

Fight against Ebola: a volunteer's tale

With Ebola continuing to devastate populations in countries of West Africa, and representing a real healthcare concern around the world, one of the first laboratory volunteers to visit Sierra Leone talks about her experiences.

With the Ebola virus (EBOV) epidemic in West Africa now claiming nearly 8000 lives, and with over 20,000 reported cases (figures correct as of 30 December), healthcare scientist Chloe Eaton talks to *The Biomedical Scientist* about the preparation for deployment to Sierra Leone as part of a laboratory team of volunteers, and the day-to-day realities of working on the frontline in the battle against this worst outbreak of viral haemorrhagic fever.

Could you give a little background about your current job role?

I began my scientific career at Worcestershire Royal Hospital where I completed my generic and specialist portfolios alongside a part-time MSc in clinical microbiology at Barts and The London School of Medicine and Dentistry. Currently, I am a trainee clinical

scientist in my final year of the STP programme at Oxford University NHS Trust.

What made you decide to volunteer to go to Sierra Leone to help tackle the Ebola outbreak?

As part of the clinical scientist training we are provided with the opportunity for a four- to six-week elective period. I received a microbiologist request, circulated via email, to help establish an enteric reference laboratory in Lakka, Sierra Leone. Following my application and subsequent interview, I was the first candidate deployed for six weeks to establish the extent of the current situation, with a view to implementing antimicrobial sensitivity testing on gastrointestinal pathogens. Towards the end of my stay in May, I was called to an emergency meeting at the Ministry of Health following four fatalities

reported in the district of Kailahun. Sadly, this marked the start of the Ebola outbreak spreading from neighbouring Guinea into Sierra Leone.

Although challenging, I really enjoyed my time in Sierra Leone and gained a wide range of skills and experience that I would never have received in the UK. I found Sierra Leone to be such a beautiful country, and the people were really very welcoming during my first assignment. I was delighted, therefore, when Porton Down contacted me in October, asking if I would be part of the first Public Health England (PHE) Ebola response laboratory team at a new UK-funded Ebola treatment centre in Kerry Town.

I had no hesitation about returning, but I realised that discussing this scenario with my family and trying to balance work commitments would be the biggest challenge. With Ebola being such a devastating and relentless disease, tearing through an already suffering healthcare system, I felt privileged to have been given the opportunity to return to utilise my skills. My employer, family and friends soon understood that this was something I was passionate about and supported my decision to return.

What were your expectations before you left for Sierra Leone?

I had travelled to Sierra Leone before, so I had an understanding of the culture and environment, and I had developed relationships with local staff earlier in the year. I knew on this occasion I would have the opportunity to work with experienced scientists, some with specialist expertise in Ebola. I was therefore satisfied that I would quickly become comfortable with the protocols and I would also be confident with validation, evolving SOPs and the necessity to think on my feet, given the general problem-solving frequently encountered when working in West Africa. I did, however, also appreciate that this secondment was part of an emergency response that would include various new challenges, working under increasing pressure and within a distressing environment.



The first Ebola team ready for deployment. Chloe Eaton is pictured second from the right.



When the team arrived in Sierra Leone, the laboratory was still a work in progress. Right: The laboratory's specimen reception area.

What kind of training did you receive before you left?

Prior to deployment, all volunteers attended a week of training at Porton Down. This was organised by staff of PHE's Rare and Imported Pathogens Laboratory (RIPL) and Save the Children International (SCI), the non-governmental organisation supporting our secondment. The first two days involved a series of lectures, assessments and group activities by SCI, including child safeguarding, disease history, mental health psychosocial support, staff health, an introduction to Sierra Leone's country and culture, media communications, virtual presentations of the Ebola Treatment Centre (ETC), health promotion and outreach including contact tracing. Days 3–5 were run by PHE and comprised presentations by field experts and practical training in particularly hot conditions set up to replicate the conditions of the PHE Kerry Town laboratory. This was a fantastic opportunity to become comfortable with some of the protocols, equipment and personal protective equipment we would be using in our new environment. In hindsight, I found it advantageous to practise as many isolator glove changes, repairs and specimen reception sequences as possible before doing it for real with high-titre Ebola samples.

What would a typical day involve working in one of the laboratories identifying Ebola cases in Sierra Leone?

Our first few days in Sierra Leone were spent locating our laboratory supplies in large warehouses based at our hotel, the Kerry Town Treatment Centre and British Army accommodation. Inside the laboratory, contractors were tiling floors and work surfaces, benches were being painted and Porton Down's Martin Hersford was busy assembling the isolators and ensuring they were working effectively to keep us safe.

On Monday 27 October, despite intermittent power and water utility supplies, the laboratory opened and, with demand for diagnostic laboratories in Sierra Leone being so great, we were inundated with samples

from the local community, hospitals and treatment centres, sometimes in batches of over a hundred at a time.

The initial stages of our stay were probably the most challenging element as we were still working in what was effectively a building site around us, with infrequent power and water supplies. The samples were not the EDTA blood samples our polymerase chain reaction (PCR) assay had been validated against in the UK, and a fragile internal control ensured the swab samples often failed. In addition, we were all still trying to adapt to the evolving protocols provided into a workable SOP which was specific to the equipment and facilities we had on site.

As team leader, I also had staffing responsibilities to ensure the laboratory was running from 06.00 to 22.00. This was achieved by dividing the team over two shifts; a 06.00–14.00 morning shift and a 14.00–22.00 evening shift. Towards the end of our secondment, we implemented a crossover shift of 10.00–18.00. This allowed continuity between teams during handover and a consistent flow of sample processing.

Despite the initial setbacks, three database changes and grabbing any spare opportunity we could to validate our assays, the laboratory developed exponentially in a short period of time. As communication to the local healthcare community improved, so did the quality of the sample packaging. We optimised the sample and internal control volumes so we were able to improve assay performance, and within the first two weeks the PHE Kerry Town laboratory was already

producing 120–150 Ebola results per day and having a significantly beneficial impact on the diagnostic capabilities of Sierra Leone.

What measures were in place to protect those working in the laboratories?

Prior to our departure, there was a substantial amount of mandatory training and occupational health assessment that had to be completed. This included passing a four-hour 'Security in the Field' module, the week of training at Porton Down, a resilience interview, full medical examination, several vaccinations, and a case full of pharmaceuticals to take should you become unwell.

On site, before the laboratory opened, isolators to handle samples were installed and certified, appropriate PPE was shipped over, and those with more experience in a particular area trained less-experienced members of staff until everyone felt comfortable and safe with the process in its entirety.

Chlorox was prepared in strengths of 10,000 ppm, 5000 ppm and 0.05%, depending on its purpose. Before samples were removed from the isolators for extraction and amplification, the virus was inactivated with AVL and either ethanol or heat.

Are you aware of any challenges specific to the current Ebola outbreak?

Specific challenges included response time, outreaching into the local community and outbreak impact. The current outbreak spread through Guinea, Liberia and Sierra Leone in a matter of months. Getting treatment centres built, supplies shipped, staff trained, and laboratories operational in the shortest time frame possible is a huge challenge.

Patients often come to treatment centres when it is too late. With so few treatment centres, it takes hours to reach appropriate medical care, meaning many patients frequently die in transit. Compounding this, with the prospect of there not being enough beds to allow admission on arrival, it is not surprising that so many families choose to remain at home with their loved ones rather than risking the journey to die in isolation.

When talking to those who lived through

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The President of Sierra Leone on a visit to the laboratory. Right: A typical roadside checkpoint for hand washing and temperature monitoring.

the Civil War in Sierra Leone, they describe this Ebola outbreak as more devastating for their families and communities. During the civil conflict, live gunfire could be heard for miles; the warning sign allowing people to flee. The Ebola virus cannot be seen or easily identified and it is not always easy to know who or what is infected/contaminated, so people are living in fear. A country that was rebuilding its infrastructure and economy has been shattered again, with businesses closing, health facilities struggling and children not having attended schools since May. Sadly, the devastating impact of this outbreak will be evident and deep-rooted for many years after it ends.

What do you think of media coverage of Ebola?

There are positive and negative elements. There is a lot of hysteria about Ebola, which certainly made my family and friends very concerned when I announced I would be returning to Sierra Leone. On a larger scale, many tourists have been deterred from travelling to Africa, impacting on the local economy of those countries that are free from Ebola.

Conversely, the media coverage has also played a pivotal role in raising awareness of the situation and, more recently, the international efforts that are taking place in order to curb further transmission. During our first operational week we were joined by the BBC, Channel 4 and *The Daily Telegraph*



The beachfront location of Tokeh provided brief respite for the team.

'The media presence was really important to convey the message from those who are contributing to this effort and to encourage others to volunteer'

newspaper. While the media presence was sometimes a real distraction when we were trying to undertake our laboratory testing, it was really important to convey the message from those who are contributing to this effort and to encourage others to volunteer.

How did you spend your time when you weren't working in the laboratory?

Free time can be restrictive as you are confined to your hotel when you are not working at the treatment centre. We could not complain, however, as we were very fortunate to be staying in the stunning beachfront location of Tokeh, so a swim in the pool or walk along the beach was the perfect way to unwind after a long day at the treatment centre.

What was the most challenging aspect of your time in Sierra Leone?

Experiencing the reality of the tragedy of Ebola first-hand was particularly difficult for me. Many people are still dying every day and every story is just as tragic as the next; whether it is a child, a mother, father or an individual left alone and outcast from their local community because they have become unwell. This part never gets any easier but it also provides a constant reminder of why you are there, and it helped me focus on the job I had to do.

Being team leader also came with its own challenges. We were working in a very unique environment, particularly during the initial stages, and this time I did not just have my own welfare to consider: but also the wellbeing of my colleagues and those organisations and local staff with whom we were working,

The team was under a huge amount of pressure to get as many results produced as possible. As we were a group of UK scientists, we were under pressure to provide reproducible quality results. Managing the expectations of external organisations was taxing at times, but it was essential to realise what the laboratory had achieved within a very tight timeframe and the impact this had on local services to ensure the morale of the team was maintained.

What do you feel you gained from your volunteering experience?

An opportunity to utilise skills I had acquired in the UK in an environment where they would really make a difference, with further experience in setting up a diagnostic laboratory in West Africa, including development and implementation of SOPs, training, laboratory supplies and surveillance/epidemiology. Also valuable was a period of time working with a Hazard Group 4 agent and working under containment, and the chance to work with experts in this field.

Would you advise others to volunteer?

Absolutely. I would, of course, advise anyone considering applying to make sure they are aware of the nature of the disease, the country and some of the sad realities that come with working in an Ebola outbreak environment. It is a big commitment and for a period of time it becomes your whole life. The rewards of volunteering, however, are tremendous. I met some fantastic people whom I hope to continue to work with in the future. In addition, I gained many professional and personal skills that will stay with me for a lifetime. I lived and worked in an absolutely stunning location, but, most of all, I felt completely honoured to be a small component in a huge effort to try and combat this devastating disease. Seeing the laboratory become operational and results being produced in the knowledge they will make a huge difference on the triaging of patients, and subsequently curbing transmission, ensured my experience was entirely worthwhile. ■