

Death Unguarded: Unsecured Virulent Pathogens in African Medical Facilities

Bob Feldman

Introduction

They are some of the deadliest and most frightening infectious diseases known: Ebola, Marburg, plague, anthrax and several others. Yet vials of the microbes that cause these diseases, being utilized for medical purposes, especially research, have been known to sit in lightly guarded facilities in Africa, making them relatively easy targets for terrorists who want to obtain the necessary ingredients for spreading disease and fear among their enemies.

Once stolen, terrorists would look for ways to bring the pathogens to America, among other places. The days of catapulting infected animals over castle walls to sicken the defenders may be long past, but the legacy of that practice – breaching border security to sneak sick animals or, even less detectable, disease-causing pathogens into a country – is still a viable one.

Even if only a relatively few people were actually infected by a bioterrorist-introduced microbe, significant panic might ensue from the fear the disease could extensively spread. This possibility for large-scale deaths or the fear they might occur could earn a stolen pathogen the designation of a biological weapon of mass destruction (WMD).

Perhaps the first time much of the American public heard Africa mentioned with regards to WMDs was in 2003 when then President George W. Bush declared in his State of the Union Speech, "The British government has learned that Saddam Hussein recently sought significant quantities of uranium from Africa."¹ This sentence would gain notoriety, even earning itself the moniker of "the sixteen words," for while it convinced many that then Iraqi President Hussein

was trying to restart his nuclear weapons program, it was later found to be untrue, but not before it helped galvanize much of the American public into believing Hussein needed to be stopped. Very little was heard about WMDs in relation to Africa after that, but though Bush was sorely mistaken regarding the Iraqi-African nuclear material connection. However, the potential for WMDs falling into the hands of terrorists does exist in Africa, only not so much in the form of uranium from Niger as Bush had thought, but rather from numerous types of microbes found across the continent.

To be sure, these poorly secured African microbes do not have to be transported across the Atlantic Ocean to present a threat to American lives. Besides American businesspersons, tourists, and students in Africa, there is a growing contingent of US troops on the continent. This latter group would likely make a particularly inviting target for someone or some organization that hates the U.S. For American military forces it is an important part of the operational environment to keep in mind, as sometimes it is what a soldier does not see - in this case a microbe - that can pose the most dangerous threat to life and mission.

Absent or Weak Lab Security

For many, hearing the word "Entebbe" conjures memories of the daring raid by Israeli commandos in 1976 to free hostages held by Palestinian terrorists after Air France Flight 139, which originated in Tel Aviv, was hijacked and brought to Uganda's main airport, located in Entebbe.² Today there is something just as scary in Entebbe, but while the world's attention was riveted on that airport during the hostage crisis, presently few are aware that located nearby is the rather innocuous sounding "Uganda's Ministry of Agriculture, Animals, Industry and Fisheries." When a Congressman and a Pentagon delegation visited the facility in 2010 they passed an

eroded fence, walked down a long hallway, and turned into a room where they found an unlocked refrigerator storing the extremely deadly anthrax microbe.³

The group also visited the Uganda Virus Research Laboratory, where the Ebola and Marburg viruses are studied. At that time they were kept in a regular refrigerator in a spare room marked with "Restricted Access" signs. Doctors, however, said that "hardly means the area is secure."⁴

Though some facilities have since been upgraded, there are other labs throughout much of Africa where rooms containing dangerous pathogens are poorly guarded, laboratory equipment does not meet high enough standards to properly contain the pathogens, and/or laboratory personnel lack enough training to properly handle the pathogens or infected tissue samples. Besides the rather chronic lack of adequate security at certain African facilities, previously secure labs may suddenly find themselves in jeopardy. Witness what happened in Egypt in early 2011. Much of the world's attention was focused on the large protests to overthrow Mubarak. Less attention was paid during this time to riot that resulted in the looting of Egypt's primary public health lab in Cairo. Maybe the people were only looking to steal the lab's equipment, including its refrigerators, but several vials of pathogens, including H5N1, went missing.⁵ H5N1 causes bird flu, which, despite its name, can strike and kill humans as well. It is not known whether the vials were stolen or destroyed during the riot, but their loss demonstrates the need to ensure adequate lab security during times of political turmoil, which is relatively common, in general, on the continent, potentially jeopardizing the security of many labs.

There is at least one other cause of concern regarding security for African labs: facilities not always knowing what pathogens they have. Unfortunately, due to limited resources a lab may have a lethal but unidentified pathogen, but, being unable to complete all of the necessary tests to identify the microbe in a timely manner, it may not ensure all of the necessary precautions that

should surround it are observed. This would likely be especially true for a pathogen that was unexpected. Ebola's 2014 outbreak in Guinea, the first time the disease had appeared in West Africa, took the impoverished nation by surprise.⁶ Some of the deaths there were attributable to personnel in medical facilities becoming infected prior to the establishment of rigorous safeguards against disease transmission.⁷ An interesting aspect of the story of Ebola in Guinea, and one which could be repeated elsewhere when panic or fear sets into the general populace, is the closure of an Ebola treatment center run by Médecins Sans Frontières (Doctors Without Borders) following threats they received from community members blaming the organization for bringing the disease into the country.⁸

Lack of Financial Resources

There are several reasons behind the perilous lab situations in Africa. Lack of financial resources for these facilities and their security is possibly at the top of the list, but it would be a mistake to think the problem is solely that many of the African nations where these labs are located are poor. Besides there often being a lack of money for the country as a whole, there are other issues preventing the allocation of sufficient financial resources to these labs. To begin with, there is the rampant corruption present in many African countries. Whether individuals skim large sums from domestic operations, such as mining concerns, or from foreign aid, there are fewer funds available for the labs.

Another reason these labs do not have sufficient financial resources is excessive bureaucratic overhead. Money that should be going to new research equipment, training of scientists, and so forth often has to pass through multiple offices, each taking its share for expenses, before actually arriving at the lab. Those who have worked in Africa will often report exasperating

experiences of a sum of money allocated but significantly whittled down by the time it reaches its destination.

Politics also sometimes plays a role in limiting how much of the national budget allocated to labs actually gets spent in a useful manner. An example of this is where a country has several poorly funded, substandard labs rather than one or two high quality facilities because of the push for decentralization by regional governments. Certainly there are some positive aspects to not concentrating all of a country's power in one central government; unfortunately, having labs capable of safely handling extremely dangerous pathogens does not appear to be one of them. In nations with limited resources, multiple labs dilute the funding to a point below what is required to have a safe and secure operating facility.

Finally, there is the question of will and priorities. Many of these countries face numerous problems, including malnutrition, drought, civil unrest...the list goes on. Spending for these research labs, especially during times when there is no major disease outbreak, can be difficult for concerned public health officials to justify. A refrigerator with a lock might sound like a relatively small expense to someone from a developed country, but in less developed countries, it could represent a significant outlay. A funding request for improved lab security might come up against what is perceived to be a more urgent need, such as feeding hungry villagers who just lost their crops to a locust infestation.

Deeply intertwined in this question of wills and priorities is the role of foreign aid. As foreign governments recognize the international dangers of having less than secure facilities and provide funding to either improve the labs run by various African agencies or build their own labs on African soil, some pressure is removed from African governments to allocate money to the African labs. There is, thus, the question facing African governments: "Why should I spend my

own money when someone else is willing to provide the same service for free?" As non-African support for labs located in Africa increases, the possibility exists that African support will decline, further aggravating a problem referred to as "aid dependency."

Impact of Limited Financial Support

Make no mistake, there are many dedicated individuals involved in the operation of Africa's labs. However, there are frequently barriers to employing and training enough competent personnel to a level that ensures lab safety and security. Perhaps the largest barrier is financial, for it takes considerable money to perform the necessary science procedures in a lab, as well as to ensure pathogens stay in the facilities and terrorists stay out. When money is not available lab operations can be severely constrained, resulting in problems such as not being able to hire and train enough qualified people or to provide them with the proper tools to do their jobs in a safe and effective manner. As an example, in Uganda's Ministry of Agriculture labs, located in a 1920s building replete with broken windows and surrounded by a chain-link fence, in the anthrax lab one doctor showed the previously mentioned delegation how they take pictures of the bacteria by placing a cell phone camera on top of the microscope, an improvised technique because they do not have the proper photography equipment.

The absence of high quality education systems in many African nations also contributes to the dearth of competent lab personnel. In other words, few African scientists are available to staff the labs because few scientists graduate African universities. Unfortunately, many of the countries which have the poorest educational systems are also the ones with the greatest need of well trained scientists to combat fatal disease outbreaks. This is not surprising, because the poor

living conditions associated with the impoverished are frequently fertile grounds for the rapid spread of disease.

The lack of qualified African scientists is also related to what has been called "Africa's Brain Drain." Those who do graduate African universities with a scientific or technical degree can often earn greater salaries and work with more sophisticated equipment by migrating elsewhere. As a result, Europe and the U.S. gain expertise while Africa loses it.⁹

Poorly paid scientists and technicians might not just be susceptible to enticements to work in foreign countries; terrorist organizations could also offer economic incentives to these same individuals. For a technician making sixty dollars a month at a government lab, who may, in an all too common occurrence in Africa, not even have received his salary for over half a year, how much would an al-Qaeda-affiliated organization have to pay for a vial of blood from an Ebola victim? How much for a Petri dish overgrown with colonies of anthrax?

Hiring and retaining well trained African scientists for the various labs is important in preventing not only terrorists from gaining dangerous pathogens but also the accidental release of these virulent microbes, potentially killing many in the local populace. However, while scientists and technicians are important in ensuring the microbes they are working with stay in the lab, from a personnel standpoint they are only half the story. Those who provide security are the other half, and there are reasons to be concerned here also. Whether military or civilian, many guards are not trained to Western standards. Because of limited financial resources, many have not had extensive practice with weapons, tactical counterterrorism training, or familiarity with the procedures and policies necessary to maintain lab security. In many African countries militaries are composed, at least in part, of poor, relatively uneducated conscripts, who might be

provided only minimal training before being sent to guard a lab, with little knowledge of what it really takes to secure the facility.

Deliberate Infection: The Suicide Pathogen Spreader

While some pathogens could be weaponized, many terrorist groups do not possess the technical and/or material resources necessary to do so. Still, it is possible to disseminate the diseases caused by the various microbes by using the living bodies of terrorists as biological weapons delivery platforms.

Some terrorists are not only willing to die for their cause but, in the hopes of becoming a martyr, appear to be quite anxious to do so. The general public probably pictures such individuals as strapping bomb-laden vests to their chest. However, a terrorist who does not care about his own life and is intent on killing many enemies does not need to don a suicide vest. That person could become infected with a pathogen, board a plane, and before symptoms appear arrive in the United States or Europe. There are no large explosives for the Transportation Security Authority or other agency to detect. There are not even shoes with secret compartments as Richard Reid, the notorious "Shoe Bomber," wore in his failed attempt to bring down American Airlines Flight 63.¹⁰ No scanners would sound as an infected but asymptomatic person passed through airport security. No concerns would be raised regarding carry-on fluid containers, because none would be required. It is the perfect concealment for an incredibly dangerous weapon, the human body.

This has happened before, though not as a premeditated terrorist act. Pathogens for diseases not usually seen in the U.S. have entered the country undetected, perhaps because the person carrying them had not yet shown any signs and symptoms. Some of these diseases, such as

malaria and Chikungunya, while capable of incapacitating an individual unfortunate to have one of them, are not likely to spread, as they are transmitted via mosquito bite and not directly from human to human. Polio is also generally not a concern, for, while quite contagious, it would probably be kept in check by the relatively high rate of people vaccinated against the disease. However, other diseases, transmissible from human to human and against which there is no effective vaccine, have entered the U.S., including Ebola in 2014 from individuals who had been to the west African region where the epidemic was centered. A few decades prior to that the most devastating pandemic in modern times occurred, acquired immunodeficiency syndrome (AIDS). The human immunodeficiency virus, which causes AIDS, is thought to have been introduced into the U.S. from Africa. Thus, if someone is infected and asymptomatic, it is not particularly difficult for that individual to carry the pathogen undetected past airport security.

It therefore becomes imperative that people who wish to harm the U.S. not be allowed access to dangerous pathogens. Once again, the concern is not so much malaria, Chikungunya, or polio, i.e., those diseases which in the U.S. would probably not spread past the initial patient. Instead, a terrorist wanting to spread sickness and fear in the U.S. would likely pick a disease which is highly contagious, thus not requiring a vector such as mosquitoes for transmission, and for which no effective vaccine exists. Ebola fits those requirements, and it is one of the diseases whose microbes have been known to sit in lightly guarded African medical facilities.

On average, an individual infected with Ebola would not show signs or symptoms for approximately 12 days, more than enough time to board a flight in Africa and arrive in the U.S. looking fit and healthy, thus not arousing any suspicions based on appearances.¹¹ Even when symptoms do begin, they are rather nonspecific - fever, muscle pains and headaches - making an initial diagnosis difficult and also relatively easy to mask with over-the-counter products such as

acetaminophen. Should that individual actually be rapidly diagnosed and subsequent investigations find no one else acquired the disease, there would still be fear, maybe even panic, among the population, particularly in those areas where that individual had lived or frequented. Fear or panic is possibly the best case scenario; the worst case would be an outbreak of Ebola in the U.S.

Perhaps significantly adding to the fear would be a terrorist who not only spread the disease by walking around and trying to come into contact with people, but also who in the end blew himself up, thereby splattering nearby individuals with infected blood and other body parts. Israeli scientists warn of blood-borne diseases spreading this way. Following a suicide bomber's blast that embedded a bone fragment with hepatitis B in an Israeli woman, survivors of all such attacks in Israel are now vaccinated against the disease.¹² Fortunately there is a vaccine available against hepatitis B; unfortunately, there is no vaccine against Ebola.

The Other Pathogens: Dangers to Animals and Plants

While the emphasis in this paper is the lack of security in medical facilities guarding human pathogens, it bears mentioning that animal and plant pathogens in Africa are also poorly protected. Such pathogens introduced into the U.S. could potentially spread rapidly, leaving a very expensive wake of destruction behind. As an example, it is uncertain how porcine epidemic diarrhea virus (PEDv), which kills piglets and causes hogs (domesticated pigs, usually over 120 pounds) to lose weight, entered the U.S., but it did and in 2014 killed millions of piglets, wreaking havoc on American pig farms and driving up pork prices. While the disease probably was not brought into the U.S. by terrorists, the estimate that a mere tablespoon of PEDv-infected manure is enough to infect the entire U.S. herd of 66 million hogs gives pause to consider what

would happen if terrorists did deliberately choose to acquire animal or plant pathogens in Africa for use in the U.S.¹³ Besides the fact that some animal diseases are zoonotic, i.e., they can be transmitted to humans, the death of say a few cattle raised on U.S. farms from a recently introduced pathogen could result in massive and expensive culling of herds, as well as bans on American beef by other countries. Because of PEDv France recently suspended the importation of live pigs and certain pig products from the U.S.¹⁴ With American farm exports worth over 100 billion dollars each year, animal or plant pathogens stolen from a poorly guarded African facility and clandestinely brought into the U.S. by terrorists could thus result in enormous economic consequences.

Possible American Military Support Measures

There are American efforts to improve lab security in less developed countries, including the Biosecurity Engagement Program, part of the Office of Cooperative Threat Reduction, a U.S. Department of State initiative.¹⁵ There are also American defense initiatives, including those by the Defense Threat Reduction Agency, with the Nunn-Lugar Global Cooperation Initiative being particularly important in the area of biosecurity.¹⁶ However, this huge undertaking to prevent dangerous pathogens in Africa from falling into the wrong hands could benefit from additional military resources and attention, though it should be noted some security improvements can be accomplished with relatively few boots on the ground and rather minimal expense. These include the following, several of which in various forms are already occurring but could possibly be expanded:

- Assess. A small contingent of American soldiers with expertise in security could assess, with permission from the appropriate host country officials, a lab or other

medical building holding dangerous pathogens. Such an assessment would include not just the physical facilities, but also the capability of the personnel, such as the guards, to maintain a secure environment, as well as the security plans and policies in place. Noting what is and is not working is the first step in remedying any underlying deficiencies.

- Make recommendations. Based on the findings from the assessment, the American security contingent would make recommendations. These could be along the lines of improving plans and policies, installing new fencing, improving the training of the guards, upgrading the alarm systems, instructing how to detect and deal with leaks and spills of infectious material, and so forth.

- Train the guards to a higher standard. As has occurred numerous times before, American military trainers could provide instruction, only this time it would not be for military forces, but rather guards at foreign labs. Such training might best be performed by American military police, as they have expertise in protecting facilities.

- Train the laboratory workers to a higher standard. This would be a job for American military medical personnel. It could perhaps be accomplished in conjunction with a humanitarian mission to the region.

- Share intelligence. By providing host countries with intelligence, such as knowledge of potential impending attacks on vulnerable facilities or, even less specific, increased terrorist activity in a certain region, measures can be taken to mitigate the likelihood of dangerous pathogens falling into the wrong hands.

- Provide material support. Surplus generators, exterior lighting, alarm systems, MOPP (mission oriented protective posture) gear, weapons, and other items which might be in the American military inventory that could help prevent and/or

respond to an attack and/or accident should be considered for transfer to particularly vulnerable facilities.

There are likely additional measures the American military could undertake to help less developed African countries secure their pathogens. However, whatever actions are taken, two overall principles need to be followed. First, any American assistance in the long run should aim for the country to eventually be self-sufficient in providing security. As an example, not just guards should be trained, but also people who could train guards, the train-the-trainer concept. Second, with limited resources, as well as the potential for numerous diplomatic and bureaucratic obstacles, the American military will need to prioritize which facilities should receive the most assistance. What pathogens particular facilities hold and the likelihood of them being stolen will also need to be considered in the prioritization process.

Conclusion

In this time of fiscal austerity, with American defense budgets undergoing tremendous cuts and scrutiny, it might seem wastefully foolish to provide money to foreign governments so that they may hire and train guards for labs thousands of miles from the United States. However, such costs are relatively small compared to those which would occur should a terrorist acquire a biological agent, transport it to the United States, and then release it to a susceptible population.

To be sure, lab safety and security is not just an issue in less developed countries. The U.S. has struggled with gaps in oversight of its own labs.¹⁷ In one instance a vial of Guanarito virus, the cause of Venezuelan hemorrhagic fever, was unaccounted for in a Texas biosafety level 4 lab.¹⁸ Security lapses were even found at America's premier facility for studying infectious

diseases, the Centers for Disease Control.¹⁹ Still, while there is room for improvement in American labs doing work on dangerous pathogens, overall security is generally impressive and there are mechanisms in place to periodically review and improve it. Thus, the risk of lethal microbes falling into the hands of terrorists appears significantly greater in Africa, where even rudimentary precautions are sometimes lacking, such as observed by then Senator Lugar during a trip to Nigeria, where unsecured medical waste was sitting next to a storm drain leading to the Kibera slum.²⁰ Many African nations do not have the financial or technical resources to bring their labs completely up to developed world standards, but training guards, repairing fences, supplying surplus alarm systems, and similar actions by the U.S. military in Africa could go a long way to preventing bioterrorist acts that threaten American lives.

Disclaimer:

The views expressed in FMSO publications and reports are those of the authors and do not necessarily represent the official policy or position of the Department of the Army, Department of Defense, or the U.S. Government

Notes

-
- ¹ White House, *State of the Union*, 28 Jan 2003, <http://georgewbush-whitehouse.archives.gov/news/releases/2003/01/20030128-19.html>
- ² John T. Correll, "Entebbe," *Air Force Magazine*, Dec 2010, <http://www.airforcemag.com/MagazineArchive/Documents/2010/December%202010/1210entebbe.pdf>.
- ³ Josh Kron, "Uganda Seen as a Frontline in the Bioterrorism Fight," *The New York Times*, 10 Nov 2010, http://www.nytimes.com/2010/11/11/world/africa/11uganda.html?_r=0
- ⁴ *Ibid.*
- ⁵ Laurie Garrett, "Biology's Brave New World," *Foreign Affairs*, Nov/Dec 2013, <http://www.foreignaffairs.com/articles/140156/laurie-garrett/biologys-brave-new-world>
- ⁶ "WHO: Ebola Outbreak One of Most Challenging," *CNN*, 8 Apr 2014, <http://www.cnn.com/2014/04/08/health/africa-ebola/index.html>.
- ⁷ Centers for Disease Control and Prevention, *Outbreak of Ebola in Guinea and Liberia*, 30 Apr 2014, <http://www.cdc.gov/vhf/ebola/outbreaks/guinea/>.
- ⁸ John Lauerman, "Ebola Center in Guinea Closed Because of Threats," *Bloomberg News*, 4 Apr 2014, <http://www.bloomberg.com/news/2014-04-04/ebola-center-in-guinea-closed-because-of-threats.html>.
- ⁹ Robert Feldman, "Africa's Brain Drain: Its Impacts on Security and Stability," *Military Review*, Nov-Dec 2012, pp 448-56.
- ¹⁰ "Shoe Bomber: Tale of Another Failed Terrorist Attack," *CNN*, 25 Dec 2009, <http://www.cnn.com/2009/CRIME/12/25/richard.reid.shoe.bomber/index.html>.
- ¹¹ Martin Eichner, Scott Dowell, and Nina Firese, "Incubation Period of Ebola Hemorrhagic Virus Subtype Zaire," *Osong Public Health and Research Perspectives*, 2 May 2011, [http://www.kcdc-phrp.org/article/S2210-9099\(11\)00002-6/abstract](http://www.kcdc-phrp.org/article/S2210-9099(11)00002-6/abstract).
- ¹² Debora MacKenzie, "Suicide Bombers May Spread Disease," *NewScientist*, 24 July 2002, <http://www.newscientist.com/article/dn2588#.U2f1BK9OVv4>.
- ¹³ Nigel Hunt, "Europe Not Prepared for U.S. Pig Virus Threat," *Reuters*, 1 May 2014, <http://www.reuters.com/article/2014/05/01/us-europe-pigs-virus-idUSKBN0DH2XV20140501>.
- ¹⁴ "France Suspends U.S. Pig Imports Over Diarrhea Virus," *ABC News*, 2 May 2014, <http://abcnews.go.com/Health/wireStory/france-suspends-us-pig-imports-diarrhea-virus-23562576>.
- ¹⁵ .S. Department of State, *Office of Cooperative Threat Reduction*, <http://www.state.gov/t/isn/58381.htm>.
- ¹⁶ Defense Threat Reduction Agency, *Nunn-Lugar Global Cooperation Initiative*, <http://www.dtra.mil/Missions/nunn-lugar/nunn-lugar-home.aspx>.
- ¹⁷ United States Government Accountability Office, *High Containment Laboratories: Assessment of the Nation's Needs Is Missing*, 25 Feb 2013, <http://www.gao.gov/assets/660/652308.pdf>
- ¹⁸ Sydney Lupkin, "Texas Biolab Loses Deadly Guanarito Virus," *ABC News*, 25 March 2013, <http://abcnews.go.com/health/galveston-texas-biolab-loses-deadly-guanarito-virus/story?id=18809363>
- ¹⁹ Alison Young, "Security Lapses at CDC Bioterror Lab in Atlanta," 27 June 2012, *USA Today*, <http://usatoday30.usatoday.com/news/nation/story/2012-06-27/cdc-lab-security/55870990/1>.
- ²⁰ "Sen. Lugar Highlights Potential Bioterrorism Threat Posed by Unsecure Medical facilities in East Africa," *The Henry J. Kaiser Family Foundation*, 15 Nov 2010, <http://kff.org/news-summary/sen-lugar-highlights-potential-bioterrorism-threat-posed-by-unsecured-medical-facilities-in-east-africa/>.