2017 McGovern Lecture
CARLOS DEL RIO
Ebola AIDS & Other Plagues

Introduction (Clyde Partin): Dr. Carlos Del Rio is the John P. McGovern speaker. He currently is the Hubert Professor and Chair, Hubert Department of Global Health, Rollins School of Public Health at Emory. Carlos was born in Mexico City.

He graduated from medical school there, valedictorian. He also got the Best Students in Mexico Award. He then trained at Emory with me in internal medicine.

You remember Dr. Gil Grossman was reminiscing about that particular class of residents as being particularly good, and Carlos was one of the people that he remembered. Carlos has owned numerous national and international boards, NIH boards, CDC boards, primarily for his work in HIV disease, involving the treatment, research, and prevention of that and other sexually transmitted diseases. I counted 26 awards on his 57-page CV, his name on 500 publications.

So he is well qualified to speak about Ebola.

Carlos Del Rio: Thank you, Clyde, and thank you to the members of the society for the invitation. I'm really honored to be delivering this lecture.

Obviously, William Osler is a figure that we all revere and look up to every time when we are on service and rounding, and it reminds me about, again, what can we do when we are with the students, when we're role modeling, when we're talking about what we do, and we're thinking about our interactions with the patient. I wanted to talk today about Ebola, about AIDS, and other plagues and put that in the context of the literature and also about the experience we had here at Emory with Ebola. Plagues, as you are aware, are found everywhere in the literature, and I think that whether you go from Thucydides to Camus, there are wonderful descriptions of how these epidemics have occurred throughout history.

And you can also find a plague depicted in paintings, in music, in art. I was recently in Italy, and again, Tintoretto's depiction of the plague in Venice is just one of the most interesting ones. Probably the plague, the Black Death, which began in Asia around 1300 and spread throughout Europe, was really one of the most transformative epidemics that influenced civilization.

When you think about it, over 50 million people died as a consequence of the plague, and there are some masterful descriptions in literature of the plague, including one by Boccaccio. But I find that Shakespeare was also very good at looking at mentioning diseases, and in King Lear, he says,

> "Now, pithy daughter, do not make me mad. I will not trouble thee, my child, farewell. We're not more met, no more seen one another, but you throughout

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> my flesh, my body, my daughter, or rather the disease that is my flesh, which I must call mine, thou art a plague sore of embossed carbuncle."

And again, descriptions that really remind us about how influential the plague was to people living in the 1500s, 1600s. Most recently, I've finished reading a book called Years of Wonder, and if you haven't, I would strongly encourage this book.

It's based on a historical fact, and it's in 1665 in which the affected community by the plague votes to quarantine themselves to prevent the spread of disease, and as they do that, they run into a series of different issues of seeing how quarantine transforms the community, and really that is a microcosm of what we see in other societies and what we've seen, for example, with Ebola, people quarantining themselves and what the orders and issues of quarantine have brought during the most recent and many epidemics. But it is really the other component that I think is quite critical.

It's really this whole issue of closing houses, of keeping people isolated. As this description in 1700 says, the shutting up of houses was at first counted a very cruel and unchristian method, but it was a public good that justified a private mischief. And I think this is an issue that we face all the time when we're dealing with quarantine, right? What is the cruelty of quarantine? What are the human rights of the individual and the sufferer, and what is the public good? That is the enormous counter position that you see between public good and human rights that you frequently encounter when you're dealing with transmissible diseases. I think the influenza pandemic of 1918 is one that we clearly all see as sort of the mother of all pandemics, and I don't know, can we see if we can maybe play this video? One of the worst natural disasters in recorded history was caused by a virus.

The influenza pandemic of 1918 struck every major U.S. city, dropping people where they stood. There were at least 20 million people killed worldwide, and it's probably the worst pandemic the world has ever known. There were more people killed from influenza than there were from the First World War. The war itself was the problem. If there had been no war, that year's strain would have stayed isolated. But when Allied troops met in northern France to exchange fire with the enemy, they also exchanged a lethal strain of flu. So it began. It then went from France to the United States, and it disseminated from Boston. At Fort Devens, Massachusetts, one case of flu turned into more than 6,000 cases between September 1st and September 18th. It took only 17 days. India lost nearly 4% of its population. Alaska, 8%.

In the South Seas, the death rate was 20%. People were absolutely panicked because somebody could be playing bridge one night, and they would be dead the next day. And so they did all kinds of things. They were wearing face masks, and, in fact, the police all wore face masks. They were carrying little pouches of garlic and onion, just anything that they thought would protect them from the flu. They had no idea that they were leaving exposed the very place where flu enters the body, their noses. Nothing was known about how to cope with it. And that is something... That's the issue, really. This influenza pandemic infected about 500 million people worldwide and killed about 50 to 100 million. That's 3% to 5% of the world population.

If we were to have a similar influenza pandemic today with about 7 billion people and you had a similar attack rate, you probably would have 200 million people who would die globally as a consequence of a flu pandemic. And, obviously, this is, therefore, the pandemic that we all fear the most, right? What is fascinating is that, really, after the 1918 pandemic, was very little written in the literature about the great influenza pandemic. And it's almost like people were left totally unknown by it. There's no novels, there's nothing in the literature talking about the pandemic.

And you have great writers like Hemingway , Gertrude Stein and others who lived in Europe at that time, and nothing is written about it. It's really not until later on that different books appeared about influenza. But it's mostly chronicled as an event, rather than something that really incorporates into the literature in an effective way.

Obviously, we'll note about Camus' The Plague, which is, some people would say, is a story of cholera in the French Algerian city of Oran. But, really, others believe that it's really a metaphorical description of the French resistance during the Nazi occupation. And it's one of the books that I love the most. And in this passage where it says,

> …"sometimes a woman would cloud her sleeve, crying, Doctor shall save him, won't you? But he wasn't there for saving lives. He was there to order a sick man's evacuation. How futile was the hatred he saw on faces then. You haven't a heart, a woman told him on one occasion. She was wrong, he had won. It saw him to his 20-hour day when he's hourly watched men dying who were meant to live."

And I think this is something that we as physicians facing an epidemic and facing something like influenza will frequently have to face. If we were to have a major pandemic of influenza today, to whom would we give the few antivirals available? Who would qualify to go into an ICU? Who would not be given ICU care? Because even if you go today to the hospital, the hospital's already saturated. And I think that our medical search capacity is virtually nonexistent to face a pandemic.

HIV and TB have been in the literature a lot. Randy Schultz and the band play Dawn, Thomas Mann, Magic Mountain. And they're incredible contributions both in plays, in literature, in art, in music, about these two epidemics.

But I think the biggest contribution that HIV has to the way we manage diseases and we approach pandemic was brought by Jonathan Mann. Jonathan Mann was one of my heroes. He was at CDC. He was working in the New Mexico Health Department, and he got assigned to go to Kinshasa, to Zaire, to establish the first project that CDC had over there. And then from there, he went on to direct the WHO program on AIDS. And when he was at WHO, Jonathan realized that AIDS happened wherever human rights were being violated. And he brought up the concept of vulnerable populations, of people that are discriminated, stigmatized, as being most at risk.

And I think his approach into incorporating human rights into health is really what I see as one of his most valuable contributions. Not as a scientist, but as a physician and as a human person. Jonathan, unfortunately, in 1994, I think, or a little later, maybe 1996, died in a plane crash. You remember the Swiss Air flight that was going New York to Geneva? He was on that flight, and he was lost prematurely, unfortunately.

So I'm going to tell you a little bit about the Ebola epidemic that we saw here at Emory and what we've learned and how we can apply about these principles and these descriptions. Ebola, for those who don't know it, is a virus of the family Filoviridae. And there's five species of Ebola. And it's transmitted by contaminated body fluids, whether it's urine, saliva, blood, semen. And, you know, in the past, we knew the mortality of Ebola was very high, 40% to 88%.

There's really no therapy. Its transmission is mostly within families or within hospital settings, because that's where people are in contact with skin, with mucous membranes, with, you know, vomit, et cetera. The disease originates from animals, from bats, but then from there goes into humans. And the other way of transmission also in Africa is unsafe injection practices. Simply, there's not enough medical supplies, so needles are reused and people get infected.

But there is a phenomenon of amplification that occurs within hospital settings. If you get admitted to a hospital in, let's say in Liberia, in Monrovia, and you don't have Ebola. You probably will get Ebola because of not having the adequate infection control precautions. And there's also community amplification that occurs when caring for the ill, but also during funerals. For example, in Liberia and in Sierra Leone and many of these communities, when a person dies, one of the rituals that is taking place is that the family members clean the body, wash the body, and with the water that comes out of the body, then they wash their faces.

So obviously, if somebody died and has wounds or has blood coming out and gets contaminated this way, then the person who wasn't infected is going to get infected by that ritual. You can see here what an incredible outbreak this was. You can see the previous outbreaks of Ebola depicted here from the first one in Zaire all the way to different outbreaks until this one that occurred in West Africa. And you can see that this one was truly remarkable. It was so much bigger than the other ones and so much more intense. And there's some theories of why that happened, and I'll tell you a little bit about why we think it happened.

So the disease probably started in December of 2013, but it wasn't until mid-March that it was finally recognized that something was going on. And by end of May, the epidemic had spread to Liberia, Sierra Leone, to other countries. And then from there, it went to Nigeria, went to Mali, et cetera. But you can see that the number of people infected was more than 21,000, and more than that 8,000 had died at each one of those sites. Liberia was the most heavily affected country. It wasn't until late in 2015 that WHO declared first Sierra Leone, then Guinea, and finally Liberia free of Ebola.

And the epidemic was called as finally having ended in January of 2016. So what caused this incredible outbreak? And Margaret Chan, the WHO director, wrote this editorial in the New England Journal of Medicine in which she says,

> "You know, many people have asked me why the outbreak of Ebola virus in West Africa was so large, so severe, and so difficult to contain. And these questions can be answered with a single word, and that single word is poverty."

It really is poverty that was driving this epidemic. And when you see when the disease moved to Nigeria or moved to Mali, they're also poor countries, but they're not as poor as Sierra Leone and Liberia and Guinea, and therefore they were able to contain it in those countries. So I think when we think about epidemics, we really need to understand the historical context and the context of those countries.

And these three countries on West Africa are countries that were former colonies, whether Guinea, a French colony, or Liberia was the only country in Africa funded by U.S. colonization. It was actually former U.S. slaves that were sent back to Africa who settled in Liberia. And then Sierra Leone was a former British colony. All of these are countries have had extensive civil wars and very recent civil wars with a lot of people killed. And you can see in Liberia, 95% of health care facilities destroyed. That was the context in which this epidemic emerged. It was a context of extreme poverty, civil war, civil unrest, and that clearly became a fuel for this epidemic and again reminds us of that intersection between the social determinants of health and the spread of epidemics. WHO has recently defined a term called Public Health Emergency of International Concern. And this is a term that WHO uses to talk about when there's an extraordinary event to let other states know and to define and to mobilize resources.

The autopsy of this event really shows that WHO was very slow at declaring this a public health emergency of international concern. You can see I told you that the first cases were noted in April. Then we had seen the disease spread to all three countries by May. But it wasn't until August 8th that they finally decided to call it a public health emergency of international concern. And a lot of the discussions, a lot of the emails that have been made available from WHO are saying we need to declare this a public health emergency of international concern and we've got to mobilize resources to control this. And other people saying, no, no, we can't do that. The countries are going to be upset. The countries don't want to be stigmatized that way. The politicians of those countries are very concerned.

And therefore, you realize that the other component that we need to add into this epidemic, into any epidemic, is obviously the political context. And while we as physicians, as scientists, think that public health is driven by evidence and by science, the reality is in the setting of an epidemic, politics plays a major role into any of the decision-making we do and what happens, and with bad consequences. This epidemic could have been contained a lot faster if a public health emergency of international concern had been declared before it was actually done. I mentioned the impact on health workers of being particularly significant because the affected countries in West Africa are some of the worst countries for physician-patient ratio.

You can see Liberia had more than 86,000 patients per physician, Sierra Leone more than 45,000 per physician.

And yet a lot of the cases and a lot of the deaths were precisely among health care workers. So it was really those health care workers trying to take care of the patients who were themselves at risk. And we see this throughout history in multiple epidemics, whether you're talking about tuberculosis, about SARS, about Ebola, health care providers being frequently the ones that are at risk for a variety of circumstances like the availability of personal protective equipment, etc; equipment that is simply not there.

Now, I want to remind everybody, and I know you understand this, but one of the issues that happened quite a lot during the epidemic is that people confused West Africa, the countries affected by Ebola, with Africa. And I have to remind people that Africa is really, really big. And you can see there's a map that you can see the United States and the rest of the world really fitting into the African continent. I had somebody call me and said, my daughter is going on her honeymoon to Tanzania in a safari, and I'm really concerned about her going to Africa because of Ebola. And I said, no, no, Tanzania is, like, way down there. Ebola is, like, way up here. I would be more concerned if she went to Rome, I said, because Rome is a lot closer to Liberia than Tanzania is.

But obviously this epidemic had tremendous impact on the economy of Africa and the tourism industry. I mean, if you wanted to go on a safari, 2014, 2015 were the times to go because they were all being two-for-one bookings and stuff like that because simply the tourism plummeted in all this region.

You probably heard a lot in the news about the patients that were evacuated that went to other countries or cases that occurred in other countries, and there were a total of 24 patients that were treated outside of West Africa. And I emphasize that because here in Atlanta we took care of four patients, and sometimes it feels like four patients were, you know, four million cases, but at least the way the news covered. But the reality is that it was really a small part of this gigantic epidemic, but shows how, again, the news can really blow out of proportion something that is incredibly small.

In infectious disease we use something called the R0, which is the number of secondary cases that occurs after a primary infection. And you can see, so if you have an R0 of 1.5, it means for every case there will be 1.5 cases afterwards. And you can see here that in the horizontal axis is the infectiousness, and you can see diseases like measles having a very high R0, like around 15, but in the vertical axis you can see how deadly something is, and you can see that, again, you know, measles is not very deadly, so the mortality rate is very low.

Well, Ebola is right up there with an R0 of around 2, with a mortality around 70%. The patients typically have an incubation period of about 2 to 21 days, usually about 1 to 2 weeks, and they present very nonspecific with fever, with malaise, with flu-like symptoms, with GI symptoms, and very rarely they have hemorrhage. Even though we call this viral hemorrhagic fever, very rarely does the individual have hemorrhage.

If you're working in West Africa and you see somebody show up with fever, malaise, flu-like symptoms, and GI symptoms, they can have anything. They can have malaria, they can have, you know, typhoid, you name it, there's an enormous list of diseases. And, in fact, we saw a lot of returning people here, primarily from CDC, that were coming with those symptoms. None of them had Ebola, but a lot of them, for example, had influenza. We were having an influenza outbreak at this time, and a lot of them had influenza.

So it was late July when Dr. Ribner, one of my colleagues at Emory, was called because there were two humanitarians from the U.S. who had become infected with Ebola in Liberia. And one was a 33-year-old male physician. He was on day 11 of his illness, and the other one was a 59-year-old female missionary who was on day 15 at the time of her arrival. And they were both transferred through air ambulance to Emory approximately three days apart.

So why Emory? Why was it that they came to Emory? Well, the main reason that they came to Emory is that Emory has something called a special pathogens unit that was built here after the bioterrorism attacks of 2001. CDC was concerned that there could be smallpox, there could be other severe bioterrorism category A agents that their employees could be dealing with, and they could potentially get infected or get investigated of an epidemic or release. And CDC obviously doesn't have a facility, a health care facility, so they built a small unit as a way to have it there just in case it was necessary. This was 2001, and it had only been used once before. And in fact, in late 2013, early 2014, CDC was about to close it, saying, you know, we've never used this, this is a waste of resources. And I remind people it's a little bit like saying, you know, we haven't had a fire, so why don't we just go ahead and close the fire departments because we really don't need them.

But they were literally in the process of closing the unit and stopping the funding, which didn't cost them much, when all of a sudden these two patients arrived. And why did these two patients arrive? Well, because Ebola is actually a Category A agent. This unit was not designed just to take care of Ebola; it's designed to take care of Category A agents, and Ebola is a bioterrorism Category A agent. So again, it's not called the Ebola unit, even though it has those people in it.

It's called the Special Pathogen Unit, or SEDU. And it's a very small unit. It includes two beds, two rooms that can be turned into ICUs, and you can see in the middle there's a space where the individual can don and doff from their protective equipment before even going to the room. And very importantly, they have a window, and those windows are very important because it allows family members to continue, with a phone, having contact with the individual who's in the isolation room without being isolated. I mean, you're isolated from human touch, but you're not isolated from contact with humans and from seeing them. And we learned later on that this was incredibly powerful and very useful to have when you have put people in isolation.

So let's see what Stephen Colbert thought about this. Can we see the next video?

> "Folks, I'm so glad you're joining us tonight. If you are joining us, we tape the show at 7 o'clock, so by the time you're seeing this, you're probably dead. Because this week, the Ebola outbreak that's been ravaging West Africa finally spread to West West Africa – America.
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> Growing Ebola fear spreads around the country. There are fears the outbreak will continue to spread. Americans panic over a possible Ebola outbreak. Fear and panic over a possible Ebola outbreak. Ebola outbreak. Growing fears about Ebola. Yes, we're all afraid. We're all afraid about a coming Ebola outbreak. Everyone, everyone is on high alert. But mostly Bill in our graphics department. Here's how the plague has spread so far.
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> Two American health workers who contracted the disease while treating patients in Africa have been evacuated to Emory University for emergency medical care. To add to the horror, Emory is in Atlanta, so they probably had to fly Delta. And it brings me no comfort to know that Ebola is spread only through intimate contact with bodily secretions. Such as vomit, blood, or feces.
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> Speaking of vomit, blood, and feces, Donald Trump. He tried. Donald tried to warn us about this looming pandemic via Twitter. Stop the Ebola patients from entering the U.S. Treat them at the highest level over there. Yes, we should have treated these desperately ill Americans at the highest level in Liberia. No Civil War-era medical technology should be spared. The freshest leeches, the finest bite sticks.
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> And sure, sure, these people were providing medical care to desperate villagers. But that doesn't mean they deserve special treatment. Right, Donald? "They are great people. They're tremendous people. But they have to suffer the consequences." Yes, you have to. No, he's right. No, no, he's right. No, no, no. Wait, hey, hey. I said no. You have to suffer the consequences for your good deeds. That's why Mother Teresa's tombstone reads, 'She had it coming'."

And... So you see again, the political consequences. The sense of isolation. Keep them over there. Don't bring them here. The risks. The stigma. And that's one of the things that you learn during epidemics. That's a lot of stigma. Even as recently as yesterday, I was running at Emory Hospital, and one of the patients said to me, "Were you involved in the treatment of patients with Ebola?" And I said, "Yes." And he said, "Should I give you a hand?" I said, "Well, you know, I mean, we could say hello".

You know, this is years ago, and yet the person was still very concerned that he could be at Emory and that he could be infected. So I think we see this in all pandemics and all epidemics, is stigma becomes a major issue. And, you know, those of us working in HIV have said, Well, there's a lot of stigma around HIV, but there's a lot of stigma around Ebola. There's a lot of stigma around influenza,

tuberculosis, you name it. There's no proven therapeutics. What people needed is high-level nursing care and supportive care, and that really is what kept people alive. And, again, patient-enabled and safe interactions between family and patients was also incredibly beneficial from the individuals feeling better. There was a lot of discussions about the personal protective equipment, and at Emory there was a decision made to really use the highest potential level of personal protective equipment. And the whole idea is that not only did you need to have the equipment, you really needed to train people on how to put the equipment and to take the equipment off, because, in fact, we realized that it's precisely at the time of doing that that you can become contaminated.

They almost looked like spacesuits, and how do you reconcile those spacesuits with what CDC was recommending at that time, which was using spacesuits? And, again, CDC was trying to balance what was available in Africa with what was available here, and how do you make sure that you can reconcile the use of spacesuits with what really CDC was recommending? But we learned that, as I said, wearing protective equipment was not straightforward. It's when you remove it that you contaminate yourself. And avoiding contamination took training, but it also took having a buddy there.

It took having somebody look at you when you were taking it off and saying, oh, you've made a mistake, you just broke vertical and you need to rapidly go clean yourself because you could potentially become contaminated. But I think Emory's biggest contribution to the care of Ebola patients was not what we did clinically for those four individuals. I recall the words that Jonathan Mann said about the HIV epidemic, and I'll paraphrase what he said, which was, our responsibility is historic for when the history of AIDS and the global response is written our most precious contribution may well be that at the time of plague we did not flee, we did not hide, we did not separate.

And I think the critical role of Emory in addressing the epidemic was precisely that, precisely accepting the patients, precisely saying, yes, we will take the patients, we will take care of them, as opposed to saying, no, no, I'm sorry, but we don't want anything to do with that, send them somewhere else. And I really think that as physicians we accomplished a lot. I would give credit to our administrators, it was really the administrators who saw this as something that they wanted to do, it was the nursing personnel, it was an entire team that said, this is the right thing, this is our obligation, this is what we're here for, and therefore this is why this unit exists, and therefore we need to activate it and we need to use it and we need to use it in an effective way.

Obviously, dealing with fatalities is a problem, as I told you, what to do, what to do with the bodies, how do you get rid of, how do you funeral arrangements, but one of the things that we struggle with here at Emory is what to do with the trash. The amount of trash being produced by the unit was quite significant, and there was no company that wanted to take care of the trash. They simply said, we're not taking that trash, and even went to the point that the county called Emory and said, and by the way, if you put any of that bloody Ebola down the toilet, we'll cut your water off.

So again, you know, you don't think about decisions until you have to deal with them, but a special arrangement had to be made to deal with that, and special arrangements had to be made in case we had a death, and fortunately we did not have any deaths here at Emory. There were a lot of the recommendations that were put into place and recommended for Africa (remains should be cremated or buried promptly, and autopsy should only be done in limited cases). Well, you can imagine that for any population, to think that that's how they're going to bury their loved ones and never see them again, especially in an area that has just been ravaged by civil war, is not precisely what you want to do, right? I mean, think about having a sick family member in a village, and all of a sudden this ambulance with white people comes, picks them up, takes them to a facility, then they die and they never give you the body back.

I mean, that will be no different than what happened during, you know, civil war between different factions, right? So obviously, a lot of the delay in the response was really required to understand the community and really to work with the community and try to translate, especially with the religious leaders. How do you get this to work effectively? And, in fact, while not proven, the people think that the epidemic was contained much rapidly in Guinea, primarily because the Muslim leaders in that country were very quick at getting behind the appropriate things that needed to be done to control the epidemic. It was very clear that the religious leaders there had a critical role in convincing the community of what needed to be done to control the epidemic.

But obviously, you know, the bigger picture is that I think this epidemic, this Ebola outbreak, has really thought about the new challenges that we have in the global response to diseases. And the Ebola epidemic was simultaneously a public health crisis, a humanitarian crisis, but also a human rights crisis. And therefore, public health programs cannot be considered things like isolation and quarantine outside of sort of bringing up ethical, human rights, and legal principles.

And Ali Yarman said Ebola is a human rights crisis and therefore needs a human rights response. And I think what, again, brought into the context is that in public health, when we deal with an epidemic, we really need to think in a sort of human rights approach when we're approaching an epidemic. You know, this man from Liberia says, remember, they had just got a civil war, and he says, we even prefer war to Ebola because if you hear that war is coming into the area, you can run, but with Ebola, you don't know who has it.

And again, you know, think about the implications that that had for a community. They'd rather have war than Ebola. So what are the lessons learned? Well, the first lesson was that Ebola was not the problem.

Ebola just revealed the problem, revealed the problem of poverty, revealed the problem of civil unrest, revealed the problem of lack of infrastructure. You have to understand the culture and the context. You have to build trust.

I think it was very important not just to address the epidemic from a public health perspective, but really to teach the community the what and the why. The lack of

health care system was critical. I think it became also clear that, you know, you're going to use community health workers. They must be paid. They cannot be volunteers. And there's something to be learned from success, and I will end just by saying that Paul Farmer put it better than anybody.

I think what is lacking in these places was what he calls stuff, staff, and systems, and it's the lack of stuff, staff, and systems that really runs the epidemic. And if you can play this last video, this is Paul Farmer doing an interview. I think the most important thing to understand is that this is a reflection of longstanding and growing inequalities of access to basic systems of health care delivery, and that includes the staff, the stuff, and, again, these systems.

And that's how we link public health and clinical medicine is to understand that we're delivering care in the context of protecting the health of the population. And so if you go down to each of these epidemics that are, of course, one epidemic, and you ask the question, well, do they have the staff, stuff, and systems that they need to respond? The answer is no. And then what will stop the epidemic, which it will be stopped, is an emergency-type response, but then, again, how are we building local capacity to do that so these epidemics don't spread, as they would never spread in the United States, by the way.

And the astounding fatality rate that we keep hearing about, is that... So really, you know, I think we traditionally have thought about epidemics as public health and science informing it, but obviously we have to now think about how do you incorporate politics, how do you incorporate all those different things that we talked about today, how do you bring in, you know, religion, how do you bring in community, how do you really develop an effective response that goes beyond just the way that traditionally we thought about disease control, which is, you know, a very public health, science-based approach. And, again, you know, it was Robert Virko who told us that medicine and politics are closely related. So this is, again, not something new.

We're discovering the past. We're realizing what we've learned all along. And therefore, we should not think this as being novel or different. This is simply the way that we need to behave. And with that, I'm happy to take any questions.

Question: I enjoyed your lecture immensely. I have a couple of comments. The first is about the most lethal epidemic. I think number-wise, you're probably correct, but percentage-wise, I'd probably argue the plague from 1347, 1350, because 25 million people in three continents were affected by that. The second thing is with the Ebola problem. I think the CDC, the spokesman for the CDC, Thomas, I think, Friedman, was it? I think he didn't instill the confidence to the American public that he should have. I think he was probably the wrong spokesman, or I know they didn't have a lot of the facts, but he kept making errors, and then you'd have problems arising.

Del Rio: There was panic, and I don't think he was the appropriate spokesman for the Ebola epidemic that occurred during that time. At least that's my feeling concerning him. Yeah, you know, it's really hard. I mean, Thomas is a good friend, but in a way, I sort of agree in the sense that I think when you see how Rich Besser

was a spokesperson during the influenza pandemic of 2009, Rich was such a great communicator that, in fact, he went on to be the medical correspondent for ABC News because he's so good at communicating. He's a natural at communicating. I think that one of the things that Rich Besser told me that I think is really important is that during a pandemic, when you're communicating, you wish you knew today what you're going to know tomorrow because you're going to make mistakes.

In other words, you're saying something today, and then tomorrow you're going to have to backtrack or say we learned something different. And I think there's a difficult balance of communicating confidence without making yourself be infallible, right? You have to say, based on the evidence we have right now, this is what needs to be done, but this can change. And then when the information changes, you have to acknowledge very rapidly that you made a mistake, and you have to simply say that you made a mistake and that you're correcting course.

And I think that there was a lot of difficulty doing that. I think there also is the whole issue that we haven't quite really understood how to communicate in this environment of 24-hour news, social media, et cetera, in which things are out there immediately and continuously. During the pandemic of influenza of 2009, I was advising and helping the CDC, and I remember talking to David Sensor.

David had been the CDC director during the flu outbreak in Fort Detrick, that swine flu outbreak in Fort Detrick. If you remember that outbreak, they created a vaccine, and then the vaccine got complicated with Guillain-Barre, and they had to stop the vaccination. And I was talking to Dr. Sensor.

I said, David, when you were CDC director back in 1976 and the Fort Detrick outbreak happened, how many press conferences did you have? And he said four. When we said we had an outbreak, when we said we had a vaccine, when we said we have a problem with the vaccine and we need to stop vaccination, and when they fired me. There were four press conferences.

You know, during Ebola, Tom Frieden was having four press conferences a day, and it's just really, really hard to communicate at that intensity, in that level, without... Because what the news, what you saw in the Colbert, what news wants is a sensationalism, right? And when you're not communicating that way, then you immediately lose trust in people because they say, well, obviously, a lot of bad things are happening, and this person is not communicating that. So how do you communicate without being paternalistic? How do you communicate without being... infusing too much confidence, but at the same time, not being... not making mistakes is really hard. And I think we simply need a lot to be learned.

Question: A lot has to be learned about how to communicate in a time of crisis. Um, Stephen Koss, in his book, The Fevers of 1721, suggests that the response of Cotton Mather and Benjamin Franklin to the British crown was the beginning of the American Revolution. I wondered if you had any comments about that.

Del Rio: Yeah, you know, the, uh... A lot of the... When I think about this, a lot of the, you know, 1700 epidemics, when you think about, you know, yellow fever and a lot

of the diseases that were ravaging this country in, you know, 1700s, and how do we respond when we didn't even know the cause, we didn't know treatments, there was no facilities. And a lot of it had to do with really, I think it emphasizes a point of leadership and how do you propose, you set yourself, and again, creating the trust necessary to respond to an epidemic. But the role of the people in the community in buying into quarantine, I think, is really important, buying into understanding how do you create a way to isolate people without detaining them, without violating their rights.

Question: I think that's an area that we still don't have a lot of answers. Thank you for a very interesting talk. What is the present status of a vaccine for Ebola? Actually, there's a very nice vaccine that has been developed and has been tested.

Del Rio: The Canadians developed the vaccine, it has been tested, and appears to produce a lot of immunity. Obviously, now we're waiting for the next outbreak to see if it indeed can be used and if it's effective, because at least it produces a good immunity, and in the animal model, the primate, it works, but we really need to see if it really works in clinical settings. But, no, having vaccines against many of those diseases, I think, is one of the immediate priorities.

I think one of the things that we also learned with Ebola that we didn't know before is that not everybody gets sick and not everybody dies. So, obviously, there's a degree of immunity that happens at a population level, and I think that's pretty critical because one of the things that was done here, for example, at Emory, is a lot of the survivors were coming here to get plasmapheresis, because in the absence of therapy, actually convalescent plasma was being shipped to England and to multiple other places from survivors because that plasma actually is very good therapy. So, you know, immune therapy has already been used in a very effective way.

Question: I've often wondered how Benjamin Rush avoided getting yellow fever. What's that? How Benjamin Rush avoided getting yellow fever because he cared for so many patients in Philadelphia. But the question I had, or the speculation I had, you mentioned the pandemic of the influenza during the First World War, and in Mr. Berry's book, The Great Influenza Epidemic, he speculates that the influenza epidemic started in the United States, in Kansas, and went eastward. Well, I don't know whether that's true or not, but one of the interesting things is that I have heard that the Germans, in their march on France, contracted influenza. And it caused the German army to come to a screeching halt for a period of weeks. During that period of time, because we were late getting into the war, it allowed General Pershing time to land a couple of million American troops on French soil and go forward and push the German army back.

Del Rio: I've heard it speculated that if it hadn't been for the influenza epidemic, it might be speaking German in France now. That's really interesting. I was not aware of that.

But again, it's possible that, and I think the combination of an epidemic and a war at the same time really creates total unpredictability and can really change the course of history, as you mentioned. My understanding concerning the vaccine is that Merck

has released it in the area with the Ebola vaccine, and it's been actually quite good in regard, because you still have outbreaks in that area concerning Ebola. But the problem is that there's five different Ebola viruses, so the vaccine's only going to work for that one in that area and not for the one that came from Sudan and the other areas.

Is that correct? Yeah, that is correct. It's very strain-specific. But again, while it has been used and there's clear immunity, the way they did the study was sort of saying, well, when it's used, there's less transmission, but really the number of cases was so small.

So it really hasn't been tested in an outbreak, and I think that's where people are. But there will be another outbreak. Dr. Pierre Roland, who's the one that runs, sort of has seen almost every Ebola outbreak at CDC, says, don't worry, we will have another outbreak.

Question: Thank you. Dr. Del Rio, that was a splendid presentation. Thank you. I have a question, and we'll set the scene by saying, you remember probably several years ago, there was a man who had a seizure on the platform in New York at the subway, fell onto the tracks. The man jumped in, covered him over, saved his life. My question for you, is there any common denominators on those folks who are willing to take care of these people and those folks who refuse? That's interesting.

Del Rio: Well, I think that clearly altruism is something that clearly distinguishes a lot of individuals and the ability to put themselves at risk. When CDC and Doctors Without Borders and Partners in Health started asking for volunteers to go to help with the Ebola relief efforts in West Africa, I was amazed by the number of people that actually volunteered and that said, I'm going and I'm doing this. And again, it reminds you that people are willing to go and do the right thing in ways that really emphasize a lot of the reasons why, when I'm in the admissions committee and you read essays from students who are applying to medical school and they talk about what they want to do, I hope that altruism, that wanting to change and improve humanity, is something that we don't take away from them throughout our medical education, but we actually continue enforcing and keeping well and alive.

Because I think that desire of altruism, that focus on social justice and helping those in need, I think it's something that is very common among the people in the medical profession and hopefully we will continue to foster it and we continue to instill it and we continue to make sure that people don't lose that.

Question: Quick comment on this topic and linking this to Osler. He was very touched by individuals and colleagues who cared for these patients, got sick due to the care and some succumbed. He actually made note of this often in his textbook of those who died in the service of their patients. Just a quick follow-up on those two previous comments. I think American medicine needs to do a much better job of publicizing those physicians who respond in an altruistic or supererogatory way to these issues. Osler himself, of course, exemplified this when he assumed charge of the smallpox wards in Montreal. But I don't think he really did enough at publicizing the efforts of his peers. For example, he didn't write an essay or article about Jesse

Lazear. But I think we clearly need to do a better job at this and publicizing. I think every graduating medical student should be able to write a 300-word essay, for example, about Carlo Urbani.

Del Rio: No, I mean, I agree. I think that it's something that we need to celebrate and we need to highlight when people are doing this and as opposed to thinking that, oh, why are they doing this and they have other things to do here and why are they volunteering? I think there's a lot of people willing to do precisely the right thing, and we've learned a lot from just following their lives and setting their example. There is, in particular, one of the sickest Ebola patients we took care of here was a physician who really has emphasized that over and over about how, you know, despite the fact that he got really ill and almost died, he will go do it again. I mean, he really sees no reason why he would not go and do it again.

Question: A fascinating presentation, just to sort of follow up on Charlie Bryant's comment about altruism. I have a personal family anecdote about altruism. I also wrote a great deal about typhoid fever. My maternal grandmother, who I never knew, came to America as an orphan at age 12 and wound up in nurses' training school in western Pennsylvania, where she met a farmer who was my maternal grandfather, who I never knew, but she met him when he had typhoid fever. So most people in this room probably are alive because their ancestors didn't get sick. I'm alive because my maternal grandfather got typhoid fever and met the nurse who was willing to take care of him. But another point I wanted to make had to do with the 24-7 news cycle. And, you know, you showed some examples and another person commented on it. Many of us in this room were in Welsh Library two years ago when the riots and problems in Baltimore occurred.

I actually was an undergraduate at Hopkins in 1968 when the riots of a much larger magnitude occurred. But I think many of us who went back to our rooms after the banquet in Baltimore kept seeing the same intersection recycled and recycled and recycled in three or four other places in Baltimore. And it gave you the impression, more or less like you were showing with Colbert, that the entire city was in flames. And it's a fascinating phenomenon, a sociological phenomenon we're certainly not dealing with well, and I have no clue how we're going to, but it is somewhat troubling, but an extraordinary presentation. It amplifies anything, as you said, right?

Del Rio: Yeah. I would add any of the people that took care of the Ebola patients, nurses, custodial staff, lab personnel, were strictly volunteer bases. Just a few days before the patient arrived, first patient arrived, there was some discussion among lab personnel who were uncomfortable having the Ebola blood in the lab, and in a period of not much time left, overnight the facilities management people came in and built a lab in the antechamber to run the simple electrolytes and CBCs and that sort of thing.