

CDC Ebola Response Oral History Project

The Reminiscences of

Stephen C. Redd

David J. Sencer CDC Museum

Centers for Disease Control and Prevention

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Stephen C. Redd

Interviewed by Samuel Robson
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Interview 1 of 1

CDC Ebola Response Oral History Project

Q: This is Sam Robson. Today is Friday, August 12th, 2016, and I'm here with Dr. Stephen Redd. This is the CDC [United States Centers for Disease Control and Prevention] Roybal Campus in Atlanta, Georgia, and I have Dr. Redd here to talk about his experiences as part of CDC's Ebola response of 2014 to 2016. Thank you so much for being here, Dr. Redd. Can I start off just by asking you if you can pronounce your full name for me and tell me your current position with CDC?

Redd: Sure. My name is Steve Redd, or Stephen Redd. I'm director of the Office of Public Health Preparedness and Response at CDC now.

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

Redd: I was born in Augusta, Georgia, on September 7th, 1957.

Q: Did you grow up there?

Redd: We moved to Atlanta when I was two, so I grew up in Atlanta here, not too far away.

Q: What was that like?

Redd: Well, that's a hard question to answer. It was great. I've lived here almost my whole life, except for college and residency training, so I went to medical school next door.

Q: What did your family do?

Redd: My dad was a pediatrician. My mom didn't work but took care of us at home. I've got a brother and two sisters.

Q: What kinds of things interested you when you were growing up?

Redd: Mostly sports, in high school, especially. I played football and soccer, so that was probably the main thing, outside of school.

Q: Did you kind of know what you wanted to do at that point?

Redd: Well, I always planned on becoming a doctor. I was kind of following in my father's footsteps in that way. That had always been my plan, and I followed that plan.

Q: This is kind of a strange question, but did he ever tell you anything about being a doctor that kind of stuck with you?

Redd: This is not an answer to that question, exactly, but when I was in college, during a Christmas vacation, I worked in his office for a week, and it wasn't really what I was expecting in some ways. There were a lot of sick children as it was sort of a busy time of year. That experience made me think I wanted to be a doctor but probably not a pediatrician. [laughter]

Q: Where did you go after high school?

Redd: I went to college at Princeton [University] and then went to medical school at Emory [University], and then did residency training at the Johns Hopkins [Hospital].

Q: I actually cheated and looked up your bio on CDC Connects just before coming here. From there, you did EIS [Epidemic Intelligence Service], is that right?

Redd: I did. It was in the Respiratory Diseases Branch in the Division of Bacterial Diseases, so that was in 1985. I've been at CDC for quite a long time. I've had a lot of different jobs at CDC in international health, immunizations, malaria, environmental health for a while, and then for about the last ten years, I've worked in preparedness on pandemic influenza, preparing for an influenza pandemic, and then most recently, the sort of broader vision of all kinds of public health emergencies.

Q: That's a great overview. Momentarily going back to the EIS experience, were there projects that you worked on during that time or outbreaks that you responded to that are particularly memorable for you?

Redd: Yeah, I think every outbreak response is pretty memorable. The first one that I participated in—I'd been at CDC for about three weeks, I'd done the EIS course, and there was an outbreak of *Shigella*, of diarrhea, dysentery, that was resistant to the antibiotic that was mainly being used to treat it, and so I went and worked on that investigation in Tuba City, Arizona. [I had] never been to Arizona before, and I was there for about three months working on that investigation, and then I did an evaluation of a rapid test for strep throat [streptococcal pharyngitis], and they had a lot of strep throat on the reservation. I actually lived there—for that period of time, I'd been in Arizona longer than I'd been in Atlanta after finishing residency. So the first one, I guess, that was probably the most striking. But I did a couple of Legionnaires' disease outbreaks. I investigated pneumococcal disease in HIV-infected [human immunodeficiency virus] individuals in San Francisco, really interesting work there.

Q: Especially in the eighties, no doubt.

Redd: Yeah. The way that I did that investigation was I got permission to review the bacteriology records at the hospitals in San Francisco and I did chart reviews on—it wasn't a million people, but several hundred chart reviews. In the chart review, I tried to

determine whether the person had an HIV infection or not. You could tell, it was very clear if people had AIDS [acquired immune deficiency syndrome]. It was a little bit harder to tell if they had HIV infection, and looked at the rates of pneumococcal disease in people that had AIDS and didn't have AIDS.

Q: That's fascinating. Did you do any international travel?

Redd: I did just at the very end of EIS. I went to Senegal and there was a vaccine for pneumococcal disease that was being developed, and it was clear that you needed a place with a lot of pneumococcal disease to be able to do a trial to show that the vaccine was effective, so it was kind of a scouting expedition to see if that was a good setting to do that kind of a trial. It was just fascinating being there. It was the first time I had been in a developing country, so just really interesting from that standpoint. From the standpoint of being a good place to do a vaccine trial, at that time, it really didn't have the laboratory capacity to be able to do it, but I think the idea of what is possible in public health and what's needed in a developing country, that was a really formative trip for me.

Q: Was that your first time in Africa?

Redd: It was, yeah.

Q: Is there anything you remember especially seeing or doing there?

Red: I guess the thing that really struck me, there was a beach where fishermen at the end of the day would bring their catches in and it was right next to an open sewer, kind of a trough that led to a little stream that fed into the beach, and it was just the—this kind of 360-degree, five-sense assault of that. I think the smells and the vivid colors are things that I remember from that trip. [laughter] It really wasn't the best design for having a fish market or the fish being brought in right where there was open sewage.

Q: Right, wow, something you might not see here in the United States.

Redd: I think the other part of that was just the—you could see a picture of that and it wouldn't quite have the same impression as the 360-degree thing with the smells and the heat.

Q: Yeah, all the sensory impacts. What happened after that, after EIS and Senegal?

Redd: I took a job in international health, an office that doesn't exist at CDC anymore, the International Health Program Office, and I was based in Atlanta, but [did fieldwork] in countries in Africa, doing studies and helping ministries set up programs to prevent deaths from pneumonia in young children. That actually led to the next—I got to know the people that worked in the Malaria Branch and did some work with them, and then actually joined the Malaria Branch after that. That was the first little period of my career.

Q: Was that like in the nineties when you joined the Malaria—

Redd: Yeah, early nineties

Q: Then what happened from there?

Red: From there, I took a job in the immunization program in the—it was the Measles Elimination Activity. We still had some measles in the United States and our primary mission was to eliminate transmission of indigenous measles, which was very close to happening right when I joined [the group]. We actually documented, both in the laboratory and with surveillance data, that there were periods of time when we had interrupted transmission. There were no viruses that continued to be circulated in the US. [All the new cases were from new strains that had been] imported from outside the US.

Q: Is that something that they hadn't known previous to you joining?

Redd: Yeah, it was something that was right at the time I joined, we were able to document that.

Q: That's amazing. Positive discovery. [laughs]

Red: Yeah.

Q: What happened after that?

Redd: Then I took a job in environmental health, and that program had two main components. One was on asthma control, so we worked with state health departments to set up programs to improve the management of asthma, to reduce hospitalizations. And we also did work, both research and programs, to reduce the impact of air pollution, so things like the reductions in carbon monoxide deaths from the restrictions on carbon monoxide emissions from cars. There was an association that we were able to show [between] reduced carbon monoxide deaths [and] cars that emitted less carbon monoxide. Those mainly were suicides, so it was harder to commit suicide with the new technology that cars don't emit as much carbon monoxide.

Q: And after that?

Redd: [In 2006], I went to work as director of the Influenza Coordination Unit, and that was [where I really began in] preparedness. In the mid-2000s, a new influenza virus, [H5N1], was detected, mostly in poultry, but [also in wild birds; this virus occasionally infected humans, and had] a high mortality rate. Even less frequently, small clusters of these cases [occurred], so the concern was that this virus could mutate, evolve to be more transmissible among people and cause a very severe pandemic. We did a lot of planning, a lot of exercising to be ready for a pandemic. There were actually several episodes in that job. There [were several years of] planning, and then the H1N1 pandemic, [where I served] as the incident commander. After that—[an eleven-month response]—we identified a lot of things that we needed to improve upon, so that was back to preparing.

[In 2013], we also activated for the emergence of a different novel influenza virus, H7N9, in China, which looked like it had characteristics that maybe were closer to being transmissible among people than even H5N1. That was a shorter response. That virus, it turned out, wasn't transmissible from person to person. That takes us up to the current job of the Office of Public Health Preparedness and Response.

Q: You mentioned, after—maybe it was after the H1N1 response when you were incident commander, you made some improvements to the process?

Redd: Well, we identified things that didn't go as well as we wanted them to; for example, we developed a modeling unit. We continued to work on guidance for personal protective equipment that had been very controversial during the H1N1 pandemic, and so did work in that area.

Q: And there hadn't been that much modeling before, or the modeling—

Redd: We really didn't have a unit that was addressing that in the response. We knew something had—there had been modeling before, but it wasn't as connected to the response as [it should have been]—the experience of responding made us realize it needed to be more tightly integrated.

Q: Well, that's interesting, knowing what I know after interviewing Martin [I.] Meltzer and how effective the modeling was in motivating action in the United States for the [Ebola] response.

Redd: Yeah, that was Martin's group. We added people to that for influenza preparedness, and it was something that was useful. He also obviously worked a lot on Ebola.

Q: And then you become director of OPHPR [Office of Public Health Preparedness and Response]. I'll spell that out in the transcript. [laughs] When was that?

Redd: January of 2015. So, [I've been in the job] about a year and a half.

Q: Do you remember what kinds of things you were working on immediately before Ebola?

Redd: We actually were planning a pandemic influenza exercise for August of 2014, and so that really was the main thing that we were working on, developing the scenario, identifying the issues that we wanted to address in the exercise. That exercise didn't happen; because of Ebola, the operations center was overwhelmed. In fact, most of the people that would have worked on the exercise were working on Ebola by that time.

Q: How did you get involved in Ebola?

Redd: I had some awareness of what was happening in the spring of 2014. It was kind of low-level—we knew there was an event in West Africa. I think maybe the EIS Conference, I listened to a couple of talks about it. It was clear that there were a couple of things that were new. It was in an area [that hadn't had an Ebola outbreak] before; that Conakry, the capital city of Guinea, was involved, which also hadn't been seen before. But it seemed like other than those things, it was going to be kind of a typical Ebola outbreak, kind of on the large size side, but not what eventually turned out. [The response in the spring was kind of the first hint of what was to come.]

Then in the summer of 2014, we were planning for this exercise. The event that I remember was getting a phone call as I was coming back from vacation at the Denver airport from the person who was actually the acting director in the job that I have now saying that she needed to detail a person that worked for me to the Ebola response. This was Sunday night, and I said, “Okay, I’ll call her tomorrow,” and she said, “No, we really need to know right now if she’ll be there tomorrow morning.” So I made a call to this person and we talked about it, and she agreed to start on the Ebola response that following Monday, early August of 2014. That was my first introduction to the second wave.

Q: Can you tell me who the phone call was from?

Red: It was from Sonja Rasmussen. I don't know if you talked to her.

Q: Not yet.

Redd: Yeah. The person she wanted to have detailed was Rachel Holloway, who ended up working for many months in the response.

Q: I just spoke with her yesterday about her work as operations coordinator under Inger [K.] Damon. Interesting experiences there, too. So what happens next?

Redd: Then I got back to Atlanta, and our small Influenza Coordination Unit was kind of depleted because people were working on Ebola. That Friday, [a leader from the Ebola response visited me, and she] said that there was an opportunity to work on Ebola in the White House, was I interested in doing that? I wasn't really sure if I wanted to, but I said, let me think about it. It seemed like there was a willingness [from the White House people to have a CDC person working with them]. It would be a little bit unclear what that role would actually be, but basically, somebody to help with Ebola and other things up there. That was Friday. Saturday, I got a call from Tom [Thomas R.] Frieden, asking me to not do that thing that was asked for yesterday but something different. [laughter]

Q: Who asked you the thing for yesterday?

Redd: Beth Bell. On Saturday, the request from Tom Frieden was to work with ASPR, the Associate Secretary for Preparedness and Response, with that office, to make sure

that CDC and ASPR were well coordinated. I agreed, said, “I’ll do that.” The next day, I got a document that was a summary of vaccines and drugs that can be used to treat Ebola, that up until that point in time, we didn’t think there were any drug treatments or vaccines that were even in development, and that was around the time [that ZMapp, an experimental treatment for Ebola, was first being discussed.] I think just a few days before was when the first people had been—the first two people had been evacuated to Emory.

Q: Sometime in July, maybe?

Redd: Yeah, well early August, I think.

Q: Early August.

[overlapping dialogue]

Redd: [I don’t think we knew at] that time that they would be treated with ZMapp. But yeah, that was the kind of introduction.

Q: Wow. Tell me—just keep going. [laughs]

Redd: I don’t actually remember too much about that next week. There was a lot of work on the timelines for vaccine development and discussion about how those products would

need to be tested, whether the outbreak was so severe that [the normal randomized trial wouldn't be appropriate]—did they need the same kind of thoroughness of testing that they would need outside of an emergency? That was quite controversial. With some discussions with people in NIH [National Institutes of Health] and FDA [Food and Drug Administration] about what kind of trial would be needed, whether you needed to do a regular—the same thing you do for a non-epidemic condition—randomized clinical trial, whether that would even be possible in the setting of the outbreaks that were occurring in Liberia and in Guinea and Sierra Leone. Thinking about some possible alternatives to a randomized clinical trial, where you can get some information on safety, but use the vaccines more as an intervention than as a research study. It was quite controversial in that period of August.

Q: Some people saying one thing and other—

Redd: Yeah, basically maybe the extreme points of view were that the epidemic was the reason to do the study, but we should do as clean a trial as possible, that every individual should be randomized and that we should do the same kind of design that you would do here or for an endemic disease. The other extreme version was if we have immunogenicity data and some safety data, the problem is so severe that we should use the vaccine, when we have enough of it, to try to control the outbreak and try to collect what data we could, but not be restricted from using it at a scale that we could, based on the availability.

Q: Do you remember who was making the different kind of arguments?

Redd: CDC and NIH had sort of the opposing sides, where at NIH, the view was that we really couldn't be sure that the drug, the vaccine was safe in the absence of an unvaccinated comparison group. And the CDC point of view was that the outbreak is so bad that this might be the only thing we can do to actually bring it under control and it's worth—you know, again kind of the extreme version was it's so bad, we should be using [the vaccine] to try to prevent the deaths that [could] be prevented.

Q: Do you remember who was in conversations with NIH at that point?

Redd: It was different people. Cliff [H. Clifford] Lane and Tony [Anthony S.] Fauci, the main ones at NIH, and Tom Frieden and Anne Schuchat and others here, me at CDC, Tim [Timothy M.] Uyeki.

Q: I've had the privilege of talking with Dr. Schuchat about her work on STRIVE [Sierra Leone Trial to Introduce a Vaccine against Ebola]. It is interesting to learn about the origins of that stuff. So, what happens after that point?

Redd: Then, I was planning to take a trip to China that had been maybe several months in preparation, and this was later in August—it was early September when I was planning to go for about a ten-day trip, and I got another call from Dr. Frieden. It was on a Thursday night, I remember, and basically, he was saying that this probably isn't a good time to go

to China, that we need you to help with the response here. Mainly, I think, to provide advice [based on the experience I'd had running the big response on H1N1], and that was probably the [largest and longest CDC response we'd had]. At that time, it still was a bigger response than Ebola was, even though Ebola turned out to be much bigger in the end. So I ended up not going to China and trying to help in the response here in Atlanta.

Q: Why were you going to go to China in the first place?

Redd: [I was going to help on their pandemic preparedness, planning] to review their work, give some talks, and really understand what they were doing to prepare for a future pandemic.

Q: Did that mean that you had a new position in the response, or—

Redd: I was kind of getting moved into the response gradually. I think this was a somewhat chaotic period where there were so many things to do that just having people that could say, "Okay, I'll do that," was helpful. That actually led to the main role that I had in the response, so this is now early September. There had been discussions with—I'm not even sure who all was involved in these—but basically, very high-level discussions about the need for assistance from the Department of Defense in West Africa, that the scale of the problem was beyond public health, beyond USAID [United States Agency for International Development]. There were not many qualified people there to

help do the kinds of things that you can do in normal places. The healthcare workers were getting sick with Ebola. There was a loss of confidence in the medical care system.

There was a decision that DoD [US Department of Defense] would—within the administration, that DoD would help with the Ebola response. Part of that planning process was for DoD to brief the committees that they report to in Congress. There are two committees in the House and two committees in the Senate. The thing that I remember [was hearing on] a Friday morning, “There’s a call with DoD to plan for this briefing next week. Can you be on it?” I was going to be in Washington that next week anyway. There was this call, and the word was you don’t need any preparation. It was pretty clear that it actually did need some preparation, and the expectation from the DoD people was that CDC would help with this briefing. So we had an organizing call on Friday. We had another call on Sunday, just really going over who was going to talk when, what the plan was for these briefings, and it turned out that I was going to be the CDC person doing the briefings. We did four briefings that next Monday and Tuesday to each of the committees, and that became a kind of a regular rhythm that I would describe the problem; there was an AID person who would talk about what AID was doing; sometimes, a person from the Department of State; and then a series of Pentagon officials, an assistant secretary or deputy assistant secretary for policy, the surgeon for the Joint Chiefs of Staff, then another operational person from the Joint Chiefs of Staff, [going over what DoD was doing or was planning to do]. But it always started with, this

is really a severe problem, we need DoD's help. So we got a bit of teamwork there with the different—there were four different perspectives of the outbreak.¹

Q: What was at stake in these meetings with the Congress members?

Redd: Well, I think that DoD was making the case that they needed funding that was already in their budget but needed to be moved from one part of their budget to another part. The initial request was for a billion dollars. I'm not sure where that actually came from, but it was going into this group that does the humanitarian response for DoD, but it's in the Assistant Secretary [of Defense] for Special Operations/Low-Intensity Conflicts. AID works frequently with them not on infectious disease outbreaks but on the tsunami, on earthquakes, on things where DoD and USAID can work together, in countries where they can work together.

Q: Do you remember, were the congress members inquisitive, or how were you received?

Red: Well, I think they were generally supportive, but they had a lot of questions, and they kind of fell into two main categories. One was, what work is DoD going to be doing. The plan was [for DoD not to be involved in direct patient care, to be providing

¹ Note from S. Redd, August 2018: The perspectives we each brought were remarkably similar. The Ebola outbreak was a huge problem and one that required several agencies to work closely together. There were concerns about the DoD role; the primary one was that a soldier would contract Ebola. If that had happened it would have raised concerns that DoD would potentially have been less able to carry out their primary role of defending the country. The general feeling was that Liberia, the country where DoD was planning to deploy, would welcome U.S. troops in a way that wouldn't be true in other countries. In that sense, the expectation was that DoD and the Liberians would see the U.S. military role as part of a larger humanitarian mission rather than a military deployment in the usual sense.

healthcare], but it was to do training; to provide engineering expertise, which was building Ebola treatment centers; to provide logistics and air transport. They set up an air bridge between Dakar, Senegal, and Monrovia, so there were DoD planes flying back and forth, bringing equipment that had been staged in Senegal. That was one area of questions, what is the work. The other zone of questions was along the lines of, what are you doing to make sure that none of the troops get sick? That was another very big area.

Q: And you could answer that how?

Redd: Well, I didn't really answer many of those questions. That was really for the military people. Really, it was a lot about how is the disease transmitted.

Q: Basic education almost on Ebola?

Redd: Yeah, and also, it related to the work [that was planned] because the intention was that the troops that were deployed weren't going to have contact with people who were sick. [The questions had to do with] what steps were being taken to make sure that that would be the case.

Q: Cool. So after these briefings, what goes on?

Redd: Well, the basic format is everybody gives about a five-minute talk, and there's some period of questions that can either be thirty minutes or an hour, hour and a half,

depending on the group. That was the cycle to [the briefings]. Just in that period of time, there was also a very great interest not just on the DoD Congressional staff, but on all Congressional staff as far as what was happening. There were similar briefings, telephone briefings, that were set up every week on Friday morning, so I started doing those, and that was generally a CDC person and a USAID person, with other people on the line, and then answering questions. This went from—I'm not sure when they started, but I started doing them sometime in September through the end of the year.

Q: Tell me if this mischaracterizes at all your part in it, but it sounds like you're serving as a liaison between CDC and some of these organizations wanting to work together, and also the government up in Washington, DC. What kind of information are you relaying back down to Atlanta? What did people want to know?

Redd: I'd have to say that mainly, they weren't detailed things that people wanted to know here. I think they mostly wanted to be sure that [CDC was] helping DoD get what they needed, and so that was the main function that we were serving. I think the way you put it is correct, facilitating that collaboration in the continental United States side of the work that was going on in West Africa.

Q: And this is all previous to President Obama coming down on September 16th?

Redd: It was right in that time. I think the first briefing was actually on the Monday before he came down, on Thursday, maybe, so Wednesday or Thursday, when he came down. This was just right in the hours before that almost.

Q: One thing I'm interested in is really the origins of those conversations about the Department of Defense being part of West Africa, the Ebola response—when, exactly, we define the beginning of those conversations. When I talked to Dr. Frieden, he said that there had been for several weeks, if not months, conversations about the potential for getting the Department of Defense involved. Was that in your experience?

Redd: I think he's the person that had those conversations. From the DoD people that I talked with over those months, I think that they were having internal conversations through the summer, but they really weren't doing the kind of detailed planning that they needed to do to be able to do what they ended up having to do, and that was one of their considerations. They're a very planning-oriented group and they, in retrospect, recognized that they could have taken more initiative to do the planning. I think during the summer, they weren't really thinking that they would be asked to do anything, and they were probably thinking more of the contingencies about force protection than we're going to be asked to deploy to West Africa.²

Q: We're in about the middle of September. What happens then?

² Note from S. Redd, August 2018: By force protection, I mean the steps they would need to take to make sure US troops stayed healthy and Ebola-free, so that they could do their primary military mission.

Redd: Well, so I'm traveling back and forth to Washington quite a bit. Then the [next] big thing that happened in the outbreak was that there was the case in Dallas. That was—surprising may not be exactly the right word, but I think the public reaction to that case was surprising. [I think it probably started off on the wrong foot because as we all know, at that first emergency room visit for that gentleman, he had symptoms of Ebola and a travel history from Liberia. Those symptoms and the travel history didn't get put together, so he went back home, came back several days later much sicker. That initial lack of detection was an unfortunate beginning. I don't know whether there were things that might have been done differently given that first visit to the emergency department], but we were behind the eight ball there already because the—when I say “we,” the US government had created the impression that all hospitals would be able to take care of a patient with Ebola with no problem. Medical care systems in West Africa are not the same as the ones in the US. So that initial problem of detection was a problem. When the first nurse became ill, the way that that was discussed also wasn't very positive. Then the second nurse became ill, and then she had been in Ohio. It was a mess. I was not involved in those discussions, except I was in Washington. I did do some briefings during that period of time, and explaining what was happening and the guidance that was evolving was something that I ended up doing. My recollection from that is that there was really a hunger for explanation and people were really looking for things that made sense. This idea that we've now established screening at airports and will be sending the contact information to state health departments so that they can follow these people during their incubation period [provided some degree of relief to policy makers]. We're working to make sure that if somebody gets sick, we'll be in consultation and we'll make sure, to the

extent that we can, that those people aren't exposing other people to Ebola. The steps that were being undertaken were very logical. People I think really understood that we were making a course correction, and it made sense.

[There was a point of view, individuals expressing a point of view] that we needed to close borders with the highly affected countries, but that was really only a couple of people in my experience. The thing that I remember about it is that they didn't seem to be very wanting to hear an alternative approach that really would be more effective in the long run, even in the short run, than shutting things down. I think overall, it's maybe something that people would be a little bit surprised to hear, but a clear explanation seemed to be all that was needed in terms of what—basically, these people representing the population just wanted some explanation for what our plans were. It took several weeks to get all those documents finalized, but I think that was a really pretty positive thing, overall.

Q: Did you play a part in helping shape the content of some of these plans?

Redd: More of an explainer than a shaper of the policies.

Q: And so you were doing things like press briefings, is that how—

Red: Mostly briefing of Congress. A lot of the same format as with DoD, but the context of the domestic cases changed the discussion quite a bit.

Q: I understand. Were these public briefings, too?

[overlapping dialogue]

Redd: I guess the settings would be different, but in general, a meeting room in the Capitol, so either one of the office buildings nearby or actually in the Capitol, and the number of people that attended ranged from dozens to hundreds.

Q: Any conversations that you remember that really stand out for you, when you look back?

Redd: I'm not sure what day it was, but it was one where I was in a very large room in the Capitol and I remember walking into this room and just being surprised. There were people in the balcony and every seat was filled, and just the intensity of interest surprised me. That's the one that sticks in my mind the most. It was right around the time that the nurse cases had been identified, so it was just huge interest, and I think really a lot of concern that things were out of control, which wasn't the case, but no one really knew for sure that it wasn't out of control. It wouldn't have been surprising to have at least a few additional cases in healthcare workers in Dallas.

Q: Please continue.

Redd: I actually left out something—

Q: Oh yeah, please!

Redd: I'm going to go back to September. One of the challenges that we were considering was—this was kind of two things at once, but related to medical evacuations. The one issue is there were very limited numbers of beds in these high-containment facilities. There were two beds at Emory, two beds at the University of Nebraska, and two beds at NIH in Bethesda. If more than six people needed to be evacuated during the same courses of illness, we'd need more beds. There was also a concern, and this again is before Dallas, that by doing medical evacuations only to these facilities, we were making the disease seem worse and more transmissible than it actually was. [We talked a lot about trying to] recruit other hospitals beyond these three to accept patients with Ebola in medical evacuation. We developed a process to try to recruit additional hospitals. We called the Association of State and Territorial Health Officials and asked them to ask their members if they could recruit hospitals to participate. We had a couple of conference calls with a limited number of state health officers—we asked them to contact institutions in their jurisdictions. We had other conference calls. The question was, for a hospital system, would you be willing to accept a medical evacuation patient in your hospital with Ebola? It was really a very interesting process. I think most of the groups that we talked to really wanted to do that. They saw the need, the kind of the national need to have this capability, but there was really a lot of concern about [whether they would really be able to do it]. They didn't have the training or the exercising that

Nebraska or Emory had had or NIH. It wasn't that they wanted funding, they just wanted to be sure they could do the job well. There were some concerns about liability: how are we going to make sure that our healthcare workers are safe? One hospital system did agree to do that in September, Harborview Medical [Center] in Seattle. Nobody said absolutely not, but we didn't have any other real takers.

I think actually in retrospect, there were two things. I think one is that the hospitals were thinking about this in the right way, in that they really wanted to be sure they were able to do the work that was needed. Secondly, we should have been hearing something from that discussion that maybe every hospital in America—it's not something [where] routine procedures are going to be able to be sufficiently safe. Interesting, particularly in light of what happened with the Dallas case and what we ended up doing later with the additional personal protective equipment measures and a system of personal protection rather than just the guidance and the list of equipment that you needed. And then, the other planning in Dallas for what would happen if we had additional cases, a larger number of cases. I think after the second Dallas case, there was really a concern that we might have some number of additional cases, and [concern about] how would we take care of them there.

Q: It sounds like, when looking back, one of the things you're paying attention to, in memory, is here were some signs that people were giving us that they at least were uncomfortable with these things.

Redd: Right. Yeah, I think that's a hard thing in emergencies, to really hear the underlying message there.

Q: Right. So even if someone has—yes, technically, you have all of the capability to do these things, we can check all the boxes—the attitudes do matter, the feelings matter, and can affect—I don't know, is that a fair statement?

Redd: Yeah. The thing that I took away from there is that it's very hard to recognize the assumptions that we have going in, hearing voices that are not consistent with the assumptions. It's really hard to rethink those. Of course, these people think this—we believe that they're able to do something that they're not sure they can do. But I think hearing that really, maybe we're wrong and they aren't is a hard thing.

Q: I'm sure, hard for anybody. And then the nurses happen. Does that alter the conversation that you're having in DC?

Redd: I think it certainly decreased the proportion of the conversation about West Africa and increased the proportion of the conversation about the US. So yeah, it did. There were a lot more—I'm trying to remember specifically if there were more requests for briefings. I can't say that there were, particularly, because there were so many going on, kind of on an ongoing basis. The thing I said and that others said, our line was really, the best way to make sure that we have no cases in the US is to stop transmission in West Africa. If that can be brought under control, we know we won't have cases here. If that

doesn't get brought under control, we could always be at risk for imported cases of Ebola if there are substantial numbers of cases continuing in Africa.

Q: What that immediately brings to my mind, what other concerns then come up when you make that recommendation? Because I can imagine members of Congress thinking okay, but then are you going to keep our personnel safe when they're sent over there? I know that the military was limited in its ability to ship specimens and take CDC EIS members out of villages in remote locations, that kind of thing.

Redd: I wouldn't say it's even short-term risk, but there are risks that are pretty small if done right, that EIS officers shouldn't have been exposed to people who were contagious or had infectious Ebola, that would come into contact with infectious secretions. But being in West Africa, especially having large numbers of people in West Africa, is not as safe as being in the US, so there's some risk there. But not having people exposed to that level of risk would mean that we'd be at greater risk here ultimately, because the outbreak wouldn't be brought under control.

Q: Were conversations about safety of deployers happening even in DC between us and the Department of Defense, for instance?

Redd: I think that there were high-level decisions in DoD to really restrict the movement of their troops in West Africa, not able to do the things that we had our people doing, for example, just limiting contact with the local population in a way that we didn't do at

CDC. So there weren't really discussions about us making our guidance more restrictive on what people could do. There were almost apologies from the DoD side that we know this isn't really [necessary from a medical perspective]—the twenty-one-day quarantine was the big thing. When the troops came back, they were put under quarantine [or limited movement for twenty-one days,] so they'd be on a base waiting for that twenty-one-day period to expire. Our approach here for our staff and for other people returning from or traveling from West Africa, those countries in West Africa, was that you didn't have to be quarantined but you did need to report or have regular monitoring of symptoms for Ebola and fever. That was sufficient protection for the rest of the population.

Q: When you're making the argument that we need to stop it in West Africa because that's ultimately going to make us safe, what kind of reception are you getting?

Redd: It really depended. I think there were people that it was like oh yeah, that's obvious. Other people felt that it was not the right approach, that we should have closed the borders with those countries, that that was the only way to really be sure—that would be a higher level of protection for the US. That would have had a lot of really bad consequences. It would have been harder to recruit health workers to go there. It would have been harder to move equipment in and out. It would have probably done more to limit—already, commercial transport was limited. Airlines had canceled flights to some of the countries. It would have made that even worse of a problem. It would have just been a downward spiral. It wouldn't have helped the response locally. Since there's only one other case of an imported person, it wouldn't have done much to reduce the number

of travelers who actually were infected. We didn't know that at the time, but still.

Especially now, it's easy to see that on balance, it would have had a negative impact. I think even then, not knowing that there might have been additional travelers, if those travelers could have been rapidly identified and managed, it was still the right decision.

Q: So what happens next in your experience? Make sure to tell me any vivid memories that you have along the way.

Redd: I think that one [briefing where I remember] just being shocked at how big the room was and how full it was. [laughter] I actually remember in that particular meeting being really grateful for some of the people talking much longer than they were supposed to, because I knew that that was just giving me time to think about the questions that I knew I was going to be asked. [laughter]

Let's see, there was a congressional hearing in November. The topic for the hearing was Ebola countermeasures, and so I mostly talked about the diagnostic test development, the work that we were doing, the STRIVE [Sierra Leone Trial to Introduce a Vaccine against Ebola] trial. But the NIH and BARDA, the Biomedical Advanced Research and Development Authority, they were the main speakers at that hearing. But that was kind of a big event, to testify at the hearing.

Let me see what else the other things were. By December, the briefings, those Friday morning briefings, there was [declining interest, so we planned] to reduce the frequency

of them. At that point, when I took the job in January, I had a new set of responsibilities, so I was doing less Ebola work. The things that I remember from that early part of 2015, there were a lot of after-action reviews that were convened, either on the phone or—listening in or being interviewed. There were several interviews with DoD staff. Their after-action reviews started before the deployment. They had two people. They traveled to Africa, a couple of times to Europe, several times to Atlanta, really trying to get the history of what happened, what could be done differently.

There was a National Security Council after-action review that I participated in. I'm trying to think—the other ones were AID—I didn't participate in the AID one, but there was just a series of after-action reviews that were being undertaken.

Q: What kinds of things were being discussed in these after-actions, and the themes that were coming out?

Redd: A couple of major things. One was the country capacity to detect and respond to these kinds of events. This really was something that was being worked on, the Global Health Security Agenda is [a strategy to prevent a future Ebola epidemic on the scale of the West Africa epidemic.] This idea that there's work that needs to be done for countries to be able to detect and respond to events, and also to call for help when needed, and that there's a global requirement to be able to provide that help in a quick way. That was one of the themes, sort of the capability.

There were a lot of discussions about coordination within the government and whether there needed to be different structures or different plans for interaction, because I think we work very effectively with USAID. In the beginning, that didn't seem like it was going to be so effective. There was some confusion at the beginning with the Disaster Assistance Response Team, the DART team from USAID, how was the CDC and that team supposed to be working together. I think that got figured out within a few weeks. But until that happened, there was [some amount] of people walking on each other's toes. So that government coordination was a pretty big issue. Communications is something people always talk about in emergency responses.

The countermeasure development and working with industry, and doing the clinical trials, some of that review which I think went pretty well. It didn't happen in a timeframe that would have been sufficient to actually respond to the event—several of the trials were started after the outbreak was mostly over. I think that's going to be a problem. So that was another zone. Those were the main themes.

Q: That was early 2016 is when those kind of—or December—

Redd: Well, 2015 really, kind of through 2015, some of them started early. [laughter] Some of them, it seemed like we were still in the midst of the response and people were wanting to talk about what went well and what didn't, and it was like well, it's not over yet. We actually didn't demobilize until this year, until March of 2016. Those after-action reviews were over before we actually demobilized.

Q: Maybe even a year before.

Redd: Some of the discussions—with the DoD, they redeployed in March or April—
March, I think, of 2015.

Q: How does your role continue to evolve through 2015 or—

Redd: It was pretty much limited to those after-action reviews. Our office supports the response, so looking at some of the challenges with staffing, ways that we could support the response more effectively, those are the things that are in our zone. The state and local program in the Office of Public Health Preparedness and Response provided funding for states in March, maybe was when the grant announcement went out, so that was a pretty significant amount of funding for states, one hundred fifty-five million dollars. Especially looking back, that funding would have been much more useful in November and December than it was in March and April. I guess the award was made—I'm not sure exactly when it was made, maybe it was made in March, but it was still months after the main impact of cases was—we're sort of talking about when screening would [be stopped]—for people returning from Liberia, that requirement to identify those people and [send] that private information to state health departments—when could that be stopped. When I think about the first months of 2015, it didn't really feel like it was over, but when I look back, it probably mostly was.

Q: And as you said, more and more of your responsibilities shifting back to OPHPR in general.

Redd: Right. There were things with—different kinds of emergencies on our side with *Burkholderia* cases being identified in primates in Louisiana, that's a bacterium that doesn't normally exist in the United States, and there were two monkeys that were found to be infected. In May, we had anthrax spores being shipped that supposedly had been inactivated, but were still viable—could grow—so were potentially pathogenic, so could cause disease. We had a lot of things happening in OPHPR in those months.

Q: You guys dedicated so much personnel and time to Ebola. When you look back, are there some specific ways that you can say this affected some of the other normal processes that you try and carry out?

Redd: I think we're seeing that actually in Zika right now, more than I personally was able to see it in Ebola. I think that there was a huge amount of work that went into Ebola. I think a good bit of that actually has been transferred into Global Health Security Agenda, and staff have been hired for that. The things that didn't happen in our office—I guess it's easier to see what the consequences of Ebola were and what new work we're doing to be readier than we were for Ebola, than it is to say, here are four projects that didn't get done. Maybe it's partly because of the timing, that I came in as the [event was ending]—even though we didn't recognize that some of the work was tapering off from what it had been in September and October of 2014.

Q: But Zika is demanding a lot of resources?

Redd: It is. I think the coordination challenge is even greater than it was in Ebola so that we've got many different parts of CDC involved, many more parts than were involved for Ebola, because we've got birth defects, we've got a vector-borne disease. Some of the same—communications, diagnostic test development in the laboratory, those are not so different, but there are some additional elements for Zika.

Also, the problem is not as dramatic as Ebola, when somebody gets sick and within a few days they die or infect other people. Zika is much more a stealthy [pathogen], I suppose. The real problem doesn't emerge until a woman delivers a baby, but you're infected months before. There's a different timeliness element. Even though it's a really severe problem, it's not really manifest to the same degree that Ebola was.

Q: Well, I don't know if you have any memories that you'd like to share of the rest of your time working with Ebola or just looking back on all of your time, if we haven't covered something.

Redd: I guess just the overall thing is that I think this was really a very important moment for CDC. The president [of the United States] visited, gave his speech about how the federal government was all in, so I think that bringing the outbreak under control, CDC

didn't do it alone, but had a large part to do with that. I think that in the big picture, this is a really proud moment for CDC.

Q: Well, thank you so much for being here with me. I've learned quite a bit. I appreciate your time.

Redd: It's a pleasure.

Q: Thanks, Dr. Redd.

Redd: Thanks.

END