What is known about the epidemiology of Acute Flaccid Myelitis

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AFM Symposium
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Surveillance for AFM is challenging

Person with cough and fever

+

Laboratory test

=

Case of influenza

Surveillance for AFM is challenging

Person with
cough and fever

Laboratory test

Case of influenza

Person with
Limb weakness

Medical records and MRI images

Case of AFM

Case definition for AFM

Confirmed case of AFM – Acute onset of limb weakness and magnetic resonance image (MRI) showing a spinal cord lesion largely restricted to gray matter *in a patient ≤21 years of age*

Confirmed case of AFM – 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. *Probable case of AFM – Acute onset of focal limb weakness, AND cerebrospinal fluid (CSF) with pleocytosis (white blood cell count >5 cells/mm³).*

Confirmed case of AFM – Acute onset of flaccid limb weakness, AND an MRI showing a spinal cord lesion largely restricted to gray matter and spanning one or more spinal segments. *Probable case of AFM – Acute onset of flaccid limb weakness, AND cerebrospinal fluid (CSF) with pleocytosis (white blood cell count >5 cells/mm³).*

Confirmed case of AFM – Acute onset of flaccid limb weakness, AND an MRI showing a spinal cord lesion largely restricted to gray matter and spanning one or more spinal segments* *AND absence of clear alternative diagnosis attributable to a nationally notifiable condition*

Probable case of AFM – Acute onset of flaccid limb weakness, *AND an MRI showing spinal cord lesion where gray matter involvement is present* but predominance cannot be determined AND absence of clear alternative diagnosis attributable to a nationally notifiable condition*

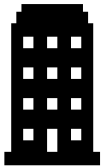
Suspect case of AFM *- Acute onset of flaccid limb weakness, AND an MRI showing a spinal cord lesion in at least some gray matter and spanning one or more spinal segments* AND available information is insufficient to classify as confirmed or probable.*

June 2019: CSTE adopted revisions to case definition

* Excluding persons with gray matter lesions in the spinal cord resulting from physician diagnosed malignancy, vascular disease, or anatomic abnormality.

AFM surveillance processes involve clinicians and health departments

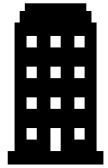
Clinician reports patient suspected to have AFM to Health Department



Health department (HD) verifies patient meets criteria and reports to CDC

HD collects medical information, MRIs and coordinates specimens to send to CDC

Neurology panel reviews information and images and provides a case classification



Surveillance classification communicated to HD and then HD relays classification to clinician

Clinical diagnosis and public health surveillance have different purposes

Clinical Diagnosis

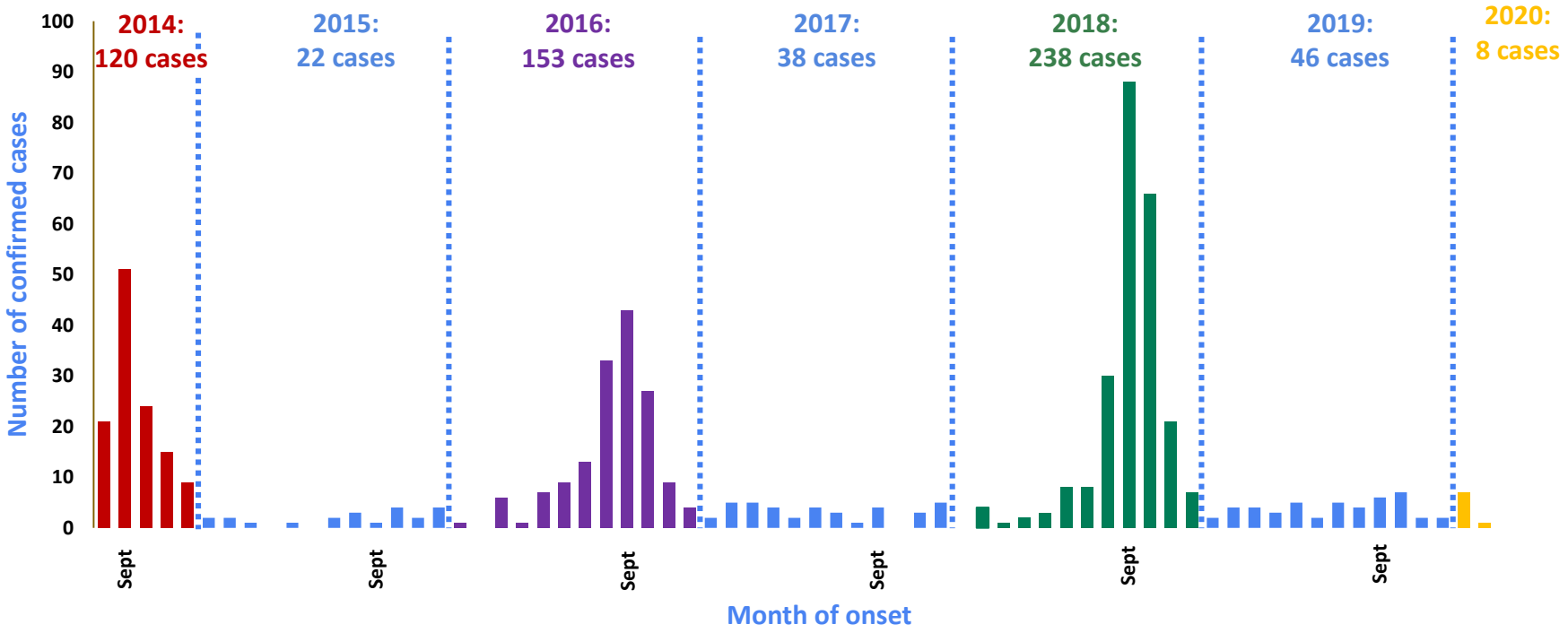
- Patient-level
- Used for individual clinical management decisions
- Time-sensitive
- Diagnosis based on full clinical presentation
- Aim for the most accurate diagnosis

Public Health Surveillance

- Population-level
- Use of standardized case definitions
- Measures disease burden and trends over time
- Delayed reporting and classification
- Balances sensitivity and specificity

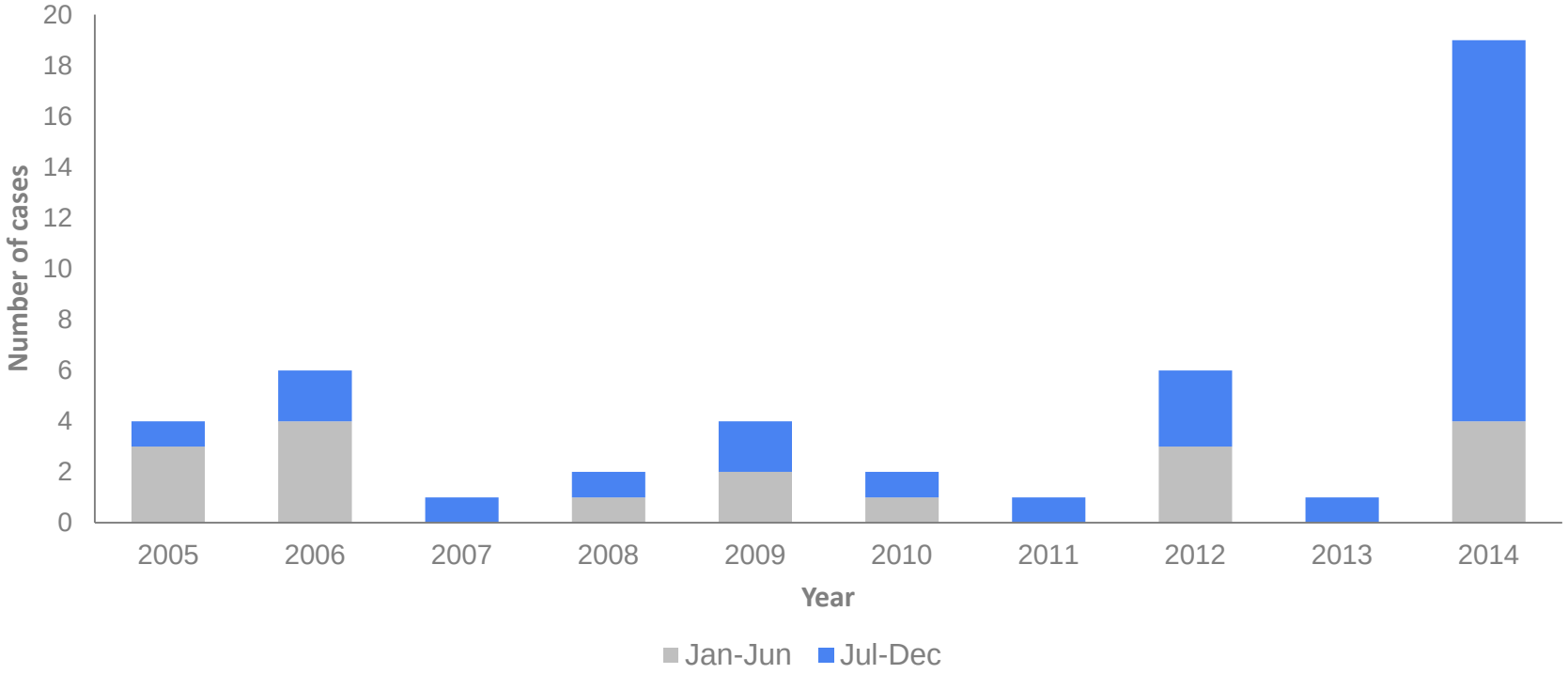
National increase in AFM cases every 2 years since 2014

Number of confirmed reported AFM cases, Aug 2014 – May 2020 (n=625)



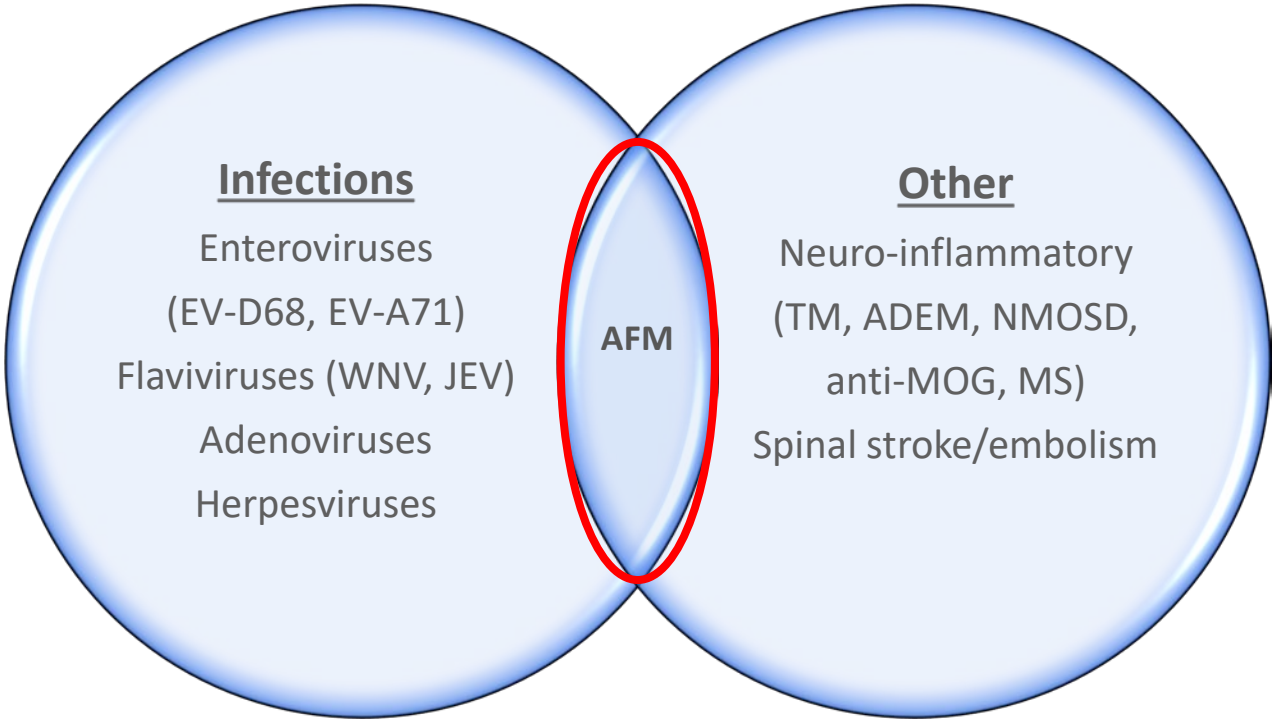
https://www.cdc.gov/acute-flaccid-myelitis/cases-in-us.html
Data current as of June 1, 2020

AFM cases, 2005-2014, 5 sites combined, United States



Cortese MM, Kambhampati AK, Schuster JE, et.al. A ten-year retrospective evaluation of AFM at 5 pediatric centers in the US, 2005 – 2014. PLOS One. January, 2020.

AFM has multiple causes



U.S. surveillance shows a consistent baseline rate of AFM

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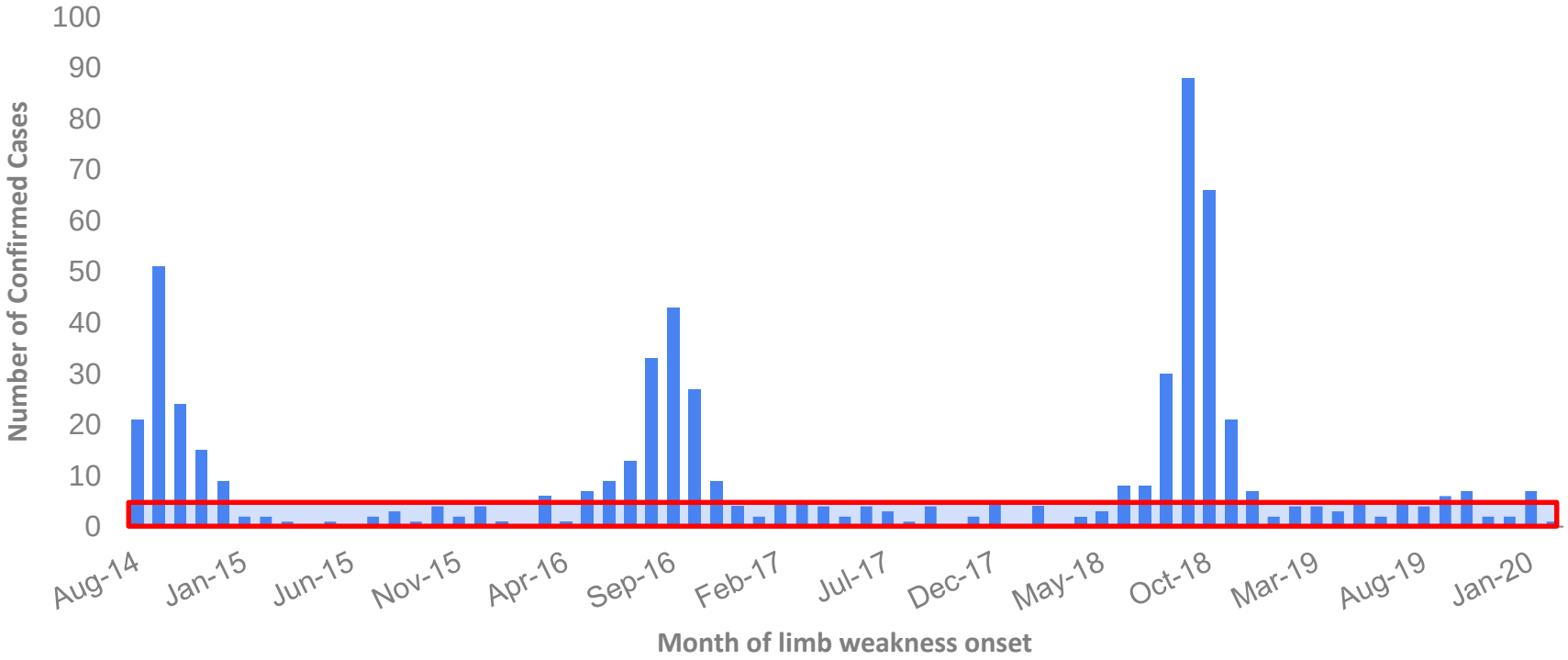

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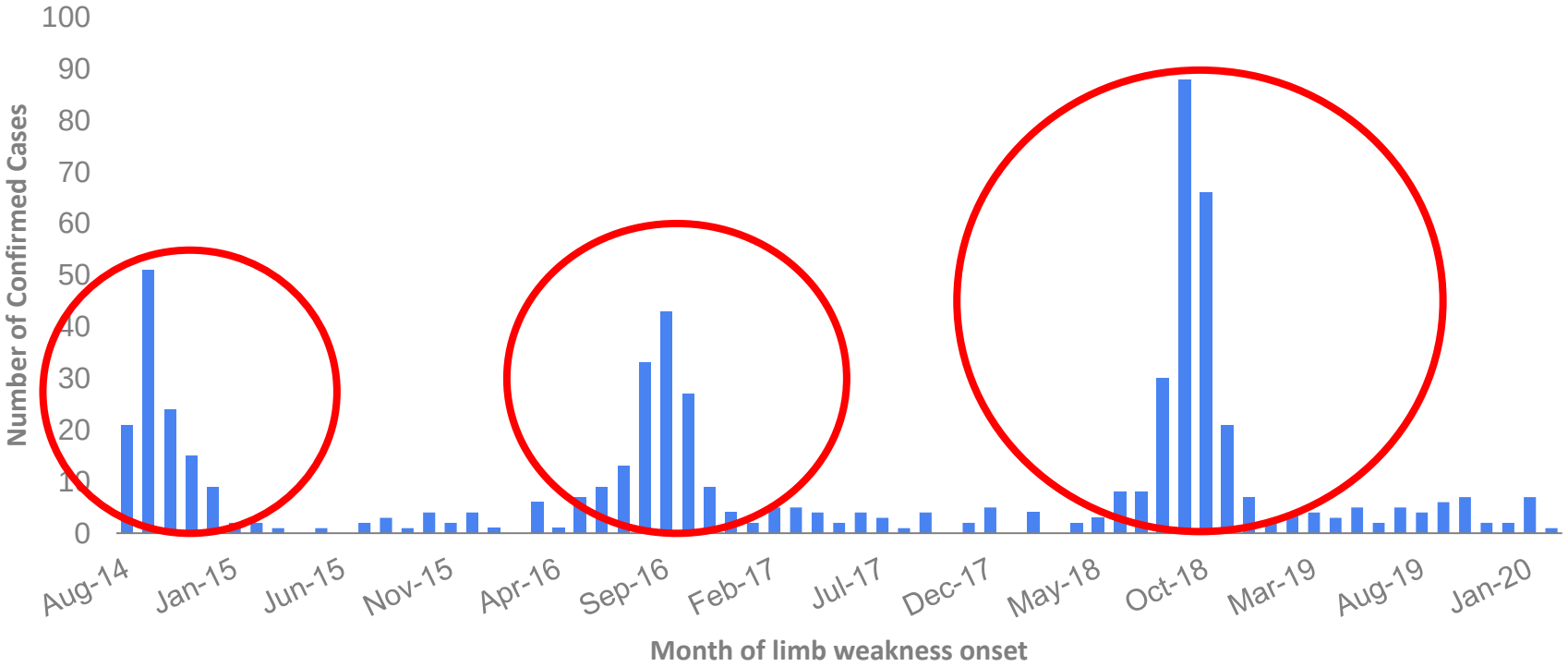
What is causing the biennial peaks in AFM?

Number of confirmed reported AFM cases, Aug 2014 – May 2020 (n=625)



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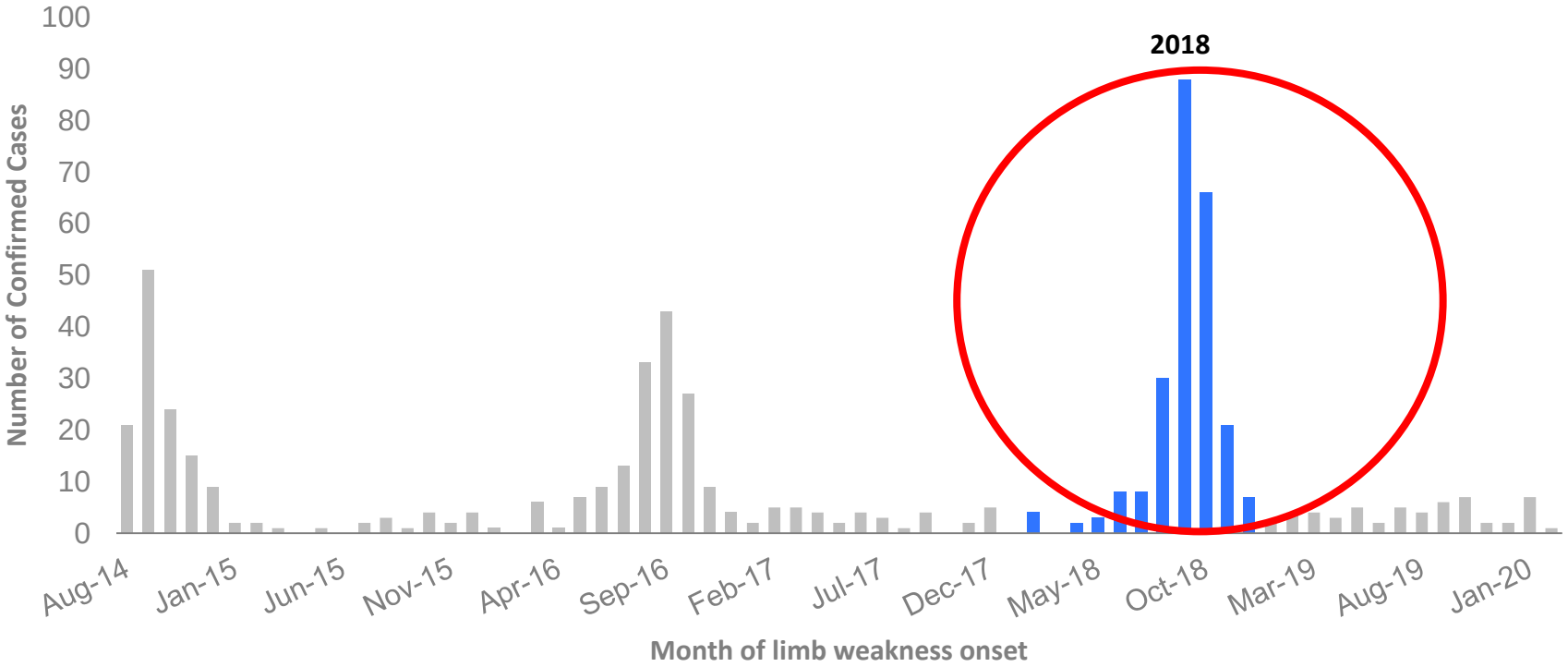
2018 was the most recent peak year for AFM

Number of confirmed reported AFM cases, January – December, 2020 (n=238)



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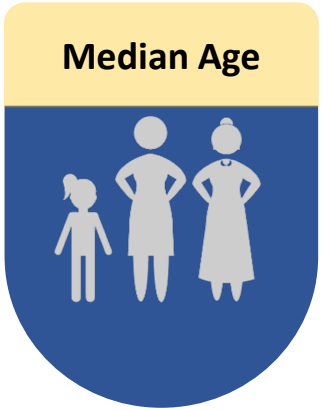
Demographic characteristics of confirmed AFM cases, 2018

42 states



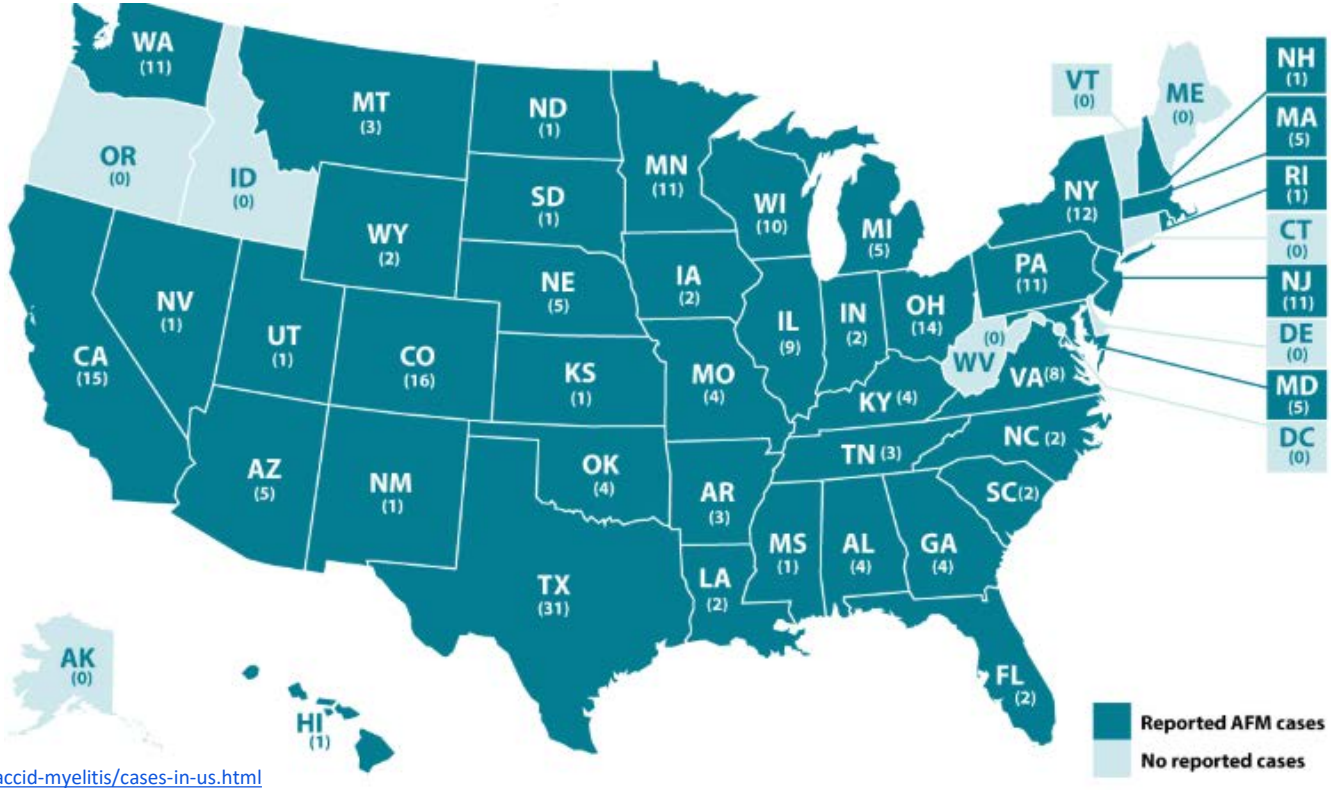
5.3 years
(IQR: 3.3—8.2)
94% <18 years

58% male

53% White
20% Hispanic
9% Black
4% Asian

Data current as of June 1, 2020
Icon Credits: Juan Pablo Bravo; Marie Van de Broeck; DT Design; MRFA

No geographic clustering of AFM among 238 cases in 42 states



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Clinical Characteristics of confirmed AFM cases, 2018

Hospitalization

98%
(54% ICU)

CSF Pleocytosis

87%
WBC count 94 cells/mm^3
(IQR: 43–163)
Lymphocyte predominance

Number of Limbs

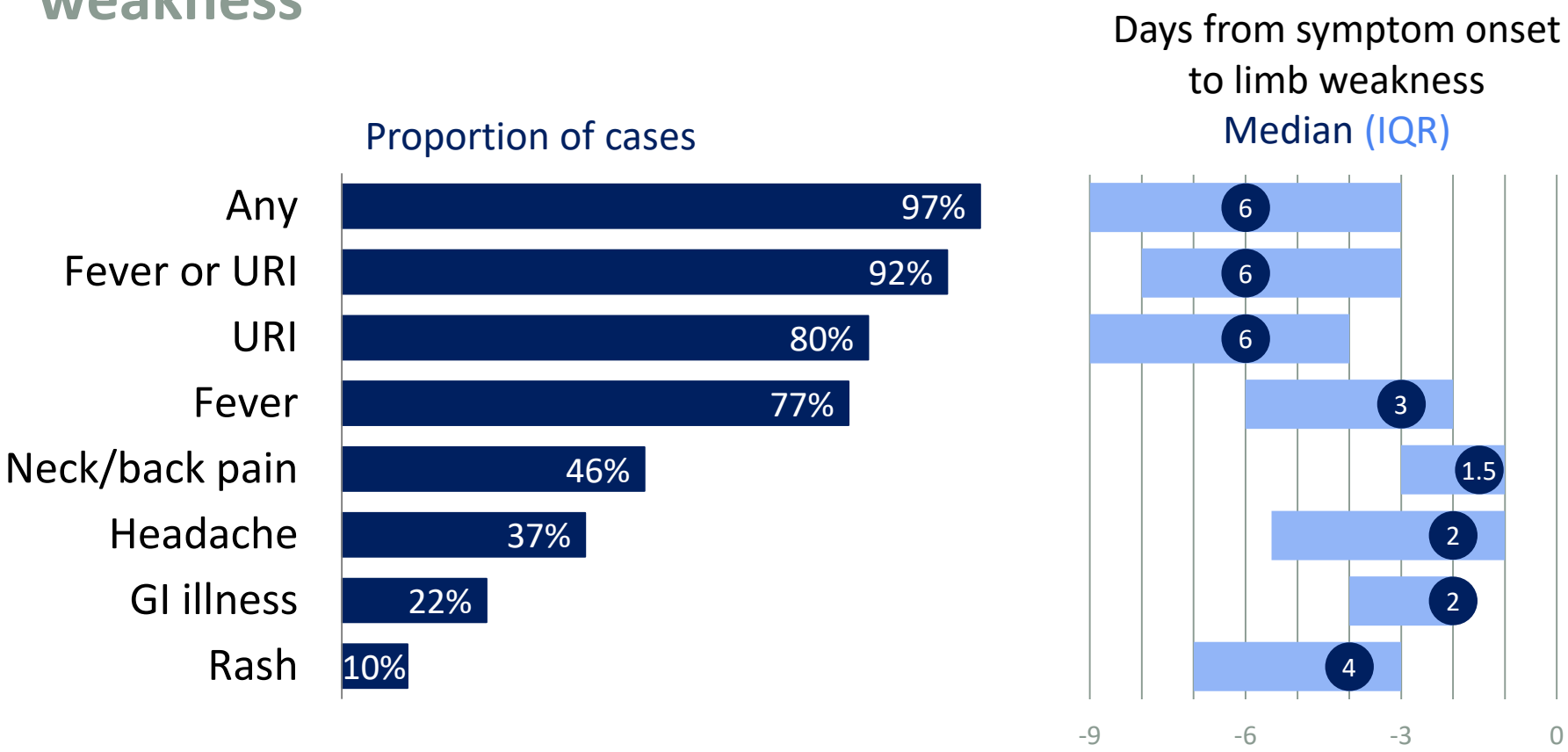
1 limb: 37%
2 limbs: 30%
3 limbs: 6%
4 limbs: 27%

Limbs affected

47% **upper** only
16% **lower** only

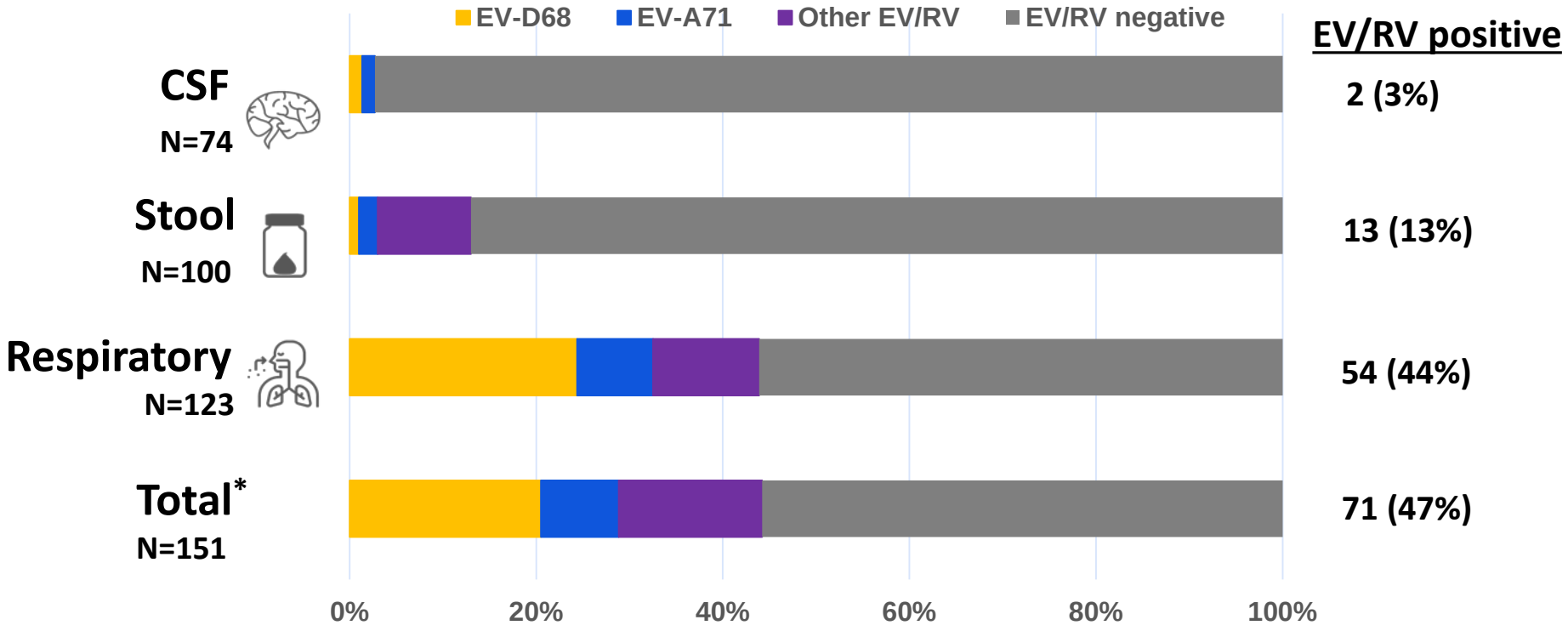
Data current as of June 1, 2020
Icon credits: Aldric Rodriguez; ProSymbols; Tawny Whatmore

Symptoms consistent with a viral illness precede limb weakness



AFM diagnostic testing remains low yield

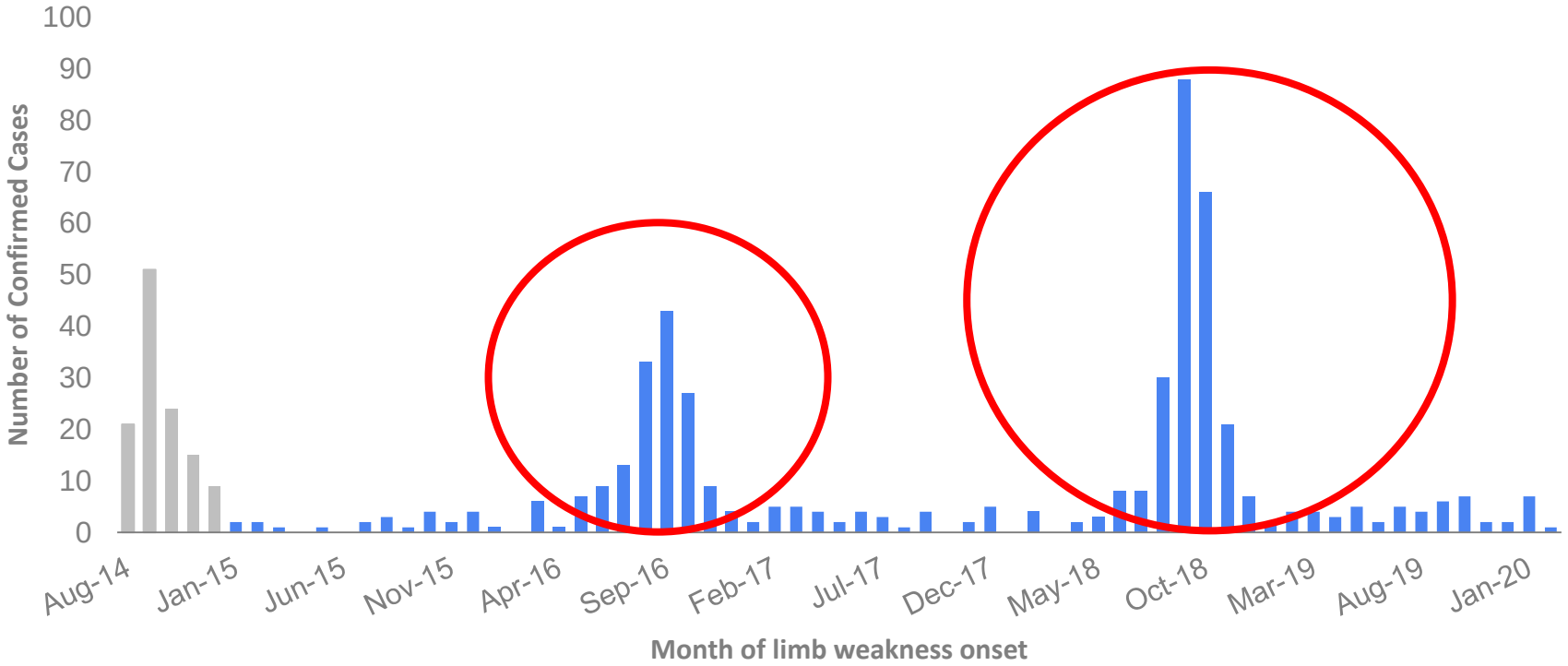
CDC testing results, 2018



*Some patients had multiple positive specimens

Lopez, et al. Vital Signs: Surveillance for Acute Flaccid Myelitis – US, 2018, MMWR 2019

What is causing the biennial peaks in AFM?



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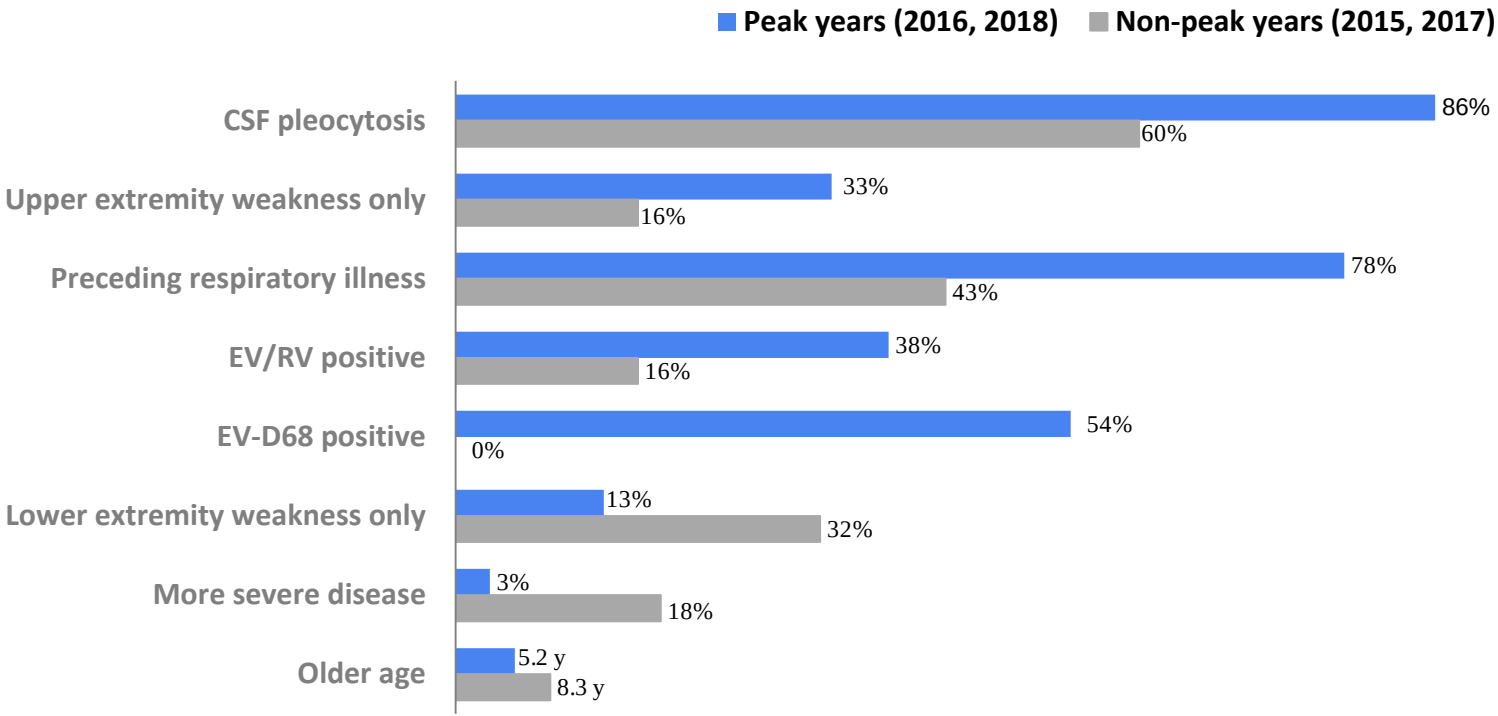
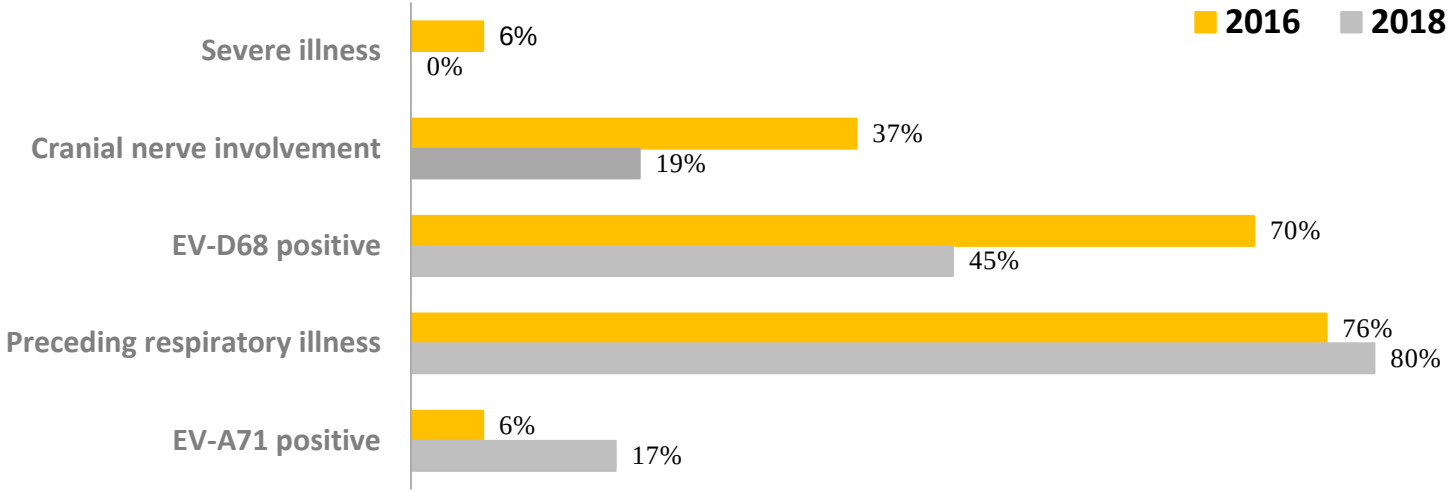
AFM case characteristics in peak years differ from those in non-peak years



McLaren, et.al. Characteristics of Patients with Acute Flaccid Myelitis, United States, 2015 – 2018. EID, Vol 26; February 2020.

AFM case characteristics also differ between peak years

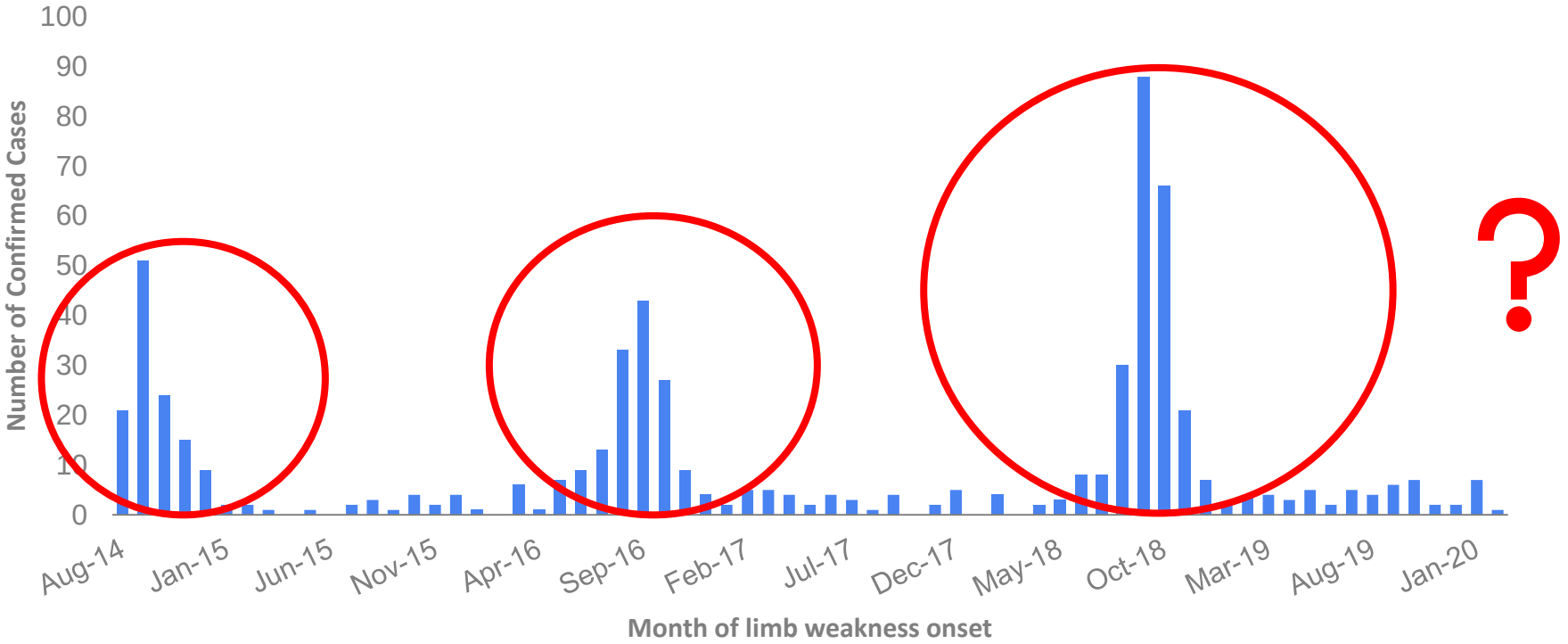


McLaren, et.al. Characteristics of Patients with Acute Flaccid Myelitis, United States, 2015 – 2018. EID, Vol 26; February 2020.

Summary

- Causes of AFM in peak years appear different from those in non-peak years, but even in peak years there may be multiple causes
- Differences in EV and EV-D68 detection support an association in peak years
  - Detection of two main EV types in 2018 emphasize need for clinical surveillance plus laboratory surveillance to understand the full spectrum of AFM
- Underlying mechanism of disease remains the critical unknown
  - If EV-D68 is the primary driver in peak years, why does paralysis develop rarely?
  - Do different case characteristics give clues about disease mechanism?
  - Understanding disease mechanisms for AFM will allow for treatment and prevention strategies to move forward

What do we expect for AFM in 2020?



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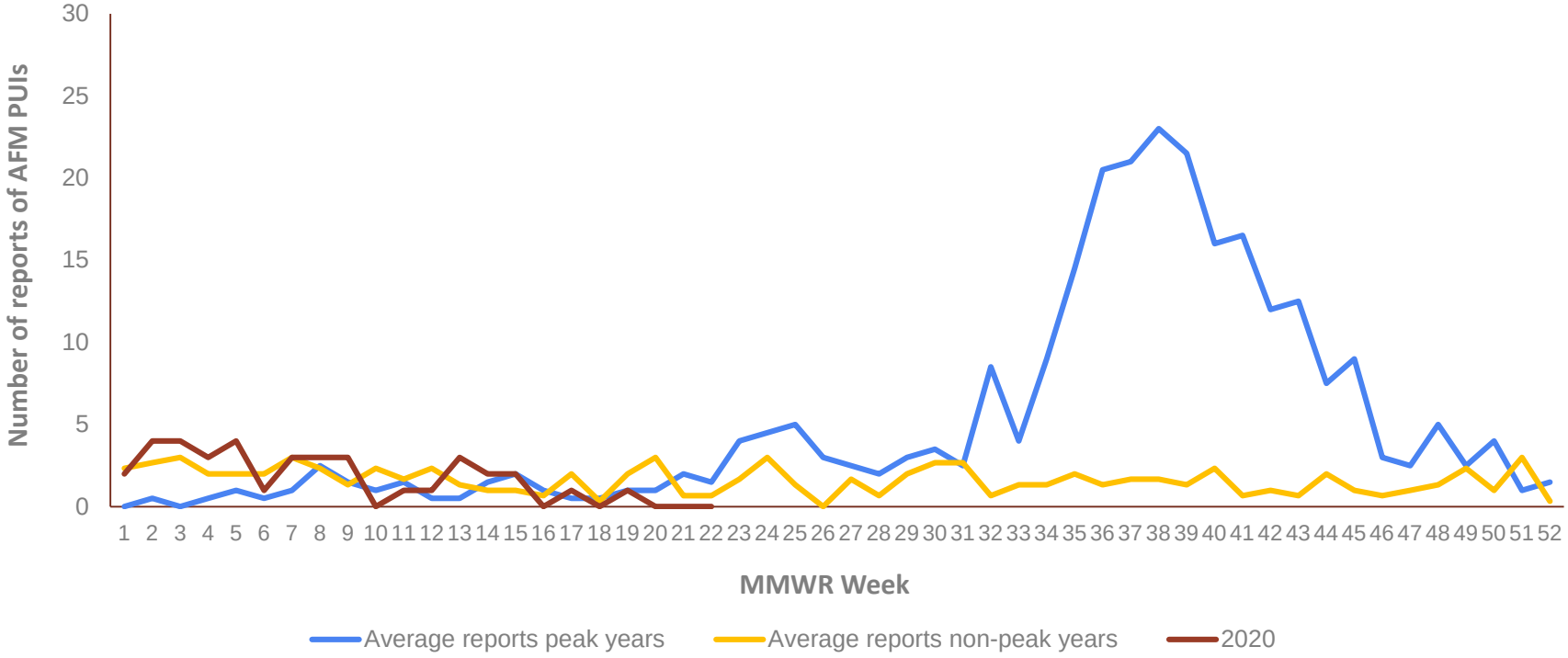
Current number of suspect AFM cases reported to CDC is typical of both peak and non-peak years for this time period



Thank you!

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What is known about the viruses involved in AFM

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