



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

**Manisha Patel, MD MS**

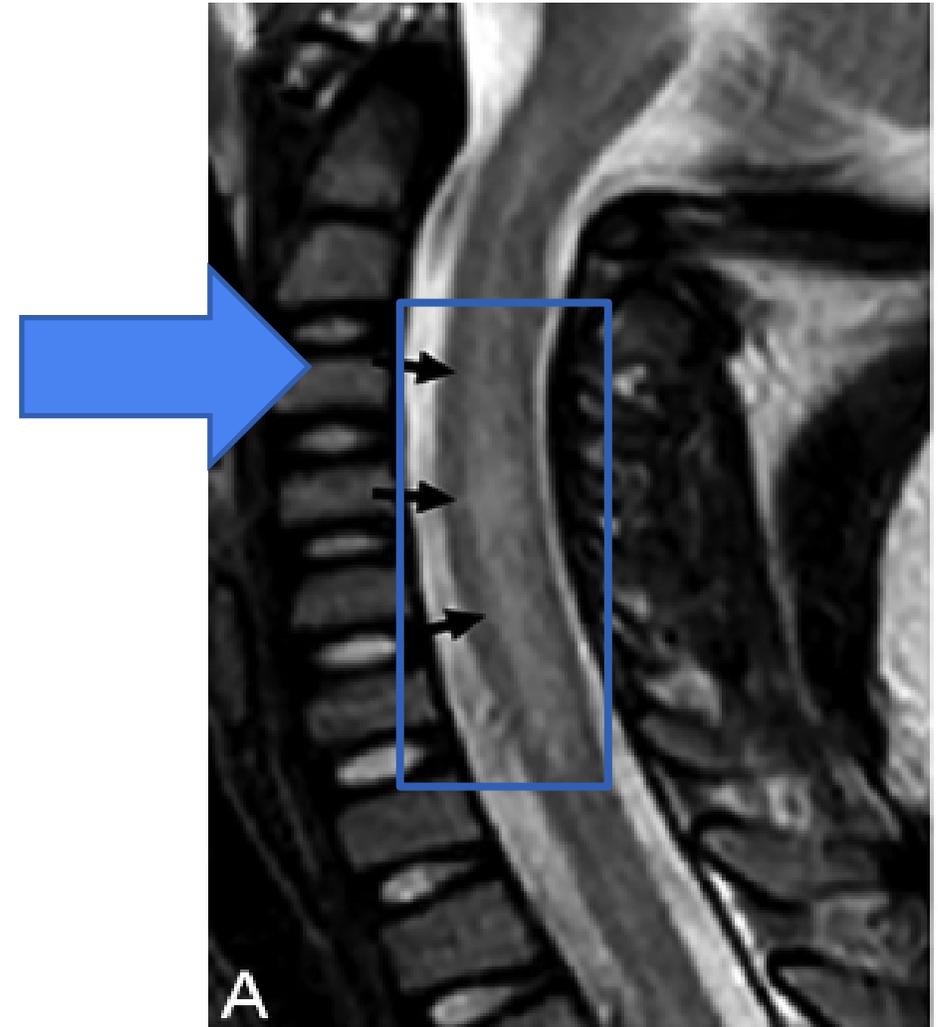
Measles, Mumps, Rubella, Herpesvirus and Domestic Polio Epidemiology Team Lead

Board of Scientific Counselors

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# Acute Flaccid Myelitis (AFM)

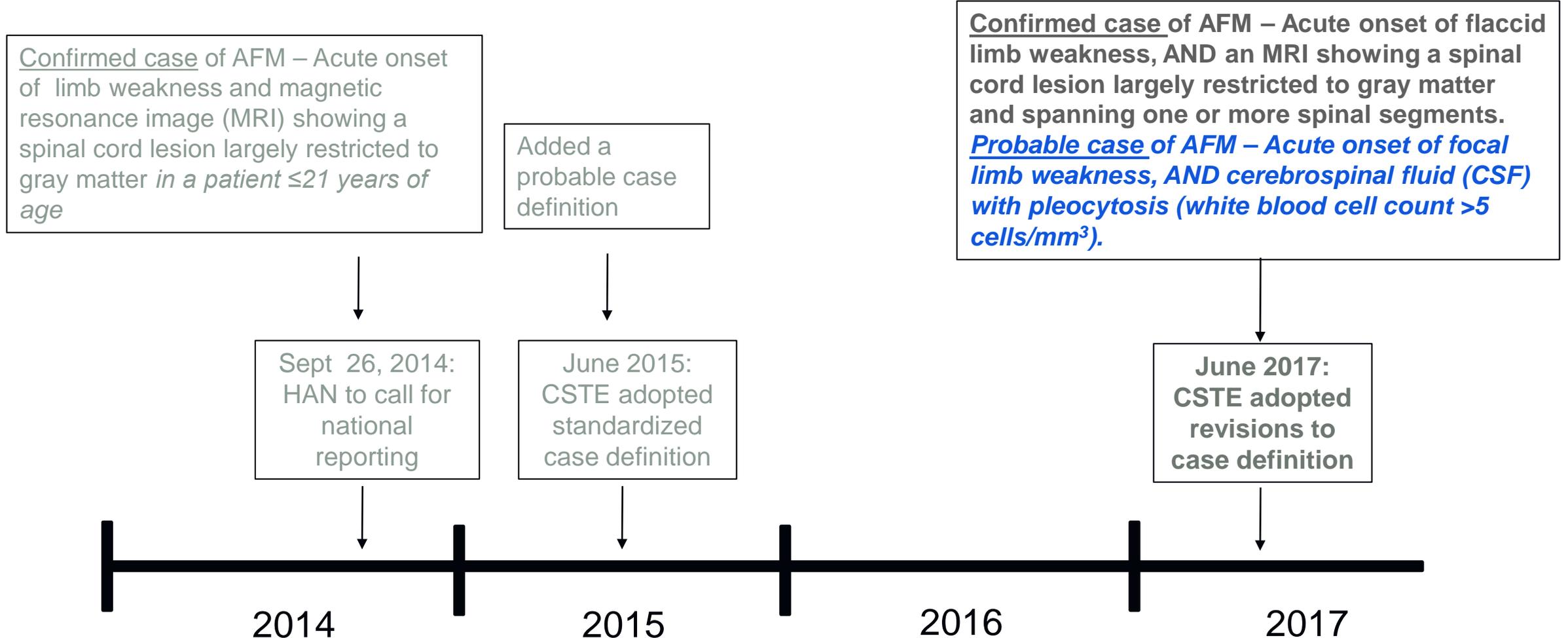
- Sudden onset of limb weakness within hours to a few days
- MRI findings demonstrate spinal cord lesions largely restricted to gray matter
- Risk factors unknown, most cases among children with preceding respiratory or febrile illness
- No proven treatment; management of AFM patients in consultation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



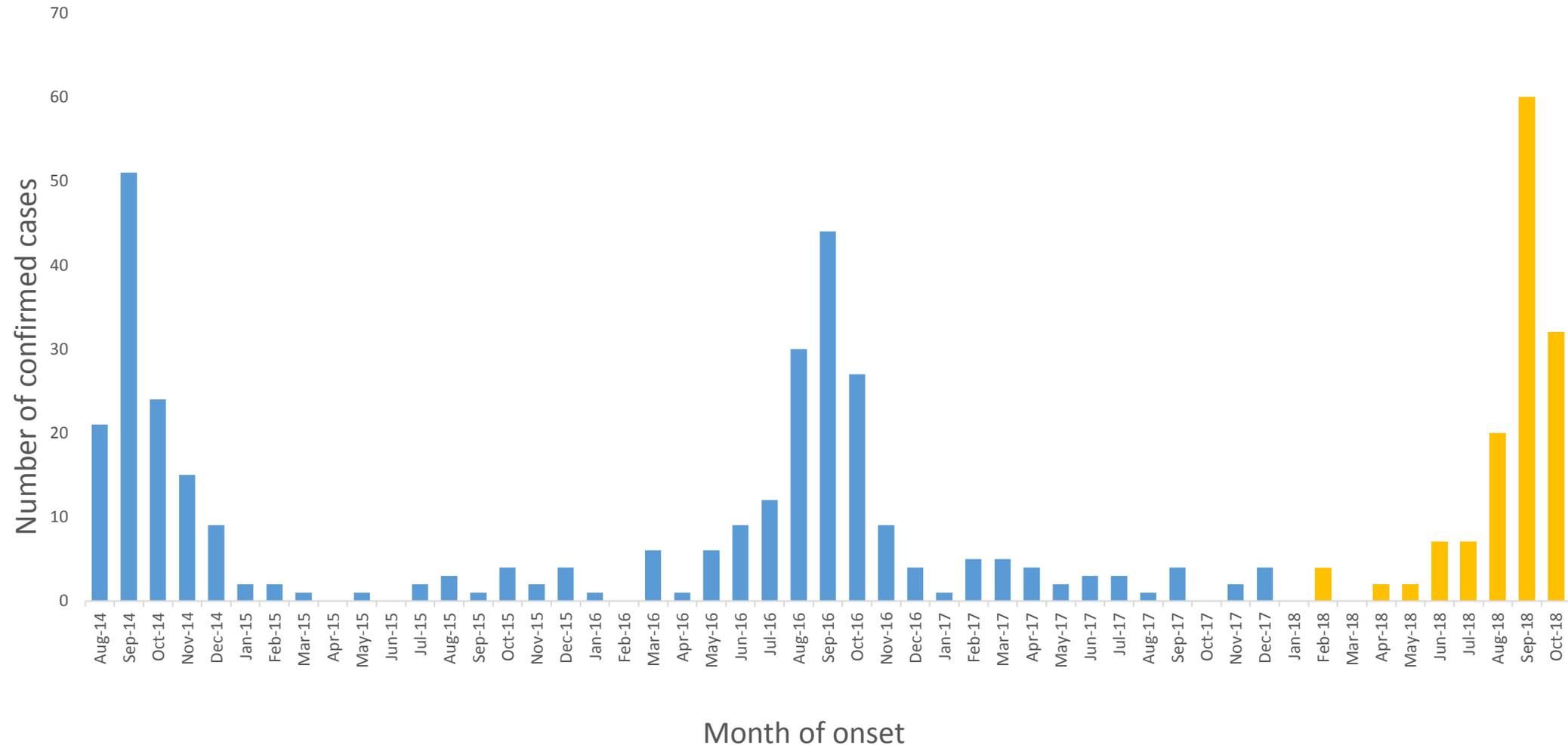
# Initial investigations of AFM in the United States

- 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>

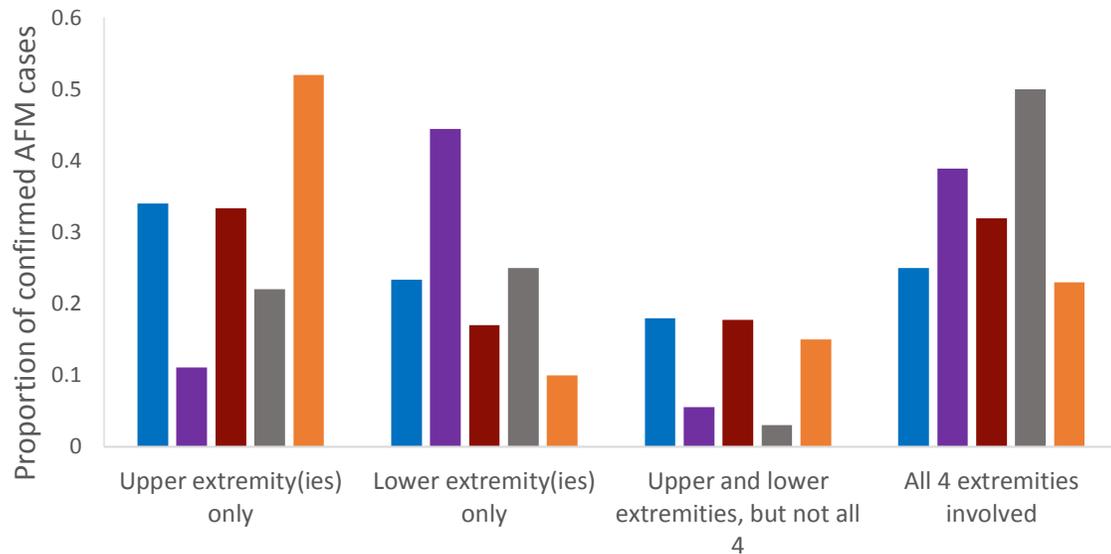
# Demographic characteristics of confirmed pediatric AFM cases, Aug 2014–Oct 2018 (N=442)

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

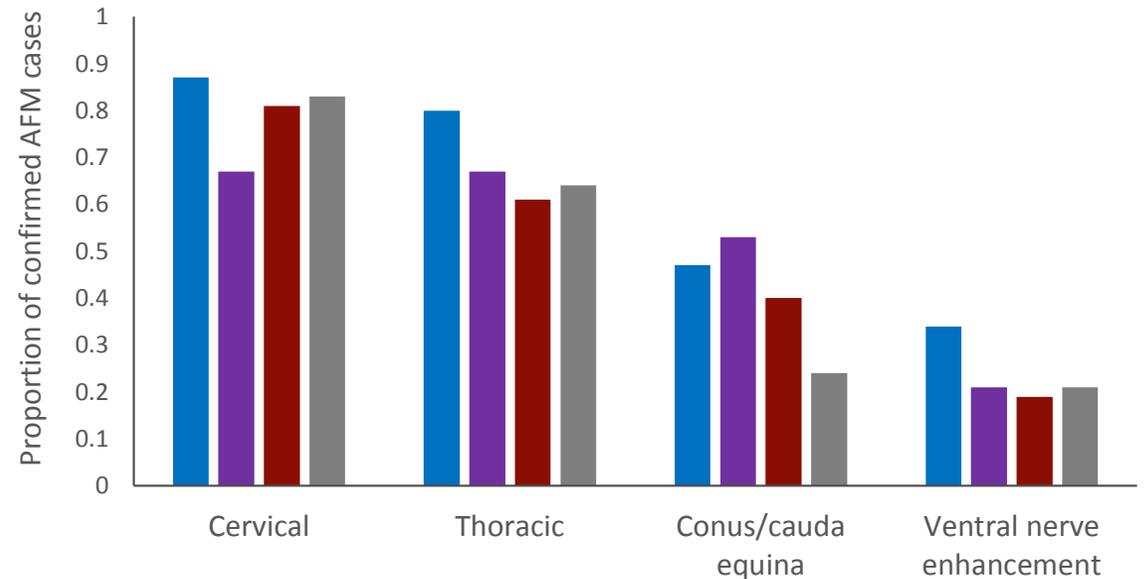
■ 2014 ■ 2015 ■ 2016 ■ 2017 ■ 2018

### 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

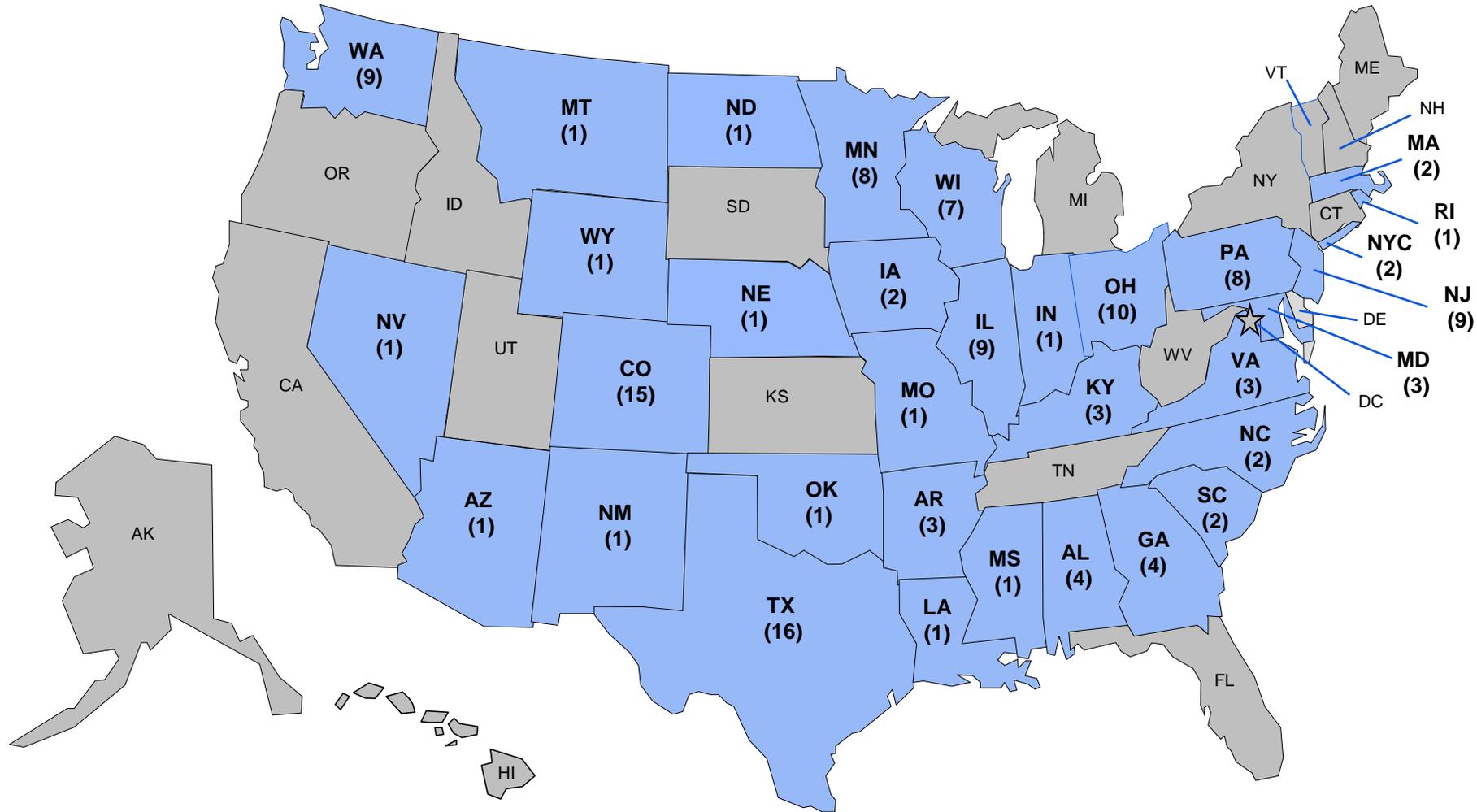
	Year					
	2014	2015	2016	2017	2018	Total
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
<b>Number of cases</b>	<b>120</b>	<b>18</b>	<b>143</b>	<b>32</b>	<b>129</b>	<b>442</b>
Any respiratory illness	<b>95 (81)</b>	5 (28)	<b>106 (74)</b>	16 (50)	<b>104 (81)</b>	<b>326 (74)</b>
Any gastrointestinal illness*	<b>n/a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

\*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)\*



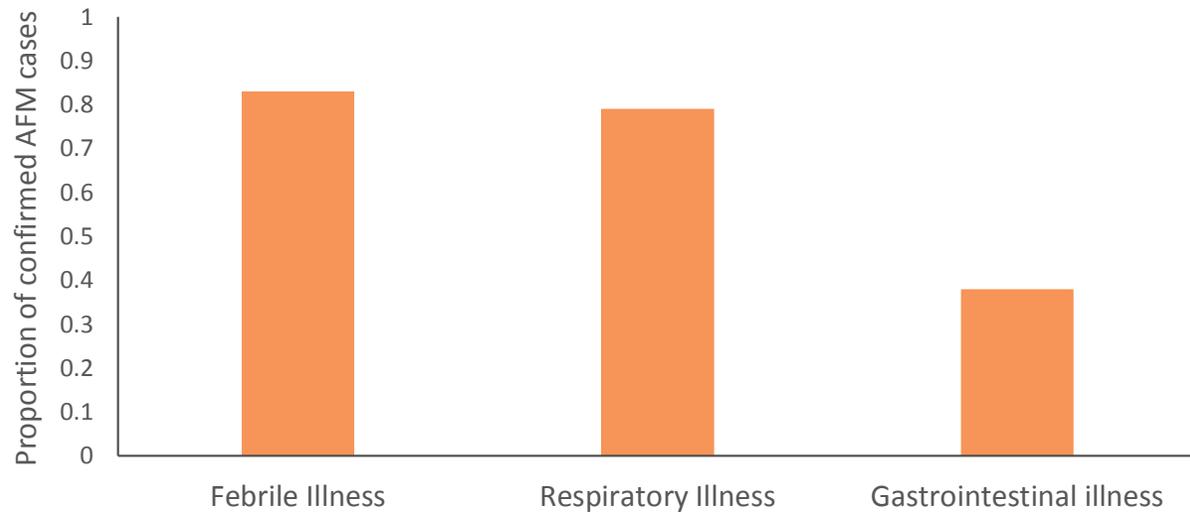
\*Confirmed AFM cases as of November 30, 2018. Patients under investigation are still being classified, and the case counts are subject to change. Case counts will be updated every Monday.

# 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/mm<sup>3</sup> (IQR: 51–175 cells/mm<sup>3</sup>)
  - 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 } 97%  
37% GI Illness

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

<b>Specimen type (# tested)</b>	<b>Positive samples, n (%)</b>	<b>Organism Identified</b>
Cerebral Spinal Fluid (n=32)	2 (6)	Enterovirus-A71 (1 adult case) Enterovirus -D68 (1)
Respiratory (n=81)	40 (49) <sup>¥</sup>	Enterovirus -D68 (21) Enterovirus -A71 (10) Rhinoviruses (7) Parechovirus (2) <sup>¥</sup> 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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# Thank you

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

