Defining Moments in *MMWR* History: Swine Influenza A (H1N1) Infection in Two Children, Southern California, March-April 2009

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

[Dr. Rasmussen] Welcome to *Defining Moments in MMWR History*. I'm your host, Dr. Sonja Rasmussen, Editor-in-Chief of the *MMWR*.

Today, we're talking about the identification of novel influenza A H1N1 virus infection in two children from southern California. First identified in April of 2009, these cases marked the beginning of the 2009 H1N1 influenza pandemic. *MMWR* was the first scientific publication to break the news of these cases and went on to publish critical findings from the pandemic.

Joining me today is Dr. Dan Jernigan, one of the first at CDC to hear about and investigate these two cases. Dan played a central role in CDC's response to pandemic H1N1 influenza and is currently Director of CDC's Influenza Division. Welcome to the show, Dan.

[Dr. Jernigan] Thanks, great to be here.

[Dr. Rasmussen] Dan, influenza in children is common. What made you especially concerned about these cases?

[Dr. Jernigan] Well, yes, influenza in children is very common. So, the symptoms themselves were not what cued us into an unusual activity in influenza here. It was actually the viruses that we collected from those two children.

[Dr. Rasmussen] So what about this virus was different?

[Dr. Jernigan] Well, this particular virus actually has a number of changes in it that make it very different from the viruses that were circulating at that time. When that happens and a human gets infected with it, we call that a novel influenza virus infection. And so, these were two novel influenza virus infections in children in sort of the same area. And when we're looking for things that define a pandemic, we're looking for a novel influenza virus infection that has efficient spread from one person to many people and has sustained transmission from person to person to person. And with these two cases, we had novel influenza but the transmission piece we didn't have, so it was concerning that there might be a pandemic but it wasn't enough right at that time for us to say *this* was a pandemic.

[Dr. Rasmussen] So before these two children were identified, the United States and many other countries were preparing for a future pandemic. Was this the expected scenario?

[Dr. Jernigan] No, it was not. The two children in California was not the scenario that we were looking at. At that time, a number of folks within the federal government were very concerned about a virus that had emerged in China and in Asia called H5N1. It was a virus that caused

about six out of every 10 people to die with infection, and the concern was that it might mutate, might adapt to humans and become a pandemic that likely would start in Asia and spread around the world. That's not what we got in 2009. We ended up with a H1N1 virus that didn't cause as severe disease and emerged from North America. And so, things were different, but a lot of the preparation that had been done during that period before 2009 really was great for us.

[Dr. Rasmussen] So tell me more about these first two cases.

[Dr. Jernigan] The first two cases—it's interesting—they were both from California. One was from San Diego County, one was from Imperial County, which is along the border with Mexico. CDC was involved in two different kinds of systems—surveillance systems in both of those counties. Along the border with Mexico, we actually had activity with the Department of Defense, where we were collecting specimens from people along the border. That's how we picked up that particular case. And then in San Diego, the child there actually had a swab taken from their nose and was put into an experimental diagnostic device that actually was able to pick up that this was a novel influenza virus, and so those are what cued us. The other thing that was interesting was both of these kids had viruses that looked like swine viruses. So when we compared them to other viruses out there, they didn't look like human virus, they looked like viruses that were circulating in swine. However, we needed to figure out -- did they actually have some swine exposure? So, for the 10 year old boy in San Diego, we actually asked his family, and it turned out he'd actually gone to the San Diego Zoo. And at the zoo, there was a pig on a leash that they would take around the grounds and the kids would pet and so forth. And so we actually did contact the San Diego Zoo, work with them, actually anesthetize the pig, swab the pig, and test the pig, but it turned out not to have any of this kind of virus in its nose. For the other case, that child had actually gone to the Imperial County Fair, and at that fair had gone to the pig barn and seen a lot of pigs, but when we went to try and swab those pigs, all of those pigs had actually been slaughtered and turned into breakfast. And so, for that reason, we weren't able to test there, but we were able to say they didn't have the same exposures. There was not really swine that were involved here—what we often refer to as the smoking pig (instead of a smoking gun)—so that really said that something is really unusual here. We need to get the word out, and that's why we put an MMWR out.

[Dr. Rasmussen] You published information on those two children in MMWR. What happened next?

[Dr. Jernigan] Well, that led to the recognition that what looked like very minor illness in those two children was in fact the beginning of a pandemic. We heard subsequently from folks in Mexico and in Canada about cases that they had been evaluating, and because we published it in MMWR, it led to a cascade of events that really started our response to the pandemic.

[Dr. Rasmussen] How did you learn more about the virus?

[Dr. Jernigan] Well, there were a number of things that had to get done very quickly. Whenever something like this happens, you have to evaluate the severity of illness in the people themselves by looking at hospitalizations. You want to know how quickly it's transmitting from person-to-person. You want to know if the antiviral drugs that are out there will actually treat it, and so a

number of studies had to get done very quickly at the same time that we started doing mitigation efforts.

[Dr. Rasmussen] What was done to stop the outbreak?

[Dr. Jernigan] Well, a number of things. First of all, a lot of infection control was put in place to help prevent healthcare workers [from getting sick], antiviral drugs were distributed through the nation's strategic national stockpile, a lot of guidance was given, some schools ended up closing, but whenever you have a flu virus that emerges for which the population is complete naïve, we have to get a vaccine out, and so the first thing that we started working on was the development of a vaccine.

[Dr. Rasmussen] And what happened to the 2009 H1N1 pandemic virus since the pandemic, since it was declared over in August of 2010?

[Dr. Jernigan] So, this is the thing that flu viruses do. They completely change, start circulating, cause a pandemic, but then they become seasonal viruses. They actually become the thing that appears every fall in the United States and elsewhere around the globe. So, the virus that showed up in 2009 is actually still with us, but now we have vaccines that can cover it. And we're watching it to see if it will continue to change.

[Dr. Rasmussen] Are there any viruses you're watching now that could become a pandemic in the future?

[Dr. Jernigan] Absolutely. There are a few viruses that we're looking at. One in particular is called H7N9. And so that H7N9 is currently only in China in poultry and has caused in the last few months almost 800 cases of human infection in people that were exposed. There's features about that virus that make it much more likely to emerge as a pandemic virus, and so we're following it very closely.

[Dr. Rasmussen] Thanks, Dan. We anticipate hearing more about that virus in an upcoming *MMWR.*

I've been talking today with Dr. Dan Jernigan about his experience with the 2009 influenza A, H1N1 pandemic. *MMWR* is proud of its role in communicating critical findings of this investigation and response. It was a defining moment in *MMWR* history.

For more information on this outbreak, or to learn more about the latest in public health, visit cdc.gov/mmwr.

Until next time, this is Dr. Sonja Rasmussen for *Defining Moments in MMWR History*.

[Announcer] For the most accurate health information, visit www.cdc.gov or call 1-800-CDC-INFO.