Bioterrorism and the Olympics

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While a bioterrorist attack on the Sydney Olympics is unlikely, the potential consequences for public health would be devastating. So, how do we plan for the unknown, which may never happen? And what can we learn from the planning process?

PHOTODISC AUSTRALIA

Bioterrorism would have been the last thing on anyone's minds as they watched swimmer Kieren Perkins win gold at the 1996 Atlanta Olympics. Yet, sitting in fridges at the Dobbins Air Reserve Base, just north of Atlanta, was a stockpile of antimicrobial drugs ready to be distributed if bioterrorists targeted the games with a clandestine release of one of nine pathogenic micro-organisms. In an emergency, this stash of tablets, capsules and vials would have been flown to health centres by helicopter or sent by road. There was enough medicine to treat an estimated 10,000 people with diseases including anthrax, plague and salmonellosis.

As well as stockpiling drugs including ceftriaxone, ciprofloxacine, doxycycline, penicillin G and streptomycin, the Atlantan authorities had set into motion a train of antibioterrorism measures that touched all aspects of Olympic planning.

The threat

The chance of a deliberate release of a pathogenic micro-organism at the Atlanta Games was classified as low, according to Atlanta's Centers for Disease Control and Prevention (CDC). It ranked four other types of terrorism more likely. Top of the list was the use of a conventional explosive. Next was the release of an industrial chemical, then the release of a military chemical, followed by a conventional bomb laced with chemical, biological or radiological agents. Only a nuclear attack was seen as a more remote possibility than a bioterrorist one.

So, with such low odds, why prepare for a bioterrorist attack at all? It's a question Commander Andy Robertson, medical adviser to the Australian Defence Force, and a specialist in nuclear, biological and chemical defence, has been asked. As one of the people drawing up the disaster plans for a potential bioterrorist attack at the Sydney Olympics, part of his job has been to assess risk. 'Australia is probably not a terrorism target, and bioterrorism even less', he told a Sydney conference on bioterrorism last year. 'But should we stop worrying and adjourn to the football field? No, the possible civil unrest and economic costs would be devastating'.

It may be easy to brush off the threat of bioterrorism at the Sydney Olympics as scaremongering or an unlikely event. Yet, the Federal Government is taking no chances. In the 1999/2000 budget, it allocated $23 million to the Australian Defence Force to develop chemical, biological or nuclear disaster plans. Part of that will pay for a special army response unit due to be ready in time for the Olympics. According to last year's Department of Defence budget papers, it will still be in place after the Games.

The NSW State Government is also getting in on the act. NSW Health has a little-publicised Counter Disaster and

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Olympic Planning Branch, headed by Dr Michael Flynn. This branch steps in if a 'mass casualty incident' occurs.

Perhaps the most visible preparation to date has been the training of front-line medical staff in NSW to learn how to detect and respond to a bioterrorist attack. To date, 150 to 200 public health, mental health, infectious diseases, intensive care and emergency room personnel have gone through the two-day course. They will now go back and train their colleagues. 'By the Games, all emergency health workers in the metropolitan area health services will be aware of the issues,' says Dr Flynn.

Without this extra training, health workers may misdiagnose patients with rare diseases like anthrax or smallpox when they turn up to consulting rooms or emergency departments. Most health workers would only have read about these diseases in textbooks. Ask yourself if you could diagnose a rare disease like smallpox or anthrax. What would you look for? What pathology would you order? You're not alone. After all, when was the last time you saw a case of bubonic plague?

The Australian Defence Force's Surgeon General, Major General John Pearn, agrees that heightened medical awareness is the key to minimising the health effects of bioterrorism. 'All doctors have a brief duty to dust down the textbooks of internal medicine and glance briefly at the presenting symptoms and signs of the two most likely, albeit rare, practical threats – anthrax and plague', he says. Part of that heightened medical awareness is the revision and release of emergency response manuals to hospitals and health units.[1,2]

Some of these preparations have been prompted by Atlanta's experiences in staging the Olympics. But before we look at these experiences, we have to examine the nature of bioterrorism itself.

First, know your enemy

The face of terrorism is changing in several ways, says Mr Alan Thompson, Senior Defence Fellow at the Australian Defence Force Academy in Canberra, and convenor of a 1995 conference on terrorism and the Sydney Olympics. While earlier terrorism tended to be waged country-against-country, he says that Aum Shrinrikyo's release of sarin nerve gas in the Tokyo subway in 1995 was an example of the potential damage a small organisation, not affiliated to a particular country, could do. Twelve people were killed and 3000 injured in March that year.

This was not the cult's first foray into nontraditional forms of terrorism. It had already tried to release botulin toxin and anthrax but with little success and certainly little publicity outside Japan. Mr Thompson describes this attack as 'grey terrorism, niche terrorism, the nonprofessional, the one-off'. He says it is this type of attack, rather than the country-against-country style of terrorism seen at the 1972 Munich Olympics, that would most likely happen in Sydney, if at all.

However, Mr Thompson says there are several obstacles before a grey terrorist or amateur can launch a biological attack. 'Amateurs tend to plan in a somewhat amateur way. It's much harder for amateur associations without a sophisticated planning system to put together the combinations you need – getting hold of the agent and the capacity to disperse it. The Aum Shrinrikyo cult had plastic bags it pierced with umbrellas. It's hardly what you'd call a sophisticated operation.'

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A chemical attack, like the Tokyo incident, differs from a biological attack in several ways. Chemical attacks are over reasonably quickly and the effects are known within hours. Releasing a biological agent may lead to disease developing over days or weeks, spreading throughout the community. The attack then turns into a public health issue, one that can potentially draw on the resources of an already stretched health system.

Second, predict the weapon

Tom Clancy got it all wrong in his novel about bioterrorism at the Sydney Olympics. In his 1998 thriller *Rainbow Six*, he chose the Ebola virus as the micro-organism of mass destruction. But international experts say he should have chosen the smallpox virus or anthrax spores. They think Ebola is only the bioterrorist's fifth choice.

The smallpox virus (variola) is a good candidate for a bioterrorist attack as it spreads easily by coughing and sneezing, says Professor Donald Henderson, from the John Hopkins Center for Civilian Biodefense Studies in Baltimore, Maryland. Contaminated clothing or bedding can also spread the virus.

To give an indication of how infectious smallpox is, when the former Yugoslavia saw its first smallpox patient in 45 years back in 1972, the country closed its borders to prevent infection spreading. That single infection of a Kosovan schoolteacher led to 10,000 people being quarantined, in hotels surrounded by barbed wire, and the vaccination of 19 million people.

It is perhaps ironic that Professor Henderson, the man who spearheaded the eradication of smallpox worldwide via the World Health Organization by 1977, is now one of the world's experts on smallpox as a potential agent of bioterrorism. Smallpox eradication led to the World Health Assembly recommending that all countries stop vaccination from 1980. That leaves today's population largely unimmunised. As about

one-third of unvaccinated people die when exposed to the virus, it makes today's population particularly vulnerable to a smallpox bioterrorist attack.

Professor Henderson paints an alarming picture of its deliberate release through an unimmunised population, like Australia's. He starts with a small infection of 50 people. 'It would probably take three or four days to know that those were probably smallpox', he says. 'By the time the diagnosis was recognised, those 50 people would have infected the next generation of people. Those 50 cases would have [each] infected 10 or 20 others. And in the next wave of cases, we are looking at thousands.'

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Next on the bioterrorist's shopping list is anthrax (*Bacillus anthracis)* spores, which can be released in an aerosol cloud that you can't smell or see. When people inhale the spores, they develop flu-like symptoms and have difficulty breathing. More than three-quarters of infected people die. It seems that staying indoors offers little protection from exposure.

Perhaps it is the odourless and invisible nature of anthrax spores that explains why anthrax is the hoaxer's favourite micro-organism in the USA.

Third, have we been attacked?

Crucial to a bioterrorism response is detecting whether bioterrorism, rather than a rush of flu, has taken place. After all, how many diseases share the common initial symptoms of fever, and aches and pains? One way to find out if a rogue micro-organism has been released into the environment is to place sensors around the city to monitor air and water quality.

But Mr Jerome Hauer, Director of the Mayor's Office of Emergency Management in New York City, and the person in charge of planning for a bioterrorism attack on the city, thinks they are of little use. This is despite the US military earmarking US$15.4 million in 1999 on developing them. 'They're not specific enough and they're not sensitive enough', he says of the units he has investigated. 'We have to accept the fact that if we have a clandestine release in the city…there are going to be fatalities.'

The other way of quickly picking up a rush of infections is through the existing public health surveillance system. That was the missing link in the city of Milwaukee in the USA in 1983. Health officials only realised the city's drinking water was contaminated with the parasite *Cryptosporidium* when pharmacies started running out of antidiarrhoeal medicine, and schools and businesses noticed more people calling in sick. Although this wasn't an act of bioterrorism, we can draw parallels from the public health scare, says Professor Henderson.

The first the health system would know about a bioterrorist attack would be when patients visited GPs and emergency departments with symptoms that could be confused with the flu, up to two weeks after a micro-organism was released.

Laboratory diagnosis would follow. But standard methods may not give results for a couple of days, by which time asymptomatic people would have unwittingly spread the disease. This would mean delays in distributing the correct drugs and triggering an appropriate emergency response.

So, research has focused on developing rapid diagnostics, a task that has largely landed in the lap of the US military. At the 1996 Olympics, for example, a unit from the US Naval Medical Research Institute set up camp at the CDC laboratories with several of its own rapid pathology tests including those for anthrax, tularemia, brucellosis and botulin toxin.

Future testing technologies will not only have to detect known pathogens, but also unknown or bioengineered ones. If it wasn't for key personnel involved in the Soviet bioweapons program defecting to the West in the early 1990s, we wouldn't know about the Soviet development of bioengineered antibiotic-resistant strains of anthrax and plague.

Fourth, what do we do about it?

Assume both doctors and laboratories correctly identify the rush of infectious disease, then convey their findings to their local public health unit. Assume that the public health unit reports this to the relevant branch of the Olympic security forces, what then?

Professor Henderson's thoughts turn to protecting the uninfected after a smallpox attack. 'You would want to begin vaccination very quickly', he says, possibly vaccinating the whole city. But there may not be enough vaccine to go round, or any possibility of making new vaccines. 'Are we concerned about the possibility of smallpox spreading? You'd better believe it.'

Existing supplies of the smallpox vaccine, Dryvax, are so precious that diluting existing stocks 10 or 100 times may be on the cards. In March this year, the CDC called for 60 healthy volunteers to test the diluted vaccine.

If anthrax was diagnosed before organ failure, high doses of antibiotics administered for two months would be a patient's only hope of survival. The next hope for a population at risk is for anthrax vaccination. While the US military mandates that its troops be vaccinated against anthrax, and one day may use a second-generation vaccine requiring fewer doses, little of existing stocks is available for civilians. 'Soon, civilian vaccine would run out', says Professor Henderson.

'We really have a great deal to do.'

New York City's Mr Hauer estimates that for every person who needs vaccines or antibiotics, another 10 people would turn up for medical treatment – the worried well. 'We will get civil unrest, people breaking into pharmacies and showing up at the emergency rooms', he says. 'People will be very disruptive at the [vaccine] points-of-delivery. Their tempers will be short. Obviously, people will want to loot the [vaccine] trucks.'

Fifth, lessons from Atlanta

A year after the Atlanta Games, articles began to appear in medical journals analysing the healthcare facilities or services available during the Olympics. Among the largely positive accounts, lay criticism of some aspects of the organisation of the Olympic city's healthcare efforts. Remember, this was at an Olympics with no bioterrorist attack or chemical exposure.

In 1997, the organisers of the Olympic Village Polyclinic admitted that triage had been 'a failure'. The authors wrote, 'The need for a physician to direct patient flow became apparent immediately, but schedules could not be revised to allow this.'[3]

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Another article noted that the City of Atlanta and each of the seven surrounding counties in metropolitan Atlanta had separate disaster plans and no centralised co-ordinating body. Even when a disaster response was initiated, the emergency response was described as 'suboptimal'. The authors described how the bombing at Centennial Olympic Park, which killed two people and sent 111 to city hospitals, resulted in numerous ambulances being dispatched before the scene had been properly assessed. Not only did this incident contribute to traffic congestion, it sucked away resources from other areas of the city. Although the authors suggested that this 'lack of co-ordination' had little apparent effect on patient care,[4] it still raises questions about the appropriateness of the emergency response.

A 1998 paper, written by representatives of the US military and Atlanta's CDC, went further. It criticised the lack of a 'well-conceived' and prioritised list of medical threats for emergency health workers; and inappropriately defined triage criteria for exposed patients. It said that only the FBI's specialised assessment team had doctors experienced in identifying signs and symptoms of exposure to biological agents, and that procedures for providing health care in a contaminated zone 'were not developed in time for the Games'.

The paper concluded, '…Had there been an occult attack involving biological agents, or attacks in multiple locations, it is not clear how the response would have evolved. Some response units had different, and incompatible, communications gear.'[5]

Looking to the future

Of course, it is difficult to assess exactly how much progress has been made in emergency planning since Atlanta's experience four years ago. The very nature of planning for a potential bioterrorist attack brings with it the need for a certain level of secrecy. Yet, the issue is at least being talked about, on some level, in public. Last year, for example, a day was devoted to the subject at an international microbiology conference in Sydney. Public health officials, infectious disease specialists and laboratory scientists were in the audience, the very people crucial to a swift and appropriate health response to a bioterrorist attack.

This May, preparations for a potential bioterrorist attack on the Olympics stepped up a level. A three-day counter terrorist training exercise, codenamed Exercise Ring True, included a mock bioterrorist attack on the Olympic site at Homebush. NSW Health workers took part alongside police, defence and security personnel. 'Although the chance [of a bioterrorist attack] is very low, there's an obligation for modern society to prepare,' says Dr Flynn, from NSW Health. 'The principles involved are very much analogues to preparing for natural events like influenza pandemics.'

Meanwhile, commentators are saying that we are learning more than we think by re-examining our public health system as we plan for a potential bioterrorist attack, whether one occurs or not.[6] Their message is that whatever we do now to fix gaps in our public health system will be useful in managing new epidemics or re-emergent infections. MT

Further reading

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