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Vol. 36 No 20 · 23 October 2014
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Diary

Paul Farmer

I have just returned from Liberia with a group of physicians and health activists. We are heading back in a few days. The country is in the midst of the largest ever epidemic of Ebola haemorrhagic fever. It's an acute and brutal affliction. Ebola is a zoonosis – it leaps from animal hosts to humans – which is caused by a filovirus (a thread-like virus that causes internal and external bleeding). It was first described in 1976 in rural Congo, not far from the Ebola River, as an acute-onset syndrome characterised by complaints of weakness, followed by fever and abdominal pain. Patients became dehydrated as a consequence of fever, vomiting and diarrhoea. Many became delirious and started to haemorrhage from the mouth, nose, vagina, at sites where intravenous lines had been placed, even from the eyes.

The Ebola virus is terrifying because it infects most of those who care for the afflicted and kills most of those who fall ill: at least, that's the received wisdom. But it isn't clear that the received wisdom is right. It's true that many of those who have died were medical professionals. The 1976 epidemic, for example, started in a mission hospital where Belgian nuns worked as nurses alongside Congolese colleagues. But even then it was known that the virus could be transmitted as the result of a failure to follow the rules of modern infection control: the nurses reused needles and did not wear gloves, gowns or masks, which were all in short supply. Nor did the nurses, still less their patients, receive what in Brussels, Boston or Paris would count as modern medical care.

Even without a specific antiviral therapy, the treatment for hypovolaemic shock – which occurs when there isn't enough blood for the heart to pump through the body and is the end result of many infections caused by bacteria and some caused by haemorrhagic viruses – is aggressive fluid resuscitation. For those able to take fluids by mouth, shock can often be forestalled by oral rehydration salts given by the litre. Patients who are vomiting or delirious are treated with intravenous fluids; haemorrhagic symptoms are treated with blood products. Any emergency room in the US or Europe can offer such care, and can also treat patients in isolation wards.

Both nurses and doctors are scarce in the regions most heavily affected by Ebola. Even before the current crisis killed many of Liberia's health professionals, there were fewer than fifty doctors working in the public health system in a country of more than four million people, most of whom live far from the capital. That's one physician per 100,000 population, compared to 240 per 100,000 in the United States or 670 in Cuba. Properly equipped hospitals are even scarcer than staff, and this is true across the regions most affected by Ebola. Also scarce is personal protective equipment (PPE): gowns, gloves, masks, face shields etc. In Liberia there isn't the staff, the stuff or the space to stop infections transmitted through bodily fluids, including blood, urine, breast milk, sweat, semen, vomit and diarrhoea. Ebola virus is shed during clinical illness and after death: it remains viable and infectious long after its hosts have breathed their last. Preparing the dead for burial has turned hundreds of mourners into Ebola victims.

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Many of the region's recent health gains, including a sharp decline in child mortality, have already been reversed, in large part because basic medical services have been shut down as a result of the crisis. Most of Ebola's victims may well be dying from other causes: women in childbirth, children from diarrhoea, people in road accidents or from trauma of other sorts. There's little doubt that the current epidemic can be stopped, but no one knows when or how it will be reined in. As Barack Obama said, speaking at a special session of the United Nations, 'Do not stand by, thinking that somehow, because of what we've done, that it's taken care of. It's not.' Preventing the next eruption is an even more distant goal.

As of 1 October, a third of all Ebola cases ever documented were registered in September 2014. More than seven thousand cases have been recorded since March, more than half of them fatal. In epidemiological terms, the doubling times of the current Ebola outbreak are 15.7 days in Guinea, 23.6 days in Liberia and 30.2 days in Sierra Leone. The US Centers for Disease Control and Prevention suggested at the end of September that unless urgent action is taken, more than a million people could be infected in the next few months.

The worst is yet to come, especially when we take into account the social and economic impact of the epidemic, which has so far hit only a small number of patients (by contrast, the combined death toll of Aids, tuberculosis and malaria, the 'big three' infectious pathogens, was six million a year as recently as 2000). Trade and commerce in West Africa have already been gravely affected. And Ebola has reached the heart of the Liberian government, which is led by the first woman to win a presidential election in an African democracy. There were rumours that President Ellen Johnson Sirleaf was not attending the UN meeting because she was busy dealing with the crisis, or because she faced political instability at home. But we knew that one of her staff had fallen ill with Ebola. A few days ago, we heard that another of our Liberian hosts, a senior health official, had placed herself in 21-day quarantine. Although she is without symptoms, her chief aide died of Ebola on 25 September. Such developments, along with the rapid pace and often spectacular features of the illness, have led to a level of fear and stigma which seems even greater than that normally caused by pandemic disease.

But the fact is that weak health systems, not unprecedented virulence or a previously unknown mode of transmission, are to blame for Ebola's rapid spread. Weak health systems are also to blame for the high case-fatality rates in the current pandemic, which is caused by the Zaire strain of the virus. The obverse of this fact – and it is a fact – is the welcome news that the spread of the disease can be stopped by linking better infection control (to protect the uninfected) to improved clinical care (to save the afflicted). An Ebola diagnosis need not be a death sentence. Here's my assertion as an infectious disease specialist: if patients are promptly diagnosed and receive aggressive supportive care – including fluid resuscitation, electrolyte replacement and blood products – the great majority, as many as 90 per cent, should survive.

Ebola's more general effects also damage the effort to treat the disease. The closure of national borders means, among other things, that it's more difficult for the staff and the stuff to reach those most in need. Many airlines have halted services. Schools have been shut down, including medical and nursing schools. Food and fuel, much of it imported, are becoming scarce. Exxon has announced that it is delaying offshore drilling plans. Supply chains have been cut off. Hospitals and clinics have been closed.

There have been incidents of violence linked to fear and stigma. In Liberia – where we were warmly welcomed – my colleagues and I heard that seven Ebola workers, apparently including two local public-health officials, had been murdered with machetes in rural Guinea. Their bodies were discovered in the septic tank of a local primary school. Eleven years ago, four Congolese schoolteachers engaged in Ebola-awareness campaigns were also killed. The complex relationship between contagion, lethality, stigma and long neglect – most people in rural West Africa have never had access to comprehensive medical care – has yet to be laid out.

I've been asked more than once what the formula for effective action against Ebola

might be. It's often those reluctant to invest in a comprehensive model of prevention and care for the poor who ask for ready-made solutions. What's the 'model' or the 'minimum basic package'? What are the 'metrics' to evaluate 'cost-effectiveness'? The desire for simple solutions and for proof of a high 'return on investment' will be encountered by anyone aiming to deliver comprehensive services (which will necessarily include both prevention and care, all too often pitted against each other) to the poor. Anyone whose metrics or proof are judged wanting is likely to receive a cool reception, even though the Ebola crisis should serve as an object lesson and rebuke to those who tolerate anaemic state funding of, or even cutbacks in, public health and healthcare delivery. Without staff, stuff, space and systems, nothing can be done.

If such things were thin on the ground in Monrovia and Freetown, they were all but absent in rural regions. Zwedru is the capital of Grand Gedeh County in south-eastern Liberia, a region mostly covered by rainforest. Flying from Monrovia to Zwedru reminds you how vast and green – and rainy – much of the country is, especially in September. Outside the capital, paved roads are as scarce as electricity: in 2013, it was estimated that less than 1 per cent of Liberia was electrified. As Sirleaf recently pointed out, the Dallas Cowboys football stadium consumes more energy each year than the whole of Liberia. It is very difficult to take care of critically ill patients in the dark; fluid resuscitation depends on being able to place and replace intravenous lines.

In Zwedru, we visited the Grand Gedeh's only hospital. Although there have been stories of doctors and nurses fleeing their posts, the fact is that many remain. But without personal protective equipment or other supplies, there isn't a lot they can do. We didn't see any Ebola patients in the hospital. Rumour had it that the hospital administration had just sent away a carload of suspects. In Ziah Town, a small village a couple of hours away, we met some community health workers. They were a well-informed group of mostly young men and women. Kru was their native language; they spoke English just fine. They were the front line in the struggle against Ebola, the ones who could bring information and services to the rural poor. But they were isolated and badly equipped. The sun beat down on the immense forest and the dirt roads cutting through it. We were slated to leave Monrovia the following afternoon. Thunderheads blackened the eastern sky, and it wasn't clear we'd make the plane; the four-wheel-drive vehicles were having a hard time. Stuck in the mud, we wondered how the community health workers would be able to get sick patients to Ebola care centres, a series of planned but not yet constructed halfway houses.

Although the Grand Gedeh had been declared Ebola-free, it was also free of diagnostic tests. And electricity and surfaced roads. But the community health workers, like the people in Ziah Town, were plugged into the cash economy: people had cell phones (if little signal) and wore T-shirts (one of them emblazoned with the shield of a small Midwestern college); children were kicking a football around; one boy was nursing a can of Red Bull. 'How do they make a living?' I asked one of the young American volunteers. She hesitated, although she'd lived and worked in Zwedru for more than a year. 'They're great hunters,' she said. After listening patiently to our halting conversation, the driver of the jeep – we were waiting for our convoy to emerge from the mud – helped out. He was from Monrovia, he said. He'd been working in the Grand Gedeh for more than ten years, first as an officer in the disarmament programme, and then as a driver and logistician. 'It's not just hunting and small-scale farming,' he said. There were also mining, remittances from abroad and international trade. Many of the shopkeepers in town were from Guinea, Sierra Leone or Côte d'Ivoire. It may have looked like isolated rainforest, but the place is connected to the rest of West Africa.

That means it's connected to the rest of the world too. And however the epidemic started – whether through the ingestion of bush meat or an infected bit of fruit dropped by a clumsy fruit bat – it's clear enough that attempts to seal national borders won't stop it. There are no checkpoints or barriers in the forests. The day when enclosure might have worked is long gone. A CNN interviewer asked me if Ebola might spread to Europe and North America. 'Of course it will,' I replied. 'We live in a global economy.'

On 30 September, the US Centers for Disease Control and Prevention confirmed the first diagnosis of the disease in the United States. A traveller from Liberia, asymptomatic (by self-report) on boarding a flight from Monrovia to the United States on 19 September (as our team left Zwedru for Monrovia), fell ill in Dallas a few days later. His symptoms were similar to those described in every Ebola case: a fever of 40°C, weakness, abdominal pain. He had a history of exposure, having driven a young woman, pregnant and bleeding, to a hospital in Monrovia; she was turned away and later died. But on his first visit to an emergency room, his symptoms were judged 'non-specific' and the diagnosis was missed even though he had come from Liberia. Two days later, highly infectious and critically ill, he was taken by ambulance back to the same hospital and admitted to intensive care. Within hours, the cause of his illness was confirmed as Ebola, Zaire strain. He is now dying. It's unlikely that the American subplot is over. The cycle of fear and stigma, amped up by the media, will continue to spiral, even though there's little doubt that the epidemic will be contained in the US, which has the staff, stuff, space and systems.

Ebola is more a symptom of a weak healthcare system than anything else. But until this diagnosis is agreed on, there's plenty of room for other, more exotic explanations. The palaver (as Liberians say) includes a lot of talk about the 'cultural beliefs and behaviours' said to propagate the outbreak. The list usually includes activities that are not really 'behaviours', such as hunting and eating bush meat, taking part in strange funerary practices or the bizarre rituals of 'secret societies' like the Poro or the Human Leopard Societies. An obsession with funerary rituals – the more lurid the better – was characteristic of anthropology from the late 19th century on. *Tribes of the Liberian Hinterland* (1947), written in the passive voice and matter-of-fact tone typical of the genre, contains more than five hundred pages of this sort of stuff:

> Formerly, only chiefs and big men were washed after they died. In Half-Grebo the corpse of a warrior who died from the effects of a gunshot wound was taken to a stream and washed. In both Grebo and Sapa, the shot was extracted in order to prevent his being reincarnated with a wound.
>
> Now, all the dead are washed. The corpse is then laid on a mat and rolled up in it. With the corpse are put some cloths, the number varying with the rank of the person.

Despite anthropologists' fondness of recounting such practices, these rites are not suspected of having played a major role in outbreaks of Ebola in Congo, Uganda and Sudan over the last forty years. The inhabitants of coastal West Africa have eaten bush meat for centuries and they have prepared the dead for burial without taking precautions to stop transmission of a pathogen like Ebola. Even so, it isn't improbable that these practices helped to spark and then fan this outbreak, which began in the Upper Guinea Rainforest.

What accounts for Ebola's spread from Guéckédou to Monrovia and Freetown and now to Dallas? As Larry Brilliant, who helped to eradicate smallpox almost forty years ago, just as Ebola was being discovered, and now heads the Skoll Foundation's Global Threats Fund, has observed, 'Outbreaks are inevitable. Pandemics are optional.' The eating of bush meat can't possibly explain the epidemic, but grotesque and growing disparities in access to care – in the context of a globalised political economy – can. The attempt to treat Ebola patients in a weak health system – or at home – has been strongly linked to the transmission of the virus. In several West African hospitals, Ebola has ripped through the professional staff: health professionals, nurses' aides, morgue attendants. Understaffed and undersupplied, front-line health workers in West Africa have good reason to be afraid. We who aim to help them, though better equipped, are afraid too.

The others at great risk, obviously enough, are the primary caregivers of the sick: not health professionals but family members, especially women. Associated Press reported the story of a 14-year-old Liberian boy: 'Too weak to stand, they bundled him into a taxi with his backpack and a yellow plastic bucket for his vomit ... "He's been sick for a week with a runny stomach," says his distressed mother, wiping the sweat off the boy's

brow with bare hands. “We tried calling an ambulance days ago, but nobody ever came.”’

Who will come when we call? Who will show up not just if it’s convenient or cost-effective or already budgeted? It isn’t clear that all such responsibilities should be handed out to contractors or NGOs. The three countries most afflicted by Ebola are those with some of the lowest public investment in healthcare and public health in Africa. They have been wracked by war, and by extractive industries, which have never failed to turn a profit. This is one of the reasons that Liberia could boast, only a few years ago, the fastest growing GDP in the world.

For most of a century, the Firestone Rubber Company has been the largest taxpayer in Liberia. In 1926 it negotiated a million-acre concession at six cents an acre, for ninety years. By the Second World War, there was a little bit of the Liberian forest in many, if not most, American cars. Firestone is still in Liberia. It promised 350,000 jobs, but never created more than a quarter of that number. For decades, plantation workers demanded better pay, a high school and medical care. In recent years, they achieved some measure of success. But the epidemic has affected them too. At the end of March, the wife of a Firestone employee left Lofa County, which borders Guinea, not far from where the first case was recorded. She had a sudden-onset generalised weakness and fever. Eight times out of ten, the pathogens responsible would be those that cause malaria, pneumococcal pneumonia, typhoid fever, influenza or a complication of Aids. Lassa, another haemorrhagic fever, would be on the list in Liberia, but Ebola was then unknown in the region. On 31 March, the woman travelled by taxi to Monrovia with five other passengers, including her infant, but was referred back to the Firestone plantation, to Duside Hospital. By then, sick with profuse diarrhoea and vomiting, she was diagnosed with Ebola. She continued to lose vital fluids and electrolytes, and slipped into hypovolaemic shock. As her blood pressure dropped, nurses did their best to resuscitate her. Within an hour, it was all over.

Except that it wasn’t. Four months later, 72 cases of Ebola were diagnosed in rapid succession at Duside; only 18 patients survived. Yet the Firestone response was considered a success, since infection control was improved during those months and transmission within the hospital declined rapidly.

Such back and forth is how Ebola got to the city and into its clinical facilities. St Joseph’s Catholic Hospital, in a Monrovian slum, has lost many of its caregivers and most of its patients. Within two weeks of its first cases, the hospital director fell ill with similar symptoms. This time, they knew what was coming. But even for its most valued professionals, the hospital could not conjure proper medical care out of nothing. Two more nurses, two laboratory technicians and a social worker were all dead within a couple of months of the city’s first two cases. So too were several of the nuns and priests working there. Father Miguel Pajares was airlifted home to Spain; so, later, was Father García Viejo, working in a small town in Sierra Leone. Both died in Madrid. It is unlikely that we have heard the last from Spain either.

What is to be done? The only formula we’ve come up with is the following: you can’t stop Ebola without staff, stuff, space and systems. And these need to reach not only cities but also the rural areas in which most people in West Africa still live. First, we need to stop transmission. The source of the first human cases is no longer the primary concern. Transmission is person to person, and in the absence of an effective medical system, it occurs wherever care is given: in households, clinics and hospitals, and where the dead are tended. Infection control must be strengthened in all of these places, and during burials, which requires not only training and exhortations (which are already given in cities throughout West Africa, on billboards and radio, and in community meetings) but also uninterrupted supplies of personal protective equipment. Community health workers, too, need to be better equipped, trained and paid if they are to play a role in contact-tracing and early diagnosis, as well as trying to address the mounting number of deaths caused by other conditions.

Second, we need to avoid pitting prevention against treatment. Both are necessary. Adam Levine helped to open the first Ebola Treatment Unit in Bong county, Liberia,

after working in an ETU in Monrovia. An emergency medicine specialist, he describes what it feels like to be working without the right therapies, while wearing a stifling shroud:

> On my third day of training, I come across an older man, also lying motionless on his mattress. At first I think he might be dead, but as I lay my double-gloved hand gently on his shoulder, he turns his head to look up at me. His eyes are sunken and his lips parched, his skin flattening only slowly when pinched. He is severely dehydrated from the profuse diarrhoea common with Ebola. Usually a drip of intravenous fluids would be started, but the [ETU] lacks sufficient staff to safely place intravenous catheters for patients. So instead I turn the patient slowly onto his back, grab the full bottle of oral rehydration solution lying by his side, and pour a tiny capful into the man's slightly open mouth. Surprisingly, he swallows it. I pour another capful, and then another, and he keeps swallowing. Only a few hundred more capfuls to rehydrate him, but I know that in the stifling heat I am not going to last much longer in my full PPE.

Most experts don't think staff should spend more than two or three hours in PPE. Dizzied by heat, even the most cautious professionals start to make mistakes.

Equality of access to care is important if we are to encourage the sick into quarantine. Two weeks ago, a Liberian physician told me a story I won't soon forget. He and some Liberian and Ugandan colleagues were planning on opening an ETU in Monrovia after the other clinics had stopped giving intravenous fluids; patients were dying of untreated shock. When one of the European caregivers at his ETU fell ill and was about to be airlifted home, the ETU director asked him to find an infusion pump. He spent hours looking, and eventually found one, but not before the non-national was airlifted away. She survived.

Third, the rebuilding of primary care must be informed by what has been learned from the response to this outbreak. The hospital we visited in Zwedru, which has 140 beds, was technically open; staff, including the sole attending physician, were present. But there weren't many patients in the wards, or outpatients. The pharmacy had no drugs or supplies, including PPE. The laboratory was short of reagents; the recently donated digital radiography unit hadn't been installed because there weren't any batteries. There was no infection control, which was why the five Ebola suspects had been sent away (two of them died shortly afterwards of confirmed Ebola).

Fourth, the knowledge gained from the response must be built on. Every attempt to prevent the spread of Ebola should involve proper care for quarantined patients. Even without a vaccine or Ebola-specific therapies, it's possible to imagine this bringing a marked drop in case-fatality rates. But we need specific therapy, better and faster diagnosis, and effective vaccines. The vaccines and drugs required to treat so-called 'emerging infectious diseases' do not exist because of what James Surowiecki has called 'Ebolanomics'. 'When a disease's victims are both poor and not very numerous,' he says, 'that's a double whammy. On both scores, a drug for Ebola looks like a bad investment.' The *Onion* recently ran the headline: 'Experts: Ebola vaccine at least fifty white people away.'

It needn't be this way. Several vaccines are ready for clinical trials; a number of treatments – including ZMapp, a combination of monoclonal antibodies developed by a pharmaceutical and a biodefence company, and RNA interference agents – are also ready for trial. The process should be fast-tracked, and willing Ebola survivors (who should be immune) recruited by the thousand into this work as well as into providing clinical care.

Fifth, formal training programmes should be set up for Liberians, Guineans and Sierra Leoneans. Vaccines and diagnostics and treatments will not be discovered or developed without linking research to clinical care; new developments won't be delivered across West Africa without training the next generation of researchers, clinicians and managers. West Africa needs well-designed and well-resourced medical and nursing schools as well as laboratories able to conduct surveillance and to respond earlier and more effectively. Less palaver, more action.

1 October

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ISSN 0260-9592