THE WASHINGTON POST

Out of Control

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The Washington Post: OUT OF CONTROL—How the world's health organizations failed to stop the Ebola Disaster—October 4, 2014--Story by Lena H. Sun, Brady Dennis, Lenny Bernstein,Joel Achenbach

> This is a very long article. It is comprehensive. There are many pictures and some videos incorporated into it. Some of the videos are on You Tube. They are easy to find. You will benefit greatly by spending some time reading/reviewing this one article.

Photos by Michel du Cille **(PHOTOS HAVE BEEN REMOVED FROM THIS DOCUMENT**), but they are still able to be accessed by clicking on the following link:

http://www.washingtonpost.com/sf/national/2014/10/04/how-ebola-sped-out-of-control/

* * *

Tom Frieden remembers the young woman with the beautiful hair, dyed a rusty gold and braided meticulously, elaborately, perhaps by someone who loved her very much. She was lying facedown, half off the mattress. She had been dead for hours, and flies had found the bare flesh of her legs.

Two other bodies lay nearby. Bedridden patients who had not yet succumbed said of the dead, "Please, get them out of here."

Frieden, the director of the U.S. Centers for Disease Control and Prevention (CDC), knew it was no simple matter to properly carry away a body loaded with Ebola virus. It takes four people wearing protective suits, one at each corner of the body bag. On that grim day near the end of August, in a makeshift Ebola ward in Monrovia, Liberia, burial teams already had lugged 60 victims to a truck for the trip to the crematorium.

ABOVE: A sick child, Cynthia, waits outside Redemption Hospital in Monrovia, Liberia, for health workers to remove dead bodies before she can enter.

Frieden had seen plenty of death over the years, but this was far worse than he expected, a plague on a medieval scale. "A scene out of Dante," he called it.

Shaken, he flew back to the United States on Aug. 31 and immediately briefed President Obama by phone. The window to act was closing, he told the president in the 15-minute call.

That conversation, nearly six months after the World Health Organization (WHO) learned of an Ebola outbreak in West Africa, was part of a mounting realization among world leaders that the battle against the virus was being lost. As of early September, with more than 1,800 confirmed Ebola deaths in Guinea, Liberia and Sierra Leone, there was still no coordinated global response. Alarmed U.S. officials realized they would need to call in the military.

Obama eventually ordered 3,000 military personnel to West Africa; about 200 had arrived by the beginning of this month. They will be joined by health workers from countries such as Britain, China and

Cuba. Canada and Japan are sending protective gear and mobile laboratories. Nonprofit organizations such as the Gates Foundation also are contributing. But it's not at all clear that this belated muscular response will be enough to quell the epidemic before it takes tens of thousands of lives.

This is an open-ended crisis involving a microscopic threat on the move. This week came the unsettling news that the Ebola epidemic has now reached across the Atlantic Ocean to a hospital in Texas, where a Liberian man has tested positive for the virus.

So how did the situation get so horribly out of control?

The virus easily outran the plodding response. The WHO, an arm of the United Nations, is responsible for coordinating international action in a crisis like this, but it has suffered budget cuts, has lost many of its brightest minds and was slow to sound a global alarm on Ebola. Not until Aug. 8, 4 1／2 months into the epidemic, did the organization declare a global emergency. Its Africa office, which oversees the region, initially did not welcome a robust role by the CDC in the response to the outbreak.

Previous Ebola outbreaks had been quickly throttled, but that experience proved misleading and officials did not grasp the potential scale of the disaster. Their imaginations were unequal to the virulence of the pathogen.

"In retrospect, we could have responded faster. Some of the criticism is appropriate," acknowledged Richard Brennan, director of the WHO's Department of Emergency Risk Management and Humanitarian Response. But he added, "While some of the criticism we accept, I think we also have to get things in perspective that this outbreak has a dynamic that's unlike everything we've ever seen before and, I think, has caught everyone unawares."

The epidemic has exposed a disconnect between the aspirations of global health officials and the reality of infectious disease control. Officials hold faraway strategy sessions about fighting emerging diseases and bioterrorism even as front-line doctors and nurses don't have enough latex gloves, protective gowns, rehydrating fluid or workers to carry bodies to the morgue.

"We cannot wait for those high-level meetings to convene and discuss over cocktails and petits fours what they're going to do," exclaimed Joanne Liu, international head of Doctors Without Borders, when she heard about another U.N. initiative. Her group was among the first to respond to the viral conflagration, and it kept its staff in West Africa throughout the crisis.

West Africa was ill-equipped for an Ebola disaster because civil war and chronic poverty had undermined local health systems and there were few doctors and nurses. Health workers in the region had never experienced an Ebola outbreak and didn't know what they were seeing in those first critical months. In the spring the outbreak seemed to fade, making officials overconfident. And then the virus made the leap from rural villages to crowded cities.

Local customs in handling the dead led to further infections. Some West Africans believe that the day you die is one of the most important days of your life. The final farewell can be a hands-on, affectionate ritual in which the body is washed and dressed, and in some villages carried through the community, where friends and relatives will share a favorite beverage by putting the cup to the lips of the deceased before taking a drink.

And finally, the virus itself played a critical role in accelerating the crisis. Ebola, although not nearly as contagious as some viruses, is unusually lethal and commensurately terrifying. Many foreign health workers and volunteers fled the region, and few people rushed in to take their place.

This is both a biological plague and a psychological one, and fear can spread even faster than the virus.

Ebola's catastrophic effect on the body

The virus can lurk in the body for more than a week before it begins a cascading meltdown of the immune system, blood vessels and vital organs.

Stages of hemorrhagic fever

Exposure

Ebola virus particles occupy an infected person's blood and other bodily fluids, which can enter another person through the eyes, mucous membranes, scratches on the skin or from a hypodermic needle — not from from the air or from insects. The bodies of people who have died of the disease are highly infectious. Without protective equipment, being within three feet of a patient for long periods of time is less risky, but not advisable.

In small West African villages, the close personal attention given to sick or dead family members can easily spread the disease.

Incubation

Lasts two to 21 days, but most often four to 10 days before symptoms suddenly appear.

Cell invasion strategy

Ebola is a filovirus, a tiny filament of proteins covering a single strand of genetic material, RNA, which carries only seven genes that code for viral reproduction and defense against the host's immune system.

The virus binds to a cell's surface, where it enters, surrounded ——————————————by cell membrane.

Proteins coating the virus spring open the membrane, allowing virus RNA to enter the cell and begin replicating.

Exit from the cell isn't fully understood, but virus particles seem to collect at the cell surface and protrude, exiting with perhaps a host envelope.

Early symptoms

Usually, a little over a week after exposure to the Ebola virus, people begin having symptoms: fever, chills, muscle pain, sore throat, weakness and general discomfort. In its early stages, Ebola can resemble malaria, typhoid fever or bacterial respiratory infections.

Staging the attack

The virus attacks immune cells in the bloodstream, which carry the infection to the liver, spleen and lymph nodes. Ebola blocks the release of interferon, a protein made by immune cells to fight viruses. Infected immune cells migrate out of the spleen and lymph nodes, through the bloodstream or lymph ducts to other tissues and organs.

Trouble in the bloodstream

Proteins released by immune cells create widespread inflammation, which can damage the tissue lining blood vessels, causing them to leak.

Trouble in the bloodstream

When immune cells known as macrophages are attacked by Ebola, they release proteins that cause coagulation in the bloodstream, blocking blood flow to organs such as the liver, brain and kidneys.

Trouble in the bloodstream

Red blood cells break apart when moving through small vessels filled with clots. The spleen becomes overwhelmed with broken blood vessels.

Trouble in the bloodstream

As cells in the liver are destroyed, the blood loses its normal ability to clot, exacerbating any internal or external hemorrhaging.

Massive blood loss is not a frequent result of Ebola, but when it does happen, it is usually in the intestines.

Advanced symptoms

After five or more days, patients often develop signature signs of an Ebola infection:

Bumpy red rash on the face, neck, torso and arms; skin can flake off

Severe diarrhea, nausea and vomiting

Chest pain, shortness of breath, headache, confusion, bloodshot eyes, hiccups or seizures

Spontaneous bruising, skin hemorrhages

Bleeding from the eyes, ears, nose, mouth, mucus membranes and rectum

Spontaneous miscarriage

Multi-system collapse

Ebola damages many kinds of tissue in the body, either by the virus infecting cells or by the body's extreme inflammatory response.

A breakdown of the adrenal glands leads to dangerously low blood pressure and a decreased ability to produce steroid hormones.

The body's connective tissues are attacked, as are the cells that line body cavities and surfaces.

Liver failure and kidney failure often occur.

An infected pancreas can cause severe abdominal pain.

Intestinal damage causes diarrhea and dehydration.

Multi-system collapse

Fluid accumulates in the brain. Convulsions can cause patients to spread infectious blood and other bodily fluids.

Death

People who die from the disease usually develop severe symptoms early on and die between days six and 16, succumbing to extreme low blood pressure, multi-organ failure and the shock of severe infection. The death rate can be as high as 90 percent.

In non-fatal cases, patients might have a fever for several days and maybe even a few advanced symptoms before improving, usually between days six and 11, but full recovery can be a long process involving inflamed nerves, recurrent hepatitis, bloodshot eyes and psychosis.

Those who survive tend to have an early, strong and temporary inflammation response. Many survivors seem to have red blood cells that are able to release proteins that can fix damaged blood vessels.

Download a PDF of this graphic.
SOURCE: CDC, New England Journal of Medicine, NIH, Science, The Lancet, Nature. By Patterson Clark, Darla Cameron and Sohail Al-Jamea, The Washington Post. Published October 3, 2014.

'This is relatively small still'

A virus is not really alive, in the formal sense of the word, as it cannot do anything outside of a host. Ebola is a filovirus, and looks like a piece of spaghetti. The protein envelope surrounds a strand of RNA, the simpler cousin of DNA. You could say it is pure information with instructions for replication.

Ebola is one of a number of viruses that cause "viral hemorrhagic fever." What makes it so deadly is that it can take over the machinery of many kinds of cells, replicating quickly. It shuts down or misdirects parts of the immune system and sends the rest into hyperdrive, causing the victim to suffer fever, headaches, vomiting, diarrhea and dehydration. Death can come within days from multiple organ failure.

Ebola isn't nearly as contagious as, say, measles or influenza. It is transmitted only through bodily fluids after the fever and other symptoms have occurred. But the incubation period, after infection and before the person becomes symptomatic, typically lasts about a week, or as long as three weeks. People who are infected can travel a great distance before they begin to shed the virus. Initial symptoms are similar to those caused by malaria and influenza, confounding a proper diagnosis.

The first Ebola cases surfaced in late 2013 in Guinea, in the rain forest in the district of Guéckédou, close to borders with Liberia and Sierra Leone. No one knows exactly when the virus jumped into the human population, or from which animal species - a fruit bat is one possibility - but the first victim is believed to have been a 2-year-old girl or someone close to her.

Doctors at first assumed they were looking at Lassa fever, a viral hemorrhagic fever similar to Ebola, as dozens of people began falling sick and more than half of them were dying. But then on March 23, the WHO posted a notice on its Web site:

"The Ministry of Health (MoH) of Guinea has notified WHO of a rapidly evolving outbreak of Ebola virus disease (EVD) in forested areas of south-eastern Guinea. As of 22 March 2014, a total of 49 cases including 29 deaths (case fatality ratio: 59%) had been reported."

The virus spread from Guinea to Liberia, where two people died in late March. On April 1, Sierra Leone reported that two of its citizens had died in Guinea, probably from Ebola, and that their bodies had been returned to their native country.

That same day, the WHO urged calm.

"This is relatively small still. The biggest outbreaks have been over 400 cases," WHO spokesman Gregory Hartl said at a news conference in Geneva, referring to previous outbreaks in Congo and Uganda.

Internally, WHO decided to rank the Ebola outbreak as a two on a scale of one to three, with three being the most serious health emergency.

The responders

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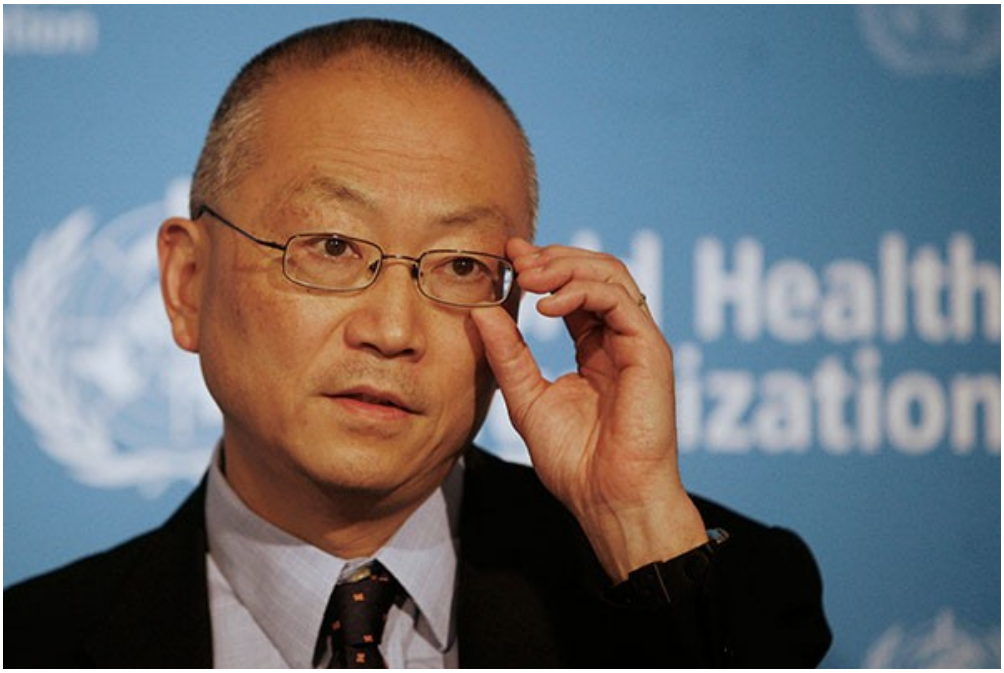
Tom Frieden is director of the U.S. Centers for Disease Control and Prevention, which tackles health issues such as foodborne illnesses and the spread of infectious disease. (Bill O'Leary/The Washington Post)

Joanne Liu is international president of the aid organization Doctors Without Borders, known internationally by its French name, Médecins Sans Frontières. (Salvatore Di Nolfi/Associated Press)



Keiji Fukuda is the assistant director-general for health security at the World Health Organization. (Anja Niedringhaus/Associated Press)

Margaret Chan is the director-general of the World Health Organization, part of the United Nations. The WHO was slow to sound the global alarm on Ebola. (Martial Trezzini/EPA)

David Nabarro was appointed senior U.N. system coordinator for Ebola on Aug. 12. He has traveled to more than 21 cities to forge a global response to the virus. (Bill O'Leary/The Washington Post)

Leisha Nolen, a disease detective with the Centers for Disease Control and Prevention, has served month-long stints in Liberia and Sierra Leone during the Ebola epidemic. (Courtesy of CDC)

Jim Yong Kim is president of the World Bank. A doctor and expert on infectious disease, Kim convened a key meeting Sept. 3 to focus the global response to Ebola. (Ray Stubblebine/EPA)

'We thought we were in the clear'

Kent Brantly, 33, is a devout Christian who in the spring of this year was working for the North Carolina-based relief organization Samaritan's Purse at a missionary hospital in Monrovia. The hospital is known as ELWA, for Eternal Love Winning Africa. He had moved with his wife, Amber, and their two young children to Monrovia the previous fall for the two-year assignment. They lived in a comfortable two-bedroom house, played on the nearby beach and snorkeled along the reef.

"Before Ebola," he said, "life was good in Liberia."

When he and his colleagues learned about the outbreak in late March, they decided to set up an isolation unit on the chance that Ebola patients would arrive. They downloaded a 1998 guide on how to control viral hemorrhagic fevers and trained hospital employees on staying safe.

Many staff members were uneasy about the decision to open an Ebola ward, and they complained to Jerry Brown, the Liberian director of the hospital. Brown, 44, is a man who exudes calm amid chaos, a virtue that would prove critical in the months to come.

"We are just preparing for the future, just in case," he told his workers.

The only available space was a yellow cinderblock tin-roofed chapel in the hospital's courtyard, where the staff gathered each morning for devotions. Now they rolled in six beds and separated them with plastic tarps. They cleaned the floors and walls. They placed a sign out front that read, "Isolation unit. Authorized personnel only."

And then they waited.

No Ebola patients arrived. The pace of infections in Guinea slowed significantly, and in Liberia and Sierra Leone, the number of new cases dropped to zero for most of April and May.

Some hospitals dismantled their isolation units. ELWA kept its as a precaution. "We thought we were in the clear," Brantly said.

'Work in that unit? I won't do it.'

The New Kru Town slum in Monrovia has no public water supply, no toilets, no sanitation system, no electricity. People live in hovels slapped together from wood and metal. Most people have no running water, other than what's in the streets when downpours soak the neighborhood.

Sometime in late May or early June, at least six people in New Kru Town came down with Ebola. There were wild rumors that someone had poisoned their food.

Brown received a call on the evening of June 11 from someone at the Liberian ministry of health who asked: Do you still have an Ebola unit? Yes, Brown said.

Workers rushed to mix chlorine solution and cleaned the chapel, and Brown tried to find staff members willing to work in the unit alongside Brantly.

"Doc, if you want to ask me to do anything, I will do it for you. But work in that unit? I won't do it," one nurse said.

Another said she had a headache and wasn't feeling well. A third said she was the sole supporter of two children and wouldn't do it. Brown finally found a scrub nurse in the operating room who was willing to go in.

Before midnight, an ambulance pulled up to the gate of the missionary hospital. Inside were two Ebola patients, a young woman and her uncle, but only the woman entered the hospital. Her uncle had died in the ambulance.

Ebola patients trickled into the hospital one at a time initially, but soon the flow picked up. One of the new patients was a doctor, Melvin Korkor, who had contracted the virus along with five nurses and four other workers at his hospital many hours away by car in the rural county of Bong. He had been told that he had a 10 percent chance of surviving.

Korkor thinks he caught the virus from one of his nurses when he touched her with his bare hand to check for fever. Before he left for treatment in Monrovia, he told his wife, "The only thing I want you to bring for me is a Bible."

At ELWA, Korkor read his Bible - particularly Psalm 91 ("Surely he shall deliver thee from the snare of the fowler, and from the noisome pestilence") - and drank 12 liters of rehydration fluid every day. He held his nose when he ate so that he wouldn't throw up.

Four days later he felt a little better, and realized he would live.

All nine of his colleagues died.

Two people lay dead on the floor Sept. 20 inside a ward at the Redemption Hospital, which has become a transfer and holding center for Ebola patients in the New Kru Town slum of Monrovia, Liberia.

'Please come help us'

In a crisis like this, the United States relies on the Centers for Disease Control and Prevention, which has disease detectives who are trained to race anywhere in the world on a moment's notice to track an epidemic. But Americans can't simply charge into a country and begin barking orders. The CDC must be invited. Even then it plays a supporting role to local officials and the World Health Organization.

Early in this outbreak, the CDC ran into bureaucratic resistance from the WHO's regional office in Africa. The American officials wanted a greater leadership role in managing the outbreak response, including data collection and resource deployment. The CDC's Frieden asked Keiji Fukuda, a former CDC official who is now the WHO's assistant director-general for health security, to intervene. Fukuda flew to the WHO's regional office in Congo and persuaded his colleagues to allow the CDC to play a larger role.

In early July, Frieden, 53, had to keep track of multiple crises. Vials of smallpox virus from the 1950s had been found in a storage room at the National Institutes of Health. That fiasco followed news that the CDC had unknowingly sent samples of anthrax from one lab to another. While dealing with these embarrassments, Frieden saw the Ebola numbers exploding in Liberia.

"It's back," he told himself. "It's in multiple countries, and we don't have a robust enough response. Second wave."

At ELWA, Brown was dismayed that Liberian government officials seemed to be overwhelmed and paralyzed. Liberia, torn by two civil wars, is one of the world's poorest countries, and deep distrust of the government makes it hard for health workers to conduct public health campaigns.

"People were sitting in places and arguing instead of acting," Brown said. "And gradually Ebola was creeping into society."

The doctors and nurses at ELWA went about their labors in protective gowns, masks, goggles, boots and gloves, while workers with chlorine tanks on their backs sprayed surfaces in a constant battle against the invisible foe. One day Brantly, covered head to toe in protective gear, identifiable only by his blue eyes peering through goggles, spoke into the camera for a video being put together by Samaritan's Purse. He asked his audience to pray and to contribute money, but then he said that what he and his colleagues needed most were doctors, nurses, paramedics and other volunteers.

"Please come help us," he said.

He e-mailed friends in Texas: "I think we are only seeing the tip of the iceberg."

At 4 a.m. on July 20, a neighbor drove Brantly and his family to Roberts International Airport. Brantly said goodbye to his wife and children, who were heading to her brother's wedding in Texas. He was supposed to go the following week.

Later that morning, Brantly headed to work to begin overseeing a new 20-bed Ebola unit that Samaritan's Purse had helped build across the street from the main hospital. He and others began transferring the hospital's six Ebola patients from the makeshift ward in the chapel to the new unit, called ELWA2.

Nancy Writebol, another American missionary, helped as always. She was affectionately known as the Bleach Lady because she mixed the all-important chlorine solution each day and trained other hygienists on how to decontaminate the hospital.

On the morning of July 23, Brantly felt feverish. Maybe he had been working too long, too hard, he thought. Maybe he had malaria.

He was not so lucky.

Kent Brantly, left, speaks with colleagues at the case management center on the campus of ELWA Hospital in Monrovia, Liberia. (Samaritan's Purse/Handout via Reuters) President Obama shakes hands with Ebola survivor Melvin Korkor of Liberia at the Global Health Security Agenda Summit at the White House on Sept. 26. (Kevin Lamarque/Reuters)

Brantly will never know exactly how he caught the Ebola virus, although he suspects it happened during an all-night shift when he admitted two extremely sick patients into the Ebola isolation unit. Both died within hours.

The virus swiftly carried Brantly to the edge of death. His fever reached 105; he vomited blood and battled diarrhea and nausea. He could barely breathe.

Brantly soon became the first human to receive an experimental Ebola drug called ZMapp, which Samaritan's Purse had arranged to get to him in Liberia. From the moment he became ill, he didn't step out of his house until he was flown to Emory University Hospital in Atlanta on a specially equipped plane.

Writebol also became sick, received ZMapp and eventually was flown to Atlanta. Neither knew then about the frenzied news media coverage of their illness, or the attendant hysteria on social media as some Americans feared their evacuation would lead to an epidemic in the United States.

Suddenly the world had begun to pay attention.

On July 24, the WHO upgraded the crisis from a two to a three, the highest level, but it did not declare a global health emergency.

Even as health officials quickened their pace, the epidemic accelerated even faster. Scores of doctors and nurses were becoming sick, and many were dying, including a beloved doctor in Sierra Leone, Sheik Umar Khan.

Patrick Sawyer, a Liberian American whose sister had died of Ebola and who had been hospitalized with an undiagnosed illness, flew to Nigeria and came into contact with numerous Nigerians before being isolated in a hospital and dying on July 25. Epidemiologists refer to such a situation as an "export" of the virus. More people are in the Nigerian capital of Abuja than in Guinea, Liberia and Sierra Leone combined.

"That's when I stopped sleeping," Frieden said.

Epidemic outruns the global response

In late 2013, the Ebola virus jumped from an unknown animal species to the human population. The outbreak's first victim may have been a 2-year-old girl from Guinea. Cases soon surfaced in the Guinean rain forest, near the country's borders with Sierra Leone and Liberia. From there, it spread throughout West Africa.

March 23 | Ebola response (0:20)

March 23

Officials in Guinea confirm 49 Ebola cases, including 29 deaths, according to the World Health Organization. Health officials and Doctors Without Borders set up treatment centers. Seven days later, two patients test positive for the virus in Liberia.

March 31

Ebola spreads to Conakry, the capital of Guinea. Doctors Without Borders says it is facing "an unprecedented epidemic regarding the distribution of cases."

April 1

The WHO urges calm, saying at a Geneva news conference: "This is relatively small still. The biggest outbreaks [in Congo and Uganda] have been over 400 cases"

Late May to early June

Two cases emerge in Freetown, Sierra Leone, and two related deaths prompt the country to ban public gatherings. Seven cases are reported in Monrovia, Liberia's capital.

June 20

Bart Janssens, a senior official at Doctors Without Borders, says the Ebola outbreak surging through West Africa is "totally out of control." The WHO ramps up its response to the crisis in the three affected countries.

July 20

Liberian doctor Patrick Sawyer collapses upon arriving in Lagos, Nigeria. He dies five days later. Health officials express concern about the possible spread of Ebola in Africa's most populous nation.

July 26-27

Relief agencies announce two U.S. missionaries in Liberia have contracted Ebola. The news triggers a wave of international attention. Both missionaries are eventually flown to a hospital in Atlanta for treatment.

July 29

Sheik Umar Khan, Sierra Leone's lead virologist, dies from Ebola. Liberia's main government hospital, JFK Memorial, threatens to shut down because staff are scared of contracting the disease.

Aug. 8

The WHO declares the Ebola outbreak an international public health emergency.

Aug. 12

U.N. Secretary General Ban Ki-moon appoints public health expert David Nabarro to coordinate the global Ebola response. A WHO panel says the use of experimental Ebola drugs is ethical.

Early September

Upon returning from West Africa, CDC Director Tom Frieden says, "We need action now to scale up the response." Joanne Liu, international president of Doctors Without Borders, tells the U.N. that "the world is losing the battle to contain it."

Sept. 16

Obama meets with Ebola survivor Kent Brantly and hours later announces an increased U.S. response. The U.S. says it will allocate $750 million and dispatch 3,000 military personnel to West Africa to supply medical and logistical support.

Sept. 23

In a worst-case scenario, the CDC says the Ebola virus could infect as many as 1.4 million people in Liberia and Sierra Leone by Jan. 20 without a more robust response.

Sept. 30

CDC and Texas health officials announce that a patient in Dallas has tested positive for Ebola.

'I’m not being pessimistic'

In late July, with the epidemic roaring, Liu, the head of Doctors Without Borders (known internationally by its French name, Médecins Sans Frontières), requested a meeting with WHO Director-General Margaret Chan at the WHO's Geneva headquarters.

Chan, an expert on the SARS virus and avian influenza, has led the WHO since November 2006. Her organization has experienced budget cuts and shifting priorities in recent years. The WHO is responsible for coordinating global health emergencies, but the legislative body that oversees it has repeatedly voted to emphasize noncommunicable diseases such as heart disease and cancer rather than infectious diseases.

Liu, a French Canadian, is a pediatric emergency room doctor by training, and for much of the past two decades has worked for Doctors Without Borders in the most war-ravaged, disaster-stricken places on Earth.

On July 30, she implored Chan to declare an international health emergency. Chan responded that she was being very pessimistic, Liu said.

Liu replied: "Dr. Chan, I'm not being pessimistic. I'm being realistic."

Chan soon flew to West Africa to meet with the presidents of Guinea, Liberia and Sierra Leone, and announced a $100 million push to stop the outbreak.

On Aug. 8, the WHO declared a global health emergency.

Chan declined to comment for this article. The WHO’s Fukuda said that if anyone asks whether his organization did a perfect job, the answer will be, “Hell no.”

But after six trips to Africa during the epidemic, he has seen a more profound truth: Global organizations can provide epidemiologists and laboratory help, but what these resource-poor countries really need are front-line doctors and nurses, and basic resources. In Africa, patients told him, “We don’t have enough food.”

He visited a clinic where 25 health-care workers became sick with Ebola and 23 died. Doctors kept going to work even as they were ostracized back home by fearful neighbors. “This is really a profound level of heroism,” Fukuda said.

In a sign of ebbing confidence in the WHO's ability to coordinate a response, U.N. Secretary General Ban Ki-moon on Aug. 12 appointed David Nabarro, 65, a longtime troubleshooter, as senior U.N. system coordinator for Ebola. Nabarro had worked on avian flu and the aftermath of the 2004 Indian Ocean tsunami. He was vacationing with his family at a beach in Kenya when he received the call asking him to jump into the crisis.

Over the next month, Nabarro would travel to 21 cities on three continents, trying to put together a coalition and showing everyone an ominous chart depicting four possible trajectories for the epidemic. The best-case scenario showed it ending in the middle of next year. The worst case showed the "epi curve" rising in the wrong direction, toward the vertical, toward an unimaginable catastrophe.

Wencke Petersen, a Doctors Without Borders health worker, talks to a man through a chain link fence on Sept. 23 in Monrovia. Wencke does patient assessment at the front gate of ELWA3, the Doctors Without Borders Ebola Treatment Unit.

'They were quickly drowning'

Rather than avoiding the viral storm, some Westerners headed directly into it. There they found West African health-care workers still on the job in the most dangerous of conditions.

One day in August, Liu donned a yellow plastic jumpsuit, gloves and face mask to visit Ebola patients in a Doctors Without Borders facility in Kailahun, Sierra Leone.

She brought a bucket to a dying man who was vomiting. She got him a tissue when his nose bled and held his hand. "I'm sorry," she said. What a tragedy, she thought, that Ebola had decreed that he must die alone, with no one to hold his hand but a stranger in a spacesuit.

The United States dispatched dozens of personnel from disaster response teams, including Defense Department planners, workers from the U.S. Agency for International Development and CDC disease detectives. One of them was the CDC's Leisha Nolen, 37, who flew to Sierra Leone in August for her second month-long stint working on the outbreak. On Aug. 12, she traveled on a fact-finding trip to the city of Port Loko. The official numbers showed only a few cases there.

Nolen asked two local health officials a series of questions. How did they hear about potential Ebola cases? From village chiefs? From family members? Did patients often show up at the hospital? Was an ambulance sent to retrieve them? Did they always draw blood for testing?

She quickly realized that the local officials couldn't possibly keep up with suspected cases. Sick people often didn't get to the hospital, and there weren't always beds for those who did come. The roads often were washed out and there was only one ambulance for an area the size of Delaware.

Nolen asked to see the tally of suspected Ebola cases. The officials pulled out a thick stack of papers. Each handwritten sheet represented a likely case, many of which had yet to be officially reported. She was shocked.

"They were quickly drowning," she said.

'We have been unable to control the spread'

Liberian President Ellen Johnson Sirleaf criticized the response of her citizens to the epidemic. "We have been unable to control the spread due to continued denials, cultural burying practices, disregard for the advice of health workers and disrespect for the warnings by the government," she said Aug. 19 in a national address.

The next day, Sirleaf ordered security forces to seal off the densely populated Monrovia slum of West Point, which sits on a peninsula that juts into the Atlantic Ocean. Even the waterfront was blocked off, with coast guard boats turning back residents in canoes trying to paddle out of the community. Protests erupted; young men threw rocks at police, who tried to dispel the crowds by firing guns in the air. A teenager was shot in both legs and died at Redemption Hospital.

A week later, the government ended the quarantine, and residents celebrated in the streets as the barricades and armed soldiers vanished.

But the virus was not about to disappear. By late August, the WHO was reporting 3,685 cases in Guinea, Liberia and Sierra Leone, and 1,841 deaths. That was just the official count, and experts believed the real toll was about 2 1／2 times higher.

'Future of the continent is on the line'

By early September, there was still no agreement among the major global health organizations and governments on how to respond to the epidemic. Unlike other disaster responses, such as the one after the earthquake in Haiti in 2010, no major U.N. operation was in place. And despite a 20-page "road map" that the WHO had introduced, it was unclear how anyone would put it into effect.

"Six months into the worst Ebola epidemic in history, the world is losing the battle to contain it," Liu, of Doctors Without Borders, told the United Nations on Sept. 2. For the first time, she implored countries to deploy their military assets - something her organization had previously opposed for health emergencies.

World Bank President Jim Yong Kim was beyond frustrated. Kim, a doctor and an expert on infectious diseases, called an emergency meeting for Sept. 3 that would include major decision-makers from the government and the private sector.

About 50 people crowded into the 12th-floor conference room at the World Bank's Washington headquarters. Gayle Smith from Obama's National Security Council was on the telephone. A senior WHO official participated by video link. The session lasted two hours.

Frieden showed up and had a dire warning: The response was like "using a pea shooter against a raging elephant."

Kim warned, "The future of the continent is on the line."

By the first week of September, senior officials across the U.S. government had come to a grim realization: The civilian response was never going to happen fast enough to catch up with the epidemic. The CDC had managed to put more than 100 staff members on the ground and the U.S. disaster relief team had dispatched 30 more, but they and other aid workers were facing too big of a challenge. Only the U.S. military had the capacity to move with enough speed and scale.

The White House was talking to the Pentagon about deploying a field hospital to treat any health-care workers who might get sick, an effort to reassure potential volunteers. U.S. military planners in West Africa were telling Washington that 500 treatment beds were needed for sick patients. A host of agencies across the government had to work out complicated logistics.

On Sept. 7, Obama said on NBC's "Meet the Press" that he intended to use the U.S. military to provide equipment, logistical support and other aid to West Africa.

But the region now had thousands of confirmed Ebola cases, and there was nowhere to treat the sick and the dying. On Sept. 9, Sirleaf sent Obama an urgent plea:

"I am being honest with you when I say that at this rate, we will never break the transmission chain and the virus will overwhelm us," she wrote.

The next day, high-level administration officials met at the White House to discuss military options. "People were asked to do more homework on the how," and then report back two days later, on Sept. 12, a senior official said.

On Tuesday morning, Sept. 16, barely a month after he nearly died from Ebola, Kent Brantly met with Obama in the Oval Office. The president was about to fly to Atlanta to the CDC headquarters to announce that the United States would send 3,000 military service members and medical supplies to West Africa as part of a $750 million effort.

Obama told Brantly that he needed to put on a few pounds. The doctor smiled and nodded; he was down more than 40 pounds from his pre-Liberia weight.

Brantly urged the president not to delay in delivering help to West Africa. The commitments that Obama was about to announce were great, but only if they arrived immediately, he said.

" 'I'm pushing,' " Brantly recalled Obama saying. " 'I'm pushing as much as I can to make this happen.' "

Brantly told Capitol Hill lawmakers that day, "It is a fire straight from the pit of hell. . . . We cannot fool ourselves into thinking that the vast moat of the Atlantic Ocean will protect us from the flames of this fire."

The numbers grew even scarier. On Sept. 23, the CDC released a report estimating that, without a more robust response, as many as 1.4 million Ebola cases could potentially erupt in Liberia and Sierra Leone by Jan. 20. That didn't include Guinea, where health data remains sketchy. A vigorous response in Nigeria has cleared the virus there after only eight deaths; a separate, unrelated outbreak of Ebola has been reported in Congo.

On Sept. 26, Obama attended a White House event known as the Global Health Security Agenda Summit. Numerous public health officials from many countries were on hand. So was Melvin Korkor, the doctor who had been stricken with Ebola and treated at ELWA.

The agenda, a broad effort to stop biological threats of any kind, had been announced at the White House during a snowstorm in February. No one knew then that Ebola was already frothing in West Africa.

Frieden of the CDC said this Ebola epidemic had served as a test.

"We, the world, failed that test," he said.

Stemming the tide

During the rainy season in Monrovia, the skies are gray, the sunshine scarce and the downpours last hours. Ebola has closed the schools, municipal offices and many banks, but the streets somehow remain choked with traffic even as the economy has largely shut down. Children in shorts and bare feet race up to cars at intersections to sell candy, cream biscuits, chewing gum, plastic bags and windshield wiper blades. The street markets are open and music blares from the stalls.

What happens next in the epidemic will be determined in part by mathematics. As of Friday, the WHO had reported 7,470 confirmed or likely cases, and 3,431 deaths in Guinea, Sierra Leone and Liberia. Currently, each infected person is infecting about two more. To slow the spread of the disease and eventually stop it, officials must somehow reverse the math. Only when each Ebola patient infects, on average, fewer than one person will the outbreak begin to fade.

Frieden recently noted that, with the disease spreading exponentially, the math suggests a growing likelihood that Ebola will be exported to other countries - and then just days later came the news that it had made its way to Dallas.

The U.S. military is gradually arriving in West Africa. The basic plan is to get as many people as possible into treatment centers where they can be properly isolated. Troops will build 17 treatment centers, each with a 100-bed capacity. That will take many weeks.

The people in charge of stopping the Ebola epidemic will have to do something that they have not been able to accomplish: They must be even more aggressive, more ruthless and more persistent than the virus - a mindless and implacable force carrying out its own genetic instructions.

Bernstein reported from Liberia. Juliet Eilperin in Washington contributed to this report.

Correction: An earlier version of this story incorrectly identified the capital of Nigeria as Lagos. It is Abuja. This version has been corrected.

Editor’s picks

Face to face with Ebola in Texas

Several members of a family who took care of a patient when he became ill now are under quarantine.

In Liberia, the sick fend for themselves

Each day, new patients arrive at treatment centers, hoping their timing and symptoms will get them past the gate.

Credits

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