

CDC Ebola Response Oral History Project

The Reminiscences of

Ryan T. Novak

David J. Sencer CDC Museum

Centers for Disease Control and Prevention

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Ryan T. Novak

Interviewed by Samuel Robson
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Interview 1 of 1

CDC Ebola Response Oral History Project

Q: This is Sam Robson, here with Dr. Ryan Novak. Today's date is February 23rd, 2017, and we're in the audio recording studio at CDC's Roybal Campus in Atlanta, Georgia. I'm interviewing Dr. Novak as part of the CDC Ebola Response Oral History Project. Dr. Novak, thank you so much for being here with me today. For the record, could you please state for me your full name and your current position with CDC?

Novak: Sure. Thanks, Sam, for the invite, of course. My name is Ryan Novak. I'm an epidemiologist with the Division of Bacterial Diseases, [Meningitis and Vaccine Preventable Diseases Branch] here in Atlanta, and [I lead] our international meningitis work. Primarily, our international work is related to responding to epidemics of meningitis globally, which the highest risk countries are in sub-Saharan Africa, which led me to Mali.

Q: Right. That makes sense. If you were to give someone a short, two to three-sentence description of what your part was in CDC's Ebola response in West Africa, what would you say?

Novak: That's a great question. My title was epidemiology team lead for the CDC Ebola Mali response team. In terms of a short sentence as to why me as opposed to many of the other talented people at CDC, is I had knowledge of Mali, and I think that was a theme throughout our team and why we were successful there. A lot of the work that I do in West Africa, Mali is one of our countries, and so I had knowledge of the partners and the people, especially the person that was leading the response on behalf of the federal government there.

Q: I really look forward to getting into that. That's super interesting. But we'll back it up for a moment, if it's okay. Could you tell me when and where you were born?

Novak: Sure. I was born in Natick, Massachusetts, in 1974.

Q: Is that close to Boston?

Novak: It is, yeah.

Q: Were you raised there as well?

Novak: I was, yes. I was there through high school, left to go to college in New England, and didn't leave New England in terms of like a life move until taking a job with CDC.

Q: What was it like growing up in Natick?

Novak: Growing up in a suburb of Boston was nice, to be close to a major city. I think I definitely gravitate now towards more city living and what that provides in terms of culture and sports and things like that. I think growing up in Natick, I was in a rather large family, I guess. I had four older brothers, one younger sister, and we were all quite active, whether it was sports or anything else. I went to private school, so I think in terms of growing up in Natick, I really grew up more regionally than necessarily in one town.

Q: Sure. You said you and your brothers and sister were very active. What were you active in?

Novak: Sports was a big part of my upbringing, and I think that taught me a lot. In part, I think the life lesson that I took away from sports was how to push yourself and knowing your limits. You learn in sports to push your body, and also how to communicate as part of a team, and in some cases, how to lead that team. I think those were all life lessons that I then took to other aspects of school or professional challenges.

Q: What sports are we talking about?

Novak: It was mostly soccer. Each of my brothers played contact sports, and all had major injuries, so football was out for me. Hockey was out for me. Even baseball was out for me for some reason. So was soccer, but then I really wanted to play a contact sport, and somehow my parents said yes to lacrosse not knowing it was even more—it was like

a combination of all the violence in football and hockey and everything else. So yeah, I played that and then played that through college and graduate school.

Q: Where did you say you went to college?

Novak: I went to Providence College undergrad [undergraduate] and then I went to the University of Connecticut for my master's [degree] and my PhD, and then went to UNC [University of North Carolina] Chapel Hill for some public health work.

Q: When you entered college, did you know immediately what you wanted to do?

Novak: No, I had no idea. My father was an oral surgeon, so I was brought up around medical professionals. None of my four brothers went straight to college. They all did their own thing, and I was the first one—which is strange because both my parents were college-educated, and I think it was a different time. But I thought I was going to be a physician or a dentist, and my father was quite negative on that life choice because of the way there were some changes in managed care, and that it wasn't, in his opinion, medicine anymore. It was now about the billing, and you do only certain procedures, and you're treating a disease—you're not treating people. He didn't very actively help me pursue that as a career. I had this biology degree, and I was pre-med [pre-medical student] and had applied to dental schools and medical schools, but because I wasn't getting full support from the family, it seemed like a costly mistake if I wasn't so sure of it. I decided, well, someone's going to pay me to go to graduate school—I'll do that for a

couple of years while I decide. A couple of years turned into five, and I realized that I should probably finish a PhD and move on. [laughter] I think I got to that point in graduate school, and I recognized I was doing something that wasn't exactly the path that I was supposed to be on.

This was 2001, and I was in Connecticut when a woman died from anthrax. There was a lot of response in public health and public health capacity building, and there was a lot of money being poured into domestic capacity building for public health systems. I'd never thought of this as a career choice, but as a very old intern, sought out an internship at the Connecticut Department of [Public] Health and ended up working for some fantastic people that really just inspired me to choose this as a career path. It's sort of serendipitous, but it taught me very early on a theme that would stay with me that public health was about people, and it's the networking that gets you that next opportunity or job or whatever, and it's the same thing now—even the response in Mali was about the networking, which was the reason I was there.

Q: What specifically were you working on when you first started in public health in Connecticut?

Novak: Like I said, there was quite a bit of money being poured into state health departments that were underfunded chronically. In part, it was to respond to this potential threat of another bioterrorism event. I saw how CDC was responding, there was an EIS [Epidemic Intelligence Service] officer in the Connecticut Department of [Public] Health,

but it didn't have any context for what that meant. For me, what I was doing just as an intern was, each of the states were being asked, if you were to have a health emergency—and they were using smallpox as an example—what would you do in order to get control of that? And there's a series of policy issues. I was an intern with the public health policy unit in the Connecticut Department of [Public] Health, and it wasn't necessarily like epidemiology like I do now, but it was probably a better entrée into public health for me because I could see a big picture. Johns Hopkins University had put together this model act for states to modify their public health emergency response code. One of the issues that states were grappling with was related to quarantine, and what were states going to do. I took that model act and I did a review of the code and made some recommendations of how they could be changed, and I don't know what ended up coming out of that. For me, it was just super interesting to see—I was in meetings that year about Connecticut trying to figure out, we've been charged by the federal government to make a smallpox hospital, and what does that look like? Is it a separate hospital we build? Do we take an old hospital? Do we just put everything in there and shrink-wrap it, or do we have an existing, fully-staffed hospital where you have volunteers that will stay and treat patients? These were real issues, and I think to be given the opportunities to see how you address those questions was really fascinating. But I recognized quickly that my career path was way off track, and I needed to get back on track, and so that really guided my next step in my career.

Q: Which was?

Novak: I was finishing a PhD, and the traditional route was to go get a post-doc [post-doctoral fellowship] and then look for an academic position. I really wasn't interested in that. I thought that I wanted to be treating patients, and I didn't ever think of a career choice that the patient could be the population, and how do I get into that and what would my role be. I was looking for options. I couldn't just apply and get a job at CDC. I didn't have the skill set. So I did a few things. I applied for post-docs. Two of them were related, that would bring me down to CDC and get my foot in the door. There would be soft money by two-year positions—fellowships. Then another was a year policy fellowship in DC, working for a congressman or a senator. They were two interesting options. I thought if I wanted to completely dump science and just use my science background as working on science in health policy, that might be interesting, but I thought that was more of a risk, and so I chose one of the fellowships to come to CDC. It ended up being a great opportunity. Again, it's that theme of public health being about people. I identified that fellowship because of someone at the Connecticut Department of [Public] Health who introduced me to somebody else who I met at Fort Collins-CDC when I was out there one year, and then they told me, you need to talk to this person at CDC in Atlanta. I happened to be in Atlanta, so I cold-called them, and that person invited me to spend the day with them. Took me to lunch, were just so generous with their time. To me, after being stuck in an academic environment for five years where your end goal is that you write a paper based on research, and you never know if anybody reads it—to see people that were so passionate about what they do. They were clearly making an impact, but they were also just nice people and seemed like they were really interested in this process of professional development and mentoring. I really thought that

was—I was inspired by that. I knew this was the place I needed to be. And I'd always admired CDC from a distance. I think everybody had read *The Hot Zone* or one of the other books that were published, and all of these things that were in popular culture. CDC was the brand, like, that's where you wanted to go work if you wanted to do this type of work. But I was just learning about public health, so I was excited to have the opportunity.

Q: What year was it that you came down here?

Novak: I moved down here in 2003 and did a fellowship for two years. Then I was accepted to join the Epidemic Intelligence Service, and then did two years in that also here in Atlanta, and then was recruited to come back to the group. When I came to CDC, I was working in the meningitis branch [Division of Bacterial and Mycotic Diseases, Meningitis and Special Pathogens Branch]. You can't do EIS in the same group, so I went and I worked for viral hepatitis [Division of Viral Hepatitis, Epidemiology Branch] for two years, which was great. Then I was recruited to come back to the meningitis branch, and I've been there since 2007.

Q: So your EIS was in hepatitis?

Novak: It was, yes.

Q: How interesting.

Novak: Yes, which is not something I would have ever considered. I don't know if you know anything about EIS.

Q: A little bit.

Novak: You have a class of type-A people that are all super intelligent. This is the cream of the crop, but then you put them into this conference in April each year, and it's like fraternity or sorority rush, and they all have to talk to various positions and then match those positions. By the end of that week, you basically have to have your home for the next two years, and it's quite a daunting experience. I enjoy it now after being out of it and now I'm on the recruiting side, and I see why it's important and why we do it the way we do. A good EIS training experience isn't just about the group that you go to and how good their work is, but it's about the personality match. Public health is about people, and you have to match personality-wise so that you're jumping in and you can be productive, because two years is short. How did I get to viral hepatitis [Division of Viral Hepatitis, DVH]? Well, I was overwhelmed by the EIS recruiting experience and everything seemed super interesting to me, but I had a very good branch chief at the time who is now the director of our center, Nancy [E.] Messonnier, and she kind of pulled me aside. I've always been fortunate enough to have a number of good mentors throughout my career that just know what you don't know. She said, "Go talk with hepatitis."

It didn't seem like a quote-unquote "sexy" group of diseases to work on, but the people were great. That group at the time had this core group of excellent epidemiologists and leadership that had clear vision. That's what initially was attractive to me because I knew that would be a good training opportunity. There were multiple people to work with. But then what I realized after I got there is that within viral hepatitis, you have the range of public health issues. You have acute issues, you have chronic, you have vaccine-preventable diseases, you have epidemic diseases that need to be responded to, you have foodborne, water, blood-borne. I think that that's a good training unit to be a part of, to be able to work on all of that. I was really lucky that someone saw what I needed and then pushed me in the right direction.

Q: Was it all of that? Was it everything that you needed?

Novak: Oh, it absolutely was. If it were left up to me, I wouldn't have chosen to even talk with them, but in the end, it was the right thing for me in that I was comfortable when I was interviewing with them that these are the right people that I wanted to work with. But I didn't know anything about the subject matter. Then, as I started learning, it was like okay, wow, now I see why Nancy was pushing me in this direction. I think she recognized that because of my background—that I didn't have as much of a public health background, that I needed that sort of basic education in all of these different issues, and that was a nice framework. A lot of my lessons learned from that, I draw on that going into my position coming back to meningitis, and I still look back to that time. EIS has been around for fifty-plus years, and they really have figured out the right way to train

public health professionals for CDC, and the people that stick around, they end up being leaders within the agency. It's this nice network that you know, oh, you went through EIS? Where did you go? Who did you work with? And you know that these are people you can depend upon to get stuff done.

Q: Briefly, who were some of the people in viral hepatitis that made that branch so attractive?

Novak: Beth Bell was the branch chief at the time. Beth Bell has recently retired, but she was center director during the Ebola response and Zika. Then Ian [T.] Williams was the team lead, and he was my supervisor, and he was wonderful. He has since moved on, and I think that's sort of a theme here is that it was this core group of people—Tony [Anthony E.] Fiore, Stephanie [R.] Bialek, Tara [M. Vogt]—all these people that each one of them, I could have just been supervised by them and had a great experience. But to be able to work with each of them, and then still see them around—people like Eric [E.] Mast, I see daily now that he's in GID [Global Immunization Division] and a lot of our work overlaps, and so it's nice to see. There was sort of a viral hepatitis diaspora when there was—just like with anything else, when there's a reorganization, I think people think about career moves and moving on. I think that's one of the nice things about CDC—there is a lot of fluidity and career choices so that when people do feel it's the right time to move to another position, they can move on.

During my EIS time, we moved from what was the National Center for Infectious Diseases to—now that they were creating new centers, we went to NCHHSTP [National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention], and was aligned with HIV [human immunodeficiency virus] and TB [tuberculosis], and that made sense and I understood why, but I think that was a difficult transition for some of the staff that were there for a while. It was less about the structural move within CDC, but more about the physical move because our office was in Decatur, and I think to be in Decatur Square and away from everything else, I think that was a nice daily commute for folks that lived in Decatur. Then we moved out to Corporate Square, and I think that became harsher. I didn't appreciate it at the time, but now that I live where I do and I bike every day to Clifton Campus, I think that would be something I would definitely consider. Quality of life and daily commute.

Q: Oh, yeah, those things have a big impact in our lives. I always love to hear EIS stories. But when you started that fellowship—when you came to CDC for the first time, it was in meningitis?

Novak: Yes.

Q: Had you worked in it before?

Novak: No, I never did. APHL, which is the Association of Public Health Labs [Laboratories], have a two-year fellowship in emerging infectious diseases, and they kind

of run it like EIS in a way where they admit you and then they match you with a group. But a group has to put in sort of a position description, and what you would work on, and so my match wasn't completely out of the blue. That networking that I had done from Connecticut Department of [Public] Health to Fort Collins and then to Atlanta, I'd been put in touch with Leonard [W.] Mayer, who was the chief working in the meningitis branch [Meningitis and Special Pathogens Branch, MSPB] and in what was the [Epidemic Investigations] Laboratory. He and I hit it off, and he worked with the lead of that laboratory unit at the time. Again, this was before some reorganization, but Tanja Popovic was the head of that laboratory and I ended up matching there. The reason I gravitate towards that, I think in part it was the people. I knew I could get a good training and mentorship. Part of what they worked on was meningitis, but they also worked on some bioterrorism agents—so anthrax, *Brucella*, and *Burkholderia*, and this connection to what I was doing in Connecticut with doing some policy work around bioterrorism issues, I thought that was an easier transition. I also, during my PhD, did a lot of work on molecular epidemiology, so much of my work during that fellowship was directly related to—at least, the work that was directly related to the fellowship was sequencing and doing that sort of molecular work. But really, what I was more interested in was the epidemiology. I knew that coming in, and they knew that, so they gave me a lot of leeway to work with the epidemiology team within the branch. That's where I had just—Nancy always had this open-door policy, and as just a fellow, she welcomed me in. She asked me what I wanted to do, and when I told her and it seemed pretty bold at the time, she just said, "Okay, great. The EIS officer is going out to Kenya, can you go with them?" I was like, "Sure, yes, absolutely, I'd love to." I think that was a great opportunity to do

something like that, and I ended up going on two separate outbreak investigations with the EIS officer and one of the staff epis [epidemiologists] at the time. That was where—like I had a “lab role,” quote-unquote, but it was really doing a little bit of everything, and I was functioning like any EIS officer working on study protocols and working on questionnaires and just doing the little things you need to do to move an investigation along, and that was an amazing opportunity.

Q: After your graduated EIS, I suppose it was 2007?

Novak: Yes, 2007.

Q: Did you go back to work with the same people, the same place?

Novak: I was hired to stay in hepatitis after EIS, and I had thought that I would stay there, but within a period of a couple months a number of staff members had moved on. I think as someone—I was still viewing that my learning in terms of becoming a productive staff member at CDC, I had a long way to go, and I needed mentorship, I needed guidance. And I was concerned that that group at the time wasn't right for me. They were a solid group in terms of the science that they put out year-in and year-out, but I think it was concerning to me that the people that I work with whom had really drawn me there in the first place were now moving on, and maybe this was the right time for me to find a different opportunity. I actually wasn't actively looking. I was presenting at a conference, IDSA [Infectious Diseases Society of America], and I ran into Nancy. She came by and

she asked me what I was doing after EIS, and I told her I was staying with hepatitis, and she said, “We’d love to have you come back.” She talked with Tom [Thomas A.] Clark, and Tom was someone that I’d worked with on those two outbreak investigations, and I didn’t really think anything of it at the time. Then ACIP rolled around, and I was presenting on behalf of the work group some policy decisions that were coming in front of ACIP, and again, she pulled me aside with Tom there and said, “Listen, we have this thing we’d like you to think about coming back and working on.” This thing was this new vaccine that was being developed to prevent epidemics of [*Neisseria meningitidis*] serogroup A in Africa, and she said it’s new and it’s novel and nothing’s ever been done like this in public health, and we need someone to come back and lead the capacity building in order to do the evaluation of this new vaccine. I didn’t know much about it, but then I read more about it—that Africa’s suffered these epidemics of meningitis for hundreds of years, and it happens every single year, and there’s twenty-six countries for a region of the world that just has this unique set of climate and environmental factors that predispose them to these crazy epidemics. And unfortunately, the public health community at large has been stuck in this response mode, that the way they deal with it is they detect an epidemic early and then respond with some vaccine. It’s imperfect. It gets very expensive, and the vaccine is not the best vaccine. It was a polysaccharide vaccine that didn’t confer long-term immunity. You might cut off the peak of an epidemic, but you don’t really prevent the next one from happening. But Nancy had been working as a part of a number of global partners like WHO and the [Bill & Melinda] Gates Foundation to come up with a different solution. The different solution was a low-cost, conjugate vaccine, which would confer long-term immunity and also provide herd immunity. So

you could protect people directly, but also indirectly within the population. This is a game-changer. Now, this vaccine in the US costs eighty to ninety dollars, so it's way cost-prohibitive for mass vaccination in Africa. But if you could do a cost-effective one, like very low cost, then you probably could. You could manufacture hundreds of millions of doses and vaccinate whole populations and eliminate epidemics.

So that happened. The Gates Foundation provided a grant. The Meningitis Vaccine Project was created, and they developed a vaccine that came in at forty cents for one dose, and only one dose was necessary to vaccinate an individual, and that should provide ten years of immunity. In 2007, when I was finishing EIS, at the time, they thought they were about a year out from it being available for implementation. It turned out they were about two years out. It was 2009 when it became available. So I decided to come back, and almost immediately, one of the largest epidemics of this serogroup of meningococcal meningitis hit Burkina Faso. I went there with the team people and ended up investigating over the next six months what was one of the largest epidemics of serogroup A. This was the last, fortunately, large epidemic of serogroup A.

A lot of what we learned at the time—I found I was drawing on my EIS, but then I was also drawing back on my graduate school. What I guess I didn't realize at the time, but why I was being recruited to come back—why Nancy sort of saw something in me—was doing surveillance and public health capacity building in resource-limited settings is challenging. You can't always answer it with technology. You sometimes have to come up with simple solutions, and that was my background. That was my training. I was

working in basic bacteriology and working, knowing what a laboratory can and should do in Africa in order to confirm a case of meningitis. What I learned at the end of that epidemic is I knew the capacity for surveillance and confirmation in this country. I knew that they had a lot more capacity than anybody realized, and we had thought that the strategy to evaluate this new vaccine when it became available was to fund special studies. The problem with special studies is that it doesn't leave capacity in the country. It's a one-time thing and answers the question—you have an effective vaccine—but it doesn't leave the country with anything. We decided, because of what we saw during that epidemic, that the country actually has this really good surveillance capacity. So what if we approached it by turning the strategy on its head? We said we will strengthen the existing surveillance capacity and use that as a platform for evaluating the vaccine, and that's what we did. I ended up bringing the head of the surveillance unit to Atlanta for a visit, and he was doing some training here, and I remember we were sitting on my back deck at the house, and over a couple beers, wrote the first protocols for what became case-based surveillance for meningitis in Burkina Faso, which was subsequently implemented.

The magic thing about that country and the region was, we had written this protocol, I didn't know if anything would happen with it, and we had funded a small pilot in five districts, and they were sort of strategically placed around the country. We thought well, even if it's just these districts, when the vaccine is implemented, we should have enough population to evaluate the vaccine's impact. Well, within six months, and then it was a year out of the vaccine being implemented, they had scaled up on their own without any

more funding from those five districts to sixty-three districts. They were doing nationwide case-based surveillance. When I would tell people at the time that the country was doing it, no one believed it because what this requires—it's all logistics. It's logistics of how you get data from a very distal part of the country to the capital and without good internet. And then, how do you also get specimens from one lab to another, to another, to the national to get confirmed? It's not as much about the fancy technology of how to confirm a pathogen, like PCR [polymerase chain reaction], but it's actually the simpler issues of how to get something from point A to point B, and they may not have computers or internet so you need to make sure you have good paper-based reporting, and that there are good protocols, but that there's country buy-in. That lesson right there where we had sat down at my house, and then we went—and this all started with, what do you want to do in the country? This is how we need to evaluate this vaccine. How do you think we do it in your country context? And we came up with a strategy to do this type of surveillance, and they scaled it up on their own. Two thousand nine was the first year they implemented that nationwide, and that surveillance became the gold standard for sub-Saharan Africa. WHO used that as a model, recommending that all countries that were implementing this new vaccine should be implementing the surveillance. Then the Gates Foundation funded us, and starting in 2013 with a ten million dollar grant to expand that surveillance beyond Burkina Faso, and then that became—I'm director of a project called MenAfriNet. It's a consortium of international partners that implements this type of surveillance in a number of West African high-risk countries, and Mali is one of those countries.

That sort of leads into why I was there, because I had been working there for a couple years as director of MenAfriNet and the head of the Ebola response in Mali was one of our key partners, and he was on our advisory board, and I knew him personally. I think with any sensitive response, it's facilitated much more quickly and efficiently when there's some personal connection because someone feels comfortable enough with you to pick up the phone and call you and give you the truth. You don't have to dance around.

Q: Right. Who was this person?

Novak: Samba [O.] Sow.

Q: You still work with him?

Novak: I do, yeah. He's a personality. He's a wonderful person. He's an advocate for a healthy population in Mali. He's a professor of a local institution, but he could be a world-class researcher anywhere. His institution in Mali is called the Center for Vaccine Development, and they have a collaboration with the University of Maryland, so he has this co-appointment. But a lot of vaccine evaluation studies are actually done in Mali because of the infrastructure he set up. His institution was one of the sites for the clinical development and some of the studies that went into the development of MenAfriVac, which was the meningococcal vaccine. It played a critical role in responding to meningitis epidemics. But he's also a collaborator across CDC for flu or other vaccine-preventable diseases. He's also a politician, and he cares about the population of Mali.

He's the person that if there is somebody that has meningitis that's way out in the rural area, he'll get in his car and go out and pick up—like, do a spinal tap and bring the specimen back and confirm it. He's dedicated like that.

But because of that dedication, that's I think what the concern was, that Mali has to respond to this serious public health threat and the government didn't really know who to turn to. They didn't have an emergency operations center. They didn't have a response unit.

Q: You're referring to Ebola now?

Novak: Yeah. But Samba Sow is there, and he knows personally the minister of health and the president, and really, this is the person you pick up the phone and call. He was appointed early to head that response, and I think he likes to have people he knows around him, especially during the Mali response. We went from coordination meetings where there were ten people there to all of a sudden, three hundred people in a room. He was being pulled in a lot of different directions, and I think in order to actually be effective as part of the response, to be able to have his ear and for him to know from us—from CDC—that these are the facts, this is what we can offer—it cuts through the politics a little bit, which is a big part of any kind of international response.

Q: So how did you make the transition to working on Ebola?

Novak: Like I said, we had been funded to start up this project, MenAfriNet. This was awarded in 2013. We had our launch meeting in February of 2014. Ebola was starting in the region, but it wasn't affecting these countries yet, so we had made our choices of countries and our first countries were going to be Mali, Burkina Faso, Niger and Togo. These are all in the same sort of area. I'm the director of this project, and I have to get country buy-in, so we need to get them—we have to propose the projects, they have to accept, but this needs to be done at a high level, so I have to make country visits and meet the ministers of health and get their buy-in that they want to be a part of this because country ownership is really important. And I'm faced with this impending regional health crisis with Ebola, and worrying that I'm not going to be able to make all my visits and get country buy-in and launch this before Ebola comes in and then derails all of our work.

Just to put in context that largest epidemic of serogroup A that I had mentioned, there were more cases of serogroup A across multiple countries in that year than there were of all cases of Ebola during its height. Even after Ebola comes and goes, meningitis has always been the largest epidemic threat in the region, and I don't say that to compare the two. They're all significant health threats, but I say that because you had this capacity in the region that existed that knew how to detect and respond to epidemics. They just happened to be a different disease. In my perspective, there was no reason for us to put on hold what we were doing. We should still move forward because whatever the capacity we built for meningitis epidemic detection and response, you can task over the same sort of capacity to deal with Ebola. So I was able to complete all those missions. I was able to get all the countries to sign up, but I happened to be in Mali in September of

2014 for a meeting with Samba Sow and members of the ministry, with WHO, and other partners from Gavi and Gates were there, and there was worry.

Mali is right on the border with Guinea, and there was a reported something going on, on the border with Guinea, and Samba got the call in the middle of this meeting. He left. He came back, and he said that something was going on. All the people in the room, they all work on meningitis, but we all knew we were going to have to probably switch over to Ebola at some point, and that actually happened that day. [laughter] We all got in a car and drove down with Samba, driving to the border of Guinea to investigate this. I saw for the first time what they were facing in terms of these weren't—I sort of knew, I'd been working in West Africa now for six or seven years, and I knew that the borders were fairly fluid, but not realizing just how fluid, especially with Guinea where there were a lot of cases, and that there was a risk there. Samba was doing what he could, but in terms of how do you detect a case and confirm a case before they expose too many other people in that infrastructure and setup? We went—we investigated—it didn't turn out to be anything at the time, and I completed that visit and then came back to Atlanta.

Back in Atlanta, the response to Ebola, you had the highly-affected countries where the majority of the response was, but then they had started this team with the unaffected countries that were at high risk, and the idea was we need to prepare them. This is probably going to expand within the region. I'm not sure Nigeria had happened yet, but there were definitely lessons learned that if you have a case that travels to another country and they expose other individuals, you have a chance to explode. So there were

these evaluations that they were doing to get a baseline assessment of what was going on in the countries, and that was essentially our mission—that there were no cases in these countries, but we would go. Fred [Frederick J.] Angulo, who was leading that team, was trying to put people in the position to—reaching out across the agency, “Who has experience in these countries? Who can go?” The meningitis branch [Meningitis and Vaccine Preventable Diseases Branch, MVPDB] has had probably the largest footprint in West Africa, and so we had a lot of staff that were francophone that had experience working in these countries, and so it wasn’t just me. We had lent a lot of our staff that year to the Ebola response. I was happy to join that team, and I was sort of pulled in directly because Rana Hajjeh, who was our division director at the time, had been working with Fred on that team and said, you need a unit that is ready to deploy as soon as, in one of these countries, you have a case reported or a suspect case—that can deploy and go in and quickly figure out what needs to be done. That was sort of a visionary suggestion that, how do you bridge between the Unaffected Countries Team to the highly affected countries team, which any one of these countries could become, and that happened with her in Mali. There was one case before the outbreak that I’d responded to, and she ended up going, and they had a team that investigated that one child who was sick. Fortunately, there were no other cases from that. But just as they were wrapping that up, that’s when the imam traveled from Guinea and into Bamako, and I was already slated to deploy that weekend to Burkina Faso where I was going to do an assessment there of their risk, and just had to switch my travel and go to Bamako the next day.

Q: I haven't heard anybody talk about doing any kind of assessment for Burkina Faso. It really hasn't come up in the interviews.

Novak: Well, it didn't get done, and that's the—I mean, that was sort of what happened at the time. We had this team, and there was this disagreement with WHO that these evaluations would be done of all the high-risk, unaffected countries, and I guess I had mixed feelings about it. Evaluations are important, but they're only as good as the team that goes and the people who they meet with. Evaluation can be a dirty word, and if someone walked into my office and said "Hey, I want to evaluate your job," I'm going to be defensive and I'm going to tell them what I'm supposed to tell them—not what actually happens, and not necessarily tell them about what my challenges are day-to-day. I think that that's the same thing countries react to every time we say we're going to evaluate because we want to improve your capacity. A true evaluation happens when you have an emergency situation and you go in and you work lockstep with the country and you decide together, yeah, we really have these gaps and we're going to figure out how to fill them. But how to do it ahead of time? I think that was a real challenge, and some of these missions happened—I know there was one in Côte d'Ivoire, and there were some in other countries, and I'm not sure how they are viewed in terms of was that the right strategy or not. I think what it did provide is it made WHO and CDC collaborate on something that was more preparation, and also it was a little bit of sensitization with the countries. Even if the evaluation didn't produce any use results, I think what you do is you have an opportunity to talk with a country about what would you do and start to

grapple with some of those issues. I saw that in Mali, it's part of the job aid that I brought.

When I was there in September for that MenAfriNet meeting, there was also this wrap-up meeting that Samba was chairing that Mali had completed their national campaign for MenAfriVac, and it was really successful. They had vaccinated over twelve million people in ten days, and in his view, there's a ton of teams of people that make a vaccination campaign successful. He wanted a celebration of that, and to see how that thank-you was done contextually in Mali and how someone like Samba Sow thanks not only his staff, but the government and the people, that was really powerful. It was a celebration of coming together and, look, we had an African problem, but we found an African solution. That sticks with me, and that's a theme throughout a lot of my work is that a true solution has to be generated by a population. An outsider technically can help, but it needs to come from the country.

But what I noticed during that celebration is that there were posters all over Bamako in September of 2014 that all had like, "If you see these signs and symptoms of Ebola"—but they were pictures, they weren't specific—"you should call this number." It was a hotline, but people were calling with all sorts of crazy things, or that they needed a ride somewhere or they were crank-calling. What was fascinating was that the mobile phone providers could work with ministries of health and set up a free phone line, and they actually had databases where when the [call] came in, they could automatically trap the content of the call, and then you could query it in a way. There were a lot of data points

there, but you just had to figure out a way to separate the signal from the noise, and there was no real way to do that when it came time for the Ebola response. That was a real critical problem early on.

We had this one case, this imam, and we didn't know, is this was the tip of the iceberg or is this it? We didn't have an answer, and when you have all these calls coming in and you have a coordination meeting every day and you're reporting out numbers of cases—because everybody in the global community wants to know, how many cases do you have? How many suspects? How many probable? Then, what are your contact tracing numbers—what do they look like? But then we have these other data points, like we had ten thousand calls into this call center. Do you report on those, and the content of those, and how many of those—do you triage them in some way? I think leading an epidemiology team and trying to figure out, where do we put our person time into that and figuring out case identification. The sooner you can identify a case of Ebola, we know—that's proven—identifying and getting them into a treatment center, that that will help get ahead of this epidemic early on before it exponentially increases. I think it was important to figure out how to do that in Mali quickly.

Q: How did things proceed from there?

Novak: The problem was the politics, and I think everybody knew that you need to identify cases early. That is easier to address when it's a small group of people that all trust each other. But when you throw together a hundred different agencies and NGOs

and they all have mandates and funding—I work in international health, and I respect this process. I just found it even for me strange to see a room where everybody shows up with their branded uniform. Sort of the vest, and everybody has their thing, and it was more about the look rather than the content. That’s why someone like Pierre [Rollin] was so amazing. I know this was in his transcript, but he shows up and people don’t know who he is and he doesn’t identify himself. He’s so humble, and he’s like “Hi, I’m Pierre, I’m here to help.” And he’s the world expert—you want his help. But he doesn’t wear that on his chest, and I think it was a very different way at least in Mali that CDC approached the responses. That we really were there to help, and Samba Sow knew that. He knew that because I was a familiar face. Because he knew Pierre’s name. Because he had the confidence of Tom [Thomas R.] Frieden behind him, and he had the support of the country office there, and the country office had some fantastic people. Adama N’Dir was one of the staff members in that country office, and between him and Samba Sow, they are the reasons that there wasn’t a large outbreak of Ebola in Mali. Because we put in all these systems to detect cases early and to report cases and then to do contact tracing. But that’s only as good as what people want to tell you. If they don’t trust you, they’re not going to identify who their contacts are or they’re not going to come into the treatment center. But to have someone that is unassuming—that can go into a community—that can have those contacts and build that trust. This is something that Pierre did even when he was there. It was something that I tried to do when we went out in the communities, or just instill in the team when they went out. Definitely, N’Dir was one of those people that just—people would pick up a cell phone and call him from wherever, and that was our

surveillance. We would hear about that there was something going on, and he knew that. Then we would have action from that.

We were there to work with WHO [World Health Organization] and a lot of my WHO colleagues who I worked with in meningitis showed up there, as well. I think in terms of how our teams interacted—and I know this got some criticism across the response—but for Mali, all these familiar faces showed up, at least from WHO and CDC. There were unfamiliar faces from other agencies, but I think to have people that were good showing up to respond contributed to getting ahead of this before it got out of hand.

Q: Just so I understand, I know the usual players were probably there. Obviously, CDC and WHO. Who were some of the other organizations?

Novak: MSF [Médecins Sans Frontières] obviously is a big part of all these responses, and their sort of epidemiology wing Epicentre was a big part of response. I think in terms from an epi [epidemiology] standpoint, the most important players from Mali were CDC, WHO, and Epicentre. MSF from the standpoint of reporting because wherever they have clinics or treatment centers, they have some information that is being provided back. At least for Mali, there was just one Ebola treatment unit, so really their reporting was on the status of any patients that were being treated. They really had more of a treatment lane, but in terms of the data collection and the contact tracing, that was really more Epicentre and WHO and CDC working together on that.

Q: Are you saying “Epicentro?”

Novak: Epicentre.

Q: What is that?

Novak: I don’t know if they’re a part of MSF directly or an independent unit, but MSF’s primary mission is response and treatment. But there is a part of that where the public health component, the epidemiology—and so Epicentre is their epidemiologists.

Q: That makes sense. Okay.

Novak: Whenever there’s an epidemic—at least, we work with them for meningitis epidemics, for instance. When MSF sets up a treatment center, Epicentre will be there doing some of the registries and the line listing and the public health portion of the response if any special studies need to happen around that response.

Q: I had another question, if you don’t mind. It’s interesting to hear about how everyone in a big meeting could get together and it kind of can become about pomp and circumstance with some organizations. Do you have an example of any time that you saw that? You don’t have to identify whoever it was or whatever organization, but a time when in your head you were like, it’s not about your reputation—it’s not about establishing yourself?

Novak: It's not anybody specifically. Mali struggled with coordination. The context in Mali was they're coming off of what was a borderline coup d'état, and they still had security issues in northern Mali, and there were security issues in Bamako even just before Ebola broke out. I think the global community was really concerned that if you do have Ebola cases in Bamako, do you have it in other places, and how likely is it that we can control it? As public health professionals, not military. I think that's where it gets scary, is if you have a serious security issue, who is the right unit to respond? I think the global community quickly responded to that call to action. You have meetings that were being held daily after all the work was done around 4:00 pm, 5:00 pm, and Samba Sow was heading those. Initially, it was just like ten people sitting around a table, and then within a few days, it was three hundred people in a room and fifty to a hundred different agencies.

Q: And are these mostly internationals, or are they local?

Novak: No, they're mostly international. Some European, American. The meeting went from one hour, going through the quick details to—they were notorious for not being any shorter than four hours long, which was difficult after a long day. Then you have a four-hour meeting before you even eat, and so you're maybe getting home around ten. I think the challenge there was everybody wanted to have their voice—their say. Everybody's been deployed to Mali to quote-unquote “save the day,” and defining roles in the response—for CDC, we had a clear role. We were lead on contact tracing. That's what

we're supposed to do. I think during these larger responses, having the framework for response—and that's why you see a lot of activity now around emergency operations centers as part of global health security. It was recognized during the Ebola response that there wasn't that emergency response framework. That when you have to scale up from a small response where everybody can do a little bit of everything, to hundreds of people and hundreds of agencies, everybody has to know their lane. Otherwise, you're not working efficiently, and then you have a four-hour meeting where everybody has to update and there's a lot of mission creep. Everybody's reporting on other things. And there's turf battles, and then you get people who aren't sharing information, they're protecting information because information is currency. Finding a way to cut through that, and public health is about people, so when you have a good core of people that know each other and that trust each other, the information still flows and the right—the true information, and you can identify where there are cases.

I think one issue we had that highlights this is we did struggle with the contact tracing a bit, and it was in part because contract tracing is hard if you don't build trust in a community. When you go out, people have to tell you honestly who are people that have been exposed, and I don't think enough effort was put towards that. We were working with WHO on this, and there was a perception that there was a criticism potentially of the units, that they weren't doing the job to build trust in the communities ahead of time. Something happened where a case was identified, but not reported right away, and so we couldn't get them into contact tracing, and what this resulted in is the person was out for a few days and exposing individuals and there was risk of further transmission. This

wasn't coming out in those coordination meetings, and so there wasn't that call to action—that urgency, and I think this is where having a personal relationship with Samba Sow, and that he trusted a core group of people that could have his ear and tell him like, listen, we're concerned about this, and he could force action on that. I think that that's the sort of thing that led to us getting ahead of the response.

Q: What does it mean that this person was identified, but not reported?

Novak: Different units were in charge of case identification and investigation, so if there was a case that was identified, or a suspect case—and this is someone that okay, we have high suspicion that they have systems consistent and they need to go to the Ebola treatment unit, then a good case investigation has to be done. You have to go, you have to interview the person, you have to get some information about where they've been, who they've had contact with, when did the symptoms start, all those things. You want to know the exposure period, and the agency that was lead on that wasn't doing a complete job. What we were hearing through informal channels is that this person was actually identified a few days earlier than it had been reported, and so what that resulted in is we didn't have all their contacts. We were doing this tracing on a case that was in the Ebola treatment unit, but we only had—let's say ten contacts on this person. When it was potentially exponentially larger. That's not to point the finger at any agency, and that's why I'm not really mentioning it. I think the point is it's having the right people that can build the trust with the individuals. It's a sensitive thing to do a case investigation, and I think when it's not complete, working as a team to figure out how you can complete that,

or just be clear where the gaps are. If you don't identify the cases early and you don't get all the contacts, then that's when something slips through the cracks and you have another case that's in another geographic location that's going to end up with another chain of transmission.

Q: That helps. Thank you for explaining. Can I ask also, was CDC—were you guys completely above the fray in terms of turf battles, or were there ever other organizations that wanted to start taking control of contact tracing, for instance?

Novak: I don't want to get—I don't think it's helpful to get too into finger pointing on this, because I think at the end of the day, any kind of emergency response is stressful, and there's always going to be heated discussions as you're dealing with it, but you come together in the end and you do the job. I will say anecdotally as a team lead of a group of individuals from CDC that were deployed to do a specific job, who were all very good. Some of them were EIS officers, some of them were staff members that have been around the agency for a long time that have responded to hemorrhagic fever outbreaks, and others like Leah [Moriarty] who had done Peace Corps, that had skill sets like language and local language, that work well in the field and could do some more community interaction in a more effective way, but were outsiders, so to come in and be humble. I think what that team faced over the course of the epidemic response—they really weren't appreciated, and daily, there was a lot of frustration. My job was to keep morale high because they became frustrated. They were doing a job in spite of not being wanted, and I

think this was difficult for them. Even though we were doing the right thing, I think we were not fully welcomed in the job, and that was challenging.

Q: Was this predominately by people from Mali, or people from international health?

Novak: It's both. I think that there are always some individuals. It's not representative of the whole agency or the whole ministry in a given country. It's just certain individuals that don't work well within a response, or they were told they had a larger role and they didn't. Or maybe they don't have the skills that are necessary to respond appropriately, and I think that there's a certain culture in some organizations that you don't admit that because you're at real risk for either losing your job or getting demoted—especially in the WHO system, I think that they're penalized more often than they are rewarded for their good work. I've worked with colleagues like that in the region for enough years to know to let it roll off my back, but I think the challenge for me was to convey to my team that it's not them. You are doing good work. You're doing the right things. We are accomplishing our goals daily in spite of what you're seeing outwardly. We're doing what we need to do. And I think we actually had a perfect group of people because I think other individuals might react differently in that situation. They may not put up—there were some personal attacks, and there's a lot of negativity that the team just let roll off, which was nice.

We were very close. We knew this was a serious situation, and we all deployed together, so we arrived together—we knew each other—we were dealing with this from when it

was just a small response. I think in that way, we were sort of a family, and we were resilient together and that was important. I think it would have been different if it was like a lot of new people coming and going and you didn't have that rapport among the team. So I guess that's to say in spite of all, any kind of challenges like that, they were able to keep a clear vision as to what we were doing there, why we were there, what our goals were.

I think what helped in that is we had daily calls with Fred Angulo back in Atlanta, and I think he was really good at giving people credit. We did our reports—we went down the list—he listened, and I think even if we weren't providing information that needed to be acted on back in Atlanta, the fact that someone was listening made the team feel good. Then we would have weekly calls with Tom Frieden, and to get fifteen minutes—and don't know how he did this through the epidemic, where he's talking with different country teams every fifteen minutes and he's asking insightful questions. His capacity to task-switch is amazing. But to also have him ask questions and be thankful for the work that we were doing, I think that that helped keep morale high. Jeff Hanson, who was the head of the response team in Mali, he was a fantastic team lead for this response and he also helped us keep balance—like knew when stress was getting a little bit too high and that we had to have a group dinner or we had to take a break or something. We were there over Thanksgiving, and the country director for Mali had us over to his house. We had a big family dinner, and I think that was nice. It was a difficult period and we were working crazy hours, but it wasn't any different than Hurricane Katrina or [influenza A

subtype] H1N1 [2009 pandemic] or anything like—any other response that our group participated in.

Q: We were talking about something before the interview that I want to make sure that we get in here, and that was how it felt in the moment, and what you anticipated—how this outbreak might turn into something much larger. Can you speak about that?

Novak: Sure. When you look back now, even now with just hindsight, I don't see Mali in terms of a serious situation. It was more of a blip in the larger Ebola response in West Africa. I have to put myself back in that time, and you know, an outbreak is defined by something that's above baseline. Baseline for Mali was there are no cases. So when you have one case, that's a serious situation and that necessitates a large response. After having worked in the region in Mali and being familiar for three or four years and seeing their lack of capacity to deal with even meningitis epidemics, and knowing the security situation and the political situation in-country and knowing that a serious public health event could break their system and could not only send the country into a prolonged epidemic, but seriously destabilize the country—there's some larger political questions here. You are a region that's relatively stable. Burkina Faso had had no transition of power for many years, they hadn't had any terrorism events, but you had AQIM [Al-Qaeda in the Islamic Maghreb] in the region that had had sporadic attacks, and that was growing. We knew that these were threats in the region that when you have some other destabilizing event, that it could result in just this downward spiral. I had a feeling we'd get through in an Ebola situation, but I was worried what this would do long-term in our

ability to respond to meningitis epidemics. That was the context at the time. I was fearful, and I think a lot of people were. Nigeria had already happened, and we knew how quickly you could have multiple chains of transmission and that this could get out of control. But we also saw how they got ahead of it. There was sort of this roadmap to—you have to detect early, that contact tracing works when it's done completely, and that an emergency operations center actually provides some structure to the response.

Unfortunately, Mali didn't have that, but we could go in and try to put in systems to do case identification and do the contact tracing. But we'd have to do it ad hoc. We were kind of building this from nothing. When Rana initially got involved in this team, and as I said, they were going out to do these evaluations, she was sent to Mali to do the evaluation of their capacity, and then the first case happened and so Mali never did their evaluation. They never had the ability to think about where they were at to respond to an epidemic, and so this was a real concern at the time. That this would get out of control.

The question, when we were deployed, was we knew something about the initial case—we knew that the case had traveled from Guinea and had then come to a hospital in Bamako and subsequently passed away. But we didn't know what happened in transit. We didn't know how much contact they had. We didn't know much about who this person was and what that would mean in terms of exposure with family or friends or anything like that, and so that unknown of, is there something—because there aren't systems to detect cases in Mali—do we just not know what's under the surface? Are there more cases we're not seeing? A lot of the work initially was just trying to get a handle on,

do we know all of the true cases that are happening? Do we know that we've identified all of them? Do we have enough feelers out, like with these hotlines so that people could call in—that they'd know that they're reporting the right thing, and not just that there's a cold and they have a cold or something? There was a real need, I think, to provide some structure to that.

You have all these agencies that are coming in that want to help. A lot of them are helping with the surveillance and the case identification, but they're doing it in non-standardized ways and it seems—this is Public Health 101—but there wasn't a standard case definition in Mali. One of the first things that we did among this sort of task force—we were a multi-agency, epidemiology task force with the country—to modify the WHO case definition for Mali. This was a little bit of an issue. WHO didn't really have a good standard. There was a lot of argument about what was a good case definition, and the WHO case definition was different than the CDC one, and I think we had to come up with one that was clear so that when we were reporting out cases—because they were going to end up on the global stage—what did this mean? Fortunately, Pierre was there to lend expertise within that because we were just a bunch of epidemiologists sitting around a table. He was the one that actually should be writing the case definition.

But I think where our team really shone on this is we had a case definition, but it needs to get out, so how does that get out? We had been fortunate that some money had been donated to the response, and so we actually had a pretty well-equipped—it seemed like overnight—office in Bamako, and there was a lot of random equipment that showed up

that supported our office, and one of them was a laminator. It's a little, small, hand laminator with sheets you have to hand feed in. I had found in my meningitis work that one of the most impactful things isn't the shiny lab equipment or the nice computer, it was really anything that was paper-based. It has to be right on paper first, and if it sticks around, paper tends to get ripped or shredded or dirty. But if you can somehow preserve that, and especially if it's something that is a routine like an SOP [standard operating procedure] or a guideline as to how someone's supposed to do a job, we have these things that we call "job aids," which is a laminated—usually one or two pages front and back, and it's something they can stick in a notebook or tack up on a wall. We came up with the idea to do a graphic of the case definition in French on one side, and then on the reverse, we decided to translate that case definition into Bambara, which is one of the major local languages, and then we laminated that.

We had this hand laminator, and we had this great idea. Everybody was really excited about it, but everybody was really tired because we'd just left our four-hour coordination meeting and it's like ten, eleven o'clock at night. I said I wanted enough of these that I could make a statement in the coordination meeting the next day, and that statement would be not just bringing one, it would be if we brought a box of them and were able to present it in a sort of formal way. I just got done talking about how everybody wants to show off in a coordination meeting, but I did feel like this was the only way to get the attention, and I knew Samba would appreciate it. So the team laminated a thousand of these, and each one takes about five seconds to get through the thing, so we had calculated out how long it actually takes to do all of this and it basically took all night.

But that was probably one of the most—it was a simple intervention, because it really was a piece of paper that was laminated, but what could be done with that, if it were replicated in enough numbers, is it could be distributed throughout the country to the call center for the hotline, for public health officials that are going out to the district health facilities, to the regional health facilities, to the border health people that are sitting on the border. All these different teams that were going out and sitting up systems, they now had, this is what you're supposed to report on. We could have spent a lot of time writing protocols and guidelines for surveillance, but it all starts with your case definition. So, came in the next day and handed Samba Sow the box, and I actually didn't do it in a big show. I did it before the meeting, and he's like no, you're going to do this during the meeting. Then I handed it to him—presented it to him, and he said, "This is great," and he held up one and he said, "This is a simple solution, but it's something that we can do throughout the country. I want ten thousand of them by tomorrow." We'll talk about that later, Samba. [laughter] I can't get you ten thousand.

Q: You calculated the time. This is interesting because it's reminiscent of when you were talking earlier about how when you were setting up basic capacity in Burkina Faso, and it wasn't like a lot of cutting-edge technology that you were using, but paper-based forms for reporting from rural areas across the country. So yeah, the creativity in low-resource areas that you have to use.

Novak: Yes, I'm a big fan of job aids. In the end—and I didn't bring them with me, but this wasn't the only job aid we made. It was something that was really embraced by the

country and they loved it. Anything that was a consensus recommendation that the country was supposed to implement—whether it was specimen collection and transport; whether it was something to give to contact tracers that are supposed to get across a concept to someone that they're educating about Ebola, how transmission happens; everything ended up on a job aid because it was something that was easy to carry around and they could pull out from their notebook and show somebody right there what they had to do, and it would jog their memories. I liked that that concept was adopted and grew.

Q: I think with all my questions, I've gotten this a little bit off of the kind of chronological narrative track. I'm not sure where we actually are in there.

Novak: The Ebola situation in Mali—the outbreak in terms of magnitude wasn't that large. You had a couple chains of transmission. Once we became confident that we didn't have undetected cases floating around; that we had identified all the cases and we were confident in that, and it's not because we weren't looking, that we had systems in place, that there was reporting, and we weren't getting any reports from the medical units; and we had enough situational awareness in the communities that we knew we weren't seeing the sort of symptoms. We were confident that okay, we were ahead of this. Now, what we didn't know is, did we have all the contacts of the cases? So we had to wait out one more incubation period to see, and I think that's where—we were confident after a few weeks, but the question is, if you didn't do your job well, then you're going to see another chain of transmission as the next incubation period comes around. I think that was where

everybody was holding their breath. In part because the last case in Mali was a younger guy.

He comes into the Ebola treatment unit—just shows up. And he gets turned away because he didn't really have all the—he had a fever, headache—and I think this is something, I don't know if Pierre talked about it, but the Ebola symptoms for whatever reason in West Africa—and I'm not the person to be speaking about this intelligently, but they weren't traditionally presentation—it wasn't—you didn't see the hemorrhagic presentations. There wasn't as much bleeding, and that was consistent in Mali. When a case presented, they sort of had severe, flu-like symptoms, but it's hard to know what the difference is unless you actually get lab confirmation. So it wasn't surprising that he was sent home. But Samba found out that he was sent home, and he knew the family. So he went to see the family, and Samba's a physician, and he recognized quickly that the individual probably was sick with Ebola. He hadn't disclosed any contacts with anybody, he wasn't on our contact list. That's in part why he was turned away, but he hadn't disclosed because when he was interviewed, there wasn't the right information. Samba found out that he actually had had contact, but he couldn't convince him to come in. This was a problem, even though he knew the family. He had to go back to the family's house and try to convince them to have him come in to the Ebola treatment unit. There was a growing sentiment that people were sent to that unit to die or get Ebola, and despite Samba's best effort to educate otherwise, I think this was common. We could have done a better job educating the public ahead of time, and it's something we did course-correct on. This is where Samba really amazed me, is he put his life on the line in order to get

this person to come in. He couldn't get them to come in to the treatment center, so he said, well, can I come out and draw blood, and so at least we could test it? And it wasn't ideal. This is not what the global community would do, but at least you would have something and he would have an opportunity to talk more—have a dialogue and try to get him to come in. He was younger. He was in his twenties and he was with a bunch of his friends that are kind of trying to be tough around him and threatening him. They were smoking and throwing cigarettes at him and still, I think, Samba was single-minded and dedicated to “Mali will not be threatened by a huge Ebola outbreak.” I think that dedication and passion to the cause—the goal of getting ahead of this Ebola situation was amazing, and eventually, he was able to convince the guy to come in.

What was amazing about him is he'd been symptomatic for like two weeks. And he was in his twenties—he was out playing soccer, he was going to bars and likely sexually active, but we do not have confirmation. I think that was scary because there's a lot talk about “super-spreaders” during the Ebola outbreak, and this is someone that had a lot of exposure to a lot of different people and everything suggests that there should have been—because of all the bodily fluids, that there was a risk of transmission. We were holding our breath after that. And we didn't see any other cases after that. It ended. So, went through one incubation period, and then once you go through the second one, you're certified as Ebola-free, and yeah, that was celebrated. After we left—that was celebrated by me when I was back in Atlanta.

Q: Did that individual survive, do you know?

Novak: Yes, he recovered. He was very lucky. I went back to my meningitis world and quickly got sucked back into the issues we deal with and ended up responding to another health issue and sort of forgot about Ebola. But it's those sort of questions that are fascinating to me. Why was this twenty-year-old guy who was symptomatic for two weeks, that should have been dead—why did he not—he sort of had this—it wasn't asymptomatic, but it wasn't as severe. When he got into treatment, he was pretty bad, but he should have been going into like multi-organ failure, and he recovered. I thought that that was amazing. Also, that he didn't—none of his contacts got sick, and I think that was also a little bit of luck, as we didn't know if he was honest about all his contacts and because of the difficulty with even getting him in, I think that that case investigation wasn't as complete as it could have been. We did the best we could with a difficult situation. But like I said, we did as much as we could and then we held our breath and were ready to respond if we needed to. Fortunately, we didn't see anything else.

Q: I'm forgetting, I'm sorry. What was the time period that you were in Mali specifically for Ebola?

Novak: It was around November and then December, and I'm forgetting the exact dates, but I do remember that it was around Thanksgiving. I was there for about six weeks, and that was around, not for the—the first case, which was the child, had occurred back in October. Then, after that investigation was completed and all the contact tracing was done, so it was twenty-one days after that, the team finished up that investigation and

came back to Bamako and then left. Then it was like a week later that you had this additional case die in Bamako, and then being confirmed that it was Ebola. That was about—I was working in the EOC [Emergency Operations Center] in October, starting in October, EOC here in Atlanta, and deployed to Mali early November, and then was there into—it was just before the holidays when I came back. So I guess it was mid-December.

Q: And you said you kind of celebrated by yourself here in Atlanta?

Novak: Yeah. Like I said, I had done those two whirlwind tours of four countries twice to try to implement this meningitis project before they were affected potentially by Ebola, and I was tired from that. And then to do the Ebola response, which was—any kind of large response is particularly draining, and I had learned enough from how I spent two months out responding to Hurricane Katrina and then doing H1N1 to know how my body needs some time. I had a ton of miles, so I just decided I'm going to go to San Diego and just sit by the beach for a week by myself and relax. But I had to do my monitoring—my temperature monitoring when I came back, and I was the first person that was being monitored in San Diego, and they were very enthusiastic. [laughter] They wanted to talk to me daily. They wanted to actually visit me daily. They did an excellent job.

Q: Did they crowd you?

Novak: No, no, no, they were fine with just the call, but this was around the winter holidays and New Year's, and if you don't pick up the phone right away, they'll come to

find you. [laughter] They were ready to quarantine me. They were not comfortable with me going.

Q: But you made it through.

Novak: Yeah, I made it through. I was fine.

Q: That's good, that's good.

Novak: Yeah, and I recovered.

Q: Right. I'm interested in—so you got back into meningitis work shortly after that. What kind of effect would you say the Ebola epidemic ended up having on your work?

Novak: It's a really good question. For me, I worked in the region before Ebola and I worked in the region after Ebola, and so I have a little bit of a different perspective than maybe others that might have just responded and they go back to their subject matter group. I had the visibility of what—I worked in a region that was sort of neglected from a public health standpoint for many years. We never had a lot of funding to deal with meningitis epidemics, and then saw all of the funding that was pouring into the region to deal with the Ebola epidemic. I think, for me, I really came back to this idea like I did with the meningitis vaccine in Burkina, what capacity are we building that's being left with the countries? I think that the Global Health Security Agenda has done a nice job

identifying what the gaps were—at least from CDC’s perspective, and the lessons learned from Ebola, and trying to key in on those. So things like IDSR [Integrated Disease Surveillance And Response] and laboratory capacity and EOCs—these are definitely things that we embrace from a meningitis standpoint and that help improve our responses, and they have. We had a very large epidemic of a new strain that emerged in Niger in 2015, so the year after the Ebola epidemic, and I think this was like, okay, this is it all over again. But all that capacity that you built in the region, you can apply that to this situation. What was unfortunate is, not all the countries benefited from that infusion of money. Niger was a country that was not a Global Health Security country. It was not an affected Ebola country. They don’t get a lot of US government funding. Now, we brought the technical expertise, and I think that our experience as a team—really they benefitted from it. But I think there’s still a risk in the region. We’re doing a good job in certain countries and we are building sustainable capacity. It just reinforced that philosophy that you’re not there just to respond to the individual health threat. That there will be some other health threat, and really what we should be doing is helping the countries grow and deal with their own health threats, whatever they are. And to determine what their own threats are, not have someone tell them that.

I think the Ebola response for me made me more appreciative of the work that we do day-to-day. I actually felt more confident that we approach dealing with a specific health threat, but doing it in a way that’s broad-based. I don’t know how to better message this. We’re a subject matter group for meningitis, but we’re not just building meningitis capacity. We’re building capacity that was demonstrated to be effective during the Ebola

response. I knew that I was having an effect that was greater than just this specific health threat of meningitis. And this is important because that vaccine that I mentioned, it's since been implemented in nineteen countries out of twenty-six. It's been given to over 450 million people, and out of all of those, there has been only one documented case of vaccine failure. This is one of the most impressive public health achievements, and it's a really nice story because it's a low-cost vaccine that is affordable by the countries. What unfortunately is happening now is there's this perception that epidemics of meningitis are over, and they're not. They are less of a threat, but I think the lessons we learned from like smallpox eradication is you build this capacity and then you eliminate disease, and now that capacity just dies or goes away. Ideally, you build a capacity that is broad-based. You're building a foundation with the country, and then that that lasts after. So if meningitis goes away, now you can deal with yellow fever, or cholera, or measles outbreaks, or whatever the next health threat is. I'm confident at least—Burkina Faso is one of those countries that they have a country office that was started under Global Health Security after Ebola, and we've really effectively partnered with them to build on this platform of, okay, we've done all this meningitis work, but how can we expand that out to deal with other health threats and how can we build capacity within the ministry, so it's not just one person—it's multiple people that have that expertise, so that they have the bandwidth? I really do believe that by doing this—by building from the ground up that's country focused and is country driven, that you can create something that's exponentially stronger than if we just come in and essentially give a bunch of money and do it for them. We'll see.

Q: All right. Now I have to ask you, Ryan. I've previously had your now-fiancée Leah Moriarity in here, and I know you guys met on the Ebola response in Mali. Can you tell me about meeting each other?

Novak: I'm surprised you waited until now. I thought you were going to lead with that. [laughter] Yeah, so Leah and I grew up two towns away from each other, and my father had his dental practice around the corner from her house in Newton, Mass. Then in Atlanta, she has an apartment that's a block away from mine. But we had never met—never even came across each other in Atlanta.

I love this type of work. I had done multiple responses with the agency, and so getting called to the EOC to do a job—I was excited, but I was also like, I know what my job is and I'm showing up and I'm very serious. So I think probably the first impression that Leah would describe of me is probably being very serious. I think she wanted to be serious. She deployed ahead of me and left her phone in a cab, and so my first real interaction with Leah was that her boss at the time called me out of the blue—and I didn't know him either—and said, "Before you leave, I need to give you a phone to bring to Leah because she didn't want me to tell you this, but she left it in a cab." I thought it was hilarious, but I knew that she thought I was being super-serious, so I showed up like I was really angry.

I'd been taught, because this is what Nancy did with me and others before, is that everybody has their strengths, and a good team is built when you maximize those

strengths collectively. I always look during a response, or even in our day-to-day work: what are individual team members' strengths, and how can those be applied? They go beyond public health, and Leah brought to the response—I knew she was hardy because she did Peace Corps in Senegal, so she knew West Africa, and I knew she was comfortable in that environment—that cultural context, that comfort is important, that someone isn't going to just—you don't know how they're going to react in a stressful response. But I knew I could—at least based on what I knew on paper is that I could have confidence and lean on this person even before I met her. Knowing she spoke French and Bambara. I knew, okay, these are the tools that I had beyond just like an EIS officer. They're good and they're motivated, but—since I was an EIS officer, sometimes they're high maintenance, [laughter] they want something that's visible or something that's cool. They want a publication, and I get that. But sometimes you just need people who are good and solid and do the work. From day one, Leah just jumped in and did it, and just did whatever was necessary.

But the way that I saw her shine was—I don't know if Pierre told this anecdote—going out to visit some of these families that were sort of angry. They had family members that were in the Ebola treatment unit and they hadn't been allowed to see them and they were angry. They were spreading rumors about what the Ebola treatment units were, and that was making it harder to fight this growing perception that that was a place where you got disease, rather than got treated for disease. He would go out there and just talk with them for hours, and initially, they'd make him stand out in the sun, and they never do this in Africa. They will always invite you in, but they made him—they just—they were that

angry, and he knew that, and Leah knew it, too, that this is not right and that they're—I think that was different than—to have that cultural awareness that some of the contact tracers didn't have. I think there's a sensitivity, and you pick up on that, and that's when you know you have to go back. You have to spend some time here. He and Leah went and bought a bunch of books, and one of the things that they were saying is the kids were expelled from school, they weren't being allowed to go, so they were missing out on their education. To bring books and some food and some writing instruments—I think the small things like that—the family just opened up, and I think that that really cracked sort of—started to build that trust with the community. Leah was a big part of that, and she showed the team how that's done, and others on the team sort of followed suit.

But what was amazing—and I think we sort of pigeonhole people by their titles or the, like, “You're an EIS officer so you should be put out in the lead on that.” But really, the foundation of our work internationally is really these public health advisors, and Leah is a public health advisor, and they grease the wheels. They do the logistics. They do the stuff that needs to get done when everybody else is talking about all the important things that they think they need to be doing. She was one of the people that stayed up all night to laminate those things, and I think that I was left with this like—this is just a good person. I need to know this person. We became friends after that, and it turned out we had a lot in common, and a lot of conversations there. We just enjoyed being around each other, so we hung out a bit when—she stayed in Mali actually for another month after, and CDC had enough confidence in her that she was the only person left in-country. I think that that's a testament to—like Pierre, she showed up—she didn't tout her resume or CV

[curriculum vitae] and just proved that this is what she can do, and they had confidence to leave her there.

Friendship slowly blossomed into something different over time, and I think what I recognized is you want a life partner that you can lean on, I knew. We saw each other's most stressful, exposed—not literally, but figuratively naked moments, and we still had liked each other. That was a great place to start with. To build a foundation for friendship. A year later, we ended up—started dating, and it's been wonderful since. I mean, I really—Mali left me with a lot of things professionally, but left me with a wonderful personal gift, as well.

Q: Absolutely. Thank you for talking about that, as well.

Novak: Yeah, thank you for asking.

Q: I still want to get you guys into a StoryCorps Booth if you are interested.

Novak: Absolutely, I would love that.

Q: Yeah, cool.

Novak: I love—so we're planning our wedding in October, and we're trying to figure out how to laminate all the things we're going to send out, [laughter] like invitations that are laminated. We still may do it.

Q: Save-the-wedding, yeah. Do it.

Novak: Save-the-dates.

Q: Laminate-the-date, yeah. Good, perfect. Well, were there any memories, any moments, any aspects of your part in the Ebola response that we haven't covered that I have asked about that you'd like to talk about?

Novak: Now, I guess I just want to—we talked a little bit about how I came to CDC and what my career path was, and I feel real fortunate that there were people along the way that took the time to get to know me and help push me to that next step, which was an introduction or an opportunity. I keep coming back to a theme that public health is about people, and I had the opportunity to have the skills and the knowledge and the experience to be the right person at the right time to go to Mali to do this response, and to have that support and confidence of all those people. I really appreciate the agency for what they do. I think that CDC is an amazing brand globally that's well-respected, and I've never had a situation in any country that I've worked in—and I've worked in many—where the doors were closed because I was from CDC. Doors were always open wider, and I think that to have that background. But then also to have a dedication to mentorship and

professional development from people like Fred Angulo and Nancy Messonnier and Tom Clark and Leonard Mayer. That has stuck with me, and I think what I see is as these young staff members participate in these responses and then they grow into senior staff members, that I hope that, like me, that they remember what got them there and that they also pay it forward a bit. Because that's what's going to keep making the agency great long-term. So, yeah, thank you to those people and thank you to the agency for the opportunity.

Q: Great. Thank you for being here. Very much appreciate your time and thank you.

Novak: Oh, thanks for asking.

Q: Of course.

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