ACT Government
Health

ACT Population Health Bulletin

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Contents

Upcoming Events

- Wednesday 10 June 2015 – Healthier Work networking breakfast – http://www.healthierwork.act.gov.au/
- Monday 15 June 2015 – cut off date for applications to the Health Promotion Innovation Fund. The next opportunity opens on Tuesday 16 June 2015 and closes for assessment on 19 October 2015 - http://www.health.act.gov.au/healthy-living/health-promotion-grants-program

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Introduction

A message from the Chief Health Officer, Dr Paul Kelly

This Issue of the Bulletin is about emerging infectious diseases (EIDs) – diseases which are previously unknown or which are rapidly changing either in pathogenicity, the number of people affected or the geographical region of occurrence. During my own professional life there have been an array of these, each frightening or intriguing in their own right, most with an animal origin and often associated with changes in human ecology including human-animal interactions. Some have been remarkably transient (eg. Severe Acute Respiratory Syndrome emerged and was eradicated in a 14 month period), others have thankfully so far remained distant from Australia (e.g. Middle East Respiratory Syndrome and Ebola Virus Disease) others have spread rapidly and become globally endemic including in Australia (e.g. Human Immunodeficiency Virus and the 2009 pandemic strain of H1N1 influenza).

The Asia Pacific is a particularly fertile region for EIDs with some remaining as a threat to our near north (e.g. Nipah virus and highly pathogenic avian H5N1 influenza) while others are home grown (Hendra virus and Australian Bat Lyssavirus). But the issue of EID is not totally limited to novel organisms. "Old foes" such as measles, which has been successfully eradicated in many countries including Australia, can recur as a public health problem if we lose our focus on evidence based prevention strategies such as vaccination, including for travellers to countries where vaccine preventable diseases continue to circulate.

Antibiotic resistance is a rapidly emerging problem which is leading to many currently curable diseases becoming incurable. It is clearly important that we prioritise the protection of this precious, but relatively recent, medical resource.

A wise teacher of mine would frequently pose the question to his medical students on ward rounds: "What is the price of survival?" The answer is: eternal vigilance. The frequent appearance of EIDs reminds us of the importance of redoubling our efforts in surveillance, prevention including immunisation where available, antibiotic stewardship, infection control, preparedness and response. In this context, the ethical and legal complexity of balancing the rights of individuals with the protection of the public is one which requires careful consideration. The article on the Mary Mallon case in 20th Century New York City is an illustration of that matter.

Thanks to the editorial committee and in particular to the guest editor, Emily Harper, as well as all the contributors to this Issue. I hope you enjoy reading the wide variety of articles as much as I did.

Dr Paul Kelly
ACT Chief Health Officer
May 2015

Breaking News

Launch of Kids at Play Active Play

Kids at Play Active Play, a program designed to build the capacity of early childhood educators to teach fundamental movement skills and increase active play in children aged three to five years, was launched by ACT Minister for Health, Simon Corbell on 31 March 2015.

The launch was held at the Charles Conder Preschool, with preschool students providing an enthusiastic demonstration of fundamental movement skills and active play games. Fundamental movement skills such as jumping, catching, running, hopping, kicking balls and throwing are the building blocks for active behaviour. Building these skills in young children will develop confidence and abilities that will be utilised throughout adult life.

As well as supporting improvement in early childhood development indicators, the Kids at Play Active Play program also supports the ACT Government's Healthy Weight Initiative to combat the rising rates of overweight and obesity levels in the ACT community.

Photographs: ACT Health

Minister for Health promotes seasonal influenza vaccination.

ACT Minister for Health, Simon Corbell received his seasonal influenza vaccination on 30 April 2015. Minister Corbell recommended that all Canberrans get their seasonal influenza vaccination as soon as possible to help protect themselves and the wider Canberra community.

Photographs: ACT Health

Flu vaccination is the single most effective action in preventing the spread of influenza in the community, and getting it before the flu season starts is the best time to do so.

Each year, influenza causes significant illness in the community, which can lead to serious complications, hospitalisation and even death.

It is recommended that everyone over the age of six months should consider vaccination against the flu, however those who are more at risk of severe complications are urged to get their flu shot, including:

- people aged 65 years and over;
- pregnant women;
- Aboriginal and Torres Strait Islander people aged 6 months to 5 years and those aged 15 years and over;
- individuals aged 6 months and over with chronic diseases.

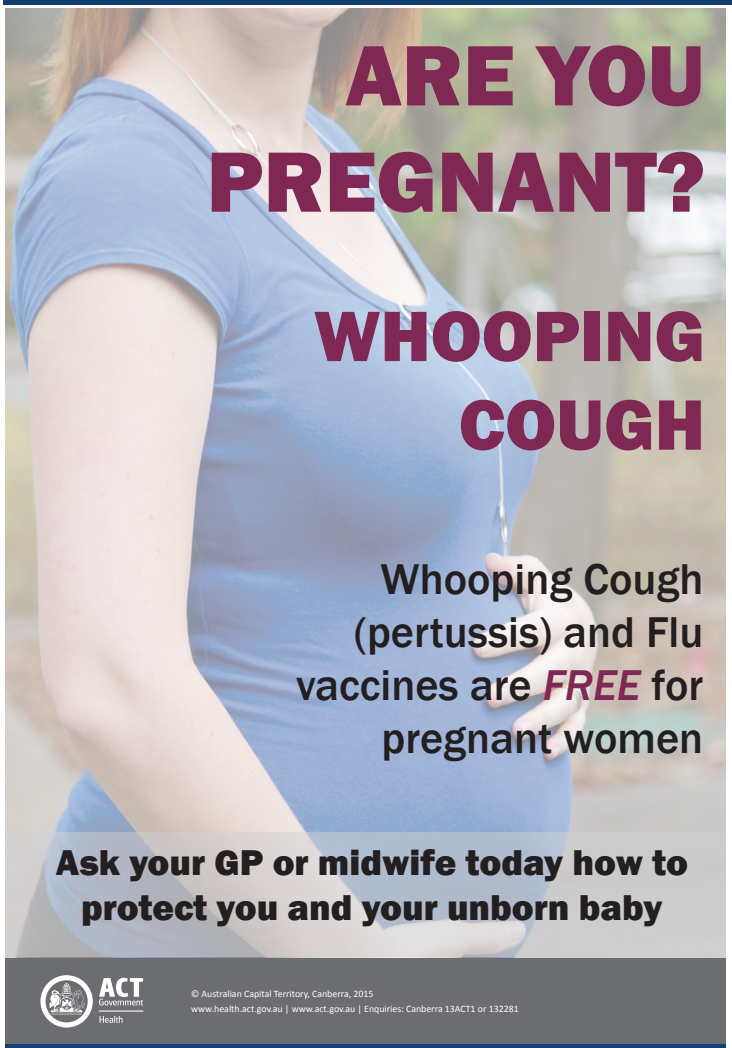
These groups are eligible to receive a free seasonal flu vaccine from their local GP, or alternatively parents can take their children under five years of age to community-based child health clinics.

Those not eligible for free flu vaccine can obtain the vaccine on private prescription from GP surgeries.

Vaccination with seasonal flu vaccine is recommended each year, because the composition of the vaccine changes annually and immunity obtained from flu vaccination only lasts about 12 months. Many work places provide free flu vaccination for their staff and some pharmacies are now also providing flu vaccination.

For more information on influenza vaccination visit the ACT Health website or phone the ACT Health Immunisation enquiry line on: 6205 2300.

Acronyms and Resources



Resources

Communicable Disease Control and Disease Surveillance

- http://www.who.int/en/
- http://www.health.gov.au/internet/main/publishing.nsf/Content/ohp-communic-1
- http://www.health.act.gov.au/public-information/public-health/communicable-diseases

Immunisation

- http://www.health.act.gov.au/our-services/immunisation
- http://www.immunise.health.gov.au/

ACT Legislation Register

- http://www.legislation.act.gov.au/

ACT Human Rights Commission

- http://hrc.act.gov.au/

Acronyms

ABL	Australian Bat Lyssavirus
ACF	Aged care facility
ACTAS	ACT Ambulance Service
AHPPC	Australian Health Protection Principal Committee
AJPH	American Journal of Public Health
AIDS	Acquired immunodeficiency syndrome
CDC	Communicable Disease Control
CHO	Chief Health Officer
CDNA	Communicable Disease Network of Australia
CH&HS	Canberra Hospital and Health Services
CNS	Central nervous system
DoH	Department of Health
ECC	Emergency Coordination Centre
EID	Emerging Infectious Disease
EVD	Ebola Virus Disease
GDP	Gross Domestic Product
GLEWS	Global early warning system
GOARN	Global Alert and Response Network
HAI	Healthcare associated infections
HA-SAB	Hospital acquired *Staphylococcus* aureus bacteraemia
HCW	Health care workers
HECC	Health Emergency Control Centre
HEMSC	Health Emergency Management Sub Committee
HEP	Health Emergency Plan
HIV	Human Immunodeficiency Virus
HPS	Health Protection Service
IHR	International Health Regulations
IPCEAG	Infection Prevention and Control Expert Advisory Group
MERS	Middle East Respiratory Syndrome
MERS-CoV	Middle East Respiratory Syndrome Coronavirus
MMR	measles-mumps-rubella
MRSA	Methicillin-resistant *Staphylococcus* aureus
MSF	Médecins Sans Frontiéres
NNDL	National Notifiable Disease List
NNDSS	National Notifiable Disease Surveillance System
PCR	Polymerase Chain Reaction
PHD	Population Health Division
PHLN	Public Health Laboratory Network
PUI	Person Under Investigation
SAB	*Staphylococcus* aureus bacteraemia
SARS	Severe Acute Respiratory Syndrome
UK	United Kingdom
USD	United States dollar
VRE	Vancomycin-resistant enterococci
WHO	World Health Organization

The origin of new communicable diseases

Dr Andrew Pengilley, Office of the Chief Health Officer, Population Health Division

In Australia and other affluent nations the impact of communicable disease decreased throughout the 20th century, and now contributes less than five per cent of the total disease burden. This was due to improvements in housing, sanitation and nutrition coupled with clinical advances such as vaccination and the development of antibiotic therapy. By the 1960s it was plausible to propose that Western societies might 'close the book' on infectious diseases and concentrate on the chronic illnesses, such as cancer and heart disease, which now contribute more than 80% of the burden of disease. This view is now noted more for its hubris than for its prescience. Despite successes like the 1980 eradication of smallpox, entirely new infectious agents have emerged and affluent nations have not been immune from their impact. One of these, the Human Immunodeficiency Virus (HIV), has spread to every country and killed over 39 million people since it was first recognised in 1983.

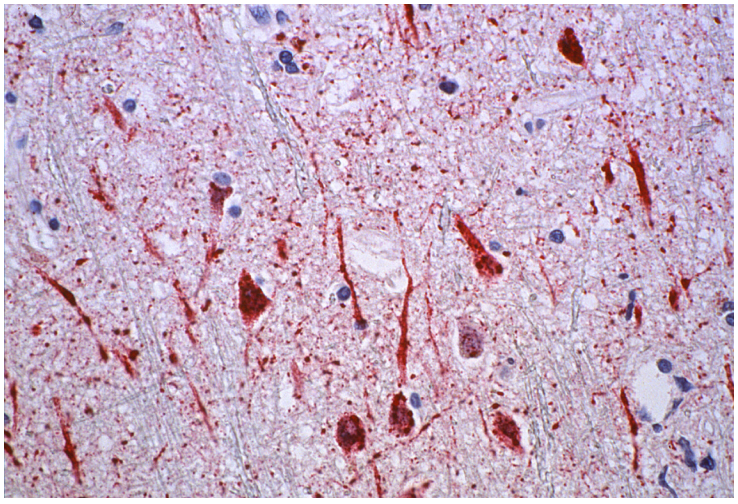
The emergence of new diseases is not a recent occurrence.[1,2] These new or resurgent infectious diseases have been labelled as "emerging infectious diseases" (EIDs) to separate them from the background matrix of communicable disease present in every community. The World Health Organization (WHO) defines an EID as one which has "appeared in a population for the first time, or that may have existed previously but is rapidly increasing in incidence or geographic range". Although EIDs are caused by different agents, emergence is itself an ongoing phenomenon which results from human engagement with the ecosystem. There is no static list of communicable diseases that can be eradicated or tamed so that none remain.

The 'textbook' epidemic diseases first occurred about eleven thousand years ago when agriculture developed. This allowed the development of populations of sufficient size and density to maintain circulating infections, and placed humans in close proximity to domestic animals. Over 70 per cent of emerging pathogens today originate from wild or domestic animals.[3] From the 13 main livestock animals domesticated worldwide came human strains of diptheria, influenza, mumps, pertussis, rotavirus, smallpox and tuberculosis. Increased contact with commensal rodents probably brought plague and typhus.[1] These diseases have been present throughout history, spreading between the early agricultural civilisations of Eurasia to eventually reach the New World and the Pacific with devastating consequences during the age of exploration and colonisation.[1]

The factors which allow an infectious disease to 'jump' between species are not well understood. It is likely that several small 'hops' are often involved in the transition between an animal and human disease.[1] Each contact with an animal presents a small chance of zoonotic infection but repeated outbreaks can occur with exposure to reservoirs like pigs, bats or chickens. Each human case raises the potential for a mutation to occur which allows an infection to spread between people without exposure to a reservoir, and these can be the start of new epidemics.

Photograph: Bill Longshaw - FreeDigitalPhotos.net

For example, in 1999 Nipah Virus (Nipah), which causes highly lethal encephalitis and pneumonia, emerged in an outbreak in Malaysia.[2] It is thought that the incursion of intensive piggeries into areas inhabited by wild fruit bats allowed the virus to move from bats to pigs, in whom it replicated to levels high enough to infect farm workers. In the initial outbreak there was no human to human transmission of Nipah, but patients in subsequent outbreaks have shown more respiratory symptoms and epidemiological evidence of spread to close human contacts. Similarly, farming of pigs and chickens in close proximity in Southeast Asia probably facilitated the reassortment of genes in influenza viruses affecting humans, pigs and chickens to produce H5N1 influenza in 1997.[4]



Photograph: Human central nervous system tissue specimen, which revealed some of the cytoarchitectural histopathologic changes associated with a Nipah virus infection. CDC/ Brian W.J. Mahy. Public Health Image Library

Current global trends may contribute to accelerating disease emergence.[4,5] The incursion of people into previously remote ecosystems driven by population growth, food pressure, and demand for agricultural land have increased novel animal interactions leading to, for example, the emergence of Ebola and HIV from apes in Africa.[2,5] Dense urban centres with poor sanitation and health systems provide the opportunity for large epidemics of disease to occur, as with the resurgence of Dengue Fever and Yellow Fever in Asia and South America.[3] The movement of people across borders for commerce, tourism or because of the disruption of war can rapidly disseminate infectious diseases through regions and the globe. Severe Acute Respiratory Syndrome (SARS) originated in China but local outbreaks were seeded by infected people who travelled by air to Canada, the USA, Singapore, Hong Kong, the Philippines and Taiwan.[3]

Globalised trade has the potential to spread endemic disease to naïve populations. West Nile Fever was endemic to Africa, but was probably spread to the USA, Canada and South America by the transport of an infected mosquito or bird in 1999 with subsequent epizoonotic outbreaks.[2] A cluster of Hepatitis A in Australia this year may be a case of long distance transport of food from countries with high rates of this endemic disease leading to an increase in rates of infection in the local population with low immunity. Poor health systems can directly spread disease, as with the re-use of needles, but also hamper the capacity of many countries to take even basic measures to limit the scale of emerging disease outbreaks. This has been a major contributing factor to the size of the current Ebola Virus Disease (EVD) outbreak in Liberia, Sierra Leone and Guinea. The development of highly drug resistant forms of infection, such as tuberculosis and malaria, is a form of emerging disease which can be increased by irregular access to essential medicines.

The origin of new communicable diseases *(continued)*

Southeast Asia is a 'hotspot'[4] which combines many of the features which promote disease emergence. It has a huge population that is expanding into previously undisturbed environments, has growing urban centres with poor infrastructure and risky animal husbandry practices. Australia is epidemiologically contiguous with this region though air and sea transport. Regular epidemics of Dengue Fever occur in north Queensland from imported cases,[6] and local resurgence may increase the size and/or frequency of these outbreaks. Climate change has the potential to increase Australia's exposure to regional emerging diseases as mosquito vectors move southward to larger urban centres. Arguably, political determinations such as the decision to curtail foreign aid, have increased the potential for poverty and poor health systems in the region to contribute to the emergence of infectious diseases.

The emergence of any particular disease is unpredictable and, in a country with a low burden of communicable disease, it is easy to minimise the risk posed by environmental and biological processes which generate new organisms. History shows, however, that far from being a rare event, the evolution and spread of new communicable diseases is inevitable. Modern factors, such as population and air travel, mean Australia is closely linked to areas of the world in which this is likely to happen. Our past success in suppressing communicable diseases is no protection against the new or unexpected, and we must main the capacity to respond when change comes.

Photograph: South East Asia. Ian Macky

One of the major risks of emerging diseases to Australia is the failure of the public to understand that infectious diseases 'of the past' are still very much alive globally.[7] A chronic lack of investment in the capacity of the health system to investigate and control outbreaks of epidemic disease reflects this complacency. The current EVD outbreak poses a miniscule risk in Australia, but the effort required to train staff in using protective equipment, isolate cases in crowded hospitals and handle potential contacts demonstrates how problematic a similar endemic threat would be for our health system. The greatest example of this fallacy of risk perception is the number of Australians who choose to travel overseas without being vaccinated against diseases like measles. Returning travellers regularly spark outbreaks of this disease in unvaccinated locals and, as the recent US outbreak centred on Disneyland indicates, voluntary non-vaccination can lead to local re-emergence of previously eliminated disease.[8]

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Emerging Infectious Disease: The global context

Joanne Greenfield, Health Improvement Branch, Population Health Division

Despite progress in global health outcomes, emerging infectious diseases (EIDs) are an increasing health and economic threat, with the costs associated with EIDs over the last few decades entering into tens of billions of dollars and rising. This article outlines that whilst there is much debate about how to develop a better global detection and response capacity, the staffing, information and supply systems of many at-risk countries remain woefully inadequate to prevent or respond to EIDs in the future.

Worldwide progress in improving health outcomes

Worldwide there have been significant health gains over the last few decades. Global life expectancy has increased for both sexes from 65.3 years in 1990 to 71.5 years in 2013.[1] The main contributing factors to this improvement are a reduction in age-standardised death rates from cardiovascular disease and cancers in high income countries, and a fall in child deaths from diarrhoea disease, lower respiratory infections and neonatal causes in low-income countries.[1]

Since 1990 the world's population is 40 per cent less likely to die of a communicable disease or maternal, neonatal or nutritional disorder.[1] For example, from 1990 – 2012 the tuberculosis mortality rate declined by 45 per cent.[2] Worldwide it is estimated that: the malaria morality rate for children under five years of age fell by 51 per cent from 2000 to 2012; measles vaccination has averted more than 20 million deaths since 2000; and the number of polio cases worldwide has decreased by more than 99 per cent since 1998.[2]

EID Burden

Despite progress in global health outcomes, EIDs remain a significant cause of mortality and morbidity, with a substantial economic impact at the country, regional and global levels. For example, in the response to Bovine Spongiform Encephalopathy in the United Kingdom (UK), culling of cattle cost farmers USD$5.7 billion and it is estimated that the HIV/AIDS pandemic has reduced Gross Domestic Product (GDP) of African countries by between two and four per cent.[3] The economic impact of EIDs is felt across many sectors including employment, trade, travel, tourism, transport, social gatherings, and health care.[3]

The economic and human costs associated with EIDs do not respect national boundaries. In the recent example of Severe Acute Respiratory Syndrome (SARS) there were around 800 deaths, infections spread to thirty-seven countries, and costs were estimated at USD$50 billion globally with a lowering of GDP seen in Asian countries and Canada.[3]

An analysis of 335 EID events between 1940 and 2004 showed the number of events rising over time with the peak incidence in the 1980s, coinciding with the emergence of the HIV/AIDS pandemic.[4] Despite the global progress in increasing life expectancy, life expectancy fell in southern Sub-Saharan Africa between 1990 and 2013 due to HIV/AIDS. In 2013, despite progress in reducing mortality rates from the infection, 1.3 million deaths were still caused by HIV/AIDS.[1] The burden of some other EIDs has not reduced. For example, between 1990 and 2013 there has been no change in age standardised death rates associated with dengue fever.[1]

EIDs are not going away and their threat to human health and the global economy, including Australia, remains as high as ever. The most recent UK assessment of risk from civil emergencies details pandemic influenza as the highest civil emergency risk and includes a potential outbreak of antimicrobial resistant infection as an emerging risk.[5]

EID global response architecture

The International Health Regulations (IHR) were instituted from 2007 by the United Nations. The IHR are a legally-binding agreement that guides the coordination and the management of events that may constitute a public health emergency of international concern. To date, not all countries have met their responsibilities under the IHR.

Countries that are member states of the World Health Organization (WHO) are bound to notify the WHO of any EID outbreak that may have potential for international spread. Through the Global Alert and Response Network (GOARN), the WHO is expected to support an epidemiological investigation to assess the source and risk of ongoing transmission. The WHO is also expected to provide advice and or support to reduce the ongoing threat, measures to control spread and ongoing surveillance and detection.

The WHO and the World Organization for Animal Health and the Food and Agriculture Organization have joined forces under the 'One Health' umbrella to create the global early warning system (GLEWS) to improve early warning and risk assessment of zoonoses and EIDs. One Health is a collaborative approach at the local, national and global level, across a range of disciplines, to improve the health of humans, animals and the environment. Many countries however lack the capacity or political will to implement this approach systematically, and research into the area is underfunded.

The WHO has recently come under considerable criticism for its response to the Ebola Virus Disease (EVD) outbreak in West Africa that has been deemed as 'too little, too late'. The WHO's reply has been to acknowledge that it's funding structure, currently dominated by the interests of particular donor countries, has depleted its capacity to respond. The WHO member states, including Australia, are faced with the challenge of whether it is possible to provide adequate funding to ensure the WHO has the political and technical capacity to improve its response capacity and be the agency that leads and coordinates any global response. This debate will play out over coming months and years.

Some of the challenges facing the prevention and control of EIDs

The risks associated with EIDs are complex and interrelated as shown in Figure 1. There is no one solution and currently no one agency that can take the systematic and coordinated approach that is required. In recent months some stakeholders have called for the lessons learnt from the current EVD outbreak to be applied to the global EID response architecture. Suggestions include reform of the WHO, and that future responses should be coordinated by a global institution with sufficient mandate, resources and the ability to make fast decisions. Other suggestions are expanded research, a global early warning and detection system, a reserve service corps of trained personnel, strengthened health systems and regular regional and global preparedness exercises.[6]

Emerging Infectious Disease: The global context *(continued)*

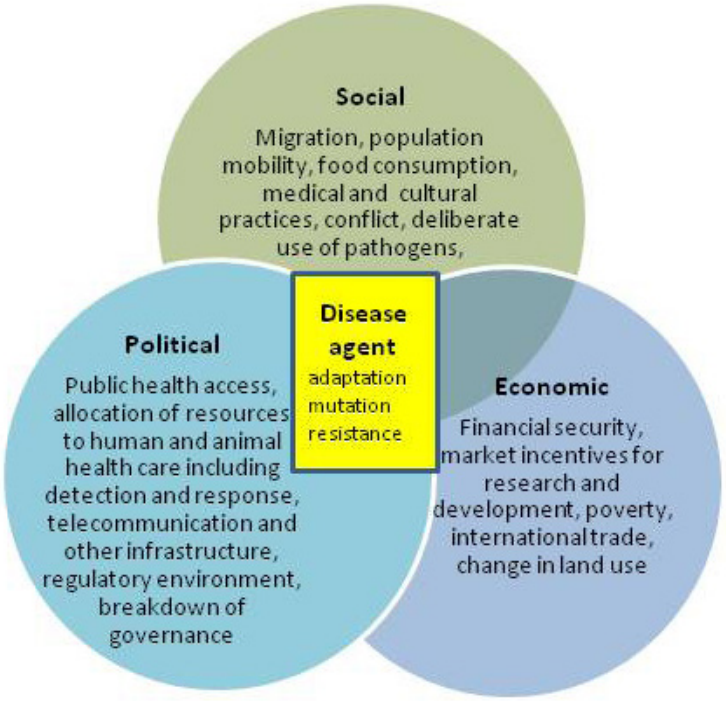

Figure 1: Factors contributing to the spread of EIDs. Joanne Greenfield.

Financing global health from development assistance reached a peak in 2010, increasing from USD $5.7 billion in 1990 to $28.1 billion in 2010. The areas of greatest increase were in funding for specific efforts to combat HIV/AIDS, tuberculosis, malaria and vaccine preventable diseases. The allocation is not based on disease burden (as many of the countries with the highest disease burdens did not receive the most development assistance for health) nor are scientific or surveillance efforts targeted at countries where the next important EID event is likely to emerge.[7] There has been some evidence in recent years that whilst this increase in disease based funding has allowed rapid scale-up of interventions, it has negatively impacted on the efforts of some countries to strengthen health systems, through the verticalisation of planning, management and data systems.[8] In recent years, particularly through the global financial crisis, there has been a reduction in health development assistance. The risk is that as resources reduce, further verticalisation of health programs will occur and the local systems needed to prevent, detect and control EIDs will not be built.

Development assistance is not the largest contributor to health expenditure in the poorest countries. Governments of the poorest countries spend more of their own resources on health with USD$521 billion being spent in 2010.[7] Therefore whilst important, development assistance cannot be expected to solve the EID challenge and any new approach will require agreement and buy-in from the countries most at risk of EID outbreaks.

The countries facing the current EVD outbreak are notably some of the poorest in the world with weak health systems unable to prevent, detect and control EIDs. Table 1 compares some key health indicators between Australia and one of the effected West African countries, Sierra Leone.

Indicator	Australia	Sierra Leone
Gross national income per capita	USD $42,540	USD $1,750
Life expectancy at birth m/f	81/85	45/46
Total expenditure on health per capita	USD $4,068	USD $205
Maternal mortality ratio per 100 000 live births	5	1200
Physicians per 10,000 population	32.7	0.2

Table 1: Comparison of key health systems indicators between Sierra Leone and Australia[9]

Conclusion

EIDs continue to be a threat to global health and to economic growth, and outbreaks in the Asia Pacific region such as SARs show that EIDs remain a threat to the health and economic prosperity of Australians. Most of the current international debate following the EVD outbreak in West Africa focuses on the global architecture to detect and respond to EIDs. The threat from EIDs will not be diminished without investment in prevention through the building of basic health system capacities, such as staffing, information and supply systems, in the countries most at risk.

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Surveillance of Emerging Infectious Disease

Rebecca Hundy, Communicable Disease Control, Population Health Division

Emerging infectious diseases can provide a challenge to protecting the health of the population, especially where sources of infections and methods of transmission are poorly defined. Well established and robust disease surveillance systems are essential to ensuring that new and re-emerging diseases are identified and appropriate public health responses initiated.

Emerging infectious diseases (EIDs) continue to pose a threat to public health both locally and nationally. As the world becomes increasingly connected, understanding, identifying and managing newly identified or re-emerging infectious diseases is a matter of high priority to ensure the morbidity and mortality associated with infectious diseases is minimised.

Well established, efficient and effective surveillance systems are necessary for the identification of known and emerging infectious diseases. Through surveillance, the spread of infectious diseases is monitored in order to establish patterns of progression – to predict, observe and minimise the harm caused by sporadic cases and outbreaks, as well as increase knowledge about factors which contribute to their transmission. Surveillance is also closely linked with public health action and is vital to the planning and initiation of disease control strategies.

National Surveillance

In Australia, surveillance of EIDs is facilitated by a well established, collaborative surveillance system: the National Notifiable Diseases Surveillance System (NNDSS). The NNDSS was established in 1990, and is currently administered by the Commonwealth Department of Health (DoH) in collaboration with the states and territories.[1] The NNDSS co-ordinates the national surveillance of more than 50 communicable diseases or disease groups, as defined in the National Notifiable Diseases List (NNDL).[2]

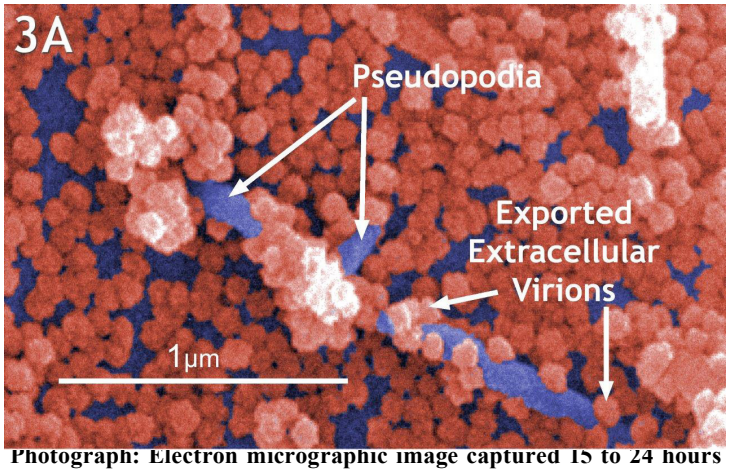
The NNDSS relies on the awareness of clinicians and laboratories to identify, diagnose and notify diseases at the jurisdictional level (see section on local surveillance below). Disease notifications are collected by state and territory health authorities as a requirement of jurisdictional public health legislation, and are subsequently provided to the NNDSS under the provisions of the *National Health Security Act 2007*.[3]

The NNDL is a pre-determined list of known diseases for which a public health priority for surveillance and response has been established. However, the NNDSS is simple and flexible enough to enable the surveillance of new and previously unidentified diseases.

In recent years, several new and/or internationally emerging infectious diseases have been placed under surveillance in Australia and appropriate public health responses developed and initiated to enable rapid identification and implementation of control measures. Examples include:

- Ebola Virus Disease (EVD) in 2014 (see article on page 18);
- Severe Acute Respiratory Syndrome (SARS) in 2003;
- Middle Eastern Respiratory Syndrome Coronavirus (MERS-CoV) in 2012 (see article on page 22); and
- H1N1 pandemic influenza (commonly referred to as Swine Flu) in 2009.

SARS was declared a quarantinable disease under the *Quarantine Act 1908* in 2003 and made a nationally notifiable disease on the NNDL in 2011.[4] Steps are currently underway to seek Health Ministers' approval for the addition of MERS-CoV to the NNDL. Comparatively, influenza has been on the nationally notifiable for many years, with monitoring of typing information in this instance enabling the identification of a previously unrecognised strain of the disease.



Photograph: Electron micrographic image captured 15 to 24 hours after Vero E6 culture cells were infected with the SARS-CoV (coronavirus). Dr Mary Ng Mah Lee. Public Health Image Library

Local Surveillance

In the ACT, routine surveillance of communicable diseases is conducted by the Communicable Disease Control (CDC) Section at the Health Protection Service (HPS). The collection of information related to disease notifications is a legislative requirement under the ACT *Public Health Act 1997*.[5] General practitioners (GPs), nurse practitioners, pathology laboratories and hospitals are required to notify CDC if they diagnose any one of more than 65 infectious conditions or diseases.

Disease notifications and outbreaks are followed-up and investigated by Public Health Officers at CDC in line with national and local disease control guidelines. The process for the follow-up of notifications and outbreaks varies from disease to disease, but can include:

- confirming the diagnosis with further testing;
- identifying the source of the disease and removing that source to reduce the risk to others;
- ensuring appropriate treatment of cases to reduce the possibility of transmission;
- identifying contacts who may have been exposed and are at risk of infection; and/ or
- implementing other disease control measures such such as isolation and exclusion of infectious cases and, where available, providing post exposure treatment to contacts.

Timely and appropriate follow-up is particularly important for new or emerging infectious diseases where the incidence of the disease is low, but the threat is high in terms of morbidity and mortality.

Surveillance data are regularly reviewed to describe local trends in the incidence of notifiable diseases in the ACT. Regular analysis and review of disease surveillance data is vital to assess whether control strategies are effective in minimising the spread of known diseases and also in recognising any new disease threats as they emerge.

The ACT provides locally collected de-identified surveillance data to the NNDSS on a daily basis. This is aggregated with data from other jurisdictions into NNDSS, which allows for analysis to describe national trends, and to detect outbreaks that may be more widespread and occurring across more than one jurisdiction.

Surveillance of Emerging Infectious Diseases *(continued)*

Conclusion

In Australia, the presence of an effective surveillance system in the form of the NNDSS, in combination with good local surveillance systems and jurisdictional co-operation, means that the capacity to identify and subsequently respond to EIDs is strong. Australia has responded effectively to past internationally emerging infections such as SARS, MERS and EVD and therefore should be well equipped to deal with any future emerging or re-emerging infectious diseases.

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5. Public Health Act 1997. http://www.legislation.act.gov.au/a/1997-69/default.asp accessed May 2015.

(for office use only) Notification Id:_____

ACT Government Health

Report of Notifiable Disease or Related Death

DISEASE TO NOTIFY (☑ Tick box below)

- ☐ Acquired Immunodeficiency Syndrome (AIDS)
- ☐ Anthrax ☎
- ☐ Arbovirus infection (specify type):

  _____
- ☐ Avian Influenza (quarantinable) ☎
- ☐ Botulism ☎
- ☐ Brucellosis
- ☐ Campylobacteriosis
- ☐ Chlamydia trachomatis
- ☐ Cholera (quarantinable) ☎
- ☐ Creutzfeldt-Jakob Disease ☎
- ☐ Cryptosporidiosis
- ☐ Diphtheria ☎
- ☐ Donovanosis
- ☐ Equine morbillivirus
- ☐ Food poisoning (not elsewhere specified) ☎
- ☐ Gastrointestinal illness cluster ☎
- ☐ Giardiasis
- ☐ Gonococcal infection
- ☐ Haemolytic Uraemic Syndrome (HUS)☎
- ☐ Haemophilus influenza serotype B (Hib) (invasive only) ☎
- ☐ Hepatitis: ☐A☎ ☐B ☐C ☐D ☐E
- ☐ Hepatits – Infectious, not otherwise specified
- ☐ Human Immunodeficiency Virus (HIV) infection
- ☐ Influenza laboratory-confirmed
- ☐ Legionellosis ☎
- ☐ Leprosy (Hansen's disease)
- ☐ Leptospirosis
- ☐ Listeriosis
- ☐ Lyssavirus ☎ (specify type):

  _____
- ☐ Malaria
- ☐ Measles ☎
- ☐ Meningococcal disease (invasive)☎
- ☐ Mumps
- ☐ Paratyphoid ☎
- ☐ Pertussis
- ☐ Plague (quarantinable) ☎
- ☐ Pneumococcal disease (invasive)
- ☐ Poliomyelitis ☎
- ☐ Psittacosis (Ornithosis)
- ☐ Q fever
- ☐ Rubella & congenital rubella syndrome
- ☐ SARS (quarantinable) ☎
- ☐ Salmonellosis
- ☐ Shigellosis
- ☐ STEC/VTEC ☎
- ☐ Smallpox (quarantinable) ☎
- ☐ Syphilis
- ☐ Tetanus
- ☐ Tuberculosis
- ☐ Tularemia ☎
- ☐ Typhoid ☎
- ☐ Varicella
- ☐ Viral haemorrhagic fever (quarantinable) ☎ (specify type):

  _____
- ☐ Yellow fever (quarantinable) ☎
- ☐ Yersiniosis

☎ Notify by calling 6205 2155, preferably on the same day probable or confirmed diagnosis is made. Conditions that are not marked with a ☎ can be notified by fax or post within five days.

Figure 2: ACT Health Notifiable Disease Report form

The ACT Epidemic Infectious Diseases Plan

Dr Andrew Pengilley, Office of the Chief Health Officer, Population Health Division

In Australia the impact of epidemics of infectious disease is mitigated by childhood vaccination, good standards of hygiene, housing and nutrition, and access to healthcare. Outbreaks of disease do occur but rarely pose a significant risk to the majority of the population or require an alteration in 'business as usual' to gain control. There is, however, always the potential for pathological organisms to evolve the capacity to cause severe disease and spread exponentially in the community. The most well known of these, such as the 1918 Influenza Pandemic, the emergence of SARS in 2002 or H5N1 influenza in 1997, have been health emergencies with wide political and economic ramifications. Controlling these outbreaks requires governments to undertake seldom-implemented actions like closing schools or mass-gatherings, limiting movement of people and changing usual clinical practice. Unfortunately every epidemic is different so an effective plan must incorporate the flexibility to assess and respond to all potential epidemic threats without being constrained by an expected scenario.

In 2009, an influenza pandemic spread around the world; the first since 1957. This occurred at the beginning of the southern winter and Australia was one of the first countries affected.

Fortunately, the threat of an influenza pandemic had been appreciated by Health Departments and considerable time and effort has been spent in preparation. Historical pandemics in 1918 and 1957 had been studied, and the newly emergent H5N1 avian 'bird flu' virus closely observed as the most likely source of a next, severe, pandemic. Emergency stockpiles of H5N1 vaccine and the antiviral oseltamivir (Tamiflu) had been procured should they be needed to protect vital services during a pandemic. The Australian Health Management Plan for Pandemic Influenza described four phases a pandemic would be expected to progress though; Delay, Contain, Protect and Alert and actions which would be taken under each. This doctrine was mirrored in jurisdictional plans including the ACT Health Management Plan for Pandemic Influenza.

Unfortunately, it was not H5N1 'bird flu' from Asia which caused the 2009 pandemic but H1N1 'swine flu' from North America. The disease was not significantly delayed in its entry to Australia and caused multiple, nearly simultaneous, outbreaks across the Eastern states which made efforts at containment moot. H1N1 was mild in most people but severe in those with existing respiratory disease and, in particular, pregnant women. H5N1 vaccine was not effective against it, and stockpiled oseltamivir of questionable value. It was not the pandemic health authorities had predicted and prepared for.

Following the 2009 pandemic, ACT Health reviewed its response. Among several key findings was that planning had narrowly focused on H5N1 and this had limited its effectiveness, that operational protocols were unnecessarily wordy but lacking working detail, and that "future pandemic planning frameworks need to be flexible to allow response to be scaled up or down, and need to be able to accommodate all pandemic scenarios, not just influenza".[1] The current ACT Epidemic Infectious Diseases Plan (EID Plan) was drafted primarily in response to this recommendation.

The EID Plan has been designed to align the management of an infectious disease outbreak with emergency planning processes used by all services under a commonly understood incident management structure. This allows a response to be staged from establishing a Health Emergency Control Centre (HECC) within Health to the ACT Emergency Coordination Centre (ECC) at which all Directorates are represented. The appendix of the EID Plan contains brief protocols describing how the Incident Controller of an EID (usually the Chief Health Officer) can undertake actions like closing schools or establishing home quarantine. The Plan is deliberately silent on what specific actions the Incident Controller will undertake or in what order because experience shows that being responsive to the emerging scenario is more important than predicting the behaviour of an outbreak in advance. The EID Plan is not written with a particular disease in mind, but provides a 'palette' of possible public health measures which an Incident Controller may wish to use once a threat emerges. With the exception of vaccination, there are no 'new' public health measures to control community spread of infectious disease beyond those well known for centuries.

A common maxim says that Generals are always ready to fight the last war. The 1918 'Spanish flu' pandemic killed far more people than the preceding world war in which Generals so ruinously failed to understand that the tactical doctrines of the 19th century would not work in the 20th. Many observers would concede that had H1N1 in 2009 been a severe disease, the failure to have adaptable plans may have made the pandemic significantly worse. The EID Plan has sought to address this by providing a governance structure and options for an Incident Controller to use to respond to events 'on the day'. It has not been fully successful in this objective. The EID Plan is still fairly 'influenza-centric', and additional detailed planning was required to implement a health response to the current Ebola crisis. It is, however, a contribution to planning by 'how to' rather than 'what if' which is likely to be more broadly applicable to future, unpredictable, epidemic threats.

"No battle plan ever survives contact with the enemy".[2] **German Field Marshal Helmuth von Moltke the Elder (1800-1891), commander of Prussian forces in the Franco-Prussian War of 1870-1.**

Photograph: Statue of Helmuth von Moltke the Elder, near the Berlin Victory Column in the Tiergarten, Berlin, Germany.

References

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2. Donnybrook: The Battle of Bull Run, 1861 (2005) by David Detzer, p. 233

To suffer the fate of Mary Mallon – the ethical challenges of depriving liberty for public health protection

Brett Purdue, Legal Policy Office, Population Health Division

- The ACT *Public Health Act 1997* vests the ACT Chief Health Officer and public health officers with the powers needed to protect the public from public health risks.
- The ACT was the first Australian jurisdiction to enshrine human rights protections in legislation with the *Human Rights Act 2004*.
- Public health and human rights protections should be complementary rather than oppositional. Nevertheless, the strongest powers available to the Chief Health Officer will conflict with some human rights.
- The burden upon public health officials to respond rapidly to public health issues whilst being cognisant of human rights is immensely challenging.

When Mary Mallon died in November 1938 at the age of 69 she had been incarcerated without conviction at the North Brother Island in New York's East River for nearly 24 years.[1,2,3]

These bare facts seem astounding, and enough to have even the most amoral amongst us consider that such a detention, even in 1930s New York, was unjustifiable and grotesque both legally and ethically.

Photograph: New York City 1930s. NYC Municipal Archives

To also know that Mary Mallon was not detained due to any political agenda, nor suspected of engaging in treason, terrorism or any other heinous treachery, but under the orders of New York public health officials would undoubtedly add to any sense of disbelief or outrage in any ordinary reasonable person. That is perhaps until it is explained that although the name Mary Mallon is not widely known, Mary Mallon is remembered infamously through the nickname given to her by the media of the time: Typhoid Mary.

What was perhaps most notable about Mary Mallon is that she is attributed as being the first asymptomatic carrier of typhoid identified by medical science in the United States.[1] Nevertheless, over the decades the truth about Mary Mallon has been overwhelmed and consumed by the myths of Typhoid Mary.

Mary Mallon did not cause thousands of deaths from typhoid, or even hundreds.[4] Through her work as a cook, she was reasonably suspected of having caused seven typhoid outbreaks consisting of a little over 50 typhoid cases, of which three resulted in death.[1] For perspective, more people died of typhoid on the convict ship Surry during the voyage to Australia between February and July 1814, than died from typhoid as a result of exposure to Mary Mallon.[1,5]

The story of Mary Mallon needs to be narrated with a historical context. Typhoid fever is relatively uncommon in most developed nations today,[6] but at the start of the 20th century when Mary Mallon commenced employment as a cook, typhoid fever was a scourge on New York City and the surrounding regions. In 1906, a year before Mary Mallon first came to the attention of public health officials, 3,467 people became infected with typhoid fever, of which 639 succumbed to the disease.[2] At the time the prevailing theory had been that typhoid was spread through impure water,[2] however this was also an era where the importance of hand washing, particularly by food handlers, was largely unappreciated. It also needs to be understood that at the time Mary Mallon's employment options were limited to domestic labour roles such as work in laundries or as a cook, the latter of which was better paid.

Photograph: North Brother Island. Harry Hamburg

So in these circumstances it is reasonable to appreciate why Mary Mallon, who reported never having been ill from typhoid fever herself, was so unwilling to accept that she was the cause of numerous typhoid outbreaks.

Mary Mallon came to be identified as a typhoid carrier and the source of multiple outbreaks through the "unusually fine piece of epidemiological work done by George A. Soper".[1] Soper presented his findings to the New York City Department of Health, who on Soper's recommendation,[7] exercised their powers under sections 1169 and 1170 of the Greater New York Charter and arrested Mary Mallon.[3]

Section 1169 provided that:

The board of health shall use all reasonable means for ascertaining the existence and cause of disease or peril to life or health, and for averting the same, throughout the city.

Whereas section 1170 went further, authorising:

Said board may remove or cause to be removed to [a] proper place to be by it designated, any person sick with any contagious, pestilential or infectious disease; shall have exclusive charge and control of the hospitals for the treatment of such cases.

To suffer the fate of Mary Mallon – the ethical challenges of depriving liberty for public health protection *(continued)*

It was through the exercise of these powers that the New York City Department of Health first quarantined Mary Mallon from 1907 through to 1910. During this time Mary Mallon challenged her detention before the State Supreme Court, without success. But in 1910 the then New York Health Commissioner concluded that Mary Mallon should no longer be kept in isolation, and could be released subject to her agreement to no longer work as a cook, keep in contact with health authorities, and "would give assurance by affidavit that she would upon her release take such hygienic precautions as would protect those with whom she came in contact, from infection". Mary Mallon agreed to those terms, and was released in February 1910.[3]

Mary Mallon's compliance with her agreement was short lived, as she soon returned to working as a cook using the pseudonym Mary Brown. Eventually in 1915 another outbreak attributable to Mary Mallon resulted. Twenty-five people were infected, two of which died. It was as a result of this outbreak that Mary Mallon was again arrested and returned to isolation in the Riverside detention hospital on North Brother Island in New York, where she remained until her death in 1938.[3]

There are perhaps few better examples than the story of Mary Mallon in illustrating the greatest challenge in public health law: in what circumstances is it appropriate and defensible to detain an individual or individuals against their will in order to protect the public from communicable diseases. In September 1908, eighteen months after Mary Mallon had begun her first period of quarantine, William H. Park MD addressed these same ethical concerns in relation to Mary Mallon when he wrote "The case of this woman brings up many interesting problems. Has the city a right to deprive her of her liberty for perhaps her whole life? The alternative is to turn loose on the public a woman who is known to have infected at least twenty eight persons."[8]

Photograph: Riverside Hospital - North Brother Island - Atals Obscura

Even at the time of her death, Mary Mallon's forced isolation was still regarded as a troubling ethical paradox. The American Journal of Public Health (the AJPH), in reporting her death, remarked that "she was a menace to her fellow men, although entirely innocent of any wrong doing".[1] The AJPH also commented that it was "not strange that she was bitter and defiant, and sought legally to escape from detention and to dodge health authorities", yet labelled those same efforts to avoid health authorities as "reprehensible".[1]

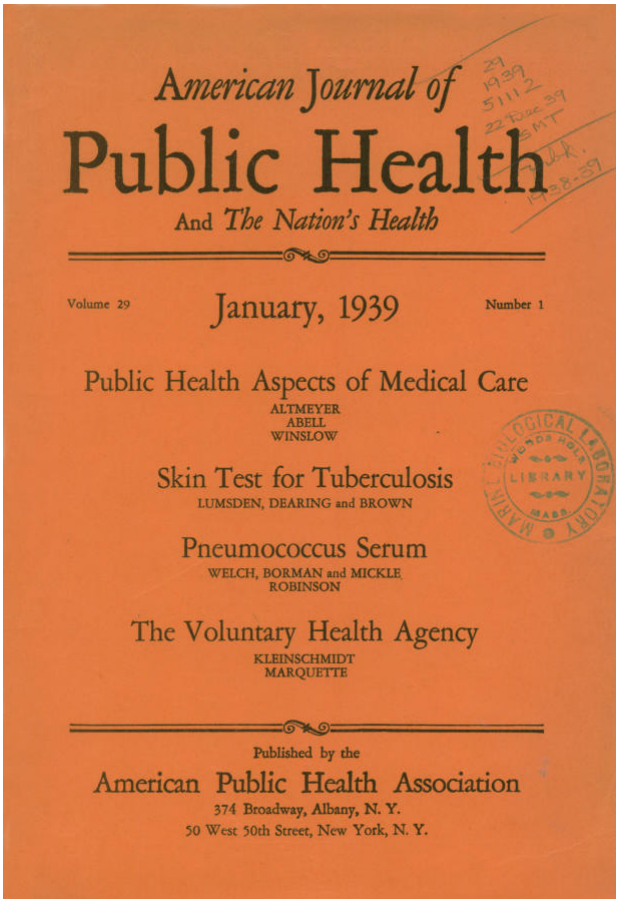


Figure 3: American Journal of Public Health 1939

Public Health law in the Australian Capital Territory (the ACT).

Every state and territory in Australia has an Act, with varying titles, that establishes the legal powers and functions to safeguard public health, and where necessary, respond to public health risks.[9-16] These legislative enactments are the primary source of public health law in Australia. In the ACT the legislation bears the clear and precise title; the *Public Health Act 1997* (the PH Act).[9]

The objectives of the PH Act include "protection of the public from public health risks" and the "provision of a rapid response to public health risks". However, indicative of the delicate equilibrium between protection of the public and the rights and liberties of the individual is that the objectives also expressly includes "the avoidance of any undue infringement of individual liberty and privacy in the exercise of functions".[9]

Other than during public health emergencies declared by the ACT Health Minister, an event that to date has never transpired, the greatest power available to the Chief Health Officer (CHO) is contained in section 113 of the PH Act. That provision assigns to the CHO the ability to give a legally compelling direction to a person(s) in order to prevent or alleviate a significant public health hazard. Under such a public health direction a person may be required to refrain from behaviour or activities, cease performing work of a particular kind, undergo a medical examination, undergo counselling, or clean and decontaminate a place. Significantly, a public health direction may also require a person with or exposed to a transmissible notifiable condition to stay away from certain places, or even be confined to a particular location.[9]

The requirements for the application of powers under the PH Act are of themselves already quite onerous, and framed so as not to permit any undue or excessive infringement on individual liberties.

To suffer the fate of Mary Mallon – the ethical challenges of depriving liberty for public health protection *(continued)*

Nevertheless, in 2004 the ACT became the first Australian jurisdiction to legislate to enshrine human rights into its legislative framework with the commencement of the ACT *Human Rights Act 2004* (the HR Act). [17]

The result is an ever present tension between respecting and protecting the rights of the individual against the protection of the community through the preservation of public health. For example, through section 113(1)(c) the CHO can issue a public health direction to require a person with "a transmissible notifiable condition to undergo a medical examination".[9] Yet section 10(2) of the HR Act clearly establishes that "no one may be subjected to medical or scientific experimentation or treatment without his or her consent".[17, 18]

Similarly, a public health direction may be issued that requires a person with "a transmissible notifiable condition, or a contact of such a person, to be confined to a particular place for a specified period". Even though the exercise of this power carries the caveat that it be "the least restrictive confinement appropriate to the person's medical condition" the use of such a public health direction is clearly in conflict with the right to freedom of movement entrenched in section 13 of the HR Act, and possibly also the right to liberty in section 18.[9,17,19]

Not all human rights are absolute however, and this is reflected by section 28 of the HR Act which confirms that human rights may be limited subject to "reasonable limits set by laws that can be demonstrably justified in a free and democratic society". [17,20]

Accordingly, the proper and diligent exercise of strong coercive public health powers in the ACT must be made having not only due regard to the requirements and conditions imposed by the relevant provision of the PH Act, but also having had fair consideration of section 28(2) of the HR Act.[17,20] That provision reads:

In deciding whether a limit is reasonable, all relevant factors must be considered, including the following:

(a) the nature of the right affected;

(b) the importance of the purpose of the limitation;

(c) the nature and extent of the limitation;

(d) the relationship between the limitation and its purpose;

(e) any less restrictive means reasonably available to achieve the purpose the limitation seeks to achieve.

The ACT Supreme Court added further to the understanding of these factors through its decision on In the Matter of an Application for Bail by Isa Islam [2010] ACTSC 147.[21,22] The court stated that the "ordinary processes of statutory interpretation, including that under section 30 of the HR Act, should be applied when interpreting Territory legislation, with the aim of finding a provision that is both human rights-compatible and consistent with purpose, before any attempt is made under section 28 to justify a meaning for the provision that is incompatible with human rights".

In its judgment the ACT Supreme Court offered four questions to be addressed in determining whether a limitation is reasonable.[22]

1. Is the purpose of the limitation of sufficient importance to warrant overriding the recognised human right?
2. Does it achieve the relevant purpose without having an arbitrary or unfair operation and without relying on irrational considerations?
3. Does the challenged provision limit the human right concerned no more than is reasonably necessary?
4. Is the limit imposed on the human right proportional to the importance of the purpose?

Photograph: Hywards. FreeDigitalPhotos.net

Case law

There is no case law in the ACT that specifically addresses the balance between public health law and human rights law. The same is also true for Victoria, which is the only other Australian jurisdiction to have enacted human rights legislation.[23]

Paradoxically this is both fortunate as it means there has never been a public health issue of such severity as to lead to litigation in this area, but also unfortunate as it means public health officials lack invaluable local case law that helps 'mark the boundaries' in their decision making.

Does the Human Rights Act help inform and influence public health decisions for the better, or make public health officials 'gun shy'?

There are strong and persuasive arguments from many sources around the world about how human rights complement public health law. The arguments generally offered contend that it leads to better and more equitable outcomes, and ensures that proper and detailed assessments of the public health risks are made rather than a 'shoot from the hip approach' or a focus on a rapid response over a measured and proportional response.

Still, in practice and in a real-time public health crisis there remains a question about whether the challenges in balancing human rights with public health interventions and the potential ramifications that may follow, make public health officials 'gun shy', reluctant or hesitant to act thereby impeding necessary, timely and courageous action to mitigate or prevent a public health crisis.

In 2008 the HR Act was amended to include Part 5A concerning the obligations of public health authorities. The new part imposed a duty to act consistently with human rights upon any public authority, and enabled legal proceedings to be commenced in the ACT Supreme Court against a public authority alleged to have failed in this duty. The Court may otherwise grant any relief that it considers appropriate, save for the awarding of damages which is expressly excluded as a form of relief that the Supreme Court may order.[24]

What is largely still unappreciated is that in Part 5A the concept of a 'public authority' reaches as high as the Minister and as low as any public employee.

To suffer the fate of Mary Mallon – the ethical challenges of depriving liberty for public health protection *(continued)*

The exclusion of damages is likely to have a number of key impacts. It may reduce the number of aggrieved persons choosing to seek remedy through the courts, and should serve as a likely disincentive to frivolous and vexatious claims. The exclusion of damages from the available remedies should also reduce the degree of concern that a public authority may hold about the potential to incur financial penalties should they make a decision that is inconsistent with human rights.

Nevertheless, due to the construction of Part 5A of the HR Act every decision of a public authority could potentially be challenged before the court, and merely engaging legal representation to respond to such litigation is potentially financially burdensome. For those public employees that are 'public authorities' for the purposes of the Act, this has the potential to influence decisions, even if unconsciously.

In most instances where the public employee has acted diligently and within the scope of their authority, it would be reasonable to expect that the ACT Government would incur any legal costs associated with responding to such litigation. Nevertheless, as no such assurances of assistance are given formally by the ACT Government there remains the potential, particularly with complex or urgent public health matters, for financial ramifications to be a 'splinter in the mind' of the decision maker.

Furthermore, the application of Part 5A of the HR Act means that the expectations upon public health officials are immensely high. In order for a public health official to be reasonably capable of acting consistently with human rights necessitates both training in statutory interpretation and an understanding of human rights. In reality this simply is not pragmatic.

Most ordinary public employees and public health officers have had no training in statutory interpretation or human rights. Even if they did, many would struggle to understand the concepts and appreciate the implications, let alone put them into practice every day.

It would be reasonable to expect more senior public health officials to understand such concepts. It must however also be recognised that the types of public health matters that would warrant the attention of senior officials will be those with serious complexities, or matters requiring an urgent response that precludes the seeking of external advice or the luxury of time to fully consider any and all human rights considerations. In urgent public health responses a public health official's duty to protect the health of the public will dominate their focus and decision making. Even if an individual's human rights were given due consideration, it is also quite likely that the pace of events would inhibit full and detailed note-taking to sufficiently evidence that consideration for later review.

Of course ethical dilemmas in public health protection extend beyond infringements of liberty. Ethical considerations exist even with routine immunisation programs, as their effectiveness in establishing 'herd immunity' is dependent upon a high percentage of the population being immunised. As such, the unimmunised threaten that 'herd immunity'. However, the right not to be subjected to medical treatment without consent applies should compulsory immunisation be proposed, whereas excluding those that are not immunised from work, school, or other social norms invokes the right to freedom of movement and the right to freedom of association.

Even the fluoridation of drinking water, well entrenched in most cities in the developed world, is arguably in conflict with the right not to be subjected to medical treatment without consent. As David Feldman noted in a lecture given in 2005 to the London School of Hygiene and Tropical Medicine, a reason "for interfering with people's bodily and moral integrity on health grounds arises in the field

Photograph: Amanda Mills. Public Health Image Library

of public health, when the interference seems to be justified in the wider public interest, particularly when it is done in order to protect society as a whole against a significant risk to health". Yet, as David Feldman observed, fluoridation "does not protect people against a serious threat to life" however it does "offer significant protection against wide spread and painful oral disease which is expensive and often difficult to treat".[25]

What can be reasonably inferred from the continuation of long established immunisation programs and the fluoridation of water supplies is that governments and communities are prepared to accept relatively minor medical treatments on the general population, without the consent of individuals, and therefore a limitation on the right in section 10(2) of the HR Act, where it protects the public from the risk of disease.

What remains largely untested is the extent to which governments and particularly communities would be prepared to see the right to liberty limited for the protection of the public from the risk of disease, particularly emerging diseases with higher mortality figures.

Perhaps the best way to predict how governments and communities would regard the deprivation of liberty in order to combat a serious risk to the public is to consider how deprivation of liberty in order to combat terrorism is regarded. Politicians and governments still appear comfortable with depriving the liberty of those suspected of terrorism related activities, but community sentiment is divided.

To suffer the fate of Mary Mallon – the ethical challenges of depriving liberty for public health protection *(continued)*

Would it be possible to suffer the fate of Mary Mallon in the ACT?

The extreme circumstance of Mary Mallon's fate means that it simply would not be repeated in the ACT or Australia. Nevertheless, there is value in theorising how public health authorities in the ACT would address a serious and novel contagion, or a recalcitrant infected individual.

Photograph: Mary Mallon. WPclipart

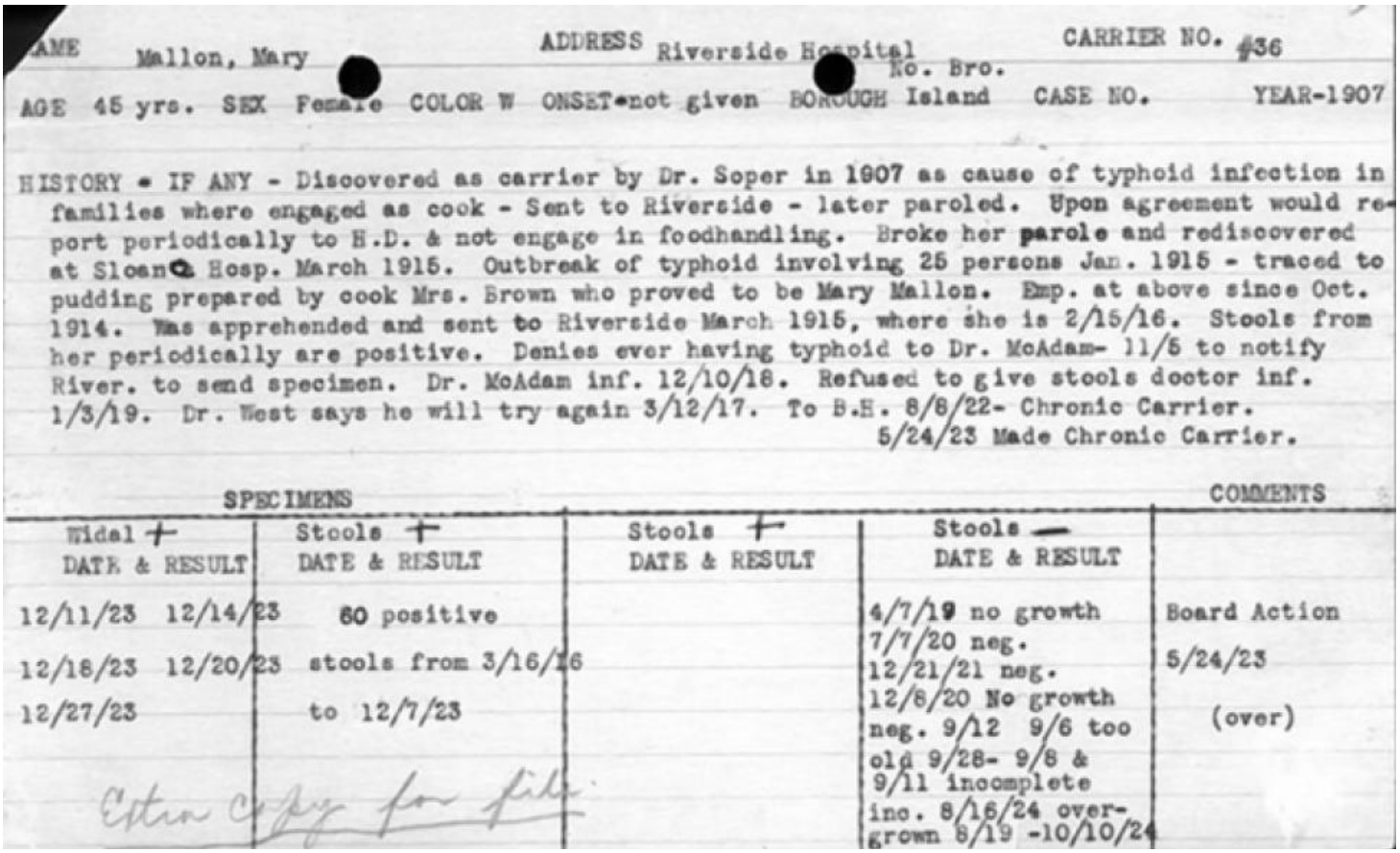
The nature of the disease will always be a key determinant in how public health officials will respond. Consideration must obviously be given to how infectious and potentially life-threatening the disease is, as well as what treatments exist. In this regard, novel and emerging diseases are of particular concern, as are those that are, or are becoming, drug resistant.

The traditional public health remedy of confining a person with a disease under quarantine works on the simple basis of isolating that person until they recover, and are therefore no longer symptomatic, or in the worst case the person succumbs to the disease. Similarly for those exposed to a disease, confinement is limited until the period in which symptoms would manifest has passed, or if symptoms develop, until the person recovers or succumbs.

Of course Mary Mallon is indicative of the possibility that a person may never be symptomatic with an illness, but may still be capable of infecting others. Although it was utilised with Mary Mallon, in such instances confinement under quarantine is largely impractical. Similarly, some infectious diseases can significantly detriment the health of the individual, and ultimately cause death, but the development of the disease may take years.

The emergence of the human immunodeficiency virus (HIV) in the 1980s demonstrated this. As such, it had a profound impact on public health law, particularly in the appreciation of how human rights can both conflict with public health law, whilst also contributing to improving public health.

HIV and the acquired immunodeficiency syndrome (AIDS) which it causes was "the spur to much rethinking of the relationship between an individual with an infection and society".[26] As a result "governments in Australia recognised that an effective response to HIV required strategies that went beyond the traditional public health remedies of abatement, control, notification or isolation".[27]



AME Mallon, Mary ADDRESS Riverside Hospital CARRIER NO. #36
No. Bro.
AGE 45 yrs. SEX Female COLOR W ONSET not given BOROUGH Island CASE NO. YEAR-1907

HISTORY - IF ANY - Discovered as carrier by Dr. Soper in 1907 as cause of typhoid infection in families where engaged as cook - Sent to Riverside - later paroled. Upon agreement would report periodically to H.D. & not engage in foodhandling. Broke her parole and rediscovered at Sloan Hosp. March 1915. Outbreak of typhoid involving 25 persons Jan. 1915 - traced to pudding prepared by cook Mrs. Brown who proved to be Mary Mallon. Emp. at above since Oct. 1914. Was apprehended and sent to Riverside March 1915, where she is 2/15/16. Stools from her periodically are positive. Denies ever having typhoid to Dr. McAdam- 11/5 to notify River. to send specimen. Dr. McAdam inf. 12/10/18. Refused to give stools doctor inf. 1/3/19. Dr. West says he will try again 3/12/17. To B.H. 8/8/22- Chronic Carrier.
5/24/23 Made Chronic Carrier.

SPECIMENS				COMMENTS
Widal + DATE & RESULT	Stools + DATE & RESULT	Stools + DATE & RESULT	Stools — DATE & RESULT	
12/11/23 12/14/23	60 positive		4/7/19 no growth	Board Action
12/18/23 12/20/23	stools from 3/16/16		7/7/20 neg.	5/24/23
12/27/23	to 12/7/23		12/21/21 neg.	
			12/8/20 No growth	(over)
			neg. 9/12 9/6 too old 9/28- 9/8 & 9/11 incomplete	
			inc. 8/16/24 overgrown 8/19 -10/10/24	

Extra copy for file

Figure 4: Mary Mallon's medical history card. New York County Clerk Archives

To suffer the fate of Mary Mallon – the ethical challenges of depriving liberty for public health protection *(continued)*

Stevie Clayton, former Chief Executive of the AIDS Council of NSW, has noted:

... public health objectives would be most effectively realised if human rights are respected, a principle that holds public health and human rights issues as complementary rather than oppositional. Respect for human rights protects those who are vulnerable and marginalised, establishes trust for efforts to access populations that are hard-to-reach, promotes confidence in health services, and secures the cooperation necessary for preventing further transmission. [27]

The behaviour of the relevant individual is also pivotal in determining what public health interventions will be considered necessary. Whenever possible though, public health officials will prefer an educative approach and, consistent with the thoughts of Stevie Clayton, to enlist the cooperation of the relevant individual rather than resort to powers under the PH Act.

In many instances a person who fully understands the risks associated with their condition will cooperate in both seeking treatment and taking reasonable steps to avoid exposing others. Whilst this will not be true of all people, it is perhaps incumbent upon public health officials to explore such an approach as a first avenue. To presume in the first instance that an individual will be noncompliant or bears a mal intent is to immediately choose a more complicated and combative path, and to increase the likelihood of the individual's human rights being contravened, to some extent, in the process.

In the case of Mary Mallon, from his own account it is likely that George A. Soper's attempts to educate Mary Mallon and seek her cooperation were dramatically unsuccessful. Indeed Soper's first interaction with Mary Mallon served only to rapidly escalate matters to a degree in which Mary Mallon felt highly persecuted. As a result she dodged health authorities as often as possible, and was steadfastly defiant when she could not.[1-3,7]

Of course changes in society itself would also make it near impossible for the extremes of Mary Mallon's case to occur in the ACT today. The number of outbreaks that Mary Mallon is known to have caused was largely attributable to her own ignorance, her ability to dodge health authorities, and her ability to gain further employment as a cook without detection or recognition.

Today we are in an era of rapid and varied forms of media, social media, mobile communications and computing, and data retention and accessibility. The ACT itself has a highly educated and informed population, living in a geographically condensed area. It is therefore challenging to believe that short of suffering from a mental impairment or mental health issues, or carrying some malicious intent, that an ACT resident in modern society could not, and would not, inform themselves of their diagnosed illness and the potential risks to both themselves and others.

It is also hard to imagine that a person could readily evade public authorities, whilst continuing to gain employment with others without being recognised. Nevertheless, there are some forms of employment for which identification and tracking of individuals is quite challenging, particularly those of a casual nature or which are paid cash-in-hand. This was experienced first-hand by ACT authorities in 2009 when attempting to deal with an HIV infected sex worker. In that case, locating the individual due to their transient lifestyle was challenging, and determining if they were continuing to work as a sex worker contrary to a public health direction even more so.

Ultimately, it is ACT legislation that guarantees that the fate of Mary Mallon could not befall someone here. The powers under the PH Act are as strong, if not better, than those that were in the Greater New York Charter during Mary Mallon's life, but the threshold requirements for the appropriate use of those powers is clearer and more succinct.

Nevertheless, the HR Act ensures that deprivation of a person's liberty, without a conviction, can happen in only exceptional circumstances, and where those circumstances do exist, the confinement be for the shortest period necessary. Detention for several years without a conviction would not survive being challenged in the ACT Supreme Court.

A final consideration is that Mary Mallon was never charged with any crime in New York. Yet when Mary Mallon was released from her first three year stint in quarantine it was under the condition that she no longer work as a cook. Her failure to comply with this direction by public health officials, and the fact that she resorted to an alias in order to resume work in this field, would most likely be prima facie evidence of culpability for the next outbreak she caused and the deaths that resulted. Legal action, including prosecution, would certainly be explored were the story of Mary Mallon to play out today in the ACT.

Fig. 5.1. *"Typhoid Mary" breaking skulls into skillet, 1909.*

Photograph: The New York American

To suffer the fate of Mary Mallon – the ethical challenges of depriving liberty for public health protection *(continued)*

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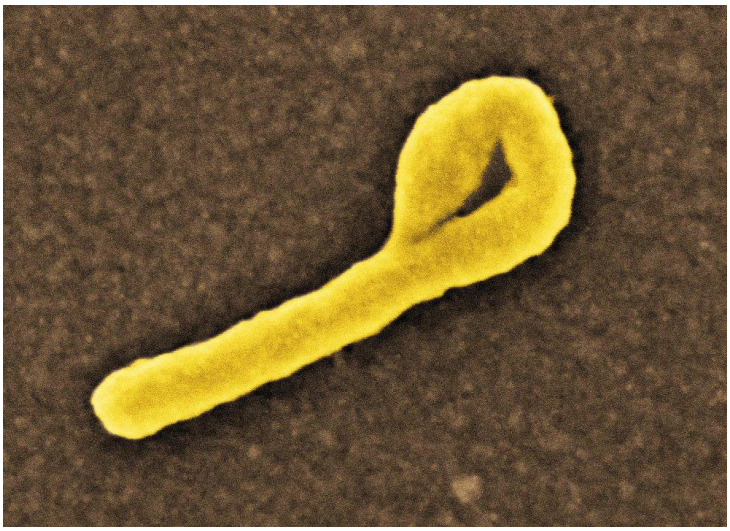
Ebola Virus Disease - How did it become a problem and what have we done to prepare?

Dr Ranil Appuhamy, Office of the Chief Health Officer, Population Health Division

The current West African Ebola outbreak has been the largest ever, causing over 26,000 cases and over 11,000 deaths. A multitude of factors led to the disease spreading rapidly and to such a scale. The global impact of this has been unprecedented. Australia implemented a range of public health and border measures as a response to the outbreak. In the ACT there has been extensive and ongoing work with hospitals and other stakeholders to deal with the threat of Ebola.

The spread of the epidemic

Ebola, a disease with a mortality rate of up to 90%, is caused by the Ebola virus. It was discovered in 1976 after outbreaks in Southern Sudan and Zaire.[1] Although there have been over 20 outbreaks since its discovery, they have been mostly limited to remote jungle areas in equatorial Africa. However, the ongoing outbreak in West Africa changed all that. By 13 May, there were 26,724 cases and over 11,000 deaths notified in Guinea, Liberia and Sierra Leone.[2] It also spread beyond these countries into Nigeria (20 cases), Mali (eight cases) and Senegal (one case). Further afield, there were also cases in the United States (four cases), Spain (one case) and the United Kingdom (one case).[3]



Photograph: Ebola. National Institute of Allergy and Infectious Diseases (NIAID). Public Health Image Library

So how did this outbreak get this big and why has it become a global issue? Also, given the fact that the outbreak is ongoing and has been exported to other countries, what have we done to prepare for it?

To explore this, we go back to how this outbreak began. The index case was an 18 month old boy, from a remote village in Guinea, who developed signs of the illness on 26 December 2013 and died two days later.[4,5] By early January, several of his family members and health care staff who treated them, also developed the disease and died.[4] The disease soon spread to the capital, Conakry and to the neighbouring countries of Liberia and Sierra Leone where it began to spread rapidly.

There are a number of factors that led to the explosive spread of the Ebola Virus Disease (EVD) epidemic in West Africa. Unlike equatorial Africa, which had experienced numerous Ebola outbreaks in the past, this was a new phenomenon for clinicians, laboratories, the public and governments in West Africa.[4] To add to this, Guinea, Liberia and Sierra Leone, having only recently emerged from years of conflict, are among the poorest countries of the world with weak public infrastructure.[4] For example, Guinea's largest public hospital lacked piped oxygen or mechanical ventilators and had an unstable water supply which made infection control a challenge.[6] Cultural practices, such as the reliance on traditional healers and burial practices also contributed to the spread of EVD. It is estimated that by August 2014, 60% of EVD cases in Guinea were linked to these practices.[4] These countries already had a very limited health care workforce. This was further depleted by the deaths of health care workers due to EVD, making the delivery of essential healthcare a greater challenge.[4] Furthermore, the high mobility of populations between these contiguous countries, and community resistance to government authorities, made contact tracing difficult.[4]

A global issue

With the mounting number of cases in those countries and the exportation of the disease to Nigeria on 20 July 2014 by a Liberian air traveller, the fear of international spread became a reality. Soon after this, on 8 August 2014, the World Health Organization (WHO) declared the EVD outbreak a "Public Health Emergency of International Concern" under the International Health Regulations.[7] It was recognised that this outbreak was an extraordinary event, a public health risk to other states, that the consequences of international spread was serious and that a coordinated international response was required to halt the spread of the disease.[7] On 27 August 2014, WHO released a "roadmap" outlining strategies for countries to respond to the outbreak.[8]

The global response to this outbreak was unprecedented with the World Health Organization (WHO), other UN agencies, and Non-Governmental Organisations like Médecins Sans Frontiéres (MSF) and the Red Cross responding rapidly. The Australian Government contributed financially to the EVD response and contracted a private, ACT-based health care provider to run an Ebola treatment facility in Sierra Leone.[9]

Photograph: Cleopatra Adedeji. Public Health Image Library

Ebola Virus Disease - How did it become a problem and what have we done to prepare? *(continued)*

Australia prepares

Countries around the world, including Australia, also prepared for an EVD outbreak in their own countries. Australia has a strong health care system and a robust public health surveillance and response capacity, which were stepped up to plan and prepare for the potential importation of EVD to the country.

At a national level, regular meetings were held by key public health committees including the Australian Health Protection Principal Committee (AHPPC), consisting of all state and territory Chief Health Officers, the Communicable Disease Network of Australia (CDNA), the Public Health Laboratory Network (PHLN) and the Infection Prevention and Control Expert Advisory Group (IPCEAG) to plan the public health response. National guidelines were rapidly developed to enable a scientifically sound, evidence-based, and consistent approach to managing the threat of EVD. Extensive planning and preparation was done at the jurisdiction level including the development of specific response plans, designating hospitals to treat suspected cases and ensuring that there were adequate facilities and equipment available to treat cases.[10]

Several border measures were also implemented as a response to the outbreak. All international flights are required to make in-flight announcements to notify airline staff if they are unwell. Passengers were also required to fill in a travel history card that identified if they have been in an EVD affected country in the previous 21 days. Travellers who identify as such, are asked a series of screening questions and have their temperature checked.[11] If required, they are further assessed by a Human Quarantine Officer. Health care workers returning from EVD affected countries are closely followed up by local public health units according to national guidelines.[12] There was also a temporary suspension of visas for EVD affected countries.[13]

The ACT has well developed emergency management plans, including an Epidemic Infectious Diseases Plan to manage infectious diseases. These plans are regularly tested through emergency exercises coordinated by the Population Health Division.

The two major hospitals in Canberra have developed plans for the triage, isolation, management and transfer of potential EVD cases presenting to the hospitals. The ACT liaises regularly with other jurisdictions and the Commonwealth Department of Health in EVD Preparedness activities. ACT Health has done a considerable amount of work with hospitals, airport authorities, the ACT Medicare Local, the ambulance service and other stakeholders to review, plan and test EVD preparedness activities.

Photograph: Canberra Hospital campus. ACT Health

In March 2015, ACT Health conducted a one-day exercise to validate the preparedness of the ACT health sector to identify, transport and treat a suspected case of EVD (see page 20).

Where to from here?

The current EVD outbreak in West Africa is settling with a steady decline in case counts.[2] The outbreak was declared over in Liberia on 9 May 2015.[2] Although the West African EVD outbreak will eventually end, a positive impact of the EVD outbreak has been the extensive planning and preparation, which will be an invaluable foundation for dealing with future infectious disease threats when they do arise.

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Exercise Melilla – Functional Ebola Management Exercise

Chris Kelly, Preparedness and Response Section, Population Health Division

At its peak, the Ebola Virus Disease (EVD) outbreak that began in Guinea in late 2013 was spreading largely uncontrolled within four West African countries and was described as the largest EVD outbreak on record. The World Health Organization declared the outbreak "a public health emergency of international concern" on 8 August 2014.

In response to the outbreak, significant national and state/territory planning was undertaken in preparation for the management of an imported EVD case in Australia. The ACT health sector began actively planning for the management of an imported EVD case by September 2014. By early 2015, the majority of ACT Ebola management plans, policies and procedures were completed and in place. ACT plans and policy documents include the ACT Epidemic Infectious Disease (EID) Plan, Public Health Ebola management manual and clinical management policies for hospitals and the ambulance service.

Around this period the number of returned healthcare workers from EVD affected countries to Australia and the ACT had steadily increased. This may be due, in part, to the Commonwealth Government awarding a contract to an ACT based medical services provider in November 2014 to establish a 100 bed EVD treatment unit in Sierra Leone.

The ACT Chief Health Officer (CHO) coordinates emergency preparedness for the ACT health sector through the ACT Government Health Emergency Management Sub Committee (HEMSC). The HEMSC is supported by the Preparedness and Response Section (PaRS) of the Health Protection Service (HPS). The HPS has long understood the value of exercising and has been increasingly utilising emergency exercises as a tool to validate and strengthen health sector emergency preparedness. The HPS maintains an ongoing work plan that includes the development and conduct of regular emergency exercises.

Multi disciplinary team discussion exercises had been conducted at Canberra and Calvary hospitals in late 2014 to assist with the development of clinical Ebola policy and related facility logistics. In December 2015 the CHO requested that the PaRS develop a functional exercise to both practice and validate ACT Ebola preparedness and coordination across key agencies.

The PaRS formed an exercise working group in late January 2015 with representatives from Calvary Health Care ACT (Bruce) (CHC), Canberra Hospital and Health Services (CH&HS), the ACT Ambulance Service (ACTAS) and the Population Health Division (PHD) including the HPS.

An external contractor was engaged to assist with exercise development, conduct and evaluation. Over six weeks the exercise working group scoped and developed the exercise. The working group drafted exercise documentation, developed the exercise scenario, an exercise communications plan, an exercise risk register and evaluation templates.

A functional one day EVD exercise, called Exercise Melilla, was conducted on Thursday, 26 March 2015. Previous EVD discussion exercises had been named after Spanish cities and the functional exercise was named after Melilla, a Spanish city located on the north African coast.

Exercise Melilla was a complex functional exercise that incorporated approximately 60 participants across four different sites. 15 exercise control staff were appointed to both manage and evaluate the exercise.

The overall aim of Exercise Melilla was to validate the preparedness of the ACT health sector to identify, transport and treat a suspected case of EVD. The scenario involved a role-player patient as a recently returned healthcare worker from an EVD affected country presenting at CHC, activation of public health protocols by the Communicable Disease Control (CDC) section within the HPS, transport of the patient to Canberra Hospital by the ACTAS, and activation of the CH&HS protocols.

Photograph: Staff at Calvary Hospital participate in Exercise Melilla. ACT Health

Exercise Melilla – Functional Ebola Management Exercise *(continued)*

The exercise was conducted in real time, with the ACT health sector managing the presentation as closely to real-life as practicable including: implementation of all relevant infection control procedures, patient care, staff welfare, notifications and plan escalations.

A key organisational risk identified early on the development of Exercise Melilla was the potential for the exercise to impact on clinical service provision, as it was conducted in clinical areas. It was imperative that conduct of the exercise did not adversely interfere with clinical service provision across participating agencies beyond tolerable levels. To mitigate this risk each participating agency appointed a safety officer to monitor the impact of the exercise on clinical operations. During the exercise the safety officer had the power to recommend a pause of the exercise if necessary. Additionally an exercise control officer was assigned to escort the simulated EVD case at all times during the exercise. The officer had authority to suspend the exercise at any time if patient safety or clinical service was believed to be compromised.

Activation of the Health Emergency Control Centre (HECC) was included in the scope of Exercise Melilla and staff from the PHD undertook HECC roles in response to the scenario. Media and public communication in the exercise extended to the messaging expected of the broader ACT Health emergency response.

Photograph: Dr Andrew Pengilley gives a simulated press conference as a component of Exercise Melilla. ACT Health

Evaluation of the exercise is ongoing. At the time of writing, a formal exercise report was being drafted. The report will include high level recommendations for strengthening EVD response across the ACT. When the report is finalised it will be considered by the CHO and provided to relevant committees and agencies for information and action.

The PHD continues to manage returning travellers from EVD affected countries in accordance with national and local protocols. Anecdotal evidence suggests that Exercise Melilla was a timely and valuable opportunity to practice infectious disease response coordination. ACT Health subsequently responded to a real Person Under Investigation (PUI) for Ebola just 15 days after Exercise Melilla. On 10 April 2015 an ACT healthcare worker who had recently returned from an EVD affected country reported early Ebola-like symptoms. A coordinated multi-agency emergency response was required to transport, isolate and investigate the PUI. The PUI was subsequently determined to not have EVD and was released to home monitoring for the remainder of the prescribed 21 day monitoring period. Staff involved in Exercise Melilla and the subsequent PUI event reported that they benefited from participation in the simulation and were better prepared and more confident in managing the real event as a result.

Middle East respiratory syndrome coronavirus (MERS-CoV)

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Since emerging in 2012, the Middle East respiratory syndrome (MERS) has resulted in more than 1,000 laboratory confirmed cases and 400 deaths. The high mortality rate and epidemic potential of this disease has led to concerns by health authorities of a widespread epidemic, as seen with Severe Acute Respiratory Syndrome SARS in 2002. This article discusses the recent emergence of MERS and its public health importance.

Middle East respiratory syndrome (MERS) is an emerging viral respiratory illness caused by the MERS Coronavirus (MERS-CoV) which was first reported in Saudi Arabia in 2012.[1] MERS infection causes severe and acute respiratory illness and can result in death. Sporadic cases have been reported in several countries in the Middle East or in people with a recent travel history to the region. To date, the World Health Organization (WHO) has been notified of 1,075 laboratory-confirmed cases of infection with MERS-CoV, including 404 related deaths.[2]

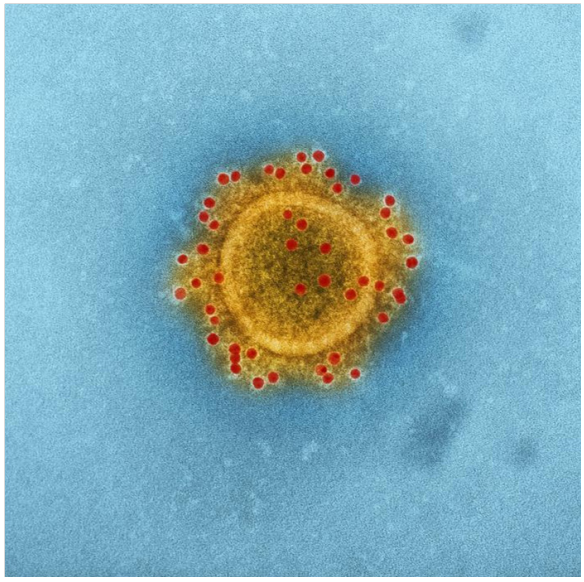
Emerging infectious diseases such as MERS pose a potential threat to global health due to their high mortality rate and epidemic potential. Of greatest concern for health authorities is the risk of transmission among the estimated two million pilgrims who travel to Saudi Arabia for the Hajj each year.[3] The region is also host to a number of major travel hubs, including Dubai, one of busiest air transit cities in the world. The large number of passengers could rapidly disseminate the virus internationally. Public health authorities around the world continue to plan and implement disease control interventions designed to reduce the potential impact of any imported cases.

Coronaviruses are generally associated with mild seasonal respiratory illness similar to the 'common cold'. However, MERS-CoV is closely related to the coronavirus that caused the deadly SARS epidemic, emerging in the Guangdong province of China in 2002, resulting in over 8,000 cases and around 800 deaths.[4]

MERS is believed to originate in animals and while the natural animal reservoir for the virus is unknown, the virus has previously been isolated in bats[5] and a number of studies have found evidence of MERS-CoV infection in camels in a number of Middle Eastern countries.[6,7] While it is not clear how people initially become infected with the virus, person to person transmission is thought to primarily occur through respiratory droplets and direct contact. Clusters of person to person transmission have been documented among family members with close contact with a MERS case or in healthcare facilities.[8]

Active case finding has been critical in detecting new cases and increasing our knowledge about the course of disease and how it is spread. The implementation of public health measures in Saudi Arabia, including the screening of respiratory patients and contact tracing have been used to limit transmission of disease in the community.[8] While infection control measures are critical to prevent the possible spread of MERS-CoV in a health care setting, certain groups of people appear to be at high risk of contracting MERS. These groups include people with underlying medical conditions such as diabetes, kidney failure, or chronic lung disease, and people who have weakened immune systems.[10]

Currently there is no evidence of widespread or sustained human to human transmission. A greater understanding of the source of infection and the primary mode of transmission in humans is needed to help develop strategies for the effective control of this emerging disease.



Photograph: Image of a Middle East Respiratory Syndrome Coronavirus (MERS-CoV) using an electon microscope. National Institute of Allergy and Infectious Diseases

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ACT Health Winter Plan

Chris Kelly, Preparedness and Response Section, Population Health Division

In recent years ACT Health has adopted a seasonal approach to the management of consequences of natural hazards, including hazards with the potential to impact ACT health sector infrastructure, as well as the community that ACT Health serves. Traditionally ACT summers see an increase in risks associated with the natural hazards of extreme heat, elevated bushfire danger and severe storms. Conversely, winter brings regular outbreaks of infectious disease, including influenza and gastroenteritis. Such outbreaks cause significant mortality and morbidity in the ACT community, and can place a substantial burden on the Territory's health services, particularly general practitioners (GPs) and hospitals.

The ACT Chief Health Officer (CHO) coordinates emergency preparedness for the ACT health sector through the ACT Government Health Emergency Management Sub Committee (HEMSC). The HEMSC is responsible for the preparation, testing and maintenance of the ACT Health Emergency Plan (HEP). The HEP provides a strategic framework describing how the health sector responds and manages all-hazard emergencies.

HEMSC members are derived from across the ACT health sector. The terms of reference for the HEMSC includes identifying risk elements related to ACT health sector emergency management, and providing advice on mitigation strategies to manage these risks. The committee also acts as a resource for the review of internal and external emergency management plans of agencies and organisations within the ACT health sector.

In 2013 the HEMSC first developed a seasonal appendix to the HEP. The seasonal appendix (part A Summer and part B Winter) provides detailed guidance to business units and partner agencies affected by the demands created by specific seasonal hazards.

Annual winter planning was initiated to better capture, coordinate and align ACT health sector winter preparedness activities. The ACT Winter Plan (the Plan) documents key agency preparedness activities from ACT Medicare Local, Calvary Health Care ACT (Bruce), the Canberra Hospital and Health Services and the Population Health Division. Activities captured in the Plan include stockpiling of essential medicines and equipment, streamlining infectious disease testing, improving surveillance arrangements, and developing health facility escalation plans to manage a surge in demand. Details of these preparedness activities are provided on the ACT Health website each year.

A formal communications strategy for the Plan was first developed in 2014. The objectives of the Winter Plan Communications Strategy are to:

- communicate the risks associated with winter disease outbreaks to key stakeholders and the ACT community;
- broadly describe the strategic preparedness and mitigation activities being undertaken across the ACT health sector; and
- provide advice to the ACT community including vulnerable groups on relevant health protection measures.

The strategy requires scheduled communications to key audiences over three identified phases: pre winter, winter and severe winter. The primary target audience for the communications strategy includes vulnerable groups that have a higher risk of developing life threatening complications from influenza (and their carers). Secondary target audiences include ACT Health staff, volunteers and visitors to ACT Health facilities; private hospital staff, volunteers and visitors; GPs and other health professionals; aged care facility staff, volunteers and visitors; the media; and other ACT Government agencies.

The communications approach utilises targeted messages via various formats tailored to the relevant winter phase. The phases are:

- Pre Winter - messages encourage the target audience to *prepare* themselves and their family;
- Winter - messages encourage the target audience to *protect* themselves and their family;
- Severe Winter - messages on how to enhance personal and organisational resilience.

The expected outcomes of the Plan include having appropriate preparedness and response mechanisms in place to effectively mitigate the risks and manage the consequences of winter outbreaks of infectious disease. This is achieved through:

- promoting simple measures that the community can take to protect themselves and family from winter illness;
- increasing staff awareness, knowledge and compliance with related agency policy;
- enhancing rates of ACT Health staff influenza vaccination;
- enhancing rates of influenza vaccination in high risk groups; and
- monitoring the number of influenza vaccines distributed to GPs for those eligible for free vaccine under the National Immunisation Program.

ACT Health's approach to seasonal planning was recently recognised with a Highly Commended citation in the State/Territory Government category of the 2014 ACT Resilient Australia Awards. The Resilient Australia Awards program is an Australian Government initiative sponsored by the Commonwealth Attorney-General's Department. The Resilient Australia Awards provide an opportunity to recognise and promote initiatives that are making Australian communities safer, stronger, more resilient and better prepared for disaster. The awards cover a broad range of initiatives across the emergency management spectrum and undertaken by a wide variety of sectors.

The 2015 Winter Plan is well advanced and was released on 26 May 2015.

Measles – no longer a problem?

April Roberts-Witteveen, Communicable Disease Control, Population Health Division

Measles elimination has been achieved in Australia. There are examples from around the world in both developed and developing country contexts of measles re-emerging following control and/or elimination. Australia needs to be vigilant so its prevention and control programs remain relevant and useful in ensuring measles is not able to re-emerge.

Measles is a highly contagious viral infection, transmitted through nasal and throat secretions of infected people. It is caused by the measles virus, which has its reservoir in humans only. It is one of the most infectious communicable diseases for humans.[1] However, within the context of high vaccination rates, sensitive surveillance and timely and efficient public health responses, the eradication of measles is theoretically and technically possible. In places where measles is eliminated, all cases acquire their infections in a country where infection is endemic, or through contact with such a person, and there is no ongoing transmission.

Photograph: Measles. Jim Goodson M.P.H. Public Health Image Library

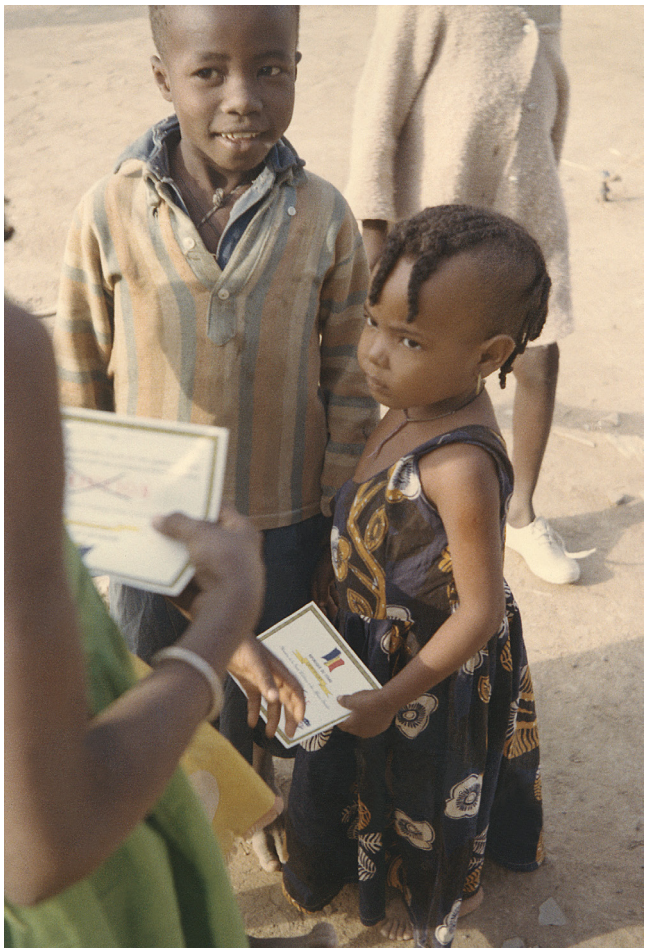
On 20 March 2014, the World Health Organization announced that Australia and other countries in the Western Pacific region had achieved measles elimination.[2] This is a significant public health achievement. That said, measles outbreaks occur frequently in Australia, including the ACT, usually initiated by travellers returning from countries where measles is endemic. Moving forward, Australia should learn from other developed countries that measles is prone to re-emergence and sustained effort is needed to maintain elimination.

In the United States of America, measles elimination was achieved in 2000[3] following concerted efforts to achieve high levels of 'two dose' vaccination in children. Subsequently, vaccination coverage has decreased. In some areas vaccination coverage is significantly below the levels needed to maintain herd immunity. In the UK, elimination was achieved in 1998 but was fleeting in the face of erroneous claims linking measles-mumps-rubella (MMR) vaccine to austism disorders.[4] A similar phenomenon was observed in France.[5] Two specific scenarios are examined in more detail below.

In the United States in 2014, the number of measles cases reported was the highest in two decades. Most recently, a large outbreak associated with Disneyland has caused infection in 146 people in seven states.[3,6] While the index case has not been identified, it was likely to be an international traveller. Of the 110 Californian cases, 49 (45%) were unvaccinated, five (5%) were partially vaccinated (one dose of MMR) and nine (8%) were fully vaccinated (two or three doses of MMR) and 47 (43%) had unknown or undocumented vaccinated status. Of the unvaccinated cases, 12 (11%) were too young to be vaccinated and 28 (25%) were intentionally unvaccinated.[7]

It was estimated that the vaccination rate in the exposed population at Disneyland in which secondary cases have occurred might be as low as 50% and no higher than 86%.[8] In this context, population vaccination rates were not sufficient to provide protection to the unimmunised or even those who were immunised but still susceptible. This is an explanation for why nine fully vaccinated individuals were infected at Disneyland.[7] Reasons for vaccinated people remaining susceptible are that between two and ten per cent of those fully immunised for measles do not develop sufficient immune responses to offer protection if exposed to measles and waning immunity over a lifetime increases measles susceptibility in the elderly.[9] Reasons for low vaccination rates include lack of access to vaccination and increasing refusal of MMR vaccine by adults and their children because of safety concerns.[4,9] The challenges for public health systems in developed countries include maintaining high vaccination coverage, and to develop more acceptable and immunogenic vaccines which provide stable immunity from a young age to old age.[1]

The capacity for measles to re-emerge is also currently being witnessed in West Africa. Health systems in Guinea, Sierra Leone and Liberia are recovering after being challenged by a devastating Ebola Virus Disease (EVD) outbreak. Prior to the outbreak, approximately 96% of children aged between nine months and five years were vaccinated against measles. After 18 months of disrupted health services, including vaccination programs, the susceptible population has expanded rapidly. Modellers have shown how an outbreak of measles is much more likely, and that it may affect many people, and result in serious illness and up to 16,000 additional childhood deaths.[10] There is an urgent need for mass vaccination campaigns to be rolled out to avoid the re-emergence of measles in these countries.



Photograph: Measles vaccination in Africa. CDC. Public Health Image Library

Measles – no longer a problem? *(continued)*

The health consequences of the re-emergence of measles have been documented. Impacts can be seen in people of all ages. In France, overall infection rates and ear, nose and throat complications are highest in children aged under one who are ineligible for vaccination. However, pulmonary complications and hospitalisation increased with age, peaking for people in their thirties.[5] Similar findings came out of a review of cases in the USA, where case fatality rates were highest in adults aged over 30 years of age.[4]

Australia is well placed to maintain elimination because of structures and programs already in place. However, it can be difficult to maintain high vaccination coverage when disease incidence is low. Creating innovative strategies to improve vaccination in those who decline will be key to maintaining elimination. Avoiding the return of sustained transmission of measles deserves ongoing commitment and effort so that people at every stage of life will be protected.

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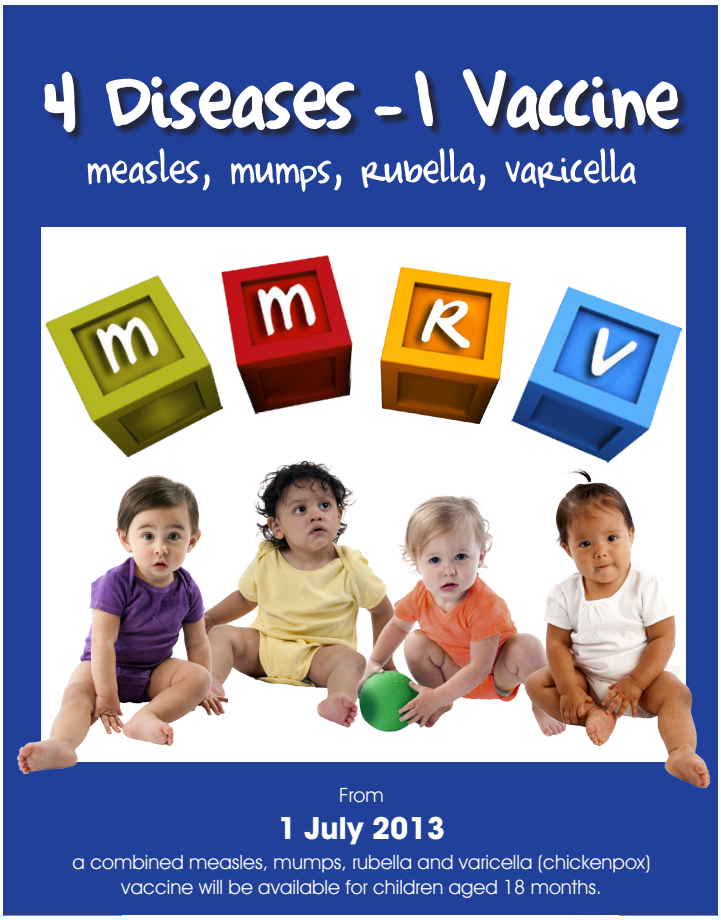

For further information
http://www.immunise.health.gov.au
or
http://www.health.act.gov.au/our-services/immunisation

Bat-Related Diseases

Ahalya Krishinan and Dr Mark Stickley, Communicable Disease Control, Population Health Division

In Australia, there are two major emerging infectious diseases which bats have a role in spreading – Australian Bat Lyssavirus and Hendra virus. The diseases caused by these viruses are fortunately uncommon in humans, but are severe and often fatal. Australian Bat Lyssavirus is transmitted directly from bats to people, is similar to rabies and is preventable with rabies vaccination and rabies immunoglobulin. Hendra virus is transmitted to humans from infected horses. There is no Hendra virus vaccine available for use in humans and no known cure.

Australian Bat Lyssavirus

Australian Bat Lyssavirus (ABL) is from the same family and genus as rabies (family Rhabdoviridae, genus Lyssavirus). ABL was first discovered in 1996 near Ballina, NSW from brain material taken from a fruit bat. Later that year, a woman in Queensland who was scratched multiple times by a bat died from rabies-like illness.[1] There have been a total of three documented human cases of ABL in Australia. All ABL infected persons have died from encephalitis.[2] The disease is shed in saliva and neural tissue and is transmitted to humans usually via bites or scratches.[3] There is no known risk of contracting ABL through contact with bat urine or faeces. In many respects, ABL is similar to rabies. Like rabies, ABL enters the body through sensory nerves and the virus can replicate in the muscle cells or attach to nerve endings. It then travels to the central nervous system (CNS) where it replicates rapidly and disseminates to the brainstem, thalamus, basal ganglia and spinal cord.[4]

Photograph: CDC Dr Sikes. Public Health Image Library

ABL has been identified in all flying fox species and the insectivorous microbat. All Australian bats are considered potential carriers of ABL. Transmission to horses is known to have occurred and there is potential for ABL to be transmitted to other mammals.[5]

Clinical ABL infection in humans has a varied incubation period and the presentation is consistent with encephalitic rabies. The known incubation period for encephalitic rabies is between several weeks to several years. Symptoms may initially present as an influenza-like illness for several days followed by cerebral dysfunction, agitation, anxiety and confusion. Once signs of rabies appear, coma and death are inevitable.[2,6] There is no cure for ABL. If ABL exposure is suspected, post exposure treatment with rabies vaccine and/ or rabies immunoglobulin should be administered as soon as possible to prevent ABL disease.[2]

Hendra Virus

Hendra virus was first discovered in Brisbane in 1994 in an outbreak involving 20 horses and two people.[7] There have been seven cases reported in people, resulting in four fatalities.[8] It is of the family Paramyxoviridae, genus Henipavirus. Its natural host is the flying fox, which likely infects horses through contamination of their feed by secretions including urine, faeces and birthing products, or spats (fibrous residue of chewed plant material).[7] Human infections have only occurred in people exposed to the respiratory secretions or blood of sick horses.[8] There has been documented horse to horse transmission. There has been one case of infection in a dog, which did not display symptoms but was euthanised.[7]

Hendra virus has been identified in horses along the east coast from Cairns in Far North Queensland to Macksville in New South Wales and at Chinchilla in inland Queensland.[7] Antibodies to Hendra virus have been found in all four species of Australian flying foxes, indicating that there is potential for the virus to spread more widely.

Hendra virus disease in humans causes an influenza-like illness and encephalitis, occurring after an incubation period of 5 – 21 days. In one instance, the infected person initially recovered before relapsing 13 months later. The Hendra virus has been associated with four deaths, with three deaths resulting from encephalitis and one from pneumonitis with multi-organ failure. Three people have survived Hendra virus infection, two have recovered fully and one has persisting neurological deficits.[7] There is no vaccine for human use and no known cure.

Photograph: Tina Phillips. FreeDigitalPhotos.net

Bat-Related Diseases *(continued)*

Prevention (#dontpatthebat)

Prevention of ABL infection in humans is only achievable through avoidance of bat contact or pre-exposure vaccination to those people who are likely to handle bats in Australia. These include bat handlers, veterinarians, wildlife officers, and any other persons who come in direct contact with bats.[9] Post-exposure prophylaxis which might consist of rabies vaccine and rabies immunoglobulin is effective at preventing ABL disease. For this reason, all potential exposures should be notified to the Communicable Disease Control section of the ACT Health Protection Service on 6205 2155 (for ACT residents).

There are two components to preventing human Hendra virus infection. The Australian Veterinary Association recommends several practices to minimise the risk of transmission from bats to horses, including vaccinating horses, placing feed and water containers under cover, removing horses from paddocks containing trees that attract flying foxes, and employing strategies to quarantine sick horses.[10] Transmission from horses to humans can be prevented by strict hand hygiene and the appropriate use of personal protective equipment by veterinarians and horse owners attending to horses where exposure to blood or body fluids is likely.[7,8]

A mainstay of the prevention of both diseases is public awareness regarding the risks of exposure, targeted to groups at highest risk. In the case of ABL, messages need to be aimed at the general public and wildlife carers; for Hendra virus the focus should be veterinary clinicians and horse owners.

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Photograph: Don Pfitzer. United States Fish and Wildlife Service

Antibiotic resistance

Professor Peter Collignon AM, Infectious Disease Physician and Microbiologist, Canberra Hospital and Health Services

Antibiotic resistance is a growing problem not only in Australia but internationally. It is a problem both in hospitals and in the community and needs to be tackled on multiple fronts. Having good data on antibiotic usage and the resistance patterns of pathogens, for both people and animals worldwide is an important step to be able to better manage this problem. We need to ensure that food and water sources do not become the primary source of multidrug-resistant micro-organism or their resistance-genes. We need better approaches that allow us to successfully restrict what and how antibiotics are used in these different environments.

Antibiotic resistance is a growing problem not only in Australia but internationally.[1-14] This has led to increasing numbers of serious infections that are very difficult, or sometimes impossible to treat. Increasing resistance involves nearly all bacteria that infect people, including very common ones such as *Escherichia* coli (E.coli) and *Staphylococcus* aureus. Recent data from India suggest that over half of community onset urinary tract E.coli infections (the commonest bacterial pathogen in people) are for practical purposes, untreatable.[11] We remain "lucky" in Australia. Even though rates are rising here, comparatively on an international scale, we continue to have amongst the lowest resistance rates for most bacteria.[14]

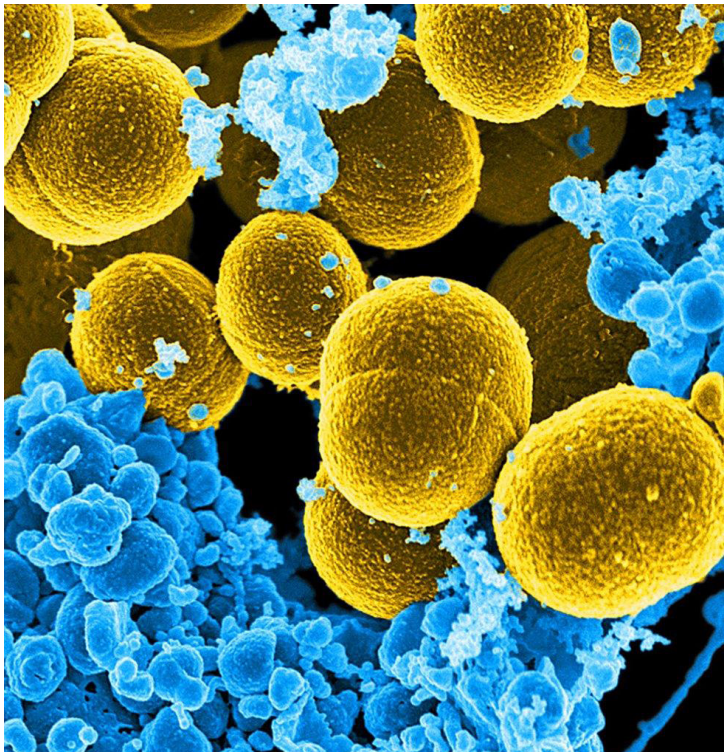
Photograph: E.Coli. CDC. Public Health Image Library

"Superbugs" are bad for us. People with infections caused by resistant isolates have much higher death rates as well as increased complications and suffering. Antimicrobial resistance also has important economic costs such as the use of more expensive drugs, waste and increasing the length of hospital stays.[2-5]

Antibiotic resistance develops and spreads wherever antibiotics are used.[12-18] With people, this is not only in medical facilities but in the community. Poor infection control, poor water sanitation and poor hygiene all facilitate the spread of resistant bacteria from person to person. The majority of antibiotic usage worldwide is in animals that are consumed as food. This usage leads to the development of resistant bacteria, which spread to people via the food chain and/or water.[4-10]

The general perception of antibiotic resistance is that it is almost entirely related to the amounts of antibiotics used, not only in the broad sense of comparative usage by different countries but also in individuals. However, this is only part of the story as these two variables are not perfectly correlated at national levels and across countries. We have recently shown "governance" is likely to be as important in controlling the development and spread of antimicrobial resistant bacteria. The worse the "control of corruption" in a country, the higher the levels of resistant bacteria that were seen causing life threatening blood-stream infections.[1] Thus, there are other factors in addition to antibiotic usage that are as important, or even more important, to account for the variations in resistance observed between regions and countries.

Hospital and health care related infections are common. Resistant bacteria are a major part of this problem. This includes bacteria such as methicillin-resistant *Staphylococcus* aureus (MRSA) and vancomycin-resistant enterococci (VRE). More recently, multi-resistant gram negative bacteria are an increasing problem. While many of these resistant bacteria develop and spread mainly in hospitals, an increasing and large proportion of MRSA and resistant E.coli originate in the community and are then introduced into hospital from the community.[9,10,14,18]



Photograph: MRSA Frank DeLeo, National Institute of Allergy and Infectious Diseases (NIAID)

Worldwide, increasing efforts are being made to try to decrease healthcare associated infections (HAIs), including *Staphylococcus* aureus bacteraemia (SAB). More than a decade ago, the landmark paper "To Err is Human: Building a Safer Health System" had a major impact on focussing the attention of policy makers, the public and health care workers (HCWs) on improving patient safety in health care facilities.[19,20] In response HCWs, hospitals and health authorities across the world have increased efforts to keep people safe from potential harm associated with receiving health care. Worldwide, SAB is a serious cause of morbidity and mortality, with associated mortality rates of 20 to 50 per cent and a significant associated economic burden.[2,3]

Antibiotic resistance *(continued)*

A recent Australian study over a 12 year period showed that combined efforts by nurses, doctors and health authorities to decrease these infections led to a major, sustained and significant reduction in HA-SAB (Hospital acquired *Staphylococcus* aureus bloodstream infection) in a large number of Australian hospitals since 2002, including MRSA. No other studies in other countries have reported such a large reduction in both MRSA and MRSA HA bacteraemia.[2]

Antibiotic resistance needs to be tackled on multiple fronts. Having good data on usage and resistance patterns for both people and animals worldwide is an important step to be able to better manage this problem. We need to ensure that food and water sources do not become the primary source of multidrug-resistant micro-organism or their resistance-genes. We need better approaches that allow us to successfully restrict what and how antibiotics are used in these different environments. "One Health" has become a major buzzword in recent years, but implementing this approach into practice seems to be something we have failed to pursue with any vigour.

Photograph: One Health. Centers for Disease Control and Prevention

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Section Highlight

Disease Surveillance Unit

The Disease Surveillance Unit is a part of the Communicable Disease Control (CDC) section at the Health Protection Service (HPS). The Unit is responsible for the coordination of the ACT Communicable Diseases Surveillance Program. The overall aim of the program is to reduce the incidence of infectious diseases in the ACT community by implementing disease control measures.

This program is legislated under the *Public Health Act 1997*, which requires certain groups of people (such as GPs, nurse practitioners and hospitals) to notify certain infectious conditions. In the ACT, there are more than 60 notifiable diseases and conditions that require notification, and these notifications are received and managed by the Disease Surveillance Unit.

The main roles of the Disease Surveillance Unit include:

- management of the ACT Notifiable Disease Surveillance Program;
- collection and recording of disease notifications, including the analysis of data and monitoring of disease trends;
- the follow-up and investigation of cases of notifiable diseases (in line with local and national guidelines) and the implementation of disease control measures to prevent the spread of these diseases in the community;
- investigation and management of disease outbreaks; and
- informing and developing disease prevention and control strategies.

Staff that work within the Disease Surveillance Unit include epidemiologists, public health nurses, a public health registrar, and surveillance officers.

Back (left-right) Irene Passaris, Lucas Mills, Dr Mark Stickley, Rebecca Hundy, Katie Penfold, Milica Stefanovic, Sue Reid
Front (left-right) Laura Ford, Kat Davis, Rachael Crane
Absent: Cameron Moffatt, April Roberts-Witteveen, Ahalya Krishinan

Notifiable Disease Report

Number of notifications of selected notifiable diseases received in the Australian Capital Territory between 1 January and 31 March 2015

	1st QTR 2015	YTD Average 2010-2014	Ratio YTD:YTD average	Annual Total 2014	5 year annual average 2010-2014
VACCINE PREVENTABLE CONDITIONS					
CHICKEN POX*	15	6.2	2.4	42	18.8
INFLUENZA A	63	20.8	3.0	1163	468.0
INFLUENZA B	10	2.8	3.6	96	100.2
MEASLES*	1	0.6	1.7	7	6.0
MENINGOCOCCAL DISEASE (INVASIVE)*	1	0.6	1.7	2	1.8
MUMPS	1	0.2	5.0	2	2.2
PERTUSSIS*	83	117.0	0.7	233	487.2
PNEUMOCOCCAL DISEASE (INVASIVE)	1	4.4	0.2	15	21.4
VARICELLA (UNSPECIFIED)	27	28.2	1.0	207	132.6
VARICELLA-ZOSTER INFECTION (SHINGLES)*	40	7.0	5.7	91	50.8
GASTROINTESTINAL DISEASES					
CAMPYLOBACTERIOSIS	122	142.8	0.9	507	481.4
CRYPTOSPORIDIOSIS	4	12.0	0.3	30	22.6
GIARDIA	39	37.2	1.0	147	116.0
HEPATITIS A *	1	1.4	0.7	5	3.6
SALMONELLOSIS	92	71.0	1.3	225	223.4
YERSINIOSIS	5	1.2	4.2	12	5.6
SEXUALLY TRANSMITTED INFECTIONS					
CHLAMYDIA	337	328.4	1.0	1197	1234.2
GONOCOCCAL INFECTION	42	32.0	1.3	119	101.8
VECTORBORNE & ARBOVIRUS					
BARMAH FOREST VIRUS INFECTION	2	1.4	1.4	1	3.0
DENGUE FEVER	8	4.2	1.9	16	16.0
LEPTOSPIROSIS	1	0.2	5.0	0	0.4
ROSS RIVER VIRUS INFECTION	9	5.0	1.8	5	10.0
RESPIRATORY CONDITIONS					
TUBERCULOSIS #	5	4.4	1.1	30	19.0

All Diseases except Tuberculosis are reported by onset date or closest known test date. Tuberculosis is reported by notification date.

* This condition includes cases that meet the probable and confirmed case definitions. Both probable and confirmed cases are nationally notifiable.

For the relevant year, Q1 refers to 1 January to 31 March, Q2 refers to 1 April to 30 June, Q3 refers to 1 July to 30 September, Q4 refers to 1 October to 31 December.

YTD refers to 1 January to 31 March.

N.B. Data reported are the number of notifications received by ACT Health. Data are provisional and subject to change.

The number of notifications received for all notifiable diseases in the ACT is available at http://www9.health.gov.au/cda/source/cda-index.cfm

HIV data are reported annually by the Kirby Institute: http://www.kirby.unsw.edu.au/surveillance/Annual-Surveillance-Reports

Notifiable Disease Report

Notes on notifications

Cases of interest and diseases with higher case numbers than expected between January and March 2015 compared to previous years.

Vaccine Preventable Conditions

There was one case each of measles, mumps and invasive meningococcal disease notified in the first quarter of 2015. A case of measles was notified in an unimmunised child who acquired their infection whilst travelling overseas. The case of mumps was in an adult with no history of vaccination. A case of invasive meningococcal disease was diagnosed in a child aged less than 1 year of age.

Pertussis

An increase in the number of pertussis notifications has been observed in the first quarter of 2015 (n=86) when compared to the same period in 2014 (n=45). Community-wide outbreaks of pertussis are known to occur every three to four years. Therefore this increase is not unexpected as the last outbreak in the ACT was in 2010-2011.

Notifications of pertussis in school aged children have also increased in 2015. The Chief Health Officer has written to all school principals in the ACT about the increase and to provide information regarding the disease and appropriate disease control measures.

A recent update to the 10th edition of the Australian Immunisation Handbook includes two changes to recommendations in the administration of pertussis containing vaccine:

- a DTPa (diphtheria, tetanus, pertussis) booster at age 18 months to reduce pertussis notifications in the 1-3 year age group and to reduce transmission to younger siblings: and
- pertussis vaccination is recommended for pregnant women (third trimester) to improve protection against pertussis in young infants.

The ACT Health Minister announced on 7 April 2015 an ACT Antenatal Pertussis Vaccination Program. Under this program, free vaccine will be offered to pregnant women in their third trimester (from 28 weeks).

Hepatitis A

Hepatitis A is an acute infection of the liver caused by the Hepatitis A virus. The virus is spread by the faecal-oral route. The symptoms of hepatitis A are usually fever, generalised aches and pains, nausea, lack of appetite and abdominal discomfort followed by dark urine, pale stools and jaundice. In February 2015, Pattie's Foods issued a nationwide voluntary recall of select packages of frozen berries after their consumption was linked to a number of cases of Hepatitis A across Australia. This included one case in the ACT who reported consuming the affected berries during their exposure period.

Leptospirosis

There was one case of Leptospirosis notified to ACT in the first quarter of 2015 in a person who had recently returned from travel in East Africa. Leptospirosis is a disease that is caused by bacteria called Leptospira. Leptospira bacteria have been found in both domestic and wild animals. Humans become infected through contact with water, food or soil contaminated with urine from these infected animals. The disease can vary in severity, common symptoms include fever, headache and muscle pain. Nausea, vomiting and bloodshot eyes may also occur. Prompt treatment with antibiotics is recommended to avoid complications, which in rare instances can be fatal.

Winter Preparedness in Aged Care Facilities

During winter the prevalence of viral respiratory and gastrointestinal illness in the community is highest, and aged care facilities (ACFs) are particularly susceptible to outbreaks of these diseases. It is estimated that there are an average of over 13,500 hospitalisations due to influenza per year in Australia, and over 3000 deaths per year in Australians aged over 50 years alone. Gastroenteritis in aged care residents is also associated with increased hospitalisation and mortality and causes significant disruption to staffing in the aged care sector. Norovirus is the leading cause of gastroenteritis in ACFs and is easily transmitted.

Each year the Health Protection Service (HPS) hosts a forum for staff working within the aged care sector in the ACT. This year the forum was held on 7 May at the HPS and included topics such as influenza trends in the ACT, influenza and gastroenteritis in the aged care setting, influenza vaccination, outbreak management, and infection control. The aim of the forum is to provide information and advice for the prevention and management of influenza and gastroenteritis in ACFs.

Forum attendees received advice about how to collect a specimen for influenza PCR, and also received testing guidelines and a starter pack of swabs. The HPS provides support to ACFs to facilitate early testing of residents as early identification of an outbreak assists with appropriate management. A PCR test on a throat or nasopharyngeal swab is the preferred testing method for influenza. The HPS has an ongoing commitment to working in partnership with ACFs in a variety of ways to prepare for and manage influenza and gastroenteritis outbreaks this winter. ACFs are asked to contact the HPS if they have three or more cases of influenza-like illness in a 72 hour period or two or more cases of gastroenteritis in a 24 hour period so that assistance with outbreak management and infection control advice can be provided.

Immunisation is the single most effective action in preventing the spread of influenza and should be promoted among residents and staff of ACFs.