

Biosecurity and infectious diseases

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Biosecurity is a relatively new and evolving discipline, and as a concept it is understood in a number of different ways. Definitions can vary between countries, organisations and different specialist groups. In the broadest sense, biosecurity can be defined as the act of protecting the economy, the environment, and people's health from pests and disease. It includes trying to prevent new pests and diseases from arriving in the country, and helping to control outbreaks when they do occur (definition from the Australian Department of Agriculture, Fisheries and Forestry webpage: www.daffa.gov.au/animal-plant-health/pests-diseases-weeds/biosecurity). It also entails the response to natural epidemic and pandemic disease, as well as the prevention of diseases that might arise after environmental disasters such as flooding. Biosecurity does not relate exclusively to deliberate or man-made biological threats.

The potential severity of the consequences of a global outbreak of disease is indisputable. The Australian Federal Government suggests that a severe influenza pandemic has the potential to overwhelm health systems and disrupt most economic activities.¹ The worldwide outbreak of severe acute respiratory syndrome (SARS), and outbreaks of foot-and-mouth disease and bovine spongiform encephalopathy (BSE) in the United Kingdom (UK), demonstrate the potential impact of emerging infectious diseases.

In the last decade, there has been an increase in the number of outbreaks of new and emerging infectious diseases in the Asia-Pacific region, for example Nipah and Hendra viruses, SARS and avian influenza. Drug resistance and more pathogenic disease are biosecurity concerns, especially with regards to zoonotic and vectorborne diseases which may be more sensitive to changes in climate. More than 70% of emerging infectious diseases are zoonotic,

and experts agree that the most likely biological threat faced by Australia comes from zoonotic disease.² Programs such as the One Health Initiative (<http://www.onehealthinitiative.com/index.php>) seek to re-integrate human and veterinary research and educational systems.

The Australian Government has developed strategies around biosecurity, including the refinement of communicable disease surveillance systems in Australia and overseas, and the support of effective communicable disease control and national biosecurity initiatives through policy, legislative and regulatory measures. Through the Department of Health and Ageing, border screening protocols will be further developed. The Department will also provide policy guidance to the Australian Quarantine and Inspection Service (AQIS) for human quarantine operations and administer the human quarantine aspects of the Australian quarantine legislation.³ A national regulatory regime will be established to help limit opportunities for the illegal use of biological agents for terrorist purposes.

The *National Health Security Act 2007* seeks to bolster Australia's surveillance capacity for outbreaks of communicable disease and other health emergencies. The Act, and its associated regulations complement the revised World Health Organization (WHO) International Health Regulations (IHR) which came into effect in June 2007. The IHR represent a legal framework for international co-operation on disease surveillance and response, with the explicit purpose of preventing the spread of disease across international borders. All WHO member countries are required to develop and maintain surveillance, reporting and response mechanisms at local, national and regional levels. The IHR require that all countries report disease outbreaks of international concern to the WHO within 24 hours of learning of the outbreak, regardless of whether the outbreak falls within or outside the country's borders.^{4,5} However, an ongoing issue of concern is that there is limited surveillance and response capacity across the Asia-Pacific region, which, combined with political and economic instability in some neighbouring countries, has the potential to leave Australia vulnerable to regional disease outbreaks.

Biosurveillance is an important component of biosecurity. While traditional surveillance systems have been vulnerable to incomplete and delayed reporting, advances in molecular diagnostics have enabled the rapid genotyping of biothreats, and investigation of markers which were not previously identifiable by traditional methods. The

integration of the three fields of biosurveillance, microbial genomics and informatics offers an opportunity for the development of effective and rapid biosurveillance methods and tools.

Biosecurity includes, but is not limited to, the prevention of and response to bioterrorism. It is also concerned with the control of established and emerging infectious diseases, and changing patterns of vectors and other biological consequences of climate change. Biosecurity is a global concern which is reflected in the recent development of new legislation both within Australia and internationally.

References

1. Lokuge B, Drahos P, Neville W. Pandemics, antiviral stockpiles and biosecurity in Australia: what about the generic option? *Med J Aust* 2006; 184: 16–20.
2. Williams L. Going Global: The battle against emerging disease. Lessons for Australia: Biosecurity Year in Review 2008. Report from the Australian Biosecurity Cooperative Research Centre for Emerging Infectious Disease, Australia: 2008. Available from: http://www1.abcrc.org.au/uploads/c7682895-5b75-4d35-993e-fd5fe9e13066/docs/Year_in_Review_2008_FINAL_PUBLISHED_ARTICLE.pdf (Cited 23 January 2009.)
3. Australian Government. 2008-09 Health and Ageing Portfolio Budget Statements. <http://www.health.gov.au/budget2008>
4. Hitchcock P, Chamberlain A, Van Wagener M, Inglesby TV, O'Toole T. Challenges to global surveillance and response to infectious disease outbreaks of international importance. *Biosecur Bioterror* 2007; 5: 206–7. doi:10.1089/bsp.2007.0041
5. World Health Organization. The World Health Report 2007. Global Public Health Security in the 21st Century: A Safer Future. Geneva, Switzerland, 2007.