

*A Centre for Infectious Diseases and Microbiology - Public Health (CIDM-PH), and  
Marie Bashir Institute for Infectious Diseases & Biosecurity (MBI) publication*

# The Broad Street Pump

## Zoonotic infection meets health inequality: the emergence of Ebola in West Africa

**Dr Grant Hill-Cawthorne**  
MBI, University of Sydney, School of Public Health, University of Sydney

In December 2013 a 2-year-old child became infected with Ebolavirus, most likely following exposure to the blood of a bat that his mother was preparing for dinner. His home village of Meliandou in southern Guinea became the epicentre of the largest outbreak of Ebolavirus disease since the virus's discovery in 1976. So far there have been over 10,000 cases culminating in nearly 5000 deaths. The World Health Organization declared the outbreak a Public Health Emergency of International Concern and launched a roadmap to control it in August 2014. Currently it is trying to implement its 70-70-60 plan: 70% of burials are conducted safely and 70% of suspected cases are isolated within the next 60 days. However, the international response has been woefully inadequate with only one-third of the money needed pledged and a shortfall of isolation beds of some 3000. Management of the epidemic continues to fall heavily on non-governmental organisations, with Médecins Sans Frontières still running 70% of the Ebola Treatment Units in the three most heavily affected countries. Researchers from the Marie Bashir Institute have been engaging heavily with the media to achieve two key objectives: a) to ensure that the media provides accurate and measured information about the outbreak and its public health risk, and b) to encourage the international community to provide the necessary resources to control the current outbreak and to develop long-lasting health infrastructure in West Africa.



### *Inside this issue*

*Zoonotic infection meets health inequality: the emergence of Ebola in West Africa*

Dr Grant Hill-Cawthorne (p1)

*Unprecedented Ebolavirus disease outbreak demands concerted international and local responses*

Prof Lyn Gilbert (p2-3)

*Don't panic about Ebola's spread, here's what we can do instead*

Dr Grant Hill-Cawthorne (p4-5)

Prof Lyn Gilbert

*Quarantine works against Ebola but over-use risks disaster*

Dr Grant Hill-Cawthorne (p5-6)

*Analysis: How SARS pandemic offers lessons for Ebola*

Dr Grant Hill-Cawthorne (p7-8)

*Mandatory Ebola quarantine is about politics, not public health*

Dr Grant Hill-Cawthorne (p9)

*Viral incubation: why do bugs hide before they strike?*

Dr Grant Hill-Cawthorne (p10)

# Unprecedented Ebolavirus disease outbreak demands concerted international and local responses

**Professor Lyn Gilbert**

*MBI University of Sydney, CIDM-PH, CIDM Pathology West—ICPMR Westmead*

The current outbreak of Ebolavirus disease (EVD) in West Africa is unprecedented in the 40 years since the disease was first described in 1976. Already there have been more cases and deaths than in all other outbreaks combined: >15,000 cases and >5000 deaths recorded (November 2014) and still increasing daily. It is the first outbreak in West Africa; the first to cross country borders; and the first to spread to major urban centres. Previous outbreaks have been confined to rural areas of single countries in Central Africa.

Although it is now known to have started in December 2013, in Guinea, EVD was not suspected until March 2014, largely because local health authorities were unfamiliar with it and it mimics other locally prevalent diseases. By March it had already spread widely, among highly mobile populations, to Guinea's capital (Conakry), to neighbouring countries, Liberia and Sierra Leone, and their capital cities, Monrovia and Freetown. All 3 countries were ill prepared, after years of civil war, social unrest and collapse of health infrastructure resulting in shortages of trained healthcare workers (HCWs), hospital beds, isolation facilities and medical supplies including personal protective equipment (PPE).

The outbreak rapidly overwhelmed local health services and the resources of locally active nongovernment organisations (NGOs), such as Médecins sans Frontières (MSF). A high proportion of cases have been linked to local burial practices, which involve close contact, by mourners, with the body of the deceased. Large numbers of HCWs have been infected (584 cases and 329 deaths by 19/11/2014) but, according to the WHO, these infections have mostly occurred in community settings or hospitals where PPE has been unavailable or incorrectly used, rather than in established Ebola treatment units (ETUs).

EVD has been imported into several other countries where it has spread locally: Nigeria (20 cases); Spain (1 locally acquired case); USA (8 imported, 2 locally acquired cases); Mali (2 imported cases; no transmission from the first, but at least 5 locally-acquired cases and 4 deaths, so far, from the second; >300 contacts are under surveillance [24/11/2014]).

The international response was delayed until August, when EVD-infected aid-workers evacuated to Spain and the USA, drew attention to the magnitude and potential threats of the outbreak and WHO declared it a "public health emergency of international concern". In September, the United Nations Security Council established the UN Mission for Ebola Emergency

Response (UNMEER) - comparable to a peacekeeping mission - the first of its kind for a health emergency. This allows various all UN agencies (WHO, FAO, WFP, UNICEF) to work closely with local and regional governments, NGOs and international partners in a coordinated response: to (among other things): establish additional field hospitals, isolation facilities and laboratories; distribute PPE and train HCWs in its use; improve contact tracing and implement safe burial practices. Far more resources are still needed, but there is some evidence of progress.

Despite the extent of the outbreak, there is no evidence of increased virulence or transmissibility of the Zaire strain of Ebolavirus (EBOV). Appropriate, correctly used PPE, if available, still provides high-level protection for HCW and local transmission from imported cases can be prevented or rapidly controlled. For example, a potential disaster in Nigeria was averted, after a traveler from Liberia, incorrectly diagnosed with malaria, was admitted to a hospital in Lagos (population 21 million). Without appropriate precautions, initially, several HCWs were infected before a rapid, effective and well-funded public health response limited the outbreak to 20 cases and 8 deaths. Transmission to HCWs caring for EVD patients in USA and Spain has been limited to two and one cases, respectively.

The scale of the outbreak, high mortality and publicity surrounding imported and locally-acquired cases have provoked irrational fear, stigmatization and unnecessary restrictions of people who have (or may have) been in contact with EVD patients, in some western countries, but the risk of widespread transmission outside of Africa is very low.

## **Australia's local preparation to manage patients with EVD**

The Australian Health Protection Principal Committee (AHPPC) - which is chaired by the Chief Medical Officer and includes all State and Territory Chief Health Officers - coordinates Australia's EVD response. This includes surveillance of in-coming travellers, which aims to identify those who have recently visited EVD-affected countries; assess and monitor any who have been in contact with EVD patients and ensure appropriate investigation and care should they become ill. The Communicable Disease Network, Australia (CDNA), Public Health Laboratory Network (PHLN) and recently formed Infection Prevention and Control Expert Advisory Group (IPCEAG) are responsible for developing recommendations - based on available evidence and/or expert opinion - on all aspects of public health action, laboratory testing and infection prevention and control, respectively, for EVD in Australia.

## Unprecedented Ebolavirus disease outbreak demands concerted international and local responses *(continued from page 2)*

Each State and Territory is responsible for implementation of recommendations, with local variations that reflect the fact that, generally, more than one way is acceptable. The aims, in developing these recommendations are to:

- prevent local transmission of EVD;
- prevent stigmatization and unnecessary restriction of recent travellers from west Africa and people who have had contact with EVD patients, including HCWs who have been caring for patients in west Africa or (potentially) in Australia;
- ensure that anyone who becomes ill after returning from an EVD-affected country, is appropriately cared for;
- allay public fear and confusion about the risks of EVD by providing appropriate, transparent public information;
- educate and train HCWs in appropriate use of PPE.

The recommendations are based on information derived from previous and current EVD outbreaks, including:

- EVD is not transmitted from asymptomatic people by ordinary social or clinical contact
- transmission occurs from contact with blood or body fluid of a patient with EVD, particularly when symptoms (especially vomiting and diarrhea) are severe and after death
- airborne transmission has not been demonstrated but, theoretically, could occur during aerosol-generating procedures
- All HCWs must be trained in standard, and transmission-based, IPC precautions and those who will be potentially caring for patients with EVD must be trained and confident in the safe use of additional PPE
- Additional PPE should cover all mucous membranes, skin and hair and should be chosen to ensure optimal comfort, visibility and freedom of movement.
- A trained assistant should supervise donning and, particularly, removal of additional PPE to ensure that it is donned correctly and removed carefully to prevent inadvertent contamination of hands or mucous membranes.



***Professor Lyn Gilbert***



***Dr Grant Hill-Cawthorne***

# Don't panic about Ebola's spread, here's what we can do instead

*Dr Grant Hill-Cawthorne*

*MBI University of Sydney, School of Public Health University of Sydney*

*Professor Lyn Gilbert*

*MBI University of Sydney, CIDM-PH, CIDM Pathology West—ICPMR Westmead*

*Conversation 11/9/2014: <https://theconversation.com/dont-panic-about-ebolas-spread-heres-what-we-can-do-instead-31559>*

Australia News that a 25-year-old Gold Coast man is being quarantined in hospital after returning from the Democratic Republic of Congo two days ago is no reason to panic. If anything, the incident highlights the problematic nature of the international response to the current Ebola epidemic.

Segments of the media have quickly highlighted the possibility the Australian man contracted Ebola virus disease during his time in Congo. The country is experiencing an outbreak of the haemorrhagic fever virus, but it's separate to the one reported in West African nations of Guinea, Liberia, Sierra Leone, Senegal, and Nigeria. The danger of such reports is that risks can get blown out of proportion and cause the spread of misinformation.

## **Resources and the lack of them**

While the isolation of the patient is entirely in keeping with good management of people suspected of having an Ebola virus infection, we don't yet know if he has the right symptoms or could possibly have been exposed to infection.

The most likely scenario is that this is another infectious disease, most likely malaria. Even if the tests for Ebola virus are positive, the risk of onward transmission in a country such as Australia is very low as long as stringent infection control measures are implemented within hospitals.

There's no evidence the Ebola virus can be transmitted through the air; infection only occurs after direct contact with bodily fluids from someone who has the virus, someone who died from it, or contact with very recently contaminated environments.

The fast spread of the disease we've seen in Africa is a direct consequence of long-standing and growing inadequacies in access to basic health care. In particular, the shortage or inappropriate use of personal protective equipment and too few trained staff to cope with the large numbers of sick people.

The response to the Gold Coast "case" should not, then, be one of panic and fear. Rather, it should act as a warning that the world has not been and is still not doing enough for affected countries.

## **A different population**

West Africa is in the midst of the world's biggest outbreak of Ebola virus disease, and more people have now died since it started than in all previous outbreaks combined.

Before this year, sporadic outbreaks of the virus occurred in countries such as Uganda, with the largest affecting 400 people and causing 200 deaths. But central Africa's experience and knowledge has translated into effective public health action.

In Uganda, laboratory samples are tested within 24 hours. On-the-ground health-care workers and the public are all trained in early recognition of the disease's symptoms. And key workers have been supplied with mobile phone interfaces for central reporting of suspected cases.

The Ugandan president has led by example, warning against close personal contact during outbreaks. Schools and markets are closed quickly and the bodies of victims are buried by local authorities to reduce the risk of family members being infected.

This is clearly a population that's wise to the actual risks of the Ebola virus and is educated in effective disease prevention. But a very different scenario is playing out in West Africa because the disease has never before been seen there.

## **Novelty, ignorance, and fear**

It's now thought the current outbreak started in Guinea in early December 2013, but cases remained unrecognised as stemming from Ebola virus and the Guinean Ministry of Health was not alerted until March 2014. By this time, 59 people had already died, and innumerable people infected.

Ease of travel from the affected regions to the Guinean capital Conakry, as well as into Liberia and Sierra Leone have helped the virus spread. And ignorance and fear of the disease have created significant setbacks in mounting an effective response.

Médecins Sans Frontières (MSF) had to suspend activities in south-east Guinea, for instance, after buildings and vehicles came under attack from locals who thought MSF brought the disease with them.

Quarantine measures and fears surrounding the spraying of disinfectant have led to protests and riots in Sierra Leone, Liberia, and Guinea. Efforts to contain the virus have been hampered by members of the community staying away from the authorities, out of fear they will be quarantined.



## Don't panic about Ebola's spread, here's what we can do instead *(continued from page 4)*

### Sharing your luck

But even the suspected Gold Coast case has a lesson for us. Epidemics are no longer something Westerners can safely view on their television screens, while they rage in a remote corner of Africa, or another impoverished part of the world.

We live in a world that is more interconnected than ever, making any infectious outbreak like the current Ebola one necessarily international.

Rather than simply being inward-looking and fearful about imported cases, the global community now needs to channel its

panic and fear into action and provide resources to the countries at the epicentre of the outbreak.

The rapid spread and high mortality that have occurred in West Africa are highly unlikely to occur in Western countries where health-care facilities, including rapid laboratory testing for reversible complications and appropriate - but not necessarily highly sophisticated - isolation and transmission precautions, are available. That shouldn't just make you thank your lucky stars, it should have you seek out ways to share your luck.

## Quarantine works against Ebola but over-use risks disaster

*Dr Grant Hill-Cawthorne*

*MBI University of Sydney, School of Public Health University of Sydney*

*Conversation 2/10/2014: <https://theconversation.com/quarantine-works-against-ebola-but-over-use-risks-disaster-32112>*

A man in the United States has become the first known international traveller to be infected in the West Africa Ebola epidemic and carry the virus abroad. He is thought to have been infected in Liberia and developed symptoms six or seven days after arriving in the United States to visit family. He's being treated in isolation in Dallas, Texas.

Quarantine, in the form of isolation, is an important component of the response to Ebola infection. As people are infectious only once they develop symptoms, isolating them and having health-care workers use personal protective equipment significantly reduces the risk of onward transmission.

The director of the US Centers for Disease Control and Prevention (CDC) says the man will continue to be treated in isolation. In a process known as contact tracing, everyone he has come in contact with since he became symptomatic on September 24 will be located and monitored for 21 days (the maximum incubation period of the virus). Anyone who shows symptoms will also be isolated and treated.

The Ebola virus is unlikely to spread further in the United States because these measures are known to be effective. Indeed, their absence has contributed significantly to the spread of the virus in resource-poor nations of West Africa.

### The benefits of quarantine

Countries have been practising this measure against infectious diseases well before we understood what caused and transmitted infections. The earliest mention of isolating people in this way is in the books of the Old Testament, for leprosy and other skin diseases.

The word "quarantine" comes from the Italian "quaranta giorni" which simply means "40 days". It refers to the 40-day isolation period imposed by the Great Council of the City of Ragusa (modern day Dubrovnik, Croatia) in 1377 on any visitors from areas where the Black Death was endemic. In its most basic form, quarantine is the isolation of people with a disease from unaffected people.

The measure has clear benefits; it was effective during the 2003 pandemic of SARS-coronavirus when the isolation of cases and their contacts for ten days was arguably one of the most significant interventions for containing the outbreak in only five months. And it has frequently been used to control Ebola outbreaks. Since the virus' first and most severe outbreak in 2000, Uganda has used quarantine measures to good effect, isolating contacts of cases for up to the 21 days of the viral incubation period.

## Quarantine works against Ebola but over-use risks disaster *(continued from page 5)*

Surveillance, a more Ebola-educated populace and targeted quarantine measures have meant Uganda had only 149 cases with 37 deaths, one case and death, and 31 cases with 21 deaths in subsequent outbreaks in 2007, 2011 and 2012.

Nigeria has also demonstrated the efficacy of a contact tracing and isolation approach. Despite being one of the most populous countries in Africa and having cases introduced into Lagos, a city of 21 million people, its last case was seen on September 5.

Removing infected and potentially infectious people from the community clearly helps reduce the spread of disease, but it still requires a place for people to be isolated and treated. That's what's missing in countries still in the midst of the epidemic, and also what continues to drive it.

### **Too much of a good thing**

While quarantine is an important weapon in our arsenal against Ebola, indiscriminate isolation is counterproductive.

The World Health Organisation has warned that closing country borders and banning the movement of people is detrimental to the affected countries, pushing them closer to an impending humanitarian catastrophe. Stopping international flights to the affected countries, for instance, has led to a shortage of essential medical supplies.

Still, this didn't stop Sierra Leone from imposing a stay-at-home curfew for all of its 6.2 million citizens for three days from September 19 to 21. Results from this unprecedented lockdown are unverified, with reports of between 130 and 350 new suspect

cases being identified and 265 corpses found. But in a country where the majority of people live from hand to mouth with no reserves of food, the true hardship of the measure is difficult to quantify.

In addition to the three-day lockdown, two eastern districts have been in indefinite quarantine since the beginning of August. On September 26, Sierra Leone's president, Ernest Bai Koroma, announced that the two northern districts of Port Loko and Bombali, together with the southern district of Moyamba, will also be sealed off. This means more than a third of the country's population will be unable to move at will.

Sierra Leone's excessive quarantine measures are having a significant impact on the movement of food and other resources around the country, as well as on mining operations in Port Loko that are critical for the economy.

The country had one of Africa's fastest-growing economies before the outbreak, with the IMF predicting growth of 14%. The World Bank estimates the outbreak will cost 3.3% of its GDP this year, with an additional loss of 1.2% to 8.9% next year.

Rice and maize harvests are due to take place between October and December. There's a significant risk that the ongoing quarantines will have a significant impact on food production.

Quarantine is an excellent measure for containing infectious disease outbreaks but its indiscriminate and widespread use will compound this epidemic with another humanitarian disaster.

## **Events....**

### **CIDM-PH Colloquium**

**Date:** Friday, 5 December 2014

**Time:** 9.00am - 4.00pm

**Cost:** Free

**Location:** Lecture Theatre 2, Westmead Education & Conference Centre, Westmead Hospital, Sydney

**Speakers include:** A/Prof Vitali Sintchenko, Professor Tania Sorrell, Professor Jon Iredell, Dr Matthew O'Sullivan, Dr Rosemarie Sadsad, Dr Matthew Watts, Dr Cameron Webb, Andrea Lawrence, Professor Wieland Meyer, Dr Elena Martinez, Sultana Banu, Muhammad Kamruzzaman, Dr Connie Lam, Cristina Sotomayor, Dr Anastasia Phillips

**Registration:** [RSVP to WSLHD-CIDM-PH@health.nsw.gov.au](mailto:RSVP to WSLHD-CIDM-PH@health.nsw.gov.au)

## Analysis: How SARS pandemic offers lessons for Ebola

*Dr Grant Hill-Cawthorne*

*MBI University of Sydney, School of Public Health University of Sydney*

CNN 16/10/2014: <http://edition.cnn.com/2014/10/16/world/asia/ebola-asia-sars-hill-cawthorne-analysis/index.html>

There have now been nearly 9,000 confirmed, probable and suspected cases of Ebola virus disease (EVD) across seven affected countries.

At least 4,400 people have died so far in this, the worst outbreak of EVD since it emerged in 1976. The World Health Organization (WHO) is warning that weekly cases could reach 10,000 by the start of December -- it is clear that the peak of this epidemic hasn't yet been reached.

Understandably, countries around the world -- particularly those affected (Guinea, Liberia, Nigeria, Senegal, Sierra Leone, Spain and the United States of America) -- have been examining their defenses against importing cases.

These have become ever more emergent since Thomas Eric Duncan -- who contracted Ebola -- traveled to Texas from Africa, leading to the subsequent secondary transmission of the infection of two people who treated him, Nina Pham and Amber Vinson. Public concerns about the infection haven't been allayed by public health officials, despite many of us stressing that we are well-prepared for detecting and responding to imported cases.

Our preparations in Asia hark back to 2003 when the world was faced with its first modern-day pandemic, in the form of Severe Acute Respiratory Syndrome, or SARS, caused by the SARS-coronavirus.

This virus first appeared in November 2002, with the first WHO outbreak alert being made in March 2003. At the time SARS caused a huge amount of public and professional anxiety, principally due to its apparent ease of transmission (via respiratory droplets and fomites) and its very early global spread from China to Canada, Hong Kong and Vietnam. However, looking back this was a far less severe infection than Ebola, with estimates of 10,000 cases in total and around 1,000 deaths.

However, two significant aspects make us remember and learn from SARS. One is the fact that 30 countries had cases within a few weeks of the outbreak, and the second is the estimated \$30-\$100 billion cost to the world economy.

Most of these economic costs were in travel and tourism with public anxiety about the disease leading to airports becoming ghost towns, schools closing, shopping malls deserted and healthcare workers shunned.

Emerging infections were no longer viewed as a healthcare problem but as a whole-of-government problem with strong coordination required between transportation, immigration, communications, finance, water and sanitation, defense, housing, and education. The decision-making processes in response to an epidemic are complex and highly challenging, and require a clear chain of command with timely, accurate, appropriate and feasible plans put forward.

### Global action

In recognition of the interconnected world that we live in and the need to expand the scope of notifiable diseases, the International Health Regulations (IHR) -- a legally-binding agreement that provides a framework for the coordination of the management of global public health events -- underwent a revision in 2005. Here the notion of "public health emergencies of international concern" was introduced, as was the need for countries to establish a minimum core of public health capacities.

In response to the IHR and the clear need for multi-agency and ministry planning to be in place, most countries developed pandemic plans. In order for these to cater for worst-case scenarios (i.e. transmissible infections with high attack rates), influenza became the focus -- the influenza pandemic plans for Asia can be found here. Many of these are modeled on the generic WHO plan but tailored for specific countries.

These plans were implemented during the 2009 A(H1N1) influenza, or "swine flu" pandemic. Some countries in Asia also used them during recent outbreaks of A(H5N1) and A(H7N9) "avian flu." But influenza is much more transmissible than the Ebola virus, so the recent focus by many countries' public health ministries has been to adjust their plans along the lines of current WHO guidelines.

Lessons have also been learned regarding what doesn't work. The screening of incoming passengers into airports was practiced widely during the 2009 influenza pandemic.

## Analysis: How SARS pandemic offers lessons for Ebola *(continued from page 7)*

However many countries note that they did not detect a single case through the use of these measures. Thermal scanners at airports to detect fever have been shown to be of limited use. The WHO has continued to stress these facts, but political considerations have led some countries, notably the U.S. and UK, to implement incoming passenger screening anyway.

### Travel restrictions

Finally the question of travel restrictions has been raised by a number of commentators. These were used to good effect during SARS but were of limited use during the 2009 influenza pandemic. It is widely acknowledged that the damage caused by travel restrictions to the economies of the West African countries would compound the very significant economic costs already experienced. Travel restrictions would only make it more difficult for the international community to provide the healthcare workers and supplies needed to get the outbreak under control.

While thinking about our own infection control processes and planning for imported cases, we need to remember that the sure-fire way to prevent domestic EVD cases is by pitching into the global effort in West Africa. While the outbreak continues to grow exponentially, the risk of spillover into other countries increases. While ensuring that we have domestic plans in place is good, all of us need to recognize our role as good global citizens and give aid and help to those countries worst affected.

## *In the media....*

**Sleek Geeks Podcast 10/11/14 - Ebola** <https://itunes.apple.com/au/podcast/sleek-geeks/id893405381?mt=2>

**Science on Top Podcast 5/11/14 - Ebola** <http://scienceontop.com/sot-167-sticky-feet/>

**ABC** <http://www.abc.net.au/news/2014-10-30/ebola-explained-australia-response/5826378>

**NCBC 3/9/14 - Economic impact of Ebola** <http://video.cnbcm.com/gallery/?video=3000307134>

**ABC 7:30 14/10/14 - Response to US nurse infection** <http://www.abc.net.au/7.30/content/2014/s4106136.htm>

**ABC 7:30 16/10/14 - Helping to fight Ebola is in Australia's interest** <http://www.abc.net.au/7.30/content/2014/s4108811.htm>

**ABC Radio Classic FM 24/9/14 - Margaret Throsby show** <http://www.abc.net.au/classic/content/2014/09/24/4092936.htm>

**SMH** <http://www.smh.com.au/national/health/ebola-false-alarms-no-reason-to-be-complacent-20140912-10fkqa.html>

**MJA Insight** <https://www.mja.com.au/insight/2014/34/ebola-raises-ethical-dilemmas>

## CONTACT US

*For more information on any articles or CIDM-PH & SEIB events, or to join the e-lists and receive regular updates, please contact us at:*

### CIDM-PH

Centre for Infectious Diseases and Microbiology - Public Health  
Mailing Address: PO Box 533  
Wentworthville NSW 2145  
Phone: (612) 9845 6255  
Website: [www.cidmpublichealth.org](http://www.cidmpublichealth.org)  
Email: [WSLHD-CIDM-PH@health.nsw.gov.au](mailto:WSLHD-CIDM-PH@health.nsw.gov.au)

**Contact: Ms Lou Orszulak**

### MBI

Marie Bashir Institute for Infectious Diseases & Biosecurity  
Mailing Address: Level 4, Westmead Millenium Institute, 176  
Hawkesbury Road, Westmead NSW 2145  
Phone: (612) 8627 3402  
Website: [www.sydney.edu.au/mbi/](http://www.sydney.edu.au/mbi/)  
Email: [mbi@sydney.edu.au](mailto:mbi@sydney.edu.au)

**Contact: Ms Christine Aitken**



# Mandatory Ebola quarantine is about politics, not public health

*Dr Grant Hill-Cawthorne*

*MBI University of Sydney, School of Public Health University of Sydney*

Conversation 29/10/2014: <https://theconversation.com/mandatory-ebola-quarantine-is-about-politics-not-public-health-33531>

Governments have a duty to protect their citizens but the plan to impose mandatory detention on health-care workers being suggested by some Australian states is excessive and unwarranted.

On Monday, the media reported the Australian government has cancelled all temporary visas from the three worst-affected countries of Guinea, Sierra Leone, and Liberia. In a bizarre world first, this includes humanitarian visas.

So it should not have come as a surprise that on Tuesday The Australian reported that some state health authorities were looking into the possibility of requiring mandatory detention of returning health-care workers if they refuse voluntary home quarantine.

Admittedly, this is not a Commonwealth-led initiative and Australian states are not the first to consider mandatory quarantine. New York, New Jersey and Illinois have hurriedly rush through similar policies in the last few days.

It does, however, contribute to an overall picture of Australia's response to the Ebola epidemic - one that appears increasingly, and unnecessarily, mean-spirited.

## Can we legally quarantine people?

Mandatory quarantine of health-care workers presents a number of ethical challenges, but it's not without precedent.

The Quarantine Act 1908 allows for people to be quarantined if they're infected with a quarantinable disease; if an appropriate inspector reasonably suspects they're infected with such a disease; if they have been in contact with or exposed to infection from people subject to quarantine; or if they have been in a quarantine area within the last 21 days.

So there's clearly a legal framework for it at the federal level, but does that mean it should be implemented?

During the 2003 SARS outbreak, some of Canada's success in controlling the spread of the virus was attributed to mandatory quarantine of people suspected of carrying the disease. This notably included health-care workers.

We now know these people not only suffered mental anguish over the separation from their families and loved ones, but the policy also made them feel like pariahs in their own communities. Instead of being praised as the selfless heroes they were, these health-care workers were made to fear walking down their streets or wearing their uniforms.

## What is the actual risk?

But governments do have a duty to protect their citizens, so what is the risk to the Australian community from doctors and nurses returning from Ebola-affected countries?

In contrast to SARS, which had an incubation period of just ten days, the Ebola virus can incubate for anywhere between two and 21 days. Unlike SARS, we know exactly what to look for with Ebola. We also have tests for rapid diagnosis.

Most importantly, even when people may have contracted the illness, they're not infectious until they start displaying symptoms. Having a fever alone is not enough; you have to be producing large amounts of bodily fluids - and therefore very sick - before you can infect others.

What this means is that the current measure of asking health-care workers to self-isolate at home for 21 days and monitor their temperature twice a day is more than adequate to protect the Australian community. But isolating people based on the possibility that they might be infected, even though they pose zero public health risk, is not just unethical. It ties up resources better spent - and arguably more needed - elsewhere.

## Not the time or place for politics

Hysterical responses to health-care workers treating patients infected with Ebola are reminiscent of the initial treatment of AIDS patients and their doctors and nurses.

Yet fortunately, even as New Jersey governor Chris Christie defended the mandatory isolation of Medecins Sans Frontieres nurse Kaci Hickox, stating he had an "obligation ... to protect the public health of all people", federal US health officials strongly condemned the unwarranted measure.

The UN Secretary-General has also joined the fray, criticising enforced quarantine that needlessly penalises doctors and nurses who have willingly put themselves at risk to save others.

Political interference in public health is not helpful as a general rule, but political posturing in these types of events is particularly unhelpful. It breeds unwarranted fear and drowns out more important messages - messages about how Ebola is actually transmitted, the steps needed to contain this outbreak in West Africa, and what Western countries such as Australia and the United States can do to help.

Worse still, it actively discourages health and aid workers from travelling overseas to lend their expertise because they don't know what political storm they will walk into upon their return.

Politics runs the risk of becoming policy whenever responsibility for public health exists within multiple layers of government. So when it comes to public health decisions, politicians need to rely on the informed opinions of their chief medical advisers.

While hollow debates about misguided measures not based in science take up media space, the increasingly dire situation in West Africa is forgotten.

# Viral incubation: why do bugs hide before they strike?

**Dr Grant Hill-Cawthorne**

**MBI University of Sydney, School of Public Health University of Sydney**

Conversation 26/11/2014: <https://theconversation.com/viral-incubation-why-do-bugs-hide-before-they-strike-33579>

Health workers returning to their home countries after working in Ebola-affected areas are being asked to place themselves in quarantine for 21 days. This period is important because it's the maximum time the virus needs to incubate. Other viruses have different incubation periods.

The term "incubation period" describes the time between a virus entering a person's body (infection) and the first appearance of disease symptoms. But why do viruses have incubation periods? And why do these vary from virus to virus and person to person?

Viral incubation periods are affected by the rate at which a virus replicates once it has infected someone, the host's susceptibility and their immune response to the virus, the viral dose that infected the host and the infection route.

## What Ebola does

For the Ebola virus, the incubation period depends on all of these factors. Direct inoculation into the skin through accidental needle-stick injuries or needle sharing, for instance, leads to a shorter incubation period than transmission of body fluids into a mucous membrane, such as through the eye, mouth or nose.

The Ebola virus can infect any cell in the body that has a particular cholesterol transporter. But as it enters the body through a mucous membrane or a break in the skin, the virus needs to infect immune cells that can carry it to other sites around the body.

The most important cells it initially infects are immune cells, which then carry the virus to the lining of blood vessels, liver and spleen. Once these immune cells have been infected, the virus is able both to replicate within the cell and to use that cell as a vehicle to travel to other sites in the body. When it has reached sufficient numbers within the cell, the virus ruptures or buds out to infect neighbouring cells. This cycle continues until large numbers of cells have been destroyed and the organ starts to fail.

While this is happening, the body starts to fight against the virus by producing chemical mediators to control its replication and stimulate the wider immune system. The chemicals include chemokines and cytokines which, while helpful, can also harm the body.

The Ebola virus causes massive numbers of these molecules to be produced, leading to systemic inflammation in the host. And because a type of immune cell has been infected, the body cannot trigger an adaptive immune response, which targets a specific virus. Instead, the white blood cells, which usually target and kill invading viruses, die due to the inflammatory response being produced. This is how the Ebola virus cripples the body's immune response and renders the person helpless to fight infection.

The release of cytokines and chemokines by cells that sense the virus and the damage to blood vessels and liver cells caused by

these inflammatory chemicals cause the characteristic symptoms of Ebola virus disease such as rashes, vomiting, diarrhoea and bleeding.

Only when it sufficiently stimulates the production of the chemical mediators and infects blood vessel cells or liver cells in high enough numbers will Ebola symptoms manifest.

The infection of multiple cells in the body and subsequent replication of the virus takes time. While the virus remains at low levels, it can neither be detected nor transmitted. This is why this time is known as the virus' incubation period.

## Other viruses

In comparison, the influenza virus is transmitted through the air and enters the body through the nose or mouth. The virus rapidly infects the cells in the respiratory tract and replicates in them, soon producing symptoms.

As it doesn't need to travel elsewhere in the body, this reduces its incubation period to a mere one or two days. It would be longer if the influenza virus had to infect the brain or some other organ far from its point of entry.

At the other end of the spectrum, the rabies virus has an incubation period of between 30 and 100 days. In rare circumstances, it has been in the order of years. The virus usually enters through the site of a wound and travels along the peripheral nerves to the brain where it causes inflammation of the brain tissue.

Rabies-infected bites to the face are associated with a shorter incubation period than bites on the extremities. Effectively, the further the site of primary infection is from the host response or tissue damage that causes the symptoms, the longer a virus' incubation period.

Whether or not an infected person is contagious during this incubation period depends on the virus.

With Ebola virus, the amount of virus in bodily fluids during its incubation period is so small that molecular tests cannot detect it. There's virtually no chance of transmitting it to others, particularly as the route of transmission requires symptoms.

But viruses that are present in significant quantities during their incubation periods may be shed; both rotaviruses, the main cause of infant diarrhoea, and polio viruses are known to be shed prior to the onset of symptoms.

The Ebola virus' lack of contagiousness during the incubation period makes the isolation of potentially infected, but currently asymptomatic, people unnecessary. Twice-daily monitoring for fever, which is the first sign of the virus being at significant enough levels to be transmitted, is all that is required.

## **MBI & CIDM-PH welcomes....**

**Name:** Kerri Anton

**Position:** Program Manager, MBI, University of Sydney

**Email:** [kerri.anton@sydney.edu.au](mailto:kerri.anton@sydney.edu.au)

Kerri studied microbiology and leadership during her Bachelor's degree in the United States then received her Master of International Public Health from the University of Sydney. She has had extensive experience in government work in the U.S. which included finance, project management, grant management and strategic planning. Her diverse background and experience will enable her pursuit of engaging with stakeholders to reduce health inequities in Australia and the Asia Pacific region. Currently she is the program manager for the Marie Bashir Institute as well as a casual tutor for Communicable Disease Control and Global Communicable Disease Control at the University of Sydney. In her role at MBI Kerri will be helping to write MBI's business case, coordinating/facilitating grant writing and developing existing/new units of study for the University.



**Name:** Dr Connie Lam

**Position:** Postdoctoral Fellow, CIDM-PH, Westmead Hospital

**Email:** [connie.lam@health.nsw.gov.au](mailto:connie.lam@health.nsw.gov.au)

Connie's research interests are in the evolution and molecular epidemiology of bacterial pathogens, particularly organisms which have outbreak and epidemic potential. So far, she has studied two such organisms in depth- *Vibrio cholerae* and *Bordetella pertussis* during her studies at UNSW. For both organisms she used molecular markers such as antigenic differences, single nucleotide polymorphisms, variable number tandem repeats and differences in antigen expression to separate highly clonal isolates.



Connie's PhD focused on understanding how *Bordetella pertussis* evolution has been affected by widespread vaccination. Pertussis is highly contagious and although an effective vaccine is available against pertussis infection, outbreaks occur every 3-5 years. Her research so far has shown that pertussis isolates circulating today differ from those isolated before the introduction of vaccines.

Connie started at CIDM-PH as a postdoctoral fellow in July 2014, with the aim of using whole genome sequencing to identify and subtype pertussis from clinical samples, and also to continue broadening her understanding of other *Bordetella* species. While her training has predominantly been in molecular microbiology, she also has a keen interest in public health, in particular the epidemiology of communicable diseases and their surveillance.

She will pursue this interest further in December when she starts a new adventure in Atlanta, United States, taking up a 2 year postdoctoral fellowship co-funded by the American Society for Microbiology and the CDC. While there, she will analyse strains of *B. pertussis* from the recent outbreaks throughout the United States and compare these to isolates from around the world. Things that she will definitely miss while she is there are good coffee and summer visits to the beach.