Inside an Ebola Treatment Unit: A Nurse's Report

A firsthand account of combating Ebola in West Africa.

ABSTRACT

In December 2013, the first cases of the most recent outbreak of Ebola virus disease (formerly known as Ebola hemorrhagic fever) emerged in the West African nation of Guinea. Within months the disease had spread to the neighboring countries of Liberia and Sierra Leone. The international humanitarian aid organization Médecins Sans Frontières (MSF; known in English as Doctors Without Borders) soon responded by sending staff to set up treatment centers and outreach triage teams in all three countries. In August 2014, the World Health Organization declared the outbreak an international public health emergency.

In September 2014, the author was sent by MSF to work as a nurse in an Ebola treatment unit in Liberia for five weeks. This article describes her experiences there. It provides some background, outlines the practices and teams involved, and aims to convey a sense of what it's like to work during an Ebola outbreak and to put a human face on this devastating epidemic.

Keywords: Ebola, Ebola virus disease, global health, supportive care, treatment, West Africa

In December 2013, the first cases of the most recent outbreak of Ebola virus disease (EVD; formerly known as Ebola hemorrhagic fever) emerged in the West African nation of Guinea. Within months the disease had spread to the neighboring countries of Liberia and Sierra Leone. In August 2014, the World Health Organization (WHO) declared the outbreak an international public health emergency.[1] Indeed, within the next year, these three countries would report almost 28,000 confirmed, probable, and suspected cases and more than 11,000 deaths.[2]

In March 2014, given predictions that the virus would continue to spread out of control, the international humanitarian aid organization Médecins Sans Frontières (MSF; known in English as Doctors Without Borders) responded by sending staff to set up treatment centers and outreach triage teams in all three countries. By the fall of 2014, MSF was reporting that it had deployed nearly 300 international workers and nearly 3,000 locally hired workers to deal with the outbreak in these countries.[3] MSF had also set up seven Ebola treatment units (ETUs) near the epicenters of local outbreaks, and had shipped more than 800 tons of supplies to the affected countries.

Among these seven ETUs was one established in Foya, Lofa County, Liberia, at a small hospital made available by the faith-based international relief organization Samaritan's Purse. The Foya ETU started admitting patients on August 2, 2014; at the peak of the local outbreak, it held 120 patients. I was sent by MSF to manage the nursing teams of this ETU for five

Author Deborah Wilson at the Foya ETU cemetery. Photograph by Marcos Leitão.

weeks. When I arrived on September 3, 2014, there were 80 patients; when I left on October 6, there were just 12. Subsequently the number of patients continued to decrease, with the last patient admitted on October 30, 2014. After conducting health promotion activities and training local health workers to ensure a robust response should the virus recur, MSF closed the Foya ETU on December 10, 2014. While it was operational, this ETU admitted 695 patients, of whom 384 were confirmed cases.[4] On May 9, 2015, the WHO declared that the Ebola outbreak in Liberia was over.[5]

This article describes my experiences there. It provides some background, outlines the practices and teams involved, and aims to convey a sense of what it's like to work during an Ebola outbreak and to put a human face on this devastating epidemic.

BACKGROUND: EBOLA

EVD was first identified in Zaire and South Sudan in 1976.[6] Since then there have been 20 outbreaks, but because they occurred in isolated geographic areas, most were quickly contained. However, the current epidemic in West Africa has "grown dramatically," in part because of "porous" national boundaries, weak health care infrastructures, and the involvement of urban areas.[6]

An RNA virus in the filovirus family causes EVD. There are five identified species, four of which can be transmitted to humans.[6] The virus is zoonotic, which explains why human outbreaks have emerged erratically. It's believed that transmission from an animal to a human occurs when the human comes into contact with the tissue or bodily fluids of an infected animal, most likely a fruit bat[6] or possibly a monkey or other primate. Transmission between humans occurs when a person comes into contact with the bodily fluids of an infected human, whether living or dead.[7,8] There is evidence that the virus remains active in the body for up to seven days after death.[9,10] The strain that has been infecting people in West Africa, known as the Zaire strain, is the most virulent. Reported mortality rates for EVD have ranged from 25% to as high as 90%, with an average of about 50%.[11]

The signs and symptoms of EVD are vague and mimic those of other diseases such as malaria and

typhoid fever.[6, 12] The most common early symptoms include abrupt onset of fever, fatigue, headache, myalgia, and sore throat, followed by gastrointestinal symptoms such as nausea, vomiting, diarrhea, and abdominal pain.[12] In later stages EVD is characterized by immunosuppression and systemic inflammatory response, leading to shock and multiorgan failure.[7] Hemorrhages occur in fewer than half of patients.[7] EVD progresses quickly, with time from disease onset to death about one to two weeks.[7, 13]

ARRIVING AT FOYA

After first receiving a briefing at the MSF office in Geneva, Switzerland, I and several other volunteers embarked on a three-day journey to Foya, traveling via a United Nations (UN) plane, jeeps, and canoes. The journey gave us time to talk about what lay ahead, discussing what we knew about Ebola and what we didn't, going over MSF's hemorrhagic fever guidelines, and wondering what to expect. (For more context, *see Liberia: An Overview*[14-17] and *Socioeconomic Determinants of Transmission*.[6, 13, 18, 19])

MSF had been involved in previous Ebola outbreaks and was the first international organization to call for international support. At a UN special briefing on Ebola on September 2, 2014, Joanne Liu, MSF's international president, chided leaders for "failing to come to grips with this transnational threat" and calling for an urgent international response.[20] Those organizations that had responded had followed the protocol developed by MSF during previous outbreaks, adapting it as needed to help them deal with unprecedented numbers of patients with Ebola. An effective intervention response requires the coordinated use of strategies that include[21, 22]

- educating communities about Ebola (transmission, signs and symptoms, benefits of early diagnosis and treatment, and the importance of isolating sick family members).
- active case finding and diagnosis.
- establishing mechanisms to alert health authorities about possible cases of infection.
- identifying or establishing laboratories with EVD testing capacity and setting up isolation units such as ETUs.
- case investigation, as well as contact tracing and monitoring.
- training in proper burial of the dead.

The main goals of these strategies are to reduce the spread of the virus, prevent death, and reduce the suffering of patients and families.

At Foya, as the outbreak worsened, the unprecedented number of patients with Ebola strained existing facilities. By the time I arrived, a tent city had been constructed around the two existing hospital buildings in order to accommodate the medical and nursing staff, the psychosocial team, and various other staff (including hygienists, water sanitation engineers, and outreach workers), as well as triage, laboratory, laundry, pharmacy, kitchen, morgue, and isolation sections. While the outreach and psychosocial teams collaborated in working with the surrounding communities, my job was to manage the ETU's nursing staff and the pharmacy. All of us were involved in the direct care of patients with suspected and confirmed cases of EVD.

The ETU nursing staff consisted of 78 nurses (including two supervisors and six team leaders) and 24 nursing assistants. The Liberian Ministry of Health had released nurses from their positions at Ministry of Health–run hospitals and clinics around the country, so that they could work with MSF to deal with the outbreak. In setting up the Foya ETU, MSF had negotiated with the Ministry of Health to secure these nurses, and then had trained them in the proper use of personal protective equipment (PPE) and the treatment of patients with EVD.

There is as yet no cure for Ebola. The two main priorities throughout the mission were keeping the teams safe from infection and providing as much supportive care as possible to the patients. In Africa, the current standard treatment for EVD used by MSF and other organizations is "aggressive" supportive care, which consists of oral and IV medication, oral and IV rehydration, nutritional supplementation, and psychosocial support.[10]

Liberia: An Overview

Liberia, a country in West Africa, has a population of nearly 4.3 million.[14] Bordered by Sierra Leone, Guinea, and the Ivory Coast, Liberia has spent the last 12 years recovering from a brutal civil war and a destabilized economy.[15, 16] Socioeconomic damages from the recent Ebola virus disease outbreak are expected to be devastating.[17]

According to a report by the United Nations Development Program (UNDP), the mining industry, an important source of national revenue, faced significant disruption as a result of restrictions to the movement of goods and personnel.[17] Two mining companies closed during the epidemic. Many flights to the affected countries stopped, hampering the delivery of medical supplies and aid workers. Tourism declined, and canceled bookings resulted in hotel and restaurant jobs lost. As borders and markets closed, thousands more lost access to their livelihoods and sources of income. In just six months, according to the UNDP report, household incomes dropped 35%, increasing families' socioeconomic vulnerability and pushing many below the poverty line. Resources devoted to development work (such as building roads, schools, and hospitals) had to be diverted into public health efforts. The UNDP report further noted that projected 2014 governmental revenues were expected to decline by 19%—a loss of about $106 million—and that the costs associated with the Ebola outbreak were estimated at nearly $80 million.[17] As the government's fiscal gap widens, its domestic and international debts will likely increase.

WORKING IN AN ETU: THE CHALLENGES

The purpose of an ETU is to provide a place where people with suspected, probable, or confirmed EVD can be cared for in isolation. There is evidence that, when used in conjunction with public health strategies, ETUs can play a major role in reducing the number of cases of EVD.[23] Every ETU consists of a high-risk zone and a low-risk zone, with a decontamination area allowing passage between the two zones. The high-risk zone houses patients who have tested positive for EVD (probable and confirmed cases) or are suspected of having the virus; it also includes the morgue and an area for disposal of all infectious waste. Besides the patients, only staff in PPE are allowed in this area. The low-risk zone houses all of the supportive services, including the laundry, the pharmacy, a water sanitation area, and the nursing and medical stations (see Figure 1). All personnel entering the ETU must wash their hands and shoes in a prepared chlorine solution and have their temperature taken. Orange fences, made of plastic mesh, are used to create barriers as needed. At Foya, there were several such fences, including one separating the low-risk from the high-risk zone inside the ETU; one in the triage area to separate physicians and translators from patients with suspected EVD; and an outer fence around the entire ETU to protect family members, friends, and nonessential staff.

The nursing teams at the Foya ETU were sorted into three shifts: morning and afternoon shifts each lasting six hours, and a night shift lasting 12 hours. Each team consisted of eight to 12 nurses, divided according to their duties as follows: those responsible for IV line insertion and maintenance, those responsible for administering medication, a translator and scribe (usually a local nurse) who accompanied physicians on rounds, and a nursing assistant supervisor who accompanied the nursing assistants and helped to feed and wash the patients.

There were numerous challenges with implications for both staff safety and patient care. In Foya, daytime temperatures typically reached 100°F or higher, which meant that team members were sweating profusely even before donning PPE to enter the high-risk zone. Dehydration of staff was a constant concern. Putting on PPE could take up to half an hour, and each team member had to be carefully checked to ensure that there were no exposed areas that would place her or him at risk for infection. Each nurse had a team buddy, and partners monitored each other for any breach of PPE while inside the high-risk zone. If a breach was found, that nurse had to exit immediately through the decontamination area. It was made clear to all staff that if for any reason they felt unsafe, tired, or weak from the heat, they could leave the high-risk zone at any time.

Having to wear full PPE affected nursing tasks. Double gloving interfered with dexterity. The hood covered the ears, making the use of a stethoscope impossible. A big problem was that goggles tended to fog up, hampering visibility and making tasks such as IV line insertion more difficult. The goggles also limited peripheral vision, and inside full PPE it was difficult to walk and to bend down. (I sometimes felt as if I were trapped inside the body of a robot.) Patients couldn't see the faces of those caring for them, and this was particularly distressing for children, many of whom were in the isolation area alone because their family members either had died or weren't infected. Patients could be touched only with gloved hands, and this profoundly limited nurses' ability to establish human connections.

The ETU's high-risk zone was inside a concrete structure that had been part of the small hospital.

Socioeconomic Determinants of Transmission

The 2014 outbreaks of Ebola virus disease (EVD) first emerged in a remote area in Guinea, near the borders of Sierra Leone and Liberia.[6] People and goods move constantly across these borders, and the virus soon spread. All three countries suffer from poor health care infrastructures; scant resources; and citizens who, after years of civil conflict, are deeply mistrustful of governing bodies and authorities.[6] The following are some of the specific socioeconomic factors that affected disease transmission and hampered preventive efforts.

- Poverty forced many people to "expand their range of activities to stay alive," such as by going deeper into forests in search of food and fuel, thereby increasing their risk of exposure to zoonotic pathogens.[13]
- Personal protective equipment was and is scarce.[6, 18] Even when it was on hand, it's possible that because EVD so closely mimics malaria and other endemic illnesses, health care workers at first didn't think to use it. In the early days of the outbreak, those workers who became infected may unwittingly have spread the virus to their communities when they returned home.[6, 13]
- There are few laboratory facilities in all three countries. Noting that the Ebola virus was first identified as the source of the Guinea outbreak in laboratories in France and Germany in March 2014, one expert asked whether it "[could] have been identified months earlier if the laboratory capacity had existed just down the road"?[19]
- The spread of EVD to more highly populated cities complicated contact tracing and containment efforts.[6]
- West Africa has few indigenous health care leaders, lacking training opportunities for advanced degrees such as doctoral programs in public health.[19]
- The intergovernmental response was hampered by numerous logistical challenges, including difficulties in getting resources and personnel to the remote epicenters, inadequate communication networks, and significant language barriers.[13]

Despite the virulence of the EVD strain emergent in West Africa, experts emphasize that an outbreak is highly unlikely in resource-rich countries like the United States, which have the trained personnel, sufficient equipment, and protocols in place to facilitate swift response.[6]

Figure 1. A Theoretical Example for Use in Designing the Layout of an Ebola Treatment Unit

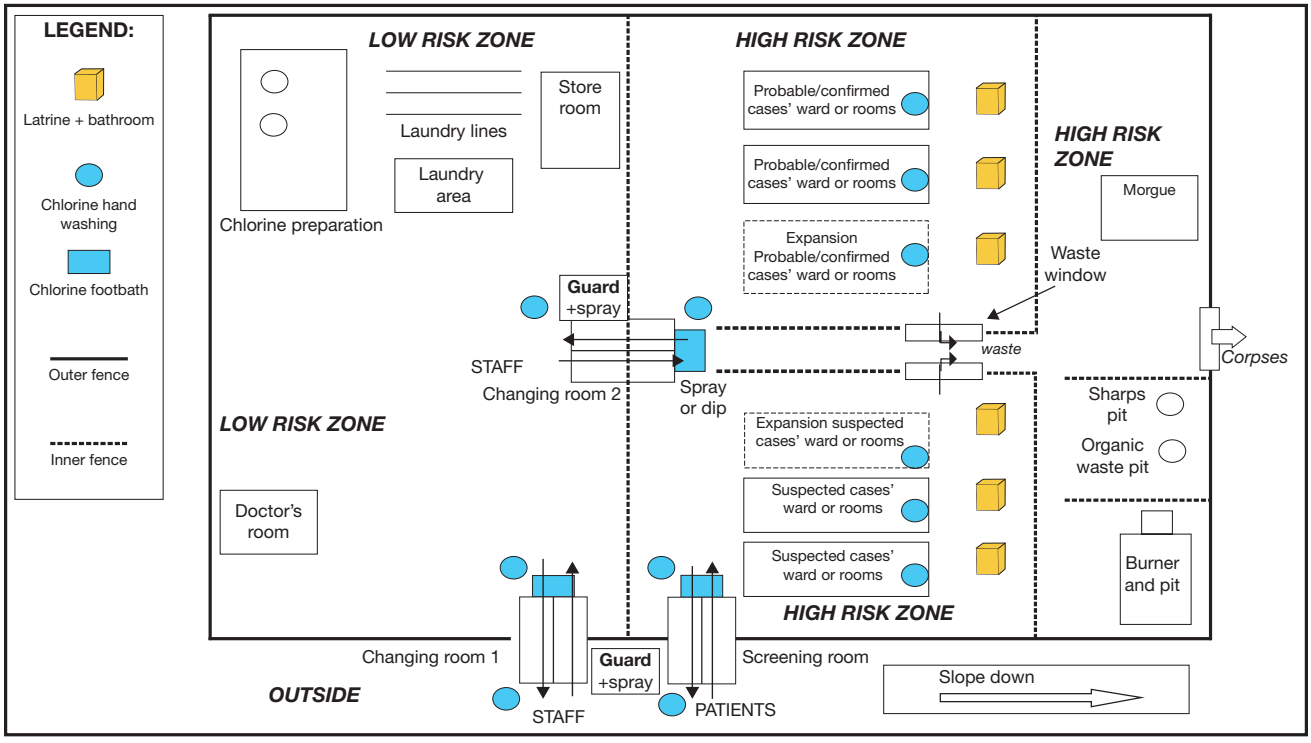

Figure courtesy of Médecins Sans Frontières.

All medications and food were prepared in individual packets and carried in. Some supplies (including IV supplies, rehydration equipment, and incontinence sheets) were kept in the probable and confirmed cases area, and it was the job of each team to inventory these supplies and let the next team know what needed restocking. All pharmacy supplies had to be ordered from Europe, as Liberia lacked the necessary resources. These included IV cannulas, lactated Ringer's solution, dressings, monitoring equipment (such as blood pressure cuffs, pulse oximeters, and digital thermometers), and medications (including antibiotics; antimalarial agents; and drugs to treat nausea, seizures, pain, and fever).

Inside the probable and confirmed cases area, patients lay on mattresses on the concrete floor. Because they were too weak to make it to the bathroom or washroom, they were usually covered in vomit and diarrhea. There were no curtains separating patients. It was rare to get through a round without finding a patient who had passed away. This was hard to bear, as these patients died alone, without the presence of their family and friends. And because they had died of EVD, the bodies could not be washed, prepared for burial by loved ones, and interred at their home villages. Instead, the bodies had to be sprayed with chlorine, placed in body bags, and buried in a graveyard that MSF had prepared on the outskirts of town. It was the nurses' job to lay out each body in preparation for the hygienists, who then removed it to the morgue. Burial was delayed 24 hours to give the psychosocial team time to contact the family and ask whether they wanted to attend.

Oral rehydration and nutrition. Every nurse, nursing assistant, and physician was responsible for helping patients to eat and drink. Oral rehydration salts are the standard treatment used by MSF for any rehydration needs. To save time inside the ETU, the salts were mixed with water or another fluid outside and placed in a bucket with a spigot. The bucket was then carried into the ETU on rounds so that patients' cups could be filled at the bedside, with staff assisting them to drink as needed. Although oral rehydration salts are highly effective for rehydration, they aren't very palatable. Mixing them with a regionally popular artificial juice powder (Foster Clark's) helped in this regard. For some patients, the extent of their vomiting and diarrhea made IV hydration the only option.

Three meals a day were prepared on-site, packaged into individual plastic bags, and carried into the ETU. Anorexia is common in people with EVD, and many patients had to be encouraged to eat. Others were just too sick. Some patients were well enough to eat food from "outside" or had cravings for particular foods, and if it was possible to purchase these foods in the village, this was done. Family members who came to stay near the ETU would sometimes cook for a loved one. Often they would cook an extra portion

for another patient who had no family nearby, whether because they had all perished, were too afraid to come to the ETU, or lived too far away.

Insertion of IV lines. The provision of IV rehydration has been demonstrated to improve the survival rate of EVD patients.[10] Despite the risk of occupational infection through needlestick injuries, IV rehydration has become part of the standard supportive therapy for EVD. Having IV access further allows the administration of IV medications to those patients who need them. At the Foya ETU, initiation of the IV protocol involved staff trainings and practice via simulation; implementation was delayed until all nurses could demonstrate safely putting on and taking off PPE. The protocol included a strict policy that IV lines be established only during daylight hours. This meant that if a patient pulled out an IV line during the night or if infiltration occurred, addressing it would have to wait until morning. It was also mandatory for nurses to bring a sharps container to the bedside, as it's well known that a majority of needlestick injuries occur when recapping, and recapping was a habitual practice here.

It is extraordinarily difficult to establish an IV line in a dehydrated patient by generator-powered light while double gloved, with one's goggles fogging. And both the IV lines and the amounts of fluids or medications being administered required constant monitoring. To meet these challenges, a task force of IV nurses was formed; methods were refined as we learned what worked and what didn't. When nurses weren't present, patients would pull out their IV lines, usually because of the delirium common in the acute phase of EVD. The task force decided to stagger nurse and physician rounds in the probable and confirmed cases area and to send in two or three nurses between rounds. But any change in protocol or procedure had to be vetted, and the decision to send in nurses between rounds met with initial resistance because of concerns for staff safety. Any changes that meant staff would spend more time in the high-risk zone were very carefully considered. In this instance, both changes were approved.

Monitoring patients' intake and output also presented problems. There is evidence that during previous EVD outbreaks, such monitoring was not systematic,[10] and so discussions and trainings were held to establish uniform assessment and documentation methods. On admission, each patient was given a bucket with a lid, to be used for urine, feces, and vomit. We measured the amounts of bodily fluids in the buckets, weighed incontinence pads, and labeled IV bags by date and bag number in order to get as accurate a sense of intake and output as possible. But when patients weren't being monitored, those who were able to do so would sometimes use the outside latrines. In the high-risk zone, any paper we recorded information on invariably got soaked in chlorine, either during the course of the shift or during decontamination. We quickly learned to call out a patient's vital signs and other findings over the fence to another nurse, who wrote everything down so that it could later be entered on the patient's chart. The process of obtaining accurate intake and output measurements continued to be refined at the Foya ETU. It will be interesting to see how the protocols have evolved after all data from this outbreak are collected.

Nurse in the ETU's low-risk zone (foreground), taking details about a patient from a nurse in the high-risk zone. Photograph by Deborah Wilson.

Delirium posed further challenges. Many nurses were reluctant to administer diazepam for sedation, believing that the real purpose was euthanasia. Unfortunately, certain symptoms—including delirium—were often predictive of death within hours, which tended to reinforce such beliefs. But patients who were delirious and agitated could put other patients or health care workers at risk for injury. Open dialogue was encouraged and nursing team meetings with the physicians were held. Eventually the medical and nursing staff were able to reach agreement on the use of diazepam for both delirium and seizure control.

Fear of contracting Ebola. Nurses (and other health care workers) are always at risk for contracting infectious diseases such as HIV or hepatitis C from their patients. As Hewlett and Hewlett have noted, such risk is much greater with Ebola.[24] In past epidemics, nurses and other health care workers were often among the earliest victims.[24,25] During the 2014 outbreak in Liberia, according to the WHO, 378 health care workers contracted Ebola, and 192 died.[26] The high infection and death rates among health care workers were attributed in part

The outreach team (white smocks) talking with nurses in order to refine their message to the community. Photograph by Deborah Wilson.

to inadequate recognition and triage of Ebola cases, inadequate supplies of basic PPE, and a lack of proper training in PPE use.[25] One result was that many health care workers abandoned hospitals and clinics, forcing them to operate with severe understaffing (such health care worker flight has been evident during other deadly outbreaks[27]).[25] And many people who needed treatment for other diseases or childbirth stopped going to hospitals and clinics, placing themselves at greater risk for illness, injury, or death.[25,28]

Even when PPE is available and used properly, and even with added staffing support from international organizations, it's still nurses and nursing assistants who provide the most direct care, often to the sickest patients. Nurses and other staff at the Foya ETU often spoke of being stigmatized and shunned by their terrified family members, friends, and communities. They had to endure the deaths of loved ones and coworkers. Moreover, most of the nurses at Foya who were there under Ministry of Health contracts (that is, those not directly hired by MSF) had not been paid for their time working in the ETU—an all-too-common occurrence in African countries.[24] Without wages, these nurses couldn't pay their rent and couldn't afford to travel to their home villages to see their families. They became a tight-knit, supportive community among themselves. They organized, writing letters to the Ministry of Health demanding to be paid and discussing whether to go on strike. (They were eventually compensated this past September for their work in the Foya ETU during the outbreak.)

There was concern that these added stressors might result in mistakes being made. And no matter how careful one is, the fear of somehow contracting the virus is constant. Interviews with nurses who worked in previous EVD outbreaks revealed that despite experiencing "enormous stress" and fear, they remained committed to their patients and to the profession.[24] This was the case among the nurses at Foya. The week before I arrived, one of the nursing team leaders died in the ETU. Although he and his girlfriend had contracted EVD in the community, his death was devastating for the staff. The psychosocial team set up confidential meetings with the entire ETU staff (either one-on-one or in small groups) so that people could talk about their experiences and concerns. The nurses later reported that it had helped them to speak and to have the risks they take recognized.

Transcultural issues. In keeping with an MSF protocol, the international staff changed every six weeks. All of the international aid agencies had similar protocols in order to minimize the risk of international workers contracting EVD. Longer missions meant that staff exhaustion could increase the chance of errors, as could staff complacency about the risks to themselves.[29] For the Foya nurses, this meant they received a new nursing supervisor every six weeks, and their frustration at having to adapt to different protocols from a succession of supervisors was evident on my arrival.

Hunt and colleagues have discussed the ethical importance of acknowledging power imbalances between "those who provide and those who require assistance" and then seeking ways to address those imbalances, in order to achieve a sense of "shared humanity."[30] Through listening to staff concerns and involving team leaders in all medical decisions, the international workers at Foya sought to engage the Liberian health care professionals as colleagues and partners. Together we succeeded in creating an environment conducive to creative thinking and mutual support. Moreover, as Sagar has stated, "knowledge and skills are empowering,"[31] and imparting knowledge and skills is another way to rebalance power. By developing the skills of the Liberian nurses and placing the nurses in charge of protocols, we were able to ensure the continuity of practice despite the high turnover of expatriate staff. Hunt has further observed that, in crisis situations like the EVD outbreak, "the level of achievable care probably will be much lower than what is familiar" to many international health care workers.[32] At Foya, ongoing discussions with nursing and psychosocial staff allowed us to incorporate Liberian cultural values into care practices whenever possible. For example, many Liberian women wanted sexual abstinence included as a protective measure against Ebola, so we amended

the outreach messages to reflect that. Spiritual faith is very important to many Liberians; so, when asked, we prayed with patients as part of their care. Thus we were able to strive together for the highest possible standard of care under the circumstances.

INSIDE AND BEYOND THE ETU: TEAMWORK

The psychosocial team provided emotional and psychological support to ETU workers, but that's only a small part of what such teams do. The Foya team, which consisted largely of local teachers and lay counselors from the Center for Victims of Torture (an international nonprofit organization), also provided support to patients and families. The nursing team and I met with the psychosocial team every morning and informed them of how each patient was doing; then the psychosocial team told us what they knew of each patient's family situation and life. These meetings profoundly affected how the nursing team worked, helping to see the patients lying on the ETU floor not only as patients but also as individual people.

The psychosocial team members were at the outer fence many times a day, speaking with patients and relaying messages to and from family members. They also brought family members for visits inside the high-risk zone. This was a change that came more slowly. It had been felt that allowing anyone other than nursing or medical staff inside the high-risk zone exposed people needlessly to infection. But we'd seen the positive effects that visits had on patients well enough to make it to the outer fence, and we felt more and more strongly that patients who were too sick to come outside, those who might die, should also be allowed more human connection. First, the supervising psychologist spoke with the medical team about permitting the psychosocial team inside the probable and confirmed cases area. It was agreed that psychosocial team members would be so permitted, in full PPE, as long as a medical team member accompanied them so that any medical issues could be handled immediately. The effects of that agreement on the sickest patients cannot be underestimated. Having someone inside who was there simply to visit and speak with each of them, relaying messages and taking requests, helped to restore their "personhood."

The success of this strategy then led to a decision to allow family members inside the high-risk zone as well. Safety concerns were addressed by having family members dress in PPE under close supervision and by having medical and psychosocial team members accompany them. The benefits were considerable. Family members not only got to see their loved ones, they also saw with their own eyes what was being done inside the ETU and could report back to their villages on what they'd seen. Such transparency helped to reduce fears and lessen the stigma that accompanied infection. This was important, because seeing the ETU only as a place one "never came back from" was preventing people from coming to us when they fell ill.

Members of the psychosocial team making plans and preparing for the day. Photograph by Henrike Zellmann.

The nursing team and the psychosocial team members also developed a palpable rapport, and their collaborative efforts benefited staff, patients, and families. For example, there was one man we were all sure would soon die. He was too ill to go outside to see his family. The psychosocial team started to go in to see him every day. They also devised a way for family members to get closer (using a specially built, decontaminated construction corridor) so that he could hear them when they shouted to him through the ETU's wall; and they brought a mobile phone in to him. One day I walked up to the outer fence to say hello to patients there; and there he was, well enough to sit outside. It meant so much to me to see him there; to be able to say hello to him with no PPE between us, just the orange fence; and to see the other psychosocial team members chatting with him. I believe he's alive not only because of the medical treatment he received but also because of the psychosocial team's interventions. (There is evidence in other populations of the impact of psychological support. For instance, a study by Liao and colleagues among women newly diagnosed with breast cancer found that psychosocial support significantly reduced their anxiety levels and symptom distress and decreased the number of unmet needs.[33])

Numerous other staff members were also crucial to the ETU's functioning; these included hygienists, water sanitation engineers, laboratory staff, and others. See *Additional ETU Staff*.[19, 22, 34, 35]

Outreach teams. Nurses were also critical to prevention efforts in the local communities. An outreach team (also called a health promotion team) typically included a nurse, a local staff member (often a hygienist or psychosocial team member), a water sanitation

Additional ETU Staff

Critical to the smooth running of the Ebola treatment unit (ETU) were several other staff members and teams that the nurses interacted with and depended on.

Hygienists (also called sprayers) were responsible for keeping patient care areas clean, disposing of all infectious waste, and removing the dead to the morgue. They were also tasked with manning and managing the decontamination area. Every health care worker and visitor entering the high-risk zone must pass through this area, where the hygienist on duty has absolute authority. The hygienist talks each person through the process of removing PPE, spraying her or him liberally with a chlorine solution at each step. At the end of a shift, we were tired, hot, dehydrated, and often shaken by what we'd witnessed inside the ETU; having someone to take us safely through the doffing procedure undoubtedly prevented potentially lethal mistakes.

Water sanitation engineers were responsible for the collection and purification of 15,000 gallons of water a day, ensuring that every area had an adequate supply at all times. They were also responsible for ensuring that the water was chlorinated to the appropriate strength for certain tasks, as recommended by the Centers for Disease Control and Prevention: strong solutions (0.5%) for the disinfection of corpses, most medical equipment, and gloved hands, and for cleaning bodily fluids from surfaces and objects such as floors, mattress covers, and foot baths; and milder solutions (0.05%) for bare hands, thermometers, laundry, and eating utensils.[34]

Laboratory staff. Confirmation of Ebola virus disease (EVD) is done using a blood test called the reverse transcriptase–polymerase chain reaction (RT-PCR) test, which can detect the presence of viral RNA in blood. A positive result is considered confirmation of the disease. A saliva RT-PCR test can also detect the virus in oral swabs, and is used to confirm infection in the corpses of people who die in the community. Because the saliva test is less sensitive than the blood test, it isn't used to confirm or rule out patients with symptoms mimicking EVD.[22, 35]

It's been reported that the lack of adequate laboratory facilities in West Africa contributed to delays in the recognition and treatment of EVD at the start of the outbreak.[19] This affected the situation at Foya as well. At first, all blood samples had to go to our sister facility in Guéckédou, Guinea, as we had no laboratory. The samples had to be placed in a cooler full of chlorine solution, fastened to the back of a motorbike, and then transported across the river into Guinea. It took three days to receive the results, forcing patients with suspicious symptoms to remain in the suspected cases area while they waited to hear; the risk of hospital-acquired EVD was a constant concern. We were grateful when the European Mobile Laboratory Consortium sent donated equipment and a team of volunteers to set up a lab on hospital grounds. The lab, which opened in mid-September, was able to provide test results in less than five hours. This was an extraordinary boon, as patients who tested negative could be released much sooner, reducing their risk of infection. We hoped eventually to include testing for electrolytes and other imbalances so that patient treatment could be tailored more precisely.

Other ancillary staff included administration staff, kitchen staff, a storekeeper (there was an onsite "giveaway" store for items that patients needed, such as clothing, buckets, and toiletries), the construction crew, the logistics teams, a cartographer, an epidemiologist, data collectors, laundry staff, and security personnel.

engineer, and if possible an EVD survivor. These teams began working with the village chiefs to speak to their communities about EVD and how to prevent its spread. Gaining the trust and acceptance of local communities has been essential to the success of efforts to contain the virus.[10, 36] In previous outbreaks, there were reports of community resistance stemming from poor communication by the health care teams and instances of teams failing to provide care to patients "for whom death was assumed to be certain."[10] The resulting anger and distrust made contact tracing and case management "impossible,"[10] and sometimes led to violence. We were reminded of this on September 18, 2014, when we received a report that eight health promoters had been murdered in a town near Nzérékoré, Guinea (less than two hours' travel away).[37]

During the Foya teams' first outreach attempts, they heard that many people believed that the chlorine solution used during disinfection actually contained the Ebola virus. Careful discussion and demonstration were required to establish trust. Ultimately, in Foya and the surrounding villages, the outreach team was well received. Cultural sensitivity of the teams was also critical to successful collaboration. Because literacy rates were low, the team used picture posters and a twice-weekly radio call-in show to convey prevention messages. These messages challenged some time-honored cultural practices. For example, Liberians greet one another by kissing, and burial practices involve washing and kissing the body.[38] The health care promoters were able to convince villagers to minimize casual physical contact (they agreed to stop kissing

each other in greeting), and to allow MSF to be involved in caring for the dead.

Burial teams led by the psychosocial team were organized to ensure that the bodies of those who died outside the ETU were also handled safely, and outreach team nurses sometimes helped with this. When a person died in a village, health care workers donned PPE there, and sprayed the corpse with a chlorine solution. The corpse was then placed in a body bag and taken to the MSF morgue. Each of these steps was carefully explained, and family members were involved to the extent that they wished to be.

RECOVERED PATIENTS

During the time the Foya ETU was operational, 154 patients recovered from EVD and were sent home.[4] To be declared "recovered" (the word "cured" is avoided because no known cure for Ebola exists), a patient has to have negative results for two consecutive blood tests.[39] Thus, even patients who became asymptomatic had to remain in the probable and confirmed cases area until both blood tests came back negative.

Patients who were declared recovered were so informed by the nurses. The patients then had to wash in a 0.05% chlorine solution, throw away everything they were wearing, and pass into the decontamination area where they were given clean clothes. After getting dressed, they stepped into the low-risk zone and were escorted to the psychosocial team's office to begin counseling. It was always clear from their faces that they had been through a lot and needed time to heal further. They were in a weakened state, and some were the sole survivors in their families. It was hard for us to fathom what their future would be like, but in those first moments of freedom, they were cheered and applauded by the ETU teams. Every recovered patient received a mosquito net and a two-week supply of a therapeutic supplement for malnutrition. Many patients infected with Ebola also test positive for malaria; patients still being treated for malaria were sent home with enough medication to complete the course.

On going home, survivors often faced rejection and stigmatization from others; grief over the loss of loved ones; and the hardships posed by loss of income, possessions, and even homes (many items and structures were burned during efforts to contain the virus).[27] When we learned that recovered patients who returned to their villages were being rejected and forced to live on the outskirts, we began issuing them certificates of discharge; each certificate was signed by the Ministry of Health representative and stated that the patient was no longer infectious and had been officially discharged. We also had an outreach or psychosocial team member accompany each patient home and meet with the village chief. One health promoter mentioned that a powerful demonstration that a patient no longer posed a risk to the community was to hug the patient in public.

At this writing, it appears that people who have recovered from EVD are immune to reinfection.[40] Because of this, survivors were sometimes recruited to work in the ETU as surrogate family caregivers for ill and orphaned children, or were invited to join the outreach team, speaking to local communities and on the radio call-in show. They were able to convey the hope that survival is possible with supportive care, and thus to encourage families to bring sick loved ones to the ETU.

GOING FORWARD

Although the Ebola outbreak in Liberia was declared over in May,[5] a handful of new cases have since emerged, and officials aren't sure why.[41] But as global health expert Peter Piot has observed, "Where there is a fertile ground of poverty, dysfunctional health systems, and slow response, local outbreaks can turn into major outbreaks."[42] It's clear that much remains to be done in West Africa. As Piot stated, "Health systems will need to be rebuilt, disease surveillance systems established, trust in health services and authorities rebuilt, orphans educated and protected, and economic losses recovered.[42] Accelerated efforts are under way worldwide to find effective curative therapies for people who become infected and for a vaccine that can confer immunity. There is emerging evidence that some EVD survivors may have persistent health problems, including severe joint pain, severe fatigue, and uveitis. The WHO has called the situation "an emergency within an emergency"[43]; best care practices remain to be determined.

Nurses will continue to serve on the front lines of Ebola outbreaks, caring for the sick and supporting local communities to combat the virus's spread. For me, it was an honor to work with the Liberian people. Their bravery, humor, and heart gave testimony to the strength of the human spirit during terrible hardship. As an international community, we cannot forget West Africa. Rather, we must continue to provide support to the affected countries and their people as they recover and begin to flourish again. ▼

For an additional continuing nursing education activity on Ebola virus disease, go to www.nursingcenter.com/ce.

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