

## Underreporting of 2009 H1N1 Influenza Cases

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[Ted Pistorius] Hello. I'm Ted Pistorius, and I'm speaking today with Dr. Carrie Reed, an epidemiologist in the Influenza Division at the Centers for Disease Control and Prevention. Today, we're talking about an article in the December 2009 issue of the CDC's journal, *Emerging Infectious Diseases*. The article takes a look at the beginning of the global pandemic caused by H1N1 influenza, and specifically the theory that the number of cases were underreported in the pandemic's first weeks and months. So welcome, Dr. Reed.

[Carrie Reed] Thanks, Ted. It's great to be here.

[Ted Pistorius] So Dr. Reed, let's start by talking about how many cases were actually reported between April and July of 2009.

[Carrie Reed] In the spring, between April and July, we at CDC were asking all of the states to report to us every laboratory-confirmed case of H1N1 influenza that they had identified in their states. And between that time period, we received reports of 43,677 cases and of those 5,009 were hospitalized.

[Ted Pistorius] Your article theorizes that the number of official cases reported during the beginning of the pandemic was significantly underreported. What are some of the reasons that cases might go unreported?

[Carrie Reed] We think there are a lot of reasons and I'll kind of walk through a few of the ones that we talk about in the paper. First of all, we know that not everyone that gets influenza is gonna go to the doctor. A lot of people have a fairly mild illness. They'll just feel lousy for a few days and so they'll just stay home and get some extra rest and drink lots of fluids, but they won't actually go to the doctor. And then, if they do go to the doctor, not everyone who goes to the doctor is going to get tested for influenza. A lot of times, the physician knows that flu is circulating in the community or they've seen a lot of flu cases already and so they'll only clinically diagnose the patient and send them home with medications. And then, even if a patient does get tested by the physician, the only way to know that this is H1N1 influenza and not a seasonal influenza that was also circulating in the early spring is to send that specimen to a state public health laboratory or here at CDC in order to confirm that it was H1N1 influenza. And only then would it get reported here to CDC. So we know that there are a lot of different ways that people might not get included in our official case counts.

[Ted Pistorius] Makes a lot of sense. So can you explain how you developed the model to estimate the true number of cases then?

[Carrie Reed] Sure. We thought about these various sources of ways that somebody might not get included in our confirmed case counts and we tried to think of ways that we could estimate what the proportion at each of these levels was, for example, what proportion of people went to the doctor if they got sick, what proportion of people that went to the doctor would get tested?

And so we looked through a number of different surveys that we'd done of patients in the community, of different investigations that we'd done early on in the epidemic to try and get sense of what these proportions were. And then once we knew what those were, we could work backwards from the number of confirmed cases to figure out what the estimated number of true cases were in the community.

[Ted Pistorius] With that in mind, what's your estimate of how many cases actually occurred between April and July of 2009?

[Carrie Reed] So, based on these surveys and the data that we got from these surveys, we estimate that on average about 79 times as many cases were actually out there than were reported and this was about, would estimate about 3 million cases were out there in the community and of those, about 14,000 would have been hospitalized.

[Ted Pistorius] Why is this important? Why do we want to have a better idea of the actual number of cases?

[Carrie Reed] Well, we were worried if we're just talking about 43,000 confirmed cases and we know that's an underestimate of the total number of cases, that that might not be a good way to base our plans and our estimates of what might happen in the fall. And so, just thinking about it, you would, you would make plans very differently for 43,000 cases than you might for 3 million cases or for 14,000 hospitalizations instead of 5,000 hospitalizations. And so, we didn't want to run the risk of underestimating the impact that this was having in the community, and so we really wanted to come up with a better way of understanding how much actual disease was out there during this spring wave.

[Ted Pistorius] Can you use this same model for other diseases or is it only for influenza?

[Carrie Reed] We've actually used this type of model before here at CDC to estimate the impact of foodborne disease in the United States, which we know is also underestimated for similar reasons that influenza is.

[Ted Pistorius] So therefore you're very confident then the number of now estimated cases is pretty good?

[Carrie Reed] It's not perfect, but it's definitely better than just relying on the number of confirmed cases that we have out there.

[Ted Pistorius] Well, thanks so much for discussing your article with us, Dr. Reed. We've been talking about a paper that appears in the December 2009 issue of CDC's journal, Emerging Infectious Diseases. And you can see the whole article online at [www.cdc.gov/eid](http://www.cdc.gov/eid).

If you'd like to comment on our podcast, please send us an email to [eideditor@cdc.gov](mailto:eideditor@cdc.gov). For Emerging Infectious Diseases, I'm Ted Pistorius. Thanks for listening and have a healthy day.

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