

MEASLES AND ACUTE FLACCID MYELITIS: TAMING TWO OLD ADVERSARIES

Measles has been much in the news, and understandably so. The number of cases just across the river in Clark County has soared past 30 and continues to rise, and Oregon has one linked, confirmed case.^{1,2} Though overall rates of measles, mumps, and rubella (MMR) vaccination among school-aged youngsters in Oregon aren't bad (96%), some communities are substantially underimmunized, and their populations are at risk.

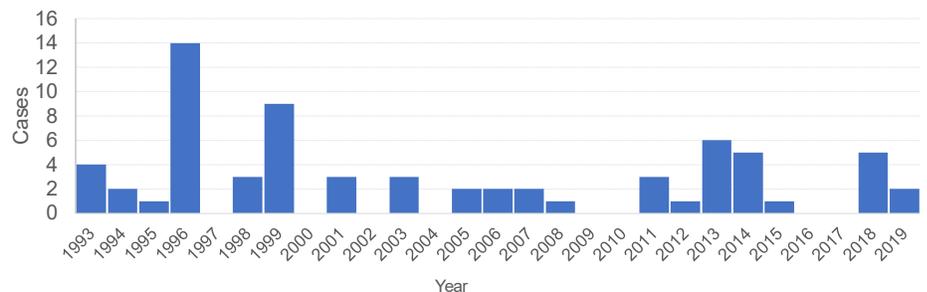
Acute flaccid myelitis (AFM) has also been getting a lot of press lately: no longer due to polio, but nonetheless causing suffering and disability among children.

In this *CD Summary*, we'll revisit these ancient scourges, review the epidemiology of recent outbreaks, and discuss strategies to stem the tide.

MEASLES

Measles is caused by a single-stranded RNA virus of the family *Paramyxoviridae*. Symptoms include fever and a characteristic morbilliform rash that starts on the face or at the hairline and spreads to the rest of the body, along with some combination of the "3 C's" of cough, coryza, and conjunctivitis. While most cases are self-limited, measles can be severe, causing pneumonia and encephalitis requiring hospitalization. Even in the U.S., CDC reports a measles mortality rate of 1–2 cases per 1000 cases.³ It spreads readily through the airborne route and is remarkably infectious: in a susceptible population, one measles case is likely to result in 12–18 additional infections.⁴ The measles outbreak in Clark County appears to have stemmed from a single imported case. Oregon has also had a few spikes like this over the years (Figure 1). This is typical of outbreaks in

Figure 1. Measles in Oregon, 1 Jan 1993 – 30 Jan 2019



the U.S. since 2000, when endemic measles was eliminated in this country through vaccination.

Common wisdom suggests that a community attaining a measles vaccination rate of about 95% will achieve herd immunity, that is, measles imported in a single case will not have enough susceptible folks around to be able to propagate, and it will die out. Alas, there is a clear risk of spread to underimmunized communities in Oregon. If measles got into these communities, it would go through them, to paraphrase an old "Down East" story from Maine, like green corn goes through the new maid. Of the 30 cases of measles reported in Oregon since 2004, 21 (70%) were unvaccinated, including two too young to receive vaccine. Six were vaccinated, and vaccination status couldn't be documented for the other three. That at least 70% of cases have occurred among the ~4% of our population that is unvaccinated is testimony to the effectiveness of the vaccine.

Several strategies can be used to prevent outbreaks in under-vaccinated communities. An easy one is making MMR vaccine available to unvaccinated patients in your practice. The number of measles cases in Oregon might be small at this point, but that could change quickly, and it's truly a kidney stone of a disease. CDC recommends an initial dose of

MMR vaccine at 12–15 months, and a second on at 4–6 years of age. If families are anxious to protect their kids, the second dose may be given at any time at least 28 days after the first dose.⁵ Kids from kindergarten through college are considered fully immunized if they've had two doses. This also goes for adults who work in health care or who will be traveling to measles-endemic areas.[†]

Other adults are considered immune if they've had one documented MMR or were born before 1957. If there's any question, the vaccine is safe and about 97% effective with two doses. Err on the side of vaccinating.

Local public health officials in Washington and Oregon are investigating contacts of all known measles cases, identifying any who are unvaccinated, and checking in with them regularly to identify quickly any who become symptomatic. If this happens, they are asked to stay away from other possibly susceptible people at home, to call their clinician immediately and arrange for evaluation and testing in a way that doesn't expose other patients or clinic staff, and to isolate themselves at home until four days have passed since rash onset.

It's an effective strategy. To work well, it depends upon healthcare providers in several respects. First, public health can only find out about suspect measles cases early, and help arrange timely,

† A designation we'd very much like to avoid

* As of 9:50 AM January 30, 2019

[appropriate testing of high-risk cases](#), if clinicians call the case's [local health department of residence](#) to report the case. It's especially important to call about any unvaccinated patients with compatible illness and known, direct exposure to a measles case or a history of visiting one of the potential exposure venues at the time an infectious measles case was present. (For a list of venues and times of exposure, see Clark County's and the Public Health Division's measles websites, references 1 and 2, below.)

Early diagnosis has several benefits. In addition to being able to provide prompt supportive care to the patient, rapid identification of the measles patient's contacts might allow preventive therapy. If given within 72 hours of exposure, MMR may prevent or ameliorate disease. Immune globulin may have benefit in exposed infants, pregnant women, and immunocompromised folks up to six days after exposure. One study found that timely receipt of MMR or IG was 83% effective in preventing measles in exposed, susceptible people.⁶ Additionally, having a plan in your facility to meet a suspect measles case outside, give them a mask, and bring them in for evaluation or testing through a non-populated area of the clinic will keep immunocompromised or as-yet-unvaccinated patients in your practice safe, and help prevent further spread.

FOR MORE INFORMATION

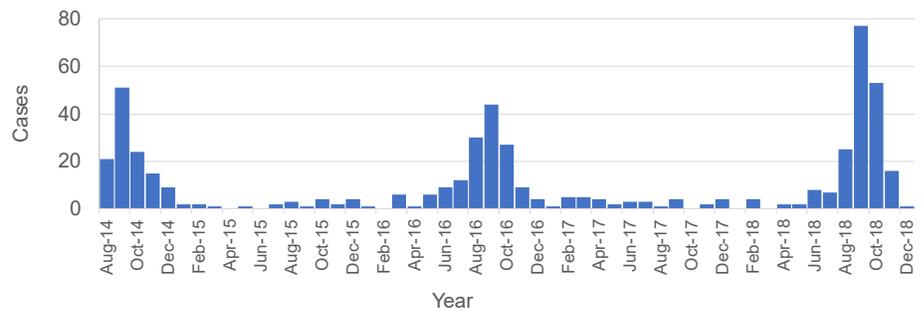
- Oregon Health Authority: www.oregon.gov/oha/ph/diseasesconditions/diseaseaz/Pages/measles.aspx

Acute Flaccid Myelitis

Acute flaccid myelitis (AFM) is a rare condition that affects the gray matter of the spinal cord, resulting in limb weakness or paralysis.⁷ It's a syndrome rather than a diagnosis and can be caused by infection and possibly environmental exposures or genetic conditions. It's been around a long time. In the pre-vaccine era, millions of people worldwide were afflicted by the scourge of polio. Thanks to the work of Salk, Sabin and millions of dedicated health workers, endemic transmission of wild poliovirus persists today in only three countries: Afghanistan, Nigeria, and Pakistan.

In the U.S., AFM reared its ugly head again in 2014, with many of the cases tied to clusters of illness in Colorado and California.^{8,9} Another spike of cases was seen in 2016, many

Figure 2. Confirmed AFM cases in U.S. reported to CDC, 2014–2018



of them in Arizona. As you've no doubt seen in the news, 2018 has also seen more than its quota of AFM cases, with 201 confirmed cases from 40 states reported to CDC.

The current definition for a confirmed case of AFM includes onset of acute flaccid limb weakness in the setting of spinal cord lesions largely restricted to gray matter and spanning one or more vertebral segments. A probable case is defined by the above symptoms, plus cerebrospinal fluid pleocytosis (white blood cell count >5 cells/mm³). We ask that you contact your local health department to report any illness involving acute-onset limb weakness or paralysis in anyone <21 years of age.

Here in Oregon from 2014 through 2017, six children with AFM were reported to the Public Health Division and subsequently confirmed to meet the above CDC case definition. We had no confirmed cases in 2018.

Nationally, the median age among confirmed cases is about four years. Almost 60% required ICU care. Testing at CDC has revealed evidence of a variety of enteroviruses in the CSF of four cases since 2014. The remaining 523 confirmed cases had none. Nonetheless, the fact that more than 90% of confirmed AFM patients had antecedent fever or mild respiratory illness prior to weakness onset suggests an infectious etiology for many of these illnesses.

MRI findings are consistent with lesions in lower motor neurons. This could be direct damage from infection or other insults, or it could reflect a maladaptive immune response.

To learn more about what is going on, we need to hear about cases of AFM, document the course of illness, and ensure systematic testing to determine their etiologies.

This is where you come in. For any patient <21 years of age who presents with acute-onset limb weakness, please contact your local health department and share with them:

- A completed AFM patient summary form available at: www.cdc.gov/acute-flaccid-myelitis/hcp/data.html,
- Admission and discharge notes,
- Neurology and infectious disease consult notes,
- MRI reports and images, and
- Laboratory test results.

We also ask that you collect the following specimens from patients under investigation for AFM as early as possible in the course of illness.

- CSF,
- Serum,
- A nasopharyngeal or oropharyngeal swab, and
- Two stool samples, collected at least 24 hours apart early in the course of illness. This will help rule out poliovirus infection.

Public health can help coordinate shipment to CDC.

FOR MORE INFORMATION

- CDC AFM Surveillance www.cdc.gov/acute-flaccid-myelitis/afm-surveillance.html

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