

# Foodborne Illness Retrospective

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

[Peter Drotman] Hi, I'm Dr. Peter Drotman, editor-in-chief of the *Emerging Infectious Disease* journal, and I'm talking today with Dr. Paul Mead, and we're going to discuss an article that he was the lead author of back in 1999 that is in our hall of fame at the journal because it is the most highly cited article in the history of EID which is now noting its 20 years, its first 20 years of publication.

Paul, you authored the article titled *Food-Related Illness and Death in the United States*. It was published in 1999 and has garnered the greatest number of citations in the history of EID publications. Why do you think that's the case?

[Paul Mead] I'd like to tell you that I think it's because it's such a brilliant article but I'm afraid that the answer is a lot less glamorous and more mundane than that. And there're really sort of several explanations. The first is, you know, I think most scientific articles have a burden statement, be it about foodborne disease or malaria or tuberculosis, something to let the reader know why the topic is important. And so this estimate provided that number for foodborne diseases. Another contributing factor is that foodborne diseases are very common, it is a big topic, both foodborne disease, in general, and then each individual disease. And so, what that means is there are an awful lot of publications on foodborne disease and every one of them needs to fight that number to start off their paper. I will say, I think there's one other reason and I think it's important in terms of EID as it approaches its 20<sup>th</sup> year anniversary and that is that EID was available for free and online, I think, at a time when many other journals were not yet available that way and I think that helps more readers get to articles and to read them. So I think that speaks to the foresight of the journal founders.

[Peter Drotman] And do you still get inquiries about this article?

[Paul Mead] Well happily those have fallen off a great deal. As you may know, CDC has published newer updated estimates of foodborne disease a few years back, and so that has cut down on the number of inquiries I get.

[Peter Drotman] To arrive at the major data that represented in that landmark article, you had to have the contributions of a great many experts in a variety of both specific foodborne organisms, as well as methods to generate the total number of infections per year for each of them. And getting them all to agree to one set of numbers and a result and a presentation must have taken some doing. What went in to that?

[Paul Mead] Well, you're absolutely right. Foodborne disease, the term, encompasses a great many different conditions and involves a great many experts, both on individual diseases, also statisticians and others who can weigh in on methodology, so it is a bit of a circus, I guess. And I think that's an important thing for scientists, or young scientists, to understand when they undertake something like this, that a lot of it is about working with your coauthors and trying to bring it to fruition. I think in this particular case, many of the people I was working with were colleagues at CDC, and although we are in different divisions and different branches and different disciplines, we know each other, for better or worse, and I think we can reach out to each other and come to a consensus. It wasn't easy, by any means, but with a lot of work, and sort of mutual trust and understanding, we were able to get there.

[Peter Drotman] So tell us something about the specific mechanics. Did you have a writing committee? Did you set up regular meetings? Or were you the central writer and sent drafts, circulating them? What are some hints for others who want to take up such an ambitious research project?

[Paul Mead] Well, probably the way to do it is *not* the way we did it. I think the short answer to it is about ten thousand drafts that we kept going back and forth over the numbers and changing them and working it through. I was really most of the writing committee, again for better or worse, but certainly we had group meetings where we would get together and discuss either specific or general topics and ways the numbers were going and ways to approach the data, and try and work that through. A lot of it was back and forth and part of both the challenge and maybe the forgiving part of it was that for some diseases, a great deal wasn't really known at the time. We know, for example, that norovirus is a very important and common disease, but exactly how much of it was foodborne, and how much of it was due to other modes of transmission, there was really very little evidence at that point. I think for people who read the paper carefully, you'll realize that as much as anything, it points out gaps in knowledge that have to be filled. And so, it's fairly easy to come to a consensus on what we don't know. It's harder to get everybody to agree on what we do know sometimes.

[Peter Drotman] So what are some of the ways that we do know that these agents get in to the food chain?

[Paul Mead] Well, the mechanism or the means by which food becomes contaminated is really almost as diverse as food itself. We eat a great many things and there are many ways pathogens can find their way into the food supply. Historically, food handlers probably played a fairly big role. We think of people like Typhoid Mary and others who may have contaminated food for a period of time. But, much of our food now comes from a centralized process where it's produced in large quantity at central places, and much of it, much of the contamination now we see with salmonella or listeria is really part of either introduction on the farm into meat or produce of essentially cow feces or animal feces that may contain pathogens. So, either from the farm or in the manufacturing process. For example, listeria is an organism that can live in cold conditions in factories and plants and when it gets into certain foods it can replicate. So, there are many steps along the way, everywhere from shellfish being harvested in the sea to on the farm to in the factory to the food handler, and at any one of those points a pathogen, or certain pathogens, can get into food, and that's probably why foodborne disease is as common as it is.

[Peter Drotman] And so what is the consumer to do? How do people prevent the transmission of these agents through their food?

[Paul Mead] Right. I think food safety is really a team effort. It really involves many different players who can have a role, including food producers, food regulators, such as USDA and FDA. What consumers can do on their part are several things. First is to, in general, avoid eating raw animal products, particularly if you're someone who has an underlying immuno-compromising condition or liver disease, for example, which can put you at higher risk of certain infections. So, that means avoiding things, such as raw oysters, raw ground beef, raw eggs, unpasteurized milk, that sort of thing. So I think, through food choices people can reduce their risk. Similarly, there are some very standard food safety practices that people can understand, such as keeping cold foods cold, hot foods hot, cooking meat to an internal temperature of 165, working to keep cutting boards clean and avoid cross contamination in the kitchen. All of these are things that people can do to help reduce their risk of getting foodborne disease. And I think consumers can find a lot of information about this on websites, probably better than I can explain.

[Peter Drotman] And don't forget to wash your hands.

[Paul Mead] And don't forget to wash your hands!

[Peter Drotman] So, you've had a major career change in the last few decades since the publication of this paper, moving from food safety into vector borne infectious diseases. But it seems that some of the experience...you developed skills that are transferable from one area of public health to another. Can you tell us

about that, how did that work out? Is food safety a good place for people to start and develop some of these skills?

[Paul Mead] Well I think one of the nice things about epidemiology is that, as a science, and public health as a practice, is that they are transferable and that you learn certain skills and certain approaches that can apply to many different public health problems and different types of infectious diseases. I think, you know, as a form of training, experience in foodborne disease is excellent. It depends a little bit upon what you plan to do in epidemiology and public health, but for experience with acute hands-on rapid response public health, foodborne can't be beat. And there're several reasons for this. First, everybody eats, usually multiple times a day, so there's almost universal potential for exposure. The food supply is always changing and evolving and so there are frequent, almost constant, foodborne outbreaks, and they often involve a new twist which can be challenging as an epidemiologist to sort out. An acute foodborne outbreak allows a person the opportunity to use surveillance data to identify the outbreak, to generate a hypothesis, to do a case control study to test that hypothesis, data to analyze, and when you got it right, action to take to either recall a food or put in place some sort of policy that would help prevent similar outbreaks in the future. So I think that process is a very fundamental process to public health, and foodborne diseases provide ample opportunity for a person to get that exposure and experience.

[Peter Drotman] This is Dr. Peter Drotman, I'm speaking with Dr. Paul Mead at the 64<sup>th</sup> annual Epidemic Intelligence Service conference, an annual conference sponsored by the Centers for Disease Control, and its main function is to report the outbreak investigations that have taken place, both in the United States and internationally in the past year. A great many of them still relate to foodborne infections, so it is somewhat timely that we are discussing Dr. Mead's landmark paper on *Food-Related Illness and Death in the United States*, originally published in October 1999, but you can still read that paper in open access fashion on the pages of the *Emerging Infectious Diseases* journal at [www.cdc.gov](http://www.cdc.gov).

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