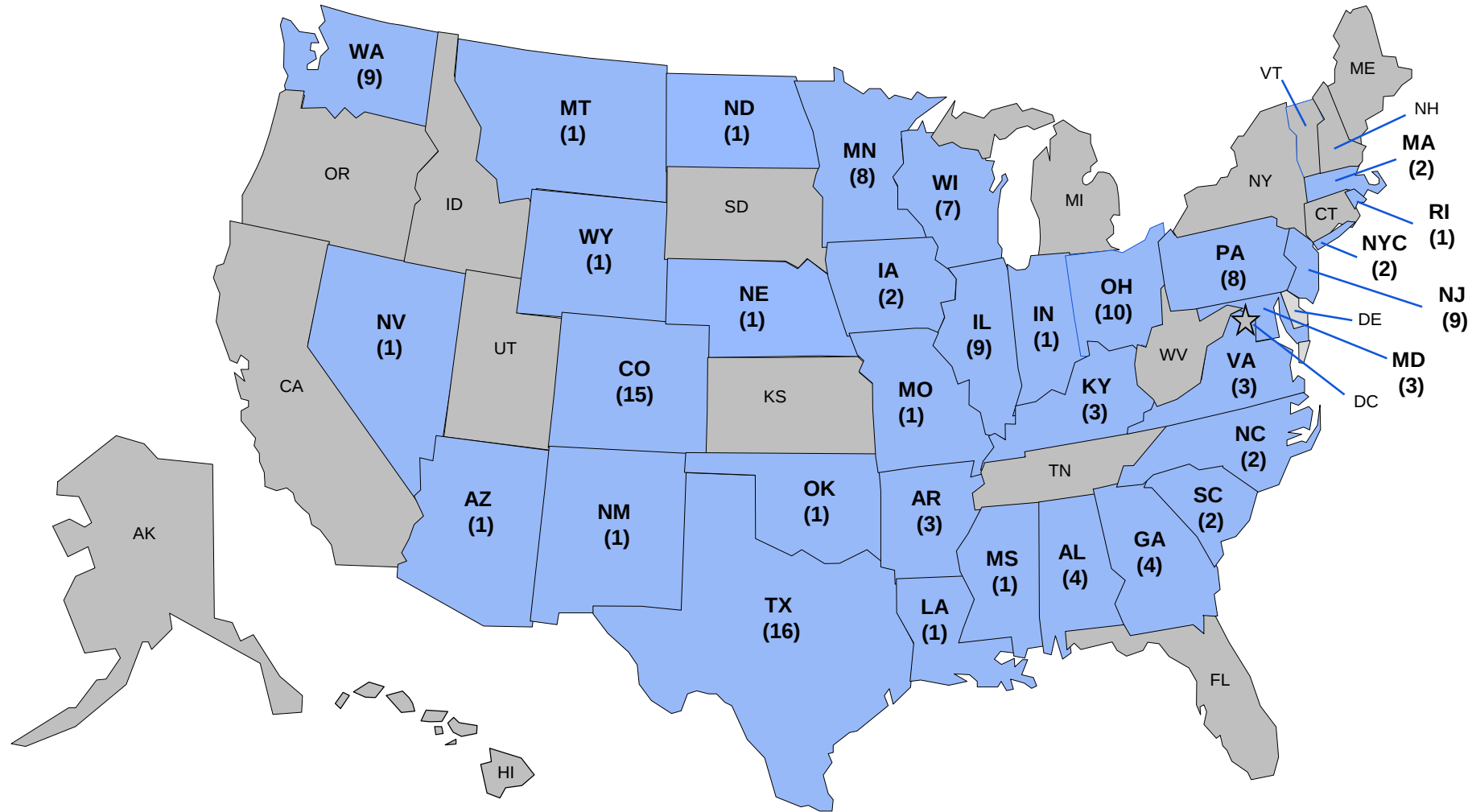
	Year					
	2014	2015	2016	2017	2018	Total
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Number of cases	120	18	143	32	129	442
Any respiratory illness	95 (81)	5 (28)	106 (74)	16 (50)	104 (81)	326 (74)
Any gastrointestinal illness*	n/a	2 (11)	33 (23)	10 (31)	48 (37)	90 (28)
Any febrile illness	74 (64)	6 (33)	93 (65)	21 (66)	105 (81)	299 (68)
Respiratory or febrile illness	105 (90)	8 (44)	122 (85)	23 (72)	125 (97)	383 (87)

*Gastrointestinal illness data collection began mid-2015

AFM diagnostic testing, Aug 2014–Nov 2018

- Cerebrospinal fluid
 - EV-D68, EV-A71, Coxsackievirus A16 in 4 confirmed cases
 - Metagenomics testing in 2014 of 14/35 CSF: GB virus C, human rhinovirus, transfusion-transmitted virus
- Upper respiratory specimen positivity varied
 - 20-30% EV-D68+ during peak years
 - EV-D68 also detected in patients later classified as non-cases
 - ~one-third specimens with other viruses detected, some co-infections
 - ~one-third specimens with no pathogen detected
- All stool tested negative for poliovirus by standard WHO methods

Confirmed cases of acute flaccid myelitis (AFM) by state — United States, 2018 (n=134)*



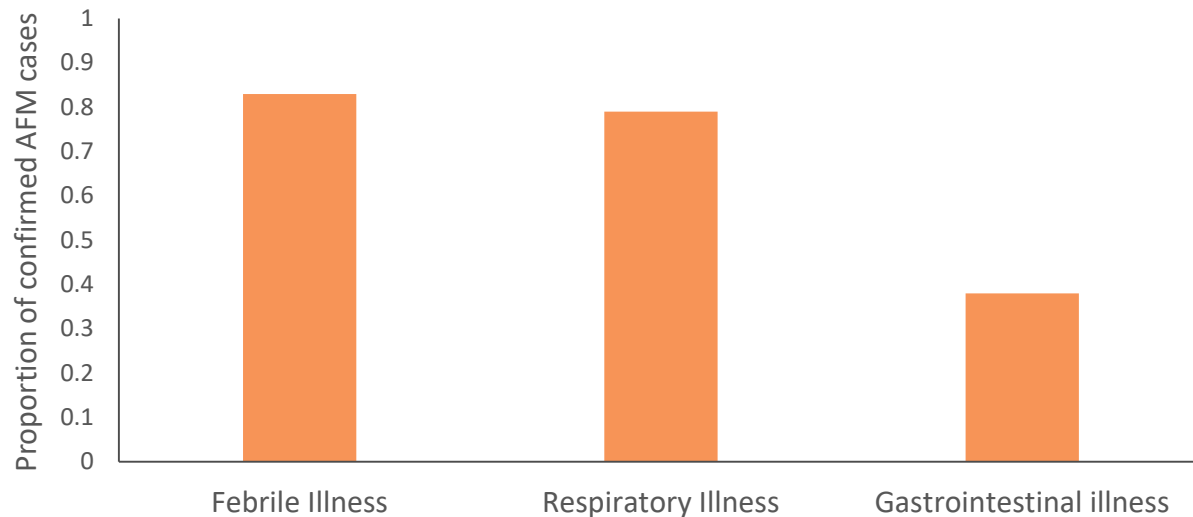
*Confirmed AFM cases as of November 30, 2018. Patients under investigation are still being classified, and the case counts are subject to change. Case counts will be updated every Monday.

Clinical characteristics among confirmed pediatric AFM cases, 2018 (n=129)

- Hospitalization: 96%
- Intensive care unit admission: 58%
- CSF pleocytosis: 81% (104 cases)
 - median cell count 104 cells/mm³ (IQR: 51–175 cells/mm³)
 - Lymphocytic predominance
 - Median time from limb weakness to CSF collection 2 days (IQR: 1–3 days)
- No deaths have been reported among cases confirmed in 2018
 - 1 death in 2017 during the acute phase of AFM
 - Aware of deaths this year among cases reported in other years

Clinical characteristics among confirmed pediatric AFM cases, 2018 (n=129)

Illnesses preceding limb weakness*



Overall: 81% febrile illness
81% respiratory illness
37% GI Illness } 97%

Days from illness onset to limb weakness, 2018 (n=129)

Illness type	median [(IQR), (range)]
Febrile illness	2 [(1–5), (0–21)]
Gastrointestinal illness	2.5 [(1–6), (0–19)]
Respiratory illness	5 [(3–8), (0–21)]

CDC laboratory test results for confirmed AFM cases, 2018

Specimen type (# tested)	Positive samples, n (%)	Organism Identified
Cerebral Spinal Fluid (n=32)	2 (6)	Enterovirus-A71 (1 adult case) Enterovirus -D68 (1)
Respiratory (n=81)	40 (49)¥	Enterovirus -D68 (21) Enterovirus -A71 (10) Rhinoviruses (7) Parechovirus (2) ¥Non-typed Enterovirus /Rhinovirus (2)
Stool (n=62)	9 (14)	Enterovirus -A71 (1) Enterovirus -D68 (1) Echovirus 11 (1) Coxsackieviruses (3) Parechovirus (1) Non-typed Enterovirus /Rhinovirus (1)

Summary

- Despite the increase in cases this year, AFM is still a rare disease
 - Predominately a pediatric illness
 - Every-other-year rise continues to be observed
 - Limited data suggests new epidemiology since 2014
 - Cases reported in 44 states since 2014
- >85% with a preceding febrile or respiratory illness
 - Virus detected in 50% of respiratory specimens
 - Among 4 confirmed cases since 2014, 3 different viruses identified in CSF
 - Unclear if direct viral invasion of spinal cord versus post-infectious process
 - Limited biopsy or tissue specimens to look at pathology

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External AFM collaborators

Thank you

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

