

Enterovirus D68 and Acute Flaccid Myelitis, 2020

[Announcer] This program is presented by the Centers for Disease Control and Prevention.

[Sarah Gregory] Hello, I'm Sarah Gregory, and today I'm talking with Dr. Sarah Kidd, a medical epidemiologist at CDC. We'll be discussing the epidemiology and surveillance of acute flaccid myelitis and its relationship with enterovirus D68.

Welcome, Dr. Kidd.

[Sarah Kidd] Hi Sarah, thanks for having me.

[Sarah Gregory] So, let's start off with what is acute flaccid myelitis, or AFM?

[Sarah Kidd] Right. So, acute flaccid myelitis (or AFM for short) is an uncommon but serious neurologic condition that most often seems to occur after a viral upper respiratory infection. AFM affects the area of the spinal cord called the gray matter of the spinal cord, and this causes the sudden onset of muscle weakness and loss of reflexes, usually in the arms or legs. But it can also cause neck weakness or facial weakness, or even weakness of the muscles needed for breathing. It can lead to permanent weakness and...and paralysis in people who are affected.

[Sarah Gregory] Is it related to polio?

[Sarah Kidd] Well, it's interesting. Poliomyelitis literally means "disease of the gray matter," which is referring to the gray matter of the spinal cord. But historically we've used the term poliomyelitis to refer to this specific paralytic disease caused by the poliovirus. Poliomyelitis caused by the poliovirus doesn't occur in the United States anymore. Poliovirus has been eradicated in the United States thanks to the vaccine. But...and CDC also tests AFM cases for poliovirus, but none have been positive. So we know that AFM is not caused by the poliovirus. The term AFM was adopted to distinguish it from the disease caused by the poliovirus.

[Sarah Gregory] Does it affect any particular age group more than others?

[Sarah Kidd] Yes. AFM primarily affects children, but it can affect adults as well. The average age of people affected is five years, and about 94 or 95% of people affected are less than 18 years old.

[Sarah Gregory] When did it first emerge?

[Sarah Kidd] CDC first began tracking AFM nationally in 2014 after clusters of cases were reported from California and Colorado. Since then, we've observed peaks in cases every two years—so, peaks in 2014, in 2016, and again in 2018. But when we look back before 2014 at medical records in hospitals, we do recognize that we did see AFM before 2014 but cases were much more sporadic and in lower numbers. So, we don't believe AFM is a brand new condition. However, it seems like something changed either in or shortly before 2014 to cause these new peaks every other year. And this suggests to us that there's either a new or emerging cause of AFM.

[Sarah Gregory] Science seems to have moved pretty rapidly on AFM. Do we know about what exactly is causing it?

[Sarah Kidd] Well, we do know that multiple viruses can cause an AFM-like picture in a small percentage of people infected. These...these viruses include the West Nile virus and also certain

types of enteroviruses like coxsackieviruses. We also know that more than 90% of children with AFM had an upper respiratory infection consistent with a viral infection in the days before they developed AFM symptoms. So, this all points to a viral or maybe a postviral cause.

Unfortunately though, it's rare to identify a virus in the cerebrospinal fluid (or CSF) of children with AFM. So, it's been difficult to definitively say what's causing each case.

[Sarah Gregory] How is enterovirus D68 involved, then?

[Sarah Kidd] We usually don't find a virus in the CSF or cerebrospinal fluid. The virus called enterovirus D68 (or EV-D68) is the virus most commonly identified in children with AFM. And it's usually from a respiratory specimen—so, from the nose or throat. And in addition, a growing amount of recent laboratory research has provided additional evidence that enteroviruses, and especially EV-D68, play a role in AFM. I...I want to emphasize though that EV-D68 is a very common virus, and most people who have it will not develop AFM. We need to know more about how this virus might cause AFM, and why some people develop AFM and some do not. And then, I...it's also important to keep in mind that we know that other viruses cause AFM as well. But it's looking more and more likely that EV-D68 is primarily responsible for the AFM peaks every two years.

[Sarah Gregory] And as you just said, it only seems to increase in severity every other year or every two years. That's very strange. Do we know why this is?

[Sarah Kidd] This is one of those intriguing questions that we'd like to know the answer to, for sure. It...it's likely that trends in AFM are caused by patterns of virus circulating in the community, and this is...at least partially depends on the proportion of the population that's immune or susceptible to the virus. So, you know, one theory is that EV-D68 is such a common virus that population immunity is so high that it prevents wide circulation one year, and then the following year the number of unexposed, susceptible people has increased as children are born each year. And it reaches a critical threshold every two years, where the virus has a...you know, there's enough susceptible people where it can circulate in a population. But this is just conjecture right now, we're definitely continuing to track AFM patterns and to learn more about them both in the United States and worldwide.

[Sarah Gregory] 2020, sadly corresponding with COVID-19 pandemic, is supposed to be a peak year for AFM. And apparently, late summer early fall has been historically when most cases appear. Has that happened as expected this year?

[Sarah Kidd] Actually, no. Based on the previous patterns, we certainly thought that 2020 was going to be another peak year for AFM. But so far we haven't seen an increase in AFM cases or case reports this year. We certainly are remaining vigilant and are prepared to respond if there is an increase in cases.

[Sarah Gregory] Do we have any guess why this is?

[Sarah Kidd] We don't know for sure, but it certainly seems like the precautions taken to prevent COVID-19, like social distancing and people wearing masks and handwashing, have decreased the circulation of other respiratory viruses, not just COVID. And so this probably applies to enteroviruses as well.

[Sarah Gregory] Ok. So, if remote learning, mask wearing, and physical distancing have offered possibly protection, do you anticipate a surge next year if those three actions are no longer being employed?

[Sarah Kidd] I really wish I knew the answer to that question. A lot of people...that's the million dollar question that a lot of people are asking. There are a lot of variables, right? Human behavior, whether schools reopen, and what happens next summer and fall. With that said, I don't want to predict anything but I certainly do think we need to be prepared for a possible surge in cases next year.

[Sarah Gregory] So, going back a little bit. Following these peak years—2014, 16, 18—what were the case numbers?

[Sarah Kidd] So, surveillance started in 2014—so, in the middle of the year—so that's sort of an incomplete year. But we have a total of 120 confirmed cases in 2014, a total of 153 confirmed cases in 2016, and then 2018 was our biggest year yet—there were 238 total confirmed cases in that year. So far, in 2020, as of the end of September there have been 22 confirmed cases. So we're lower...we're...we're lower than we would expect for a peak year, for sure.

[Sarah Gregory] Oh, ok. Yeah, that's a dramatic drop. That's...that's nice. How has the tracking of this disease been done? How were surveillance and epidemiology used together?

[Sarah Kidd] Yeah, it's...national surveillance for AFM started in 2014 and we received reports of possible cases through state and local health departments. So, along with these reports we received parts of the medical records and copies of the brain and spine MRI images as well. And then these records are reviewed with a group of expert neurologists to classify cases so that we can track trends in cases over time. At the same time, specimens from children with possible AFM are sent to our AFM laboratory here at CDC, and these are tested to look for viruses and possible causes.

In addition to those surveillance activities, we also work with clinicians and health departments to investigate and gather information about children with AFM. And we use this clinical laboratory data to help learn more about the disease and to look for possible risk factors and causes of AFM, and...and to learn why some people get AFM and some don't.

[Sarah Gregory] What are the challenges with finding the cause?

[Sarah Kidd] I kind of alluded to it before, but it is unusual to find a virus in the spinal fluid in children with AFM, and this may be because the body has already cleared the virus by the time the spinal tap is done or it could also be because the virus is basically hiding in tissues that make it difficult to detect in the spinal fluid. It's more common to find a virus in respiratory samples from the nose or throat, but sometimes these types of samples aren't collected at all or are collected too late in the course of disease to detect a virus. So, for this reason we really tried to get the message out about the importance of collecting these specimens as soon as possible when a child has symptoms of AFM. Researchers are also looking at other types of tests, like looking for antibodies to a virus in the CSF instead of the virus itself, to look for possible causes of AFM.

[Sarah Gregory] And CDC is not going this alone. Who's partnering with us to find out more about it?

[Sarah Kidd] Oh, for sure. We have many partners and collaborate with partners at the National Institutes of Health, clinical and research partners through the AFM Task Force and Acute Flaccid Myelitis Working Group, and also organizations like the Siegal Rare Neuroimmune Association (or SRNA) and AFM Parent Work Groups. The AFM Parent Groups have been really helpful in helping us get the word out about AFM.

[Sarah Gregory] Ok. So, what's the ultimate goal of these partnerships?

[Sarah Kidd] These partnerships have really strengthened the AFM network and advanced our understanding of AFM, both through research and through communications to increase awareness about AFM among both the medical community and among parents in the general population. Of course, the ultimate goal of these partnerships is that we hope this increased knowledge will ultimately lead to the development of diagnostic tests, effective treatment, and ways to prevent AFM completely in the future.

[Sarah Gregory] And is the timeliness of diagnosis important? I know you said the timeliness of getting the spinal tap could be important, but is just general timeliness of diagnosis important? Does it make a difference?

[Sarah Kidd] Well, AFM can progress very quickly over days or even hours and it can lead to respiratory failure. So it's very important to recognize the signs and symptoms of possible AFM as early as possible. About half of children with AFM will need to be admitted to the ICU (or Intensive Care Unit) and about a quarter will need a ventilator to help them breathe at some point during their hospitalization. So, it's important to recognize AFM early so that these children can be hospitalized and monitored, and also evaluated for AFM and other similar conditions, and to provide the best management for each patient.

[Sarah Gregory] Are there any treatments?

[Sarah Kidd] Right now unfortunately there's no specific treatment for AFM. Clinicians may recommend certain interventions on a case-by-case basis, and the most common treatments given are intravenous gamma globulin (or IVIG) and steroids. AFM can look similar to other neurologic conditions which do have specific treatment, so it's important to consult with specialists to help distinguish AFM from these other conditions and to guide therapy. I also want to note that we do know that physical and occupational therapy helps with the weakness and mobility, and it's important to initiate rehabilitation early to have the best outcome. Many children continue to have improvements with long-term physical therapy as well. Even over the course of months or even years, they've continued to make incremental improvements. So, rehabilitation is also a key...key part of treatment.

[Sarah Gregory] What clinical and public health actions can be taken to help protect these patients?

[Sarah Kidd] Right now, we don't have a way to prevent AFM altogether, but we do know that clinical and public health actions can have an impact on patient care and...and outcome. For this reason, a key part of our preparedness activities have really focused on communication to increase clinician and public awareness of AFM to lead to more rapid recognition of AFM. We've been conducting intensive outreach this summer, especially for frontline clinicians like emergency room and urgent care clinicians who are most likely to be the first ones to see patients with limb weakness, and be ones who will recognize AFM and get them care. I...I also want to make clinicians aware of some other AFM resources on the CDC website and also the SRNA (or Siegal Rare Neuroimmune Association) website. Specifically, there's a physician consult portal where clinicians can enter some information and request consultation with an AFM expert if they'd like to discuss a specific patient with an expert. I spoke earlier about the importance of consulting with specialists, and...and this is a great resource. You can find it by googling "AFM Physician Portal" and it will lead you right to the SRNA website.

[Sarah Gregory] That's great to know, that's really helpful. So for parents, I know it's...it's very worrisome and it's a really important question, right now other than masks and social distancing, what can parents do to protect their children? There's...is there anything? And...and you mentioned earlier that it was important for parents to get the message about this; to what end, if there isn't...if it can't be prevented?

[Sarah Kidd] Right. I think it...it can be really distressing for parents to feel like there's not...not much to do. And there isn't a specific action to take to prevent AFM. However, we do recommend of course just...the general practices that we've been hearing a lot about recently that can decrease the risk of getting viral infections in general, and these include frequent handwashing with soap and water, avoiding touching your face, and avoiding close contact with people who are sick. But I think the most important thing that I'd like parents to be aware of is if your child develops sudden weakness—especially after a recent viral infection—to seek care right away. Even in the setting of COVID, AFM is an emergency and needs to be evaluated.

[Sarah Gregory] What would you like to see as the next step taken on the path to stopping AFM?

[Sarah Kidd] That's a...that's a big question. As much as we learned in the last few years, there's still much more to learn and understand about this disease. We...we do need to know why some children develop AFM after a viral infection and...and why some don't and most don't. If we understood this, then we could identify people who are most at risk for AFM. This would help us develop preventions but also would help us target prevention efforts for people who needed it the most. And on the other end of the spectrum, for children who develop AFM or already have AFM, we are learning more all the time about treatments, rehabilitation, and outcome. It's important to keep gathering information on these so that we can help children with AFM have the best outcomes and recovery possible.

[Sarah Gregory] Tell us about your job at CDC. What you do and what you enjoy most about it.

[Sarah Kidd] I'm a medical officer and medical epidemiologist on the AFM team at CDC. I'm trained as a pediatrician, so I really enjoy working on an important topic related to children and their parents. In my position, I help set up systems and projects to collect data, and then analyze and translate that data into useful clinical and public health information about AFM. And these include surveillance projects, special studies, and I also work closely with researchers in our laboratory. I also work with our communications team to help get the word out about AFM. So, I work with a lot of amazing and smart people and I really enjoy collaborating with them and learning from them every day.

[Sarah Gregory] Are you still working remotely, like most of us at CDC? What do you do for fun and relaxation in Atlanta?

[Sarah Kidd] Yes. I think like most people, I've been working remotely for over six months now. Hard to believe it's been that long. For...for fun, now that the weather has cooled off and is beautiful here in Atlanta, I've definitely been spending more time outside working in my yard and running longer distances again. But I'm not too proud to admit that one of my main forces or modes of relaxation is streaming TV shows on Netflix. Although, I think I've started to run out on...run out of good options there. I...I definitely love the series *The Good Place*, especially the first season, and I just finished up the last season of that so I'm looking for recommendations of what to watch next.

[Sarah Gregory] That's so funny. I don't have a TV and I've never watched TV and I don't watch TV shows, literally. I mean, I don't know when the last time was...15 years or something. And...but I got into a binge thing for a while where I was...yes, streaming...but BritBox, BritBox and Acorn. British murder mysteries, that's my drug.

[Sarah Kidd] Oh, yeah.

[Sarah Gregory] Anyway, well thank you so much for taking the time to talk with me today, Dr. Kidd.

[Sarah Kidd] Thank you. It was fun.

[Sarah Gregory] And thanks for joining me out there. You can read the October 2020 online report, Enterovirus D68-Associated Acute Flaccid Myelitis, United States, 2020, online at [cdc.gov/eid](https://www.cdc.gov/eid).

I'm Sarah Gregory for *Emerging Infectious Diseases*.

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