Appendices

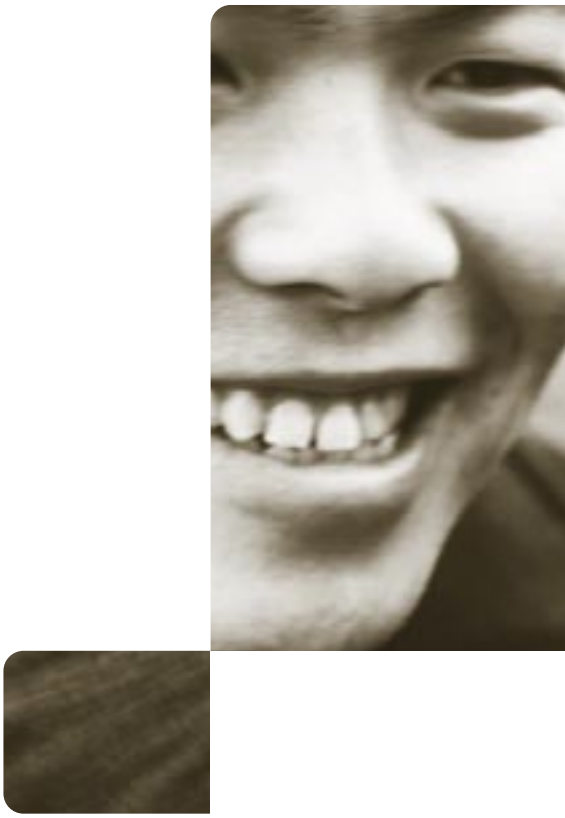
Appendix I Vaccines for disease prevention

Disease Agent	Source, route of infection	Disease Manifestations	Vaccine type
Bacterial diseases			
Diphtheria	Respiratory	Toxin induces throat inflammation, blockage and paralysis and can be fatal	Inactivated diphtheria toxin (toxoid)
Pertussis	Respiratory	Whooping cough can be fatal in infants.	Inactivated acellular antigen containing pertussis toxoid
Tetanus	Infects dirty or penetrating injuries	Toxin causes paralysis of muscles & breathing. Usually fatal within seven days.	Inactivated tetanus toxin (toxoid)
HIB disease (*Haemophilus influenzae* type b)	Respiratory	A cause of ear, nose & throat infection, bronchitis & epiglottitis. Meningitis, bacteraemia are often fatal if untreated.	Type b polysaccharide antigen coupled to a protein carrier to induce an effective response
Tuberculosis (*Mycobacterium tuberculosis*)	Respiratory	Attacks lungs most commonly with a 50% mortality if untreated.	BCG vaccine (attenuated myco-bacterial strain) - provides partial protection, preventing disseminated disease in children
Cholera (*Vibrio cholerae*)	Faecal contamination of water	High attack rate in non-immune persons exposed to a virulent strain. Profuse watery diarrhoea, dehydration and death if not treated.	Oral live vaccine and heat-killed bacterial vaccine
Typhoid (*Salmonella typhi*)	Faecal contamination of food or water	Fever, rash	Oral live vaccine and polysaccharide vaccine
Pneumococcal (*Streptococcus pneumoniae*)	Respiratory	Asymptomatic infection is common. A cause of ear, nose & throat infection and bronchitis. Pneumonia, septicaemia & meningitis are often fatal if untreated.	Polysaccharide vaccine, protects against 23 of more than 90 serotypes but not in infants. Conjugated vaccine is effective for infants and children

Meningococci (*Neisseria meningitidis*)	Respiratory	Asymptomatic infection is common. Meningitis and septicaemia often fatal if untreated.	Multivalent polysaccharide vaccine (not against commonest serotype B) is also not effective in infants Type C conjugate vaccine now available. Other conjugate vaccines in development.
Q-fever (*Coxiella burnetii*)	Respiratory – transmitted mainly from cattle	Fever, malaise rash and arthritis; rare heart complications & death.	Inactivated vaccine available for those at occupational risk.
Viral diseases			
Hepatitis B	Blood-borne	Acute hepatitis or chronic carriage; liver damage, sometimes fatal; liver cancer in later life.	Purified or recombinant surface antigen provides good protection
Poliovirus	Faecal or respiratory	Asymptomatic infection is common. Paralysis or death in a minority of those infected.	Salk vaccine (inactivated IPV) or OPV (oral polio vaccine); both provide good protection against all 3 serotypes[a].
Measles	Respiratory	High attack rate with rash & respiratory symptoms. Pneumonia, meningitis & encephalitis in a minority can be fatal.	Attenuated live measles virus vaccine; highly effective usually given as (MMR).
Mumps	Respiratory	Salivary gland inflammation; orchitis, meningitis and encephalitis and infertility as complications; rarely fatal.	Attenuated live mumps virus vaccine; highly effective usually given as (MMR).
Rubella (German measles)	Respiratory	Rash and joint symptoms; infection in early pregnancy can cause foetal abnormalities and congenital deafness	Attenuated live rubella virus vaccine; highly effective usually given as (MMR).
Varicella (chicken pox)	Respiratory or contact with lesions	Rash and occasional encephalitis; herpes zoster in older subjects.	Attenuated safe and highly effective live varicella vaccine available.
Hepatitis A	Faecal (contact or via food)	Asymptomatic infection is common in children. Liver damage; death is rare.	Inactivated virus vaccine available for travellers and other's at risk provides good protection.

Rabies	Bite of rabid animal	Progressive damage to brain and nervous system; death in 100% of cases after symptoms appear (ie can only treat prior to symptoms).	Inactivated virus vaccine is effective even if given soon after exposure.
Yellow fever	Mosquito vector in Africa and South Americas	Hepatitis, liver failure and death; haemorrhagic lesions.	Attenuated live vaccine provides good protection.
Influenza	Respiratory	Fever, malaise, cough, secondary pneumonia - causes many deaths particularly in elderly.	Type-specific inactivated vaccine for most recent strains.
Smallpox	Respiratory	Fever, rash and haemorrhagic complications; fatality rate of up to 30%.	Live vaccinia vaccine effective in prevention, but with high rate of complications.

≠ Because poliomyelitis is now almost eradicated from the world, the risk of paralysis from mutation of live OPV (Sabin) virus to cause paralysis (Vaccine Associated Poralytic Polio-VAPP) is now greater than from polio itself. VAPP is exceedingly rare (only one or two cases ever described in Australia, compared to many thousands of past deaths and paralyses caused by polio virus itself). Nevertheless, there is now a rationale to replace OPV with IPV, which as a dead vaccine, could never cause polio.



APPENDIX 2 CHRONOLOGY OF SCIENTIFIC AND PUBLIC HEALTH ADVANCES IN COMMUNICABLE DISEASES

BC 400	Hippocrates describes gonorrhoea, malaria and other epidemic fevers
AD 1546	Fracastoro attributes communicable diseases to 'seeds' spread by contact.
1796	Jenner immunises James Phipps with cowpox virus, and shows he is later protected against smallpox, thus founding the science of immunology.
1847	Semmelweiss shows that child-birth fever is preventable by medical attendants washing their hands with chloride of lime, but his work is not accepted by colleagues.
1854	Snow shows that cholera spreads via contaminated drinking water.
1857-1878	Pasteur disproves the theory of spontaneous generation, and shows that putrefaction and infectious disease are caused by living micro-organisms.
1867	Lister shows that antiseptics reduce rates of wound infection after surgery.
1879	Pasteur immunises chickens against chicken cholera using attenuated organisms, and later applies the same principle to anthrax.
1882	Koch discovers the bacillus causing tuberculosis and publishes postulates to be met before a given organism is accepted as causing a disease of interest.
1883	Koch discovers the curved bacillus (Vibrio) causing cholera.
1884-1885	Pasteur attenuates rabies virus and successfully immunises dogs and humans.
1885 onwards	Followers of Koch and Pasteur identify bacterial causes of diphtheria, typhoid, pneumonia, gonorrhoea, meningitis, leprosy, plague, tetanus, whooping cough, and syphilis.
1891-1895	Diphtheria antitoxin reduces death rate from diphtheria.
1897	Ronald Ross identifies malarial life-cycle in man and mosquito.
1907-1910	Salvarsan introduced by Ehrlich & Hata to treat syphilis.
1928	Fleming discovered penicillin and its antibacterial effect.
1933	Influenza virus isolated in ferrets at Mill Hill, London.
1935	Domagk introduced prontosil (sulphanilamide) to treat bacterial infection.

1940	Florey, Chain & Heatley purified penicillin and showed its clinical power.
1944	Waksman discovered streptomycin, the first drug against tuberculosis.
1948-1949	Enders grows mumps virus and then poliovirus in tissue culture.
1953	Watson & Crick discover the structure of DNA.
1954	Polio vaccine introduced.
1960-1963	Enders' work leads to attenuated measles virus and licensed vaccine.
1964	Blumberg describes 'Australia antigen' – hepatitis B virus.
1972	Bacterial enzymes allow *in vitro* manipulation of DNA.
1976	Hepatitis B vaccine available –human derived.
1977	WHO eradicates smallpox – last indigenous case in Somalia.
1983	Montagnier isolates HIV, the AIDS virus; Gallo learns how to grow it.
1984	Recombinant hepatitis B vaccine available.
1985	First conjugate vaccine available (for *Haemophilus influenzae* type b).
1989	Hepatitis C virus first identified. 1990 routine diagnostic test available.
1994	Full bacterial genome of *Haemophilus influenzae* sequenced.
1998	Conjugate vaccines available for *Streptococcus pneumoniae.*
2000	WHO announces polio elimination from Western Pacific region.
2001	Human genome sequence of DNA completed.
2003	Genome of SARS virus sequenced; genomes of most other major pathogens already known.

APPENDIX 3 COMMUNICABLE DISEASE CONTROL AND RESEARCH - SELECTED AUSTRALIAN EVENTS AND CONTRIBUTIONS

Year	Event or Achievement and its Significance
1770	Seaman from Endeavour dies of TB at Botany Bay.
1789	Smallpox occurs among Aborigines in vicinity of Sydney.
1804	Calf lymph first used in Sydney to vaccinate against smallpox.
1830	Severe smallpox epidemic spreads amongst Aborigines in interior.
1820-1923	Smallpox arrives in 283 vessels, but quarantine is successful in excluding it from spreading from all but 19 vessels.
1853	Leprosy recognised – particularly amongst Chinese on goldfields.
1858	First officially recorded case of diphtheria in Australia.
1880s	Malaria first reported from northern Australia.
1890	Australian TB death rate peaks at about 165 per 100,000. Victorian death rate for diphtheria peaks at 92 per 100,000. NSW death rate from whooping cough at 24 per 100,000.
1895	Diphtheria anti-toxin first used in Australia by Springthorpe First recorded epidemic of poliomyelitis at Port Lincoln, SA.
1890s	Leprosy recognised in Aborigines and others in Northern Territory.
1900	First recorded outbreak of plague in Sydney; periodic outbreaks into the 1920s.
1916	Commonwealth Serum Laboratories set up; takes over manufacture of smallpox vaccine.
1919	Death rate from influenza in NSW peaks at 660 per 100,000 in June.
1925	Australian TB death rate down to 92 per 100,000.
1928	12 children die at Bundaberg after diphtheria immunisation as a result of contamination of re-usable vaccine vials with staphylococcal toxin – outbreak investigated by Burnet.
1936-7	Derrick & Burnet identify cause of Q-fever –later named *Coxiella burnetii*.
1940	Norman Gregg notices congenital cataract after rubella in early pregnancy Burnet's 'Natural History of Infectious Disease' published – a minor classic.
1944	Bazeley manufactures penicillin at CSL.

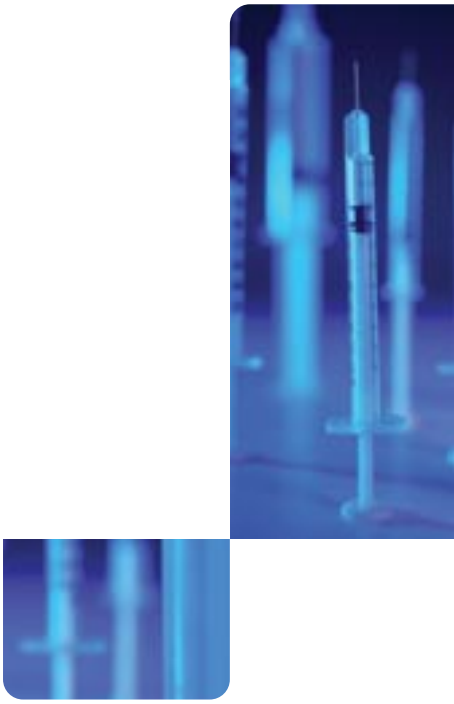
1951	Fenner, Burnet & Clunies-Ross inject themselves with myxomatosis rabbit virus to show it is harmless, and not the cause of Murray Valley Encephalitis.
1950s	Mass X-ray screening for TB in Commonwealth control program.
1954	Polio vaccine manufactured at CSL; national immunisation starts.
1957	CSL produces inactivated vaccine against Asian influenza.
1960	Burnet shares Nobel Prize with Peter Medawar for immunological tolerance.
1960s	Charles Black leads malaria control program to stop transmission in northern Australia Last polio epidemics occur in Australia.
1973	Causative agents of rotavirus diarrhoea identified by Ruth Bishop, Ian Holmes, Geoff Davidson and Brian Ruck; Hepatitis A identified by groups in Melbourne.
1977	Fenner chairs the Global Commission for the Certification of Smallpox Eradication.
1982	Warren and Marshall discover *Helicobacter pylori* in gastritis, later shown as cause of peptic ulcer; Barrie Marmion develops Q Fever vaccine.
1980s	John Hargrave and others record last cases of active leprosy in Northern Territory.
1985	Australia is first country to introduce routine screening of blood donors for HIV and to offer the test to people at risk through selected designated public health laboratories.
1989	First National HIV/AIDS Strategy – new infections reduced to 500 per year following awareness and 'safe sex' campaign.
1996	Doherty shares Nobel prize with Zinkernagel - for discovery of MHC restriction of T-cell killing.
1998	Relenza (neuraminidase receptor inhibitor), developed in Australia for influenza treatment.
June 2000	National Hepatitis C Strategy launched - a world first.
2002	Australian research consortium supported to trial their new HIV vaccine.
2002	Successful trial of vaccine to prevent papillomavirus infection - based on Australian research - holds promise of preventing cervical cancer.
2003	Funding to allow introduction of conjugate vaccine to prevent meningococcal C disease in Australia.

APPENDIX 4 DISTRIBUTION OF RESISTANCE TO ANTIMICROBIALS AND CHEMOTHERAPEUTIC AGENTS

Infection	Resistance problem	Distribution
Respiratory infection		
Streptococcus pneumoniae	Penicillin resistance, multi-resistance, fluoroquinolone resistance emerging	Worldwide
Haemophilus influenzae	Amoxycillin resistance	Worldwide
Moraxella catarrhalis	Amoxycillin resistance	Worldwide
Pseudomonas aeruginosa	Multi-resistance	Worldwide in cystic fibrosis patients
Mycobacterium tuberculosis	Isoniazid resistance, multi-resistance	North America, developing countries
Skin, soft tissue & bone infection, and Septicaemia		
Staphylococcus aureus	Penicillin resistance Methicillin-resistance	Worldwide Worldwide in hospitals and community strains are now appearing
	Vancomycin resistance at intermediate (VISA) and complete levels (VRSA)	Australia has reported cases of VISA, the first cases of VRSA was reported in 2002
Streptococcus pyogenes	Erythromycin (macrolide) resistance	Worldwide
Urinary tract infection, Septicaemia		
Escherichia coli	Amoxycillin resistance, fluoroquinolone resistance, multi-resistance	Worldwide
Klebsiella species	Third-generation cephalosporin resistance, multi-resistance	Worldwide
Proteus mirabilis	Amoxycillin resistance	Worldwide
Health-Care associated infections		
Staphylococcus aureus	Methicillin resistance, multi-resistance	Worldwide

Enterococcus faecium & faecalis	Vancomycin (glycopeptide) resistance	North America, Europe, Australia
Enterobacter species	Third - and fourth generation cephalosporin resistance	Worldwide
Acinetobacter species	Multi-resistance	Worldwide
Gastro-Enteritis		
Salmonella species	Multi-resistance	Worldwide
Campylobacter species	Fluoroquinolone resistance	North America, Europe
Malaria		
Plasmodium falciparum*	Chloroquine resistance	India, much of Africa and most tropical areas. Multi-resistance is present in Southeast Asia.

* **Malaria** is caused by a protozoal (single-celled) parasite, not a bacterium. However, the emergence of resistance in malaria is analogous to the emergence of anti-microbial resistance in bacteria.



APPENDIX 5 DISEASES INCLUDED IN THE NATIONAL NOTIFIABLE DISEASES SURVEILLANCE SCHEME

Bloodborne

hepatitis B, hepatitis C, hepatitis D, hepatitis (not elsewhere classified)

Gastrointestinal

botulism, campylobacteriosis, cryptosporidiosis, Haemolytic Uraemic Syndrome, hepatitis A, hepatitis E, listeriosis, salmonellosis, shigellosis, shiga-like toxin and vero-like toxin producing *E. coli* (SLTEC, VTEC), typhoid

Quarantinable

cholera, plague, rabies, viral haemorrhagic fever, yellow fever, smallpox, Severe Acute Respiratory Syndrome (SARS)

Sexually transmissible

chlamydial infection, donovanosis, gonococcal infection, syphilis

(*HIV is notifiable and is reported in a separate scheme to the NNDSS)*

Vaccine preventable

diphtheria, *Haemophilus influenzae* type b, influenza, measles, mumps, pertussis, pneumococcal disease, poliomyelitis, rubella, tetanus, smallpox

Vectorborne

arbovirus infection not elsewhere classified (NEC), barmah forest virus infection, dengue, japanese encephalitis, kunjin, malaria, murray valley encephalitis, ross river virus infection

Zoonoses

anthrax, Australian bat lyssavirus, brucellosis, leptospirosis, ornithosis, Hendra, Nipah, Q fever

Other bacterial infections

legionellosis, leprosy, meningococcal infection, tuberculosis, anthrax

APPENDIX 6 CDC CATEGORISATION OF POSSIBLE AGENTS OF BIOLOGICAL ATTACK

Category		Disease
A	Agents posing highest potential risk	smallpox, anthrax, plague, botulism, tularaemia, and viral haemorrhagic fevers.
B	Moderately easy to disseminate, moderate morbidity, low mortality	Food and water contamination (*E. coli, Salmonella, cholera, Cryptosporidium*) Viral encephalitidies caused by alpha viruses (equine encephalitis).
C	Emerging infectious disease	Nipah virus affecting mainly swine has caused human cases of encephalitis in Malaysia. Hantaviral disease infects rodents worldwide and occasionally caused disease in humans.

See also the CDC web-sites [63]

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