CDC Ebola Response Oral History Project

The Reminiscences of

Beth Bell

David J. Sencer CDC Museum

Centers for Disease Control and Prevention

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Beth Bell

Interviewed by Sam Robson
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Interview 1 of 1

CDC Ebola Response Oral History Project

Q: This is Sam Robson, here with Dr. Beth Bell. Today is August 17th, 2016, and we're sitting here in the audio recording studio at CDC's [Centers for Disease Control and Prevention] Roybal Campus in Atlanta, Georgia. I'm interviewing Dr. Bell today about her role in CDC's 2014 to 2016 Ebola response. Thank you for being here, Dr. Bell. I really appreciate it.

Bell: My pleasure.

Q: Would you mind pronouncing for me your full name and telling me your current position with CDC?

Bell: Sure. My name is Beth, my middle initial is *p*, Bell. And I'm the director of CDC's National Center for Emerging and Zoonotic Infectious Diseases.

Q: Thank you very much. And can you tell me where and when you were born?

Bell: I was born in Buffalo, New York, a very long time ago. [laughter]

Q: That's cool. That's cool. Did you grow up in Buffalo?

Bell: No, I didn't grow up in Buffalo, I was born—my father was in medical school. When I was born, he was going to medical school in Buffalo, at the State University of New York. So we actually moved around quite a bit when I was a kid. But my parents are both from New York City. My father is probably one of the worst New York City chauvinists I've ever come across. Most of my childhood through high school was eventually around the New York area.

Q: Were your parents both in the medical field?

Bell: No, my father was a doctor. My mother actually raised four of us and then went and got her PhD in her fifties in higher education guidance, and worked as deans in various higher education institutions.

Q: Did you kind of know, when you were going through high school, say, what you wanted to do?

Bell: I thought I was going to be a translator when I was in high school. I was very interested in languages. I took two languages in high school, which was actually quite unusual at that time. Actually, what I sacrificed was science classes. I didn't think that I was—as I say, I thought I was going to be a translator. In college, that sort of faded away, and I ended up just getting a sort of liberal arts degree. I majored, actually, in religious

studies in college, and sort of just graduated, did a number of things. Then after a few years—it was interesting. I had a very close friend who had gone and taken pre-med courses, and she said, "You know, it's really not that hard to do this." I had thought about it but really felt pretty intimidated by the science. And I decided I would try it. I hadn't taken a science course since my freshman year in college, actually. So I went back and took a whole lot of pre-med courses over a period of years and applied to medical school several years after I had graduated from college, and then ended up going to medical school after that.

Q: Where did you do your residency?

Bell: I went to Yale Medical School. I went to Brown undergraduate, and I went to Yale Medical School in New Haven. I thought I was going to do primary care. So I did a primary care residency at the University of Rochester. And then was on the faculty in the University of Rochester for a while after. I spent, actually, a couple of years—in those days—well, I guess it still exists. It's called the National Health Service Corps, where the government helps with your tuition and you pay it back by working in a rural area. So I had been in the National Service Corps. I spent two years as a solo rural family doctor in upstate New York—in rural upstate New York. Then I was on the faculty at the University of Rochester medical school. I found clinical medicine to be a combination of boring and terrifying at the same time. That really didn't suit me very well. I got used to it, but I never really felt all that comfortable with it. I'd gotten sort of interested in the denominator and the community when I was a rural solo doc. I worked a lot with some

[community institutions like] nursing homes. And as I say, I sort of got interested in the denominator. So, got an MPH [Master of Public Health degree] and did a preventive medicine residency while I was on the faculty, and then I sort of ended up at CDC after that.

Q: How exactly did you end up here?

Bell: Everybody always asks the question, how did you hear about CDC? And I don't actually remember, to tell you the truth. I don't remember. But I started, actually, with CDC in 1992. A very long time ago. I was assigned to the Washington State Department of Health. I lived in Seattle, and I spent two years—there was a really, a very seminal outbreak that occurred that was known as the Jack in the Box outbreak. This was an outbreak of *E. coli* O157:H7 infections from contaminated hamburger meat served at a fast food restaurant chain. It was an enormous outbreak with a large number of children who developed this severe complication called hemolytic uremic syndrome, and four children died. As I say, it was one of these really seminal outbreaks that resulted in some really fundamental changes in food safety, and how we approach food safety, and how we look for outbreaks, and really some—also some important improvements in terms of laboratory-based surveillance.

That's what I spent most of my time in Seattle working on. Then I kind of was dragged kicking and screaming to Atlanta, and I expected that I was just going to be here for a couple of years. It was a time when hepatitis A vaccine had just been licensed, and I was

hired in what was then the hepatitis branch to begin the epidemiologic work, the policy work, to start to sort out how would we use this new vaccine which was about to be licensed. It just struck me as such an incredibly important opportunity that I couldn't turn it down, even though I really didn't want to live in Atlanta, nor did my husband. But so that's how we ended up in Atlanta in 1994, thinking that we were going to be here for a couple of years. And you know, the rest is his—here we are, [laughter] after another twenty-two years in Atlanta.

Q: Did you stay with hepatitis for a few years then, or—

Bell: I did. I stayed in hepatitis, actually, for probably about a decade, I guess it was. I eventually ended up as the chief of the epidemiology branch in what was then the Division of Viral Hepatitis. And I was—you know, spent a large part of my career basically as I had expected, really doing the epidemiology to understand the transmission patterns of hepatitis A and using that evidence base to decide what would be the best way to use the vaccine for greatest impact. At the time, we, as a nation, actually, it was very focused on adding vaccines to the infant schedule as a way to use vaccines routinely. Hepatitis A vaccine was not licensed for children less than two. So it meant that, if we were going to use the vaccine routinely, we would have to be approaching it in a different way. I think that initially, everyone thought that we would use hepatitis A vaccine for travelers and in certain very high-risk communities. For example, American Indians and Alaska Natives had a very, very high rate of hepatitis A. So over a period of years, we developed and implemented a strategy for vaccination in a geographic-based strategy. We

were able to identify that there were certain parts of the country that had always had higher hepatitis A rates than other parts of the country. So we were able to recommend routine vaccination with a geographic focus, and the result was that, over a period of seven or eight years, we went from [about] thirty thousand hepatitis A cases a year in the United States to somewhere on the order of one to two thousand. It was a complete transformation in hepatitis A epidemiology, and it's just an example of the power of vaccines when it's a good vaccine and there's a lot of herd immunity involved with transmission, which is the case with hepatitis A.

So I spent a lot of time on that. I [also] worked a lot on hepatitis B. This was also a time that hepatitis B vaccine globally was beginning to be implemented routinely. It was sort of the beginning of [Bill & Melinda] Gates [Foundation]-funded new—trying to [incorporate], quote, "new vaccines," hepatitis B vaccine being the first one incorporated into the routine infant schedule. So I did a lot of flying around for a while, helping countries write plans for hepatitis B vaccine [introduction]. And I also did some work trying to understand the basic epidemiology of hepatitis C and what the overall contribution of viral hepatitis was to the burden of chronic liver disease. As an epi [epidemiology] branch chief, I really had a fantastic group of epidemiologists. We really, I think, got a lot done.

I spent quite a long time in that group and really kind of built a career on being—sort of working on hepatitis vaccines, and in some ways worked myself out of a job, which is kind of what we can all hope for. We were really at a point where there was very little

hepatitis A. I mean, there still is a little bit of hepatitis A. There is actually a foodborne outbreak going on right now. But for the most part, it really transformed things here and in other parts of the world where the vaccine was used as well. I spent, as I say, quite a few years working on hepatitis.

Q: So you worked yourself out of a job.

Bell: Yeah.

Q: What was the next job?

Bell: I worked for a number of years in NCIRD, which is the [National] Center for Immunization and Respiratory Diseases, as their associate director for science. During that time, I spent probably a little bit over a year in the emergency operations center working on the pandemic. And then a lot of time after that focusing on the transition back to the Center [NCIRD] of a lot of our flu activities, and what did that look like? Also, a fair amount of time trying to kind of shape the science. I worked a lot at—you know, that was a time when we had the Recovery Act. And the immunization program got a lot of money. I believe it was $300 million, as I recall, of Recovery Act funds. So I was very, very deeply involved with programming that money, figuring out what to do with it [to have the greatest impact]. It developed a component about strengthening the evidence base, which is a way to sort of explain applied epidemiology and applied research to drive policy that I think is sometimes very difficult to explain to policy makers who think

of the NIH [National Institutes of Health] when they think of research. So we were able to incorporate that into our Recovery Act program, and then a lot about the tracking and how we characterized the impact. So I spent quite a bit of time doing that when I was in NCIRD.

And then, I guess it must have been the fall of 2010, I guess, was when I took this director job. The Center [NCEZID] was a new center. So I'm actually the only director of that—of the Center. Basically, the organizational history is that we, quite a long time ago, had a National Center for Infectious Diseases, which [included] everything. And then Dr. [Julie L.] Gerberding reorganized, and we had four infectious disease centers. And then, when Dr. [Thomas R.] Frieden came and there was some interest in reorganization, a decision was made to put back together two of the infectious disease centers that had been formed. And so the putting together, the coalescing of these two previous infectious disease centers with a little bit of other reorganization, related to the Center for Global Health, formed this Center for Emerging and Zoonotic Infectious Diseases, which, as I say, I became the director of, in the fall of 2010. That's basically the trajectory. You know, a lot of people at CDC have had a lot of different jobs. I really spent my formative, scientific, epidemiologic career in viral hepatitis. Which I think actually is very, very broad, in terms of the basic principles that it teaches a person. And have kind of worked in vaccines, and as I say now, I've been managing this large organization for the last whatever-that-is, almost six years now, I guess. My goodness. [laughter]

Q: Are there other big projects that you think of, when you think of the years before—three years? About three to three and a half years, maybe, before Ebola hit, when you were director of NCEZID?

Bell: Yeah. There's always a lot of outbreaks. That's part of the Center [NCEZID], right? We're the center that has the largest number of laboratories, the largest number of Epi-Aids, which is how CDC kind of characterizes outbreaks. And really, a lot of the foundational stuff that people think of when they think of infectious diseases and CDC is out of our center. So there are always outbreaks going on.

In terms of perhaps large, relatively seminal outbreaks, we had this outbreak of fungal meningitis in—I don't remember when, but a few—a number of years ago. This was really—it was a big deal. It was an example of a situation we oftentimes find ourselves in, which is something that just sort of emerges where there's really very little prior understanding. There's not a whole lot of capacity, and there is a need to act quickly. This was a situation like that. This was a sort of obscure fungus that hardly anybody had ever heard of. The whole mycotics community is this very, very small community, very arcane. Our mycotics branch is an extremely small, little branch, funded on a shoestring. So there was a need for everybody to scale up and work together. It was also a situation, in which we also find ourselves in, in which we really had to get to the answer quickly because people literally were dying. That required, obviously, a huge amount of effort.

Then the other thing that was kind of interesting about this outbreak is that we discovered that many of the patients were not exhibiting the typical signs of meningitis that you usually associate [with the infection]. So with a stiff neck and headache. Many of the findings were very subtle. We realized relatively early on that we were actually going to have to figure out a way, working with the states, to notify everybody that had received a spinal injection with this product. Because we needed to warn them that if they had any kinds of relatively mild symptoms, that they needed to go to the doctor so that they could be diagnosed, so that they could be treated. This was actually another unusual situation, and I remember popping into the office of a couple of the experts in my center who were receiving information from some of the infectious disease doctors that had seen some of these patients. They were looking at this, going, these people are coming in, they do not look that sick. We suddenly realized, okay, we're going to actually have to go and notify fourteen thousand people. It was a very big effort. The outcomes, in terms of the kind of suffering, were pretty bad. But we did, I think, rise to the occasion. Figured out what it was very quickly, notified everyone very quickly, and I think, at the end of the day, we were able to prevent—clearly, because of acting quickly, we were able to prevent cases and save some lives. So that was a very large outbreak that I had a fair amount to do with.

Some of the other things that I was working on were not so much outbreak-related, but more having to do with trying to get resources and improve some of the—sort of fill some of the gaps that we have. I would say that one big thing that I worked on was an initiative which is called Advanced Molecular Detection. This grew out of a blue-ribbon panel that was convened actually before I was the Center director. It was convened by Dr.

[Rima F.] Khabbaz, who was the previous director of one of these two centers that was merged. And it was about this question of bioinformatics and next-generation sequencing, which was kind of a new, emerging technology, and CDC's capabilities in that area.

We convened this panel to give us some input. And the panel's report was really pretty important. Essentially, they were shocked at how far behind we were. They basically said there are junior colleges that have more capacity than CDC. We think of CDC as being in the forefront, and the gold standard, and you people are shockingly far behind, and if you don't deal with this, there is really the potential for CDC's overall mission to be really seriously harmed. This really sounded an alarm and was a bit of a clarion call. So myself, along with Dr. Frieden and Dr. Khabbaz and many other people, we put together a budget initiative which we called Advanced Molecular Detection, which was meant to bring CDC into the twenty-first century and to bring the benefits of these new technologies of bioinformatics and next-generation sequencing—to bring the benefits to public health. The idea was not to be developing new technologies and building all these new fancy toys, because that clearly was happening. But the problem was that public health was not actually benefiting by this new technology.

So we put this together and then went through the long process of explaining this to HHS [US Department of Health & Human Services], and to the White House, and then to Congress. And we were successful in getting a $30 million-per-year budget initiative through. I've now been involved with implementing that, and have been able to see how,

really, even over the course of just two or three years, we really have been able to transform a lot of what we're doing at CDC, and already have been able to show, for some pathogens, how this new technology is allowing us to find outbreaks faster, to have the outbreaks be smaller, to find more cases, to find more outbreaks. So that was a very big thing that I was working on before Ebola hit. Those are a couple of examples, at least, of the things that I was working on right before Ebola.

Q: Can I ask, do you know what time it's best if I make sure that you're out of here, on to your next thing?

Bell: Well, I have a conference call at five that I was hoping to be able to call into. That would be ideal.

Q: Okay, like, four fifty, maybe?

Bell: Yeah, or five is okay, actually. I can just—oh, actually, my phone's about to die. But that's okay.

Q: For the listeners in the future, I'm looking at this kind of Armageddon-like doomsday clock with these big, red numbers, and [laughter] that always tells me—helps me manage time. So, thanks for describing those experiences that you had, previous to Ebola. Can you tell me about how you got involved in the Ebola response?

Bell: The group that's responsible for viral hemorrhagic fevers is in my center. So kind of out of necessity, I heard about the early, first cases. We were working pretty much in that branch, and some people from the Center, on the early part of the outbreak. I pretty much was involved with all of this from the beginning. During the scale-up, as the head of the Center, there is a few of us—myself, the director of the Center for Global Health, Dr. Frieden —that were sort of involved with the overall day-to-day, very high-level. In some ways, I really feel like I didn't do much of the hard work, and really was involved with managing, or dealing with Washington, and making connections maybe across different agencies, helping with advice, perspective, making sure that everybody was doing okay, trying to marshal other resources. Those kinds of things.

Q: So for instance, what kinds of outreach were you doing with Washington?

Bell: I had to do a lot of briefings. And I actually testified. This was actually—this was a very, sort of well-remembered time. The Senate HELP [Health, Education, Labor and Pensions] Committee was having a hearing on Ebola, and it happened to be on the same day as President [Barack H.] Obama was coming to Atlanta to visit CDC. So while Dr. Frieden would have usually been the person to testify before the HELP Committee in Washington, Dr. Frieden couldn't go to Washington because the President was coming here to Atlanta. So I was deputized to go to Washington and testify before the Senate HELP Committee about Ebola. This was in the fall of 2014. It's when things were really not going well, and before many of the assets and resources of the US government were mobilized. It was before the Department of Defense got involved. So these hearing rooms

are actually very large. They are very ornate. Oftentimes, a lot of the senators don't come. This was pretty much a full house. Lots of people in attendance. A big audience.

Myself, Tony [Anthony S.] Fauci, and one other person—I can't remember. Maybe Robin Robinson from BARDA [Biomedical Advanced Research and Development Authority], I don't remember, actually. But I have to say, I got the majority of the questions, and it was a long several hours of testimony. I tried to give a sense of the urgency of the situation, how dire the situation was, how tragic the situation was, and how pivotal and important it was that we needed to act now. I basically talked about how we had a window of opportunity, but that window was closing. I tried to answer their questions and kind of inform them of—try to dispel some of the misinformation that was out there. So that was actually a very big deal. I think it certainly had some kind of impact. I don't know what, exactly. But those were the kinds of things that I was doing.

Q: Do you remember the kind of reception that you got?

Bell: I got actually a pretty friendly reception. Sometimes it can be very challenging to testify. Oftentimes, the congresspeople have their own agendas, and you never really know what they're going to say. I had testified about the fungal meningitis outbreak, for example, to the same committee, which might have been helpful, actually; some of them, I think, probably remembered who I was. In any case, this was a situation in which, I think, they were—for the most part, it was a pretty receptive audience. There were a few things that were uncomfortable. Mostly things that were political that I didn't have an

answer to that satisfied all of the senators. For example, Senator [Barbara] Mikulski said to me, "So who's in charge of this response?" This had been an issue with a lot of concern on the part of the Congress. Some of the congresspeople thought that the response was not well-coordinated. Who's in charge of the response? We had anticipated that I would get a question like this, and so I answered the question in the way that was agreed upon I should answer it. I answered it that way. And Senator [Barbara] Mikulski basically said, "What? Are you kidding?" More or less. [laughter]

Q: Do you remember what your answer was?

Bell: Yeah—well, no, I do remember exactly, because this was how we were doing it. I said that USAID [United States Agency for International Development] has the responsibility for overall coordination on the ground, and that we were participating with them. And she just said, "USAID?!" [laughter] She had a fit. I guess—it's not—there's nothing—I'm not saying anything new. It was recorded. It was on the television, that's what—but so, that was quite disconcerting, and sort of like what—and my general approach in those kinds of situations is, Senator [Barbara] Mikulski is a very powerful person. She's not really looking for an answer from me to something like that. And so I just basically smiled and said, "Thank you, Senator." So that was somewhat difficult.

There were a number of the senators that were concerned. The issue of DoD [Department of Defense] involvement had been raised, and there were a number of senators that were somewhat concerned about that. To just reflect from a very high level, I think that some

of the things about the Ebola response and the Ebola outbreak, compared to many other things that I've been involved with—the pandemic, Hurricane Katrina, the anthrax attacks, where I was actually in charge of the field team in New Jersey, which was where the letters were sent from—compared to many of these other responses, the Ebola response was really far and away the most difficult. Part of it was the tragedy. I mean, all of these—we see many tragedies. But the tragedy of this was, first of all, so much in your face. People were literally dying in the streets. And then so much was about families, and about ways that people could not grieve [as] they needed to, and the idea of seeing this kind of tragedy and having entire families decimated. And then all of the stuff around burial, then you can't really grieve. That tragedy of, as I say, just people losing so many of their loved ones, was just really very hard to see. Then the other part of it was fear. People were so afraid. Everybody was afraid. Not just the people in West Africa, but the people in Washington. Everybody was afraid. And that, I think, was also very hard to deal with.

Coming back to the hearing, I had several questions from senators about being concerned about sending "our boys" into harm's way. That was a particularly difficult question to answer, because I was thinking about our twenty-five-year-old EIS [Epidemic Intelligence Service] officers, young epidemiologists, the people working in the laboratories in [West Africa on] Ebola, people staffing the district health offices in the three countries in West Africa. I'm thinking about those people and how worried I was about them, and my responsibility towards them, and how brave they were, and how willing they were to sacrifice. And these people are concerned about soldiers in

protective gear in their own little bases with this extremely limited potential contact, where they're building an Ebola treatment unit. So it was very hard to answer those kinds of questions, because I felt that they were just very short-sighted in a certain kind of a way.

Those, I think, were the two hardest parts of this. In general, as I say, I think it was mostly really a pretty receptive audience. They did realize, I think, the tragedy that was unfolding. I think they honestly did want to try to help. As I say, I just tried to make the point as many times as I could that we really needed to act in a way that maybe in the government is not a familiar way of implementing things in the Congress. It's something that I certainly do remember. I keep telling Dr. Frieden, there's something about me and meeting presidents that—I missed meeting President Obama. And then I actually missed meeting—I remember President Bush came to CDC during the anthrax attacks. Of course, I was in New Jersey, in charge of the field team, so I missed that also. [laughter]

Q: Oh, no! [laughter] This is not a great pattern.

Bell: Right? [laughter]

Q: Well, you mentioned that you were at the hearing with Tony Fauci, and—

Bell: Yeah.

Q: —the BARDA representative, Barbara—I forget.

Bell: Oh, Robin Robinson. BARDA—BARDA is the—

Q: Oh, Robin Robinson. I know BARDA. [laughs]

Bell: Yeah.

Q: I got confused.

Bell: I think it was Robin Robinson.

Q: Robin Robinson.

Bell: I think so. I'm not sure, but—

Q: I know that's an acronym. Can you tell me more about, then, that work you were doing across agencies?

Bell: Yeah. This is always, I think, a challenge with many of our responses. And I think that it's sometimes surprising how much everybody—people—everybody wants to do the right thing. In this situation, everybody wants to help. And there's just no—I mean, that's why we all are here. But there is so much—very different perspectives, very different

cultures, very different ways of communicating. People coming from really different backgrounds. They have different ways of operating that actually make it quite challenging to work together, as an interagency. In the case of Ebola, we had Ron Klain, who was appointed as the Ebola czar. That was basically—kind of clarified who was in charge. It answered Senator Mikulski's question, eventually. But we did have a number of different ways, as we generally do in the government, of working together. So, the White House has a National Security Council and a number of these subgroups where it would bring together all of the leadership at whatever levels, whether the Cabinet, or the [deputies]—to address the question of the day. We had many, many, many of these meetings over time, with us generally on the television from Atlanta, and other people assembled together in Washington. There were various components of that. But that was a large part of the way that we tried to work together as the government. And HHS, of course the Secretary [Sylvia M. Burwell] was very, very directly involved. We had telephone calls pretty much every morning to just essentially—the Secretary wouldn't maybe necessarily be on every single morning. But all of us in HHS basically convened to—depending on the intensity, but certainly during the most intense part, pretty much every morning, to kind of go over the situation and figure out what were the priorities for the day, what was stuck, who could get things unstuck. You know, who was in the best position to deal with which particular problem. Make sure that we all knew what the other ones were doing, and a lot of that kind of stuff. So, a lot of that interagency stuff, it actually takes a lot of time and energy.

There is also a huge thirst for information. Managing the thirst for information in such a way that you don't fill up the time of all of the people that are actually trying to do the work with providing information is always a challenge, and it was a very, very big challenge in this situation. So, we—myself and a lot of people in Dr. Frieden's office, and many people around—tried to put together as much as possible, a routine, basically a form, a system for providing information and updating at certain times and agreed-upon ways to update if there's an emergency. Just a lot of those kinds of things so that we can protect our staff and let people who needed to be doing the work in fact do the work. It's actually a very challenging thing to do, but it's extremely important because I think understandably, our leadership in Washington and in the states, which is a whole other area we haven't even gotten into, and WHO [World Health Organization], and everybody legitimately wants to know what's going on. But it's a lot of work to make that happen.

Q: No doubt. Yeah, no doubt. [laughter] When we're talking about, like, the different cultures between the agencies, and how it's kind of hard to integrate them always, are there some differences—some specific differences that you noted between CDC and another agency?

Bell: I think the obvious one is the Department of Defense. They're not in the business of this sort of—they are sometimes in the business of responding to humanitarian crises, but there are some things that are very specific about infectious disease epidemics where there's a lot that's actually quite foreign to them and they're not used to thinking about.

They have their own procedures and certain ways that they have to do things. That was actually a challenge, to figure out how to bridge that communication gap.

Q: So what would they not be comple—like, one hundred percent informed about? Like—

Bell: Well, I think they—

Q: —transmission, or—

Bell: Well, it's more a matter of, I think they wanted to understand what their mission was. Be very clear about exactly what their mission was, exactly what was the duration of their mission, what was the on-ramp, what was the off-ramp, and how to ensure that they were not going to have any—they were not going to be putting their troops at risk, and those kinds of things. It's sort of like terms of engagement. That's the sort of thing that can be very difficult to bridge in an evolving situation. If you think about humanitarian disasters, what they're used to doing is, after it's over, they go in and they help fix things. So this is a very different situation, and they're just not really used to thinking that way.

Q: Right. It might not be easy to determine how long this engagement is going to be, or—

Bell: Right. And again, it's not a criticism actually, because I can completely understand how they know how to manage their, quote, "assets," and what works. But we had to get

to the point of where we could see each of our agencies' needs and how to get them to work together.

Q: I've had some—a lot of good conversations with people in CGH [Center for Global Health] about the military part of it, and I've heard some frustration from them about the limited role that the military ended up having, building ETUs [Ebola treatment units] and not staffing hospitals, and that kind of thing. You know, taking people out to villages but not bringing them back. Transport of specimens. Were you in any discussions about whether they would be involved in any of that kind of stuff?

Bell: Well, some of that, there is sort of—so, some of that is rules of engagement. Another is, I think, going back to the fear issue. The business about staffing ETUs, I think this was a discussion early on. It was difficult and it was contentious. Remember, this was in a setting in which healthcare workers were getting infected and healthcare workers were dying. There were a lot of people that were afraid, and not just the DoD. There were a lot of traditional partners that USAID was used to going to, to do things like treatment, who were not in evidence. I mean, you know, Médicins Sans Frontières were the bravest and the most principled group, and they were there [when] nobody else was there. Just as an aside, we've been involved with many, many—with Ebola outbreaks over twenty years. But over time, we, the international community, had evolved a sort of division of labor, so that for all of the outbreaks in West Africa for example, I mean in East Africa, like in Uganda, we would do the lab. We would work with the ministries of health to do the epidemiology and the contact tracing, and Médicins Sans Frontières did the clinical

work. That worked fine for these small outbreaks. But it meant that, with this situation, for example, we didn't—I mean, there were not a lot of groups, and certainly not ourselves, that knew how to do the clinical care of Ebola patients. It was a huge vacuum, and I think, as I say, because of fear, people—there were not a lot of people that were willing to jump into the breach at the beginning. Or for actually, for quite some time. Eventually it got turned around, and there were people that were willing. But it was tough.

I think, for things like this business with the transport of specimens and some of that kind of stuff, that wasn't something that I don't think we—we didn't anticipate that up front. But there were some disappointing situations like that where really there was no risk. Which is different than, like, staffing an ETU. They just were not going to do it. And that was actually quite disappointing, that part of it. In general, certainly, I think what the DoD did was pretty important. But there were some disappointing things like that, the extent to which that was individuals, I mean—I don't know. [There] was a lot on the ground in West Africa that I wasn't really very engaged with. But you know, there was a huge amount of that. In the US, there were states that didn't allow incinerated ashes from medical waste to be transported across their state. So there was a lot of that, of really, stuff that did not make any sense, and where people—insisting on being irrational. And that's a disappointing aspect to some of this.

Q: I think we have maybe about five minutes left, and I want to make sure that I get you out on time. So, moving on from the fall, and throughout the rest of the outbreak, how does your role as director of [NC]EZID, with the Ebola response kind of evolve?

Bell: As the response got more—as we got more help, as things got more under control, and as we had a way forward, a path forward that was—where you could kind of see where we were going, I didn't need to play the kind of crisis management role in quite the same kind of way. Not that things got easy, but as I say, I think that there was a path forward. I was involved then with a lot of—still, there was a lot of interagency briefings, that kind of stuff; some involvement with the budget and trying to make sure that all that Washington stuff was taken care of. There were some scientific aspects of this that surfaced, the persistence of virus in semen being an obvious one that was an important scientific issue for my group. Then I spent a fair amount of time, along with lots of others, thinking about what were the follow-ons for this. You know, what do we do about the fact that here was this little group of a very, very small number of scientists and the world's experts, who had this enormous catastrophe visited upon their shoulders. So what do we do? There's a lot of discussion about the Global Health Security Agenda and how to prevent this kind of stuff from happening in the future, which obviously I was involved with. There is also a CDC side of this, which is we are the world's experts. We never really know what the next thing is going to be. And how do we learn from this in such a way that we don't find ourselves with less than ten people who have the expertise? I spent a fair amount of time thinking about that. The other issue I think was the staff. People were really very, very exhausted and burned out. It was just a really searing

experience, as I know you've heard from a lot of people. Especially for some of the people who this is their, quote, "day job." So they can't rotate out. Which are the people in my center. What do we do to—somehow or another—allow them to heal and regenerate? The other thing I think is, because essentially there is such a huge number of people in my center—not just the people who work on Ebola, but a huge number of people in my center who were working on this. There were the few people that were left behind, and were doing many, many people's jobs, and all the work that got dropped while we were doing this. There was a lot of some of that sort of stuff that also became part of what I was doing. And also making sure that—hoping to the best of my ability that nothing really bad happened. I have to say, I really worried a lot about our staff in West Africa. I just spent a lot of time—obviously, there are things that we can do. We did all of the things, and thank heavens, nobody got hurt. But this was just a very, very constant concern that I had. Where young people are just very self-sacrificing, and they want to go out there, and this is what they signed up for. But I was quite worried.

Q: Yeah. I hear that.

Bell: Yeah.

Q: Is there anything else you'd like to talk about or mention before we end the interview?

Bell: Not really. I guess I would say, I think, as you've heard from a lot of people, this really—as I say, I've been doing this work for a very long time, and I think this was the

most challenging outbreak. The degree of suffering, the complexities around the suffering that made it so much more intense; the danger, the fear. But then on the positive side, the fact that we actually were able to turn this around. As I'm sure you've heard from people, when that case showed up in Lagos, in Nigeria, many of us thought, we are done. What could have happened here is—it really could have been Armageddon. It's not really an exaggeration. The fact that we made it through, and while there were a huge number of tragedies, we did, actually—we were saying we know what to do and we will do it, and in fact, we did know what to do and we did do it. I mean, obviously, some things like sexual transmission we hadn't been planning on. Nonetheless, we did it.

I think those are very important lessons. I do think that we really haven't—this Jack in the Box outbreak that I worked on twenty-four years ago now, there was a sea change in food safety after that. A complete transformation in how we approach foodborne outbreaks, which has resulted in some really major changes and improvements in food safety. I hope that this Ebola outbreak—and the Zika outbreak actually has many of the same themes that involve really taking this issue of emerging infectious diseases seriously, recognizing that it means that there really does need to be a really different way of approaching what basic capacity is and not assuming that we'll be there and able to scale up no matter what. I think it's yet to be seen whether we're going to actually be successful in that, or whether we're going to continue to—hopefully not something as horrible as Ebola, but situations where it takes a while to meet the challenge that faces us.

Q: Thank you so much for being here.

Bell: Sure.

Q: I appreciate it.

Bell: Yeah. Okay, it was a pleasure. Thank you.

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