The National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases (NCIRS) was established in August 1997. Core funding is provided by the Australian Government Department of Health and Ageing, supplemented by an annual grant from New South Wales Health. NCIRS accommodation and infrastructure are provided by The Children’s Hospital at Westmead and the Centre is affiliated with the Discipline of Paediatrics and Child Health and the School of Public Health of the University of Sydney.
FOREWORD

Professor Elizabeth Miller

The contribution of vaccines to the global improvement of human health over the past two decades has been impressive with the introduction of new vaccines against the main bacterial causes of meningitis, septicaemia and pneumonia and more recently against the virus that causes cervical cancer.

The aim in countries introducing the new vaccines is not only to minimise the occurrence of the diseases prevented by these vaccines but also any adverse events associated with their administration. In the pursuit of these goals, both the United Kingdom and Australia have had their share of triumphs and challenges, and each has learned from the other. I have had the pleasure of being invited to Australia on three occasions in recent years to participate in national immunisation conferences. I was struck on my last visit in 2010 by the maturity and accomplishments of Australia in immunisation. These range from the Australian Childhood Immunisation Register to the wide range of vaccines delivered free of charge to the eligible population through Australia’s National Immunisation Program and the quality and scope of data available to inform this program.

The National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases, as it has developed over the past almost 15 years, has made an enormous contribution to Australia’s capacity to measure the burden of vaccine preventable diseases, the impact of vaccine programs and to investigate the occurrence of adverse events following immunisation. NCIRS has borrowed successfully from the UK experience in developing serosurveillance as a tool to measure population immunity and how this changes as a result of vaccination. Serosurveillance provides a valuable input into disease modelling, and has also shown the way with innovative initiatives such as the MMR vaccine decision aid, which has been extensively used in the UK.

Through my experience on the World Health Organization’s Global Advisory Committee on Vaccine Safety and then its Strategic Advisory Group of Experts, I have been aware of the significant areas in which Australia has been regionally and internationally leading and of the contribution of NCIRS to this, with pandemic influenza vaccine-related adverse events prominent amongst these contributions as outlined in this report.

The scope and success of NCIRS’s work, as shown in this report, in putting the wealth of data sources available in Australia to best use and integrating them to provide a comprehensive picture of vaccine preventable diseases nationally, is impressive for what is still, despite its growth, a relatively small organisation in international terms. The award of funding for a Centre of Research Excellence, and the ability this will give to further capitalise on Australia’s potential in the use of linked data from its Immunisation Register with the wide range of other data sources, bodes well for NCIRS in the coming years.

Professor Elizabeth Miller
Consultant Epidemiologist
Immunisation, Hepatitis and Blood Safety Department
Health Protection Agency
London
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  Collaborations
    NHRCMC Centre of Research Excellence – Immunisation in under-studied and special-risk populations
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    The Sydney Institute for Emerging Infections and Biosecurity (SEIB)
    Other collaborations
Health professional support
  NCIRS fact sheets
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Education
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    Public Health Association of Australia National Immunisation Conference and pre-conference workshop
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The year 2012 marks 15 years since the National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases (NCIRS) was founded, under inaugural Director Professor Margaret Burgess.

Over this time, four Funding Agreements have been signed with the Australian Government Department of Health and Ageing following comprehensive external reviews, most recently for 2010 to 2014. Substantial core funding also comes from the New South Wales Ministry of Health, The Sydney Children's Hospitals Network and the University of Sydney. Since 1997, NCIRS has grown into a multifaceted organisation of around 50 people which provides increasingly comprehensive, high level technical capacity to underpin Australia's National Immunisation Program and increasing success in grant-funded research. This wide scope of activity is reflected in the 2010–2011 report, which summarises a time of challenge and change for immunisation in Australia.

NCIRS is unique in an international context, as it works closely with a wide range of government agencies and peak committees but has governance and accommodation through an independent research institute (the Kids Research Institute of The Children's Hospital at Westmead), and academic links through the University of Sydney (Paediatrics and Child Health and Public Health). We are privileged to be able to access a wide range of high quality national data sources, including the National Notifiable Diseases Surveillance System, databases for hospitalisations and deaths, the Australian Childhood Immunisation Register and reports to the Therapeutic Goods Administration of adverse events following immunisation, to which we add data obtained from national serosurveys conducted every 5 years. Most recently, there has been the development of the Paediatric Active Enhanced Disease Surveillance (PAEDS) network to measure severe vaccine preventable diseases and adverse events following immunisation. These resources are invaluable for estimating disease burden for prospective vaccines, evaluating the impact of new vaccines, modelling the expected impact of program changes and studying adverse events, with examples in all of these areas throughout the report. The technical writing and coordination for the 10th edition of The Australian Immunisation Handbook has been a major undertaking of the past 2 years, which will bear fruit in 2013. Finally, the wide scope of clinical research is outlined in Professor Booy's report, both investigator-driven and sponsored.

The investigation of severe adverse events following immunisation (AEFI) – intussusception following rotavirus vaccines, febrile convulsions following influenza vaccines in young children and cellulitis-like reactions following pneumococcal polysaccharide vaccine in the elderly – has been a dominant activity underpinned by NCIRS over the past 2 years. These AEFI investigations have led to significant improvements in future national capacity. The issue of intussusception with the new rotavirus vaccines was first identified through the work of the PAEDS network, which led to an intensified national investigation. With respect to vaccine preventable diseases (VPDs), work in the past 2 years has covered a wide range from HPV vaccine in boys to the impact of rotavirus vaccine on all-cause gastroenteritis hospitalisations. Work on pertussis and influenza have been particularly prominent and share the characteristics of being heavily dependent on testing practices for their measurement and vaccines which are more short-lived and less effective than for many other VPDs. The work on pertussis highlights how a complex picture can be elucidated when multiple data sources are available and the availability of serosurveillance data has facilitated modelling of potential responses to the pertussis problem.

Finally, there have been significant achievements both for individual staff through external recognition and for NCIRS through success in the highly competitive selection process to be funded as an NHMRC Centre of Research Excellence. The CRE is a tribute to the close ties which have been developed between the Westmead campus of NCIRS and the UNSW School of Public Health and Community Medicine through Senior Principal Research Fellow Professor Raina MacIntyre and her team. By providing opportunities for talented postdoctoral researchers, enhanced capacity to develop important new areas such as data linkage, and to make a contribution to addressing the needs of high-risk and marginalised groups, the CRE promises to be a major contributor to NCIRS and its development in the coming years.
FROM THE HEAD OF CLINICAL RESEARCH
Professor Robert Booy

That it seems like only yesterday we were completing the previous 2-year report of Clinical Research at NCIRS must indicate how busy (and productive!) we have been. As ever, our mission has been to perform and provide research to underpin high quality immunisation policy and practice. We continue to study the impacts, both immediate and long-term, of serious infectious diseases in physical, psychological, educational and economic terms.

Major highlights have been our role in securing NHMRC funding for two separate Centres of Research Excellence, in Critical Infection (led by Professor Jon Iredell) and in Immunisation in under-studied and special-risk populations (led by Professor Raina MacIntyre). The CRE in Critical Infection involves a strategic collaboration with colleagues in The University of Sydney, specifically the Sydney Institute for Emerging Infections and Biosecurity; several grants have already been lodged to study the epidemiology of infectious encephalitis. Research funding for clinical studies was received from the WHO (Asia Pacific), MRC (UK), NHMRC, Meningococcal Australia Foundation, Medicines Australia, The University of Sydney Research Network Scheme, and pharma, including CSL, Sanofi aventis, Pfizer, Roche and GSK.

The impact of the 2009 influenza pandemic reverberated through our research endeavours over the 2 years beginning from 2010. We had more than 20 publications on influenza alone dealing with its epidemiology, prevention, treatment and costs, to which two PhD students (Dr Kevin Yin and Dr Gulam Khandaker) contributed impressively. Some examples included studying cross-protection from seasonal vaccines against H1N1 pandemic influenza, meta-analysing the clinical features of H1N1 influenza in children as well as the immunogenicity and safety of pandemic vaccines, comparing the severity of pandemic and seasonal disease, researching the impact of antiviral treatment, investigating the extent of nosocomial disease and describing the complications in hospitalised cases. Led by Dr Nicholas Wood we instigated studies during 2010 and 2011 in both Australia and New Zealand on the safety of trivalent influenza vaccines in children. As a consequence, important data was rapidly generated to inform ATAGI and the Department of Health and Ageing in dealing with the safety scare around flu vaccination that came to light in April 2010.

Our strong profile in pertussis research continued, led by Professor Peter McIntyre and Dr Nicholas Wood. 440 babies have been recruited onto a multicentre randomised control trial, involving four sites in Australia and led by NCIRS, examining the safety and immunogenicity of birth dose pertussis vaccine. NCIRS is also involved in an NHMRC funded study examining the severity of pertussis and matching clinical data/vaccine history to the infecting pertussis genotype. This is very important data to assist in answering whether changes in the genetic make-up of pertussis result in more severe disease.

Our strategic involvement in two Centres of Research Excellence will ensure our research profile in the future remains productive in relation to protecting the vulnerable, the unimmunised and those particularly at risk of serious infection.
MISSION AND VISION

Our Mission

Our role is to foster the creation and translation of the evidence needed to inform best practice in the control of vaccine preventable diseases in Australia.

Our stakeholders are our research and funding partners, the advisory committees we support, key professional bodies, and the broader community of health service providers.

Our scope of work includes clinical, epidemiologic and social research relevant to vaccine preventable diseases.

Our impact is ultimately measured by how well vaccine preventable diseases are controlled in Australia.

Our Vision

To be recognised as a centre of national and international standing in the conduct and translation of research to policy and practice in vaccine preventable diseases.

To achieve this Vision we need to:
- continue to drive and foster high quality research and surveillance relevant to immunisation policy
- invest in growing our research programs and training capacity
- play a significant role in the development of the next generation of researchers in our areas of expertise
- be proactive in promoting systematic communication and collaboration among key stakeholders
- provide leadership in identifying emerging issues of relevance to Australia.
NCIRS STAFF
JANUARY 2010–DECEMBER 2011

Director
Head, Clinical Research
Deputy Director Government Programs
Deputy Director Surveillance
Senior Principal Research Fellow
Manager Policy Support
Manager Social Research
Manager Surveillance
Medical Manager Vaccine Trials
Public Health Physician
Senior Clinical Research Fellow

Clinical Research Fellow

Public Health Medicine Registrar
Research Fellow
Epidemiologist
Epidemiologist, Clinical Research
National Indigenous Immunisation Coordinator
Evaluation Project Officer
Statistician/Data Manager
Senior Policy Officer
Senior Research Officer

Research Officer
Research Assistant

NSW Public Health Officer Trainee

Professor Peter McIntyre
Professor Robert Booy
Associate Professor Kristine Macartney*
Dr Robert Menzies
Professor Raina MacIntyre*
Dr Jane Jelfs
Dr Julie Leask*
Dr Aditi Dey
Dr Leon Heron
Dr Clayton Chiu
Dr Nicholas Wood*
Dr Thomas Snelling**
Dr Gulum Khandaker†
Dr Jane Ho*
Dr Jean Li-Kim-Moy†
Dr Alexa Dierig†
Dr Rashmi Dixit†
Dr Andrew Habig†
Dr Helen Quinn*
Mr Brynley Hull
Dr Harunor Rashid†
Ms Telphia Joseph
Mr Brendon Kelaher*†
Ms Kirsten Ward†
Ms Han Wang
Dr Sanjay Jayasinghe
Dr Iman Ridda
Dr Spring Cooper Robbins*
Dr Deepika Mahajan
Dr Anita Heywood**†
Dr Melina Georgousakis†
Ms Swati Ghotane†
Dr Jiehui Kevin Yin
Ms Maria Chow*
Ms Kerrie Wiley*
Mr Bradley Christian***
Mr Christopher Lowbridge†
Scientific Officer (Laboratory Studies)  Ms Linda Hueston
PAEDS Coordinator  Ms Leanne Vidler*
Clinical Nurse Consultant, Immunisation  Ms Kathryn Cannings†
Research Nurse  Ms Lisa Chalmers**†
  Ms Pamela Cheung*
  Ms Elizabeth Clarke*
  Ms Alexandra Cook††
  Ms Elizabeth Deegan**†
  Ms Melissa Fraser**†
  Ms Edwina Jacobs*
  Ms Rose Joyce*
  Ms Helen Knight††
  Ms Camille Lang**†
  Ms Jennifer Murphy*
  Ms Kyunghee Park**†
  Ms Laura Rost*
  Ms Carol Shineberg*
  Ms Catherine King*
  Mr Edward Jacyna*
Information Manager  Ms Donna Armstrong*
Assistant Librarian  Ms Danielle Grant
Editing and Publications Officer  Ms Karyn Phillips*
Communications Officer  Ms Lynda Beaumont
Research Operations Manager  Ms Nicole Jacobs
Personal Assistant  Ms Danielle Marchant*
  Ms Joanne Perkins
Senior Administrative Officer  Ms Lyn Benfield
Senior Project Administration Officer

* Part-time  † Employed for part of reporting period
### Postgraduate and graduate students during 2010–2011

<table>
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<tr>
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<th>Institution</th>
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<tr>
<td>PhD, University of Sydney</td>
<td>Dr Osamah Barasheed</td>
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<td>Dr Julia Brotherton</td>
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<td></td>
<td>Ms Maria Chow</td>
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<td></td>
<td>Dr Sanjay Jayasinghe</td>
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<td>Dr Gulam Khandaker</td>
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<td>Ms Catherine King</td>
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<td>Ms Kerrie Wiley</td>
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<td></td>
<td>Dr Jiehui Kevin Yin</td>
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<td></td>
<td>Dr Robert Menzies (awarded 2010)</td>
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<td></td>
<td>Dr Nicholas Wood (awarded 2010)</td>
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<tr>
<td>Master of Philosophy, University of Sydney</td>
<td>Dr Laura Anthony</td>
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<td>Ms Telphia Joseph</td>
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<td></td>
<td>Ms Xin Ting Lu</td>
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<tr>
<td>Master of Public Health, University of Sydney</td>
<td>Ms Braedon Donald</td>
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<td>Dr Melina Georgousakis</td>
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<td>Ms Swati Ghotane</td>
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<td>Ms Sumalathaa Krishnamoorthy</td>
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<td>Dr Deepika Mahajan</td>
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<td>Ms Kate Mahendran</td>
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<tr>
<td>Master of Public Health (Honours), University of Sydney</td>
<td>Ms Kirsten Ward (awarded 2011)</td>
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<tr>
<td>Master of Clinical Epidemiology, University of Sydney</td>
<td>Ms Kerrie Wiley (awarded 2010)</td>
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<tr>
<td>Graduate Certificate in Clinical Epidemiology, University of Sydney</td>
<td>Ms Amanda Edkins</td>
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<tr>
<td>Medical Program, University of NSW</td>
<td>Mr John Kim</td>
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<tr>
<td>Master of Public Health/Health Management, University of NSW</td>
<td>Ms Tarana Lucky</td>
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<td>Ms Sarita Panday</td>
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NCIRS Advisory Board

Chair
Dr Tony Penna, Chief Executive Officer, The Children’s Hospital at Westmead (to September 2010)
Ms Elizabeth Koff, Chief Executive, Sydney Children’s Hospital Network (from September 2010)

Members
Professor Vance Gledhill, Business representative (to August 2011)
Professor Sally Redman, Chief Executive Officer, The Sax Institute
Professor Don Roberton, Pro Vice Chancellor, Division of Health Sciences, Dean, Faculty of Medicine, University of Otago, Division of Health Sciences, Dunedin, New Zealand
Professor Andrew Wilson, Executive Dean, Faculty of Health, Queensland University of Technology

Ex officio
Ms Julianne Quaine, Assistant Secretary, Immunisation Branch, Office of Health Protection, Australian Government Department of Health and Ageing
Professor Chris Cowell, Director, Kids Research Institute, The Children’s Hospital at Westmead, Sydney Children’s Hospital Network
Professor Lyn Gilbert, Director, Centre for Infectious Diseases and Microbiology – Public Health, Institute of Clinical Pathology and Medical Research, Westmead Hospital – Chair SAC
Professor Peter McIntyre, Director, NCIRS
Professor Robert Booy, Head, Clinical Research, NCIRS

Representatives
Ms Sue Campbell-Lloyd, Manager, Immunisation Unit, AIDS/Infectious Diseases Branch, NSW Health
Professor Cheryl Jones, Discipline of Paediatrics and Child Health, Faculty of Medicine, University of Sydney, The Children’s Hospital at Westmead
Ms Lisa McGlynn, Senior Executive, Health Group, Australian Institute of Health and Welfare

Secretariat
Ms Karyn Phillips, Research Operations Manager, NCIRS

Observers
Associate Professor Kristine Macartney, Deputy Director Government Programs, NCIRS
Dr Robert Menzies, Deputy Director Surveillance, NCIRS
Ms Monica Johns, Director, Immunisation Policy, Targeted Prevention Programs Branch, Population Health Division, Australian Government Department of Health and Ageing

NCIRS Advisory Board in 2011
# Scientific Advisory Committee

**Chair**  
Professor Lyn Gilbert, Director, Centre for Infectious Diseases and Microbiology Public Health, Institute of Clinical Pathology and Medical Research, Westmead Hospital

**Deputy Chair**  
Associate Professor Heath Kelly, Head, Epidemiology Unit, Victorian Infectious Diseases Reference Laboratory

**Members**  
Professor Jonathan Carapetis, Director, Menzies School of Health Research  
Associate Professor Mike Gold, Senior Lecturer, University Department of Paediatrics and the South Australian Immunisation Coordination Unit, Women’s and Children’s Hospital, Adelaide  
Professor John Kaldor, Deputy Director and Professor of Epidemiology, The Kirby Institute, University of NSW  
Associate Professor John Litt, Senior Lecturer, Department of General Practice, Flinders University  
Associate Professor Jodie McVernon, NHMRC Postdoctoral Training Fellow, Senior Research Fellow, Vaccine and Immunisation Research Group, Murdoch Childrens Research Institute and School of Population Health, University of Melbourne  
Ms Stephanie Newall, Consumer representative  
Associate Professor Peter Richmond, Vaccine Trials Group, Telethon Institute for Child Health Research  
Professor Cheryl Jones, Discipline of Paediatrics and Child Health, Faculty of Medicine, University of Sydney, The Children’s Hospital at Westmead  
Ex officio  
Ms Sue Campbell-Lloyd, Manager, Immunisation Unit, AIDS/Infectious Diseases Branch, NSW Health  
Dr Yasmine Gray, Director, Vaccine Preventable Disease Surveillance, Office of Health Protection, Australian Government Department of Health and Ageing  
Professor Terry Nolan, Head, School of Population Health, University of Melbourne, Royal Children’s Hospital, Melbourne – ATAGI representative  
Professor Peter McIntyre, Director, NCIRS  
Professor Robert Booy, Head, Clinical Research, NCIRS  
Professor Raina MacIntyre, Head, School of Public Health and Community Medicine, University of NSW and Senior Principal Research Fellow, NCIRS  
Dr Leon Heron, Medical Manager Vaccine Trials, NCIRS  
Dr Robert Menzies, Deputy Director Surveillance, NCIRS  
Associate Professor Kristine Macartney, Deputy Director Government Programs, NCIRS

**Secretariat**  
Ms Danielle Marchant, Personal Assistant to Professor Robert Booy, NCIRS
MAJOR COLLABORATIONS AND PEAK COMMITTEES

NCIRS maintains important collaborations with many individuals and organisations at local, state, national and international levels. NCIRS would like to acknowledge the following individuals with whom we collaborated during 2010–2011 and thank them for their input into NCIRS’s research programs.

Australian Childhood Immunisation Register

Dr Stephen Lambert and Ms Sarah Sheridan, Queensland Children’s Medical Research Institute, University of Queensland

Serosurveillance

Professor Lyn Gilbert, Ms Linda Hueston, Ms Katherine Tudo and Ms Fiona Blyth, Centre for Infectious Diseases and Microbiology (CIDM) Public Health
Associate Professor Jodie McVernon and Ms Patricia Campbell, Vaccine and Immunisation Research Group, Murdoch Childrens Research Institute and School of Population Health, University of Melbourne
Professor Raina MacIntyre, Dr James Wood, Dr David Philp, Dr Zhanhai Gao and Mr Ning Song, School of Public Health and Community Medicine, University of New South Wales

Paediatric Active Enhanced Disease Surveillance (PAEDS)

Professor Elizabeth Elliott, Dr Yvonne Zurynski, Ms Leanne Vidler and Ms Nicole McKay, Australian Paediatric Surveillance Unit (APSU)
Associate Professor Peter Richmond, Associate Professor Christopher Blyth, Ms Christine Robbins and Ms Caroline Wharton, Princess Margaret Hospital for Children, Perth
Dr Jim Buttery, Dr Jenny Royle, Ms Victoria Scott and Ms Donna Lee, Royal Children’s Hospital, Melbourne
Associate Professor Mike Gold, Associate Professor Helen Marshall, Ms Christine Heath and Ms Mary Walker, Women’s and Children’s Hospital, Adelaide

Program evaluation

Ms Chris Nagy and Mr Charles Strebor, Centre for Disease Control, Department of Health and Families, Northern Territory
Ms Megan Skully and Ms Dale Carcione, Communicable Disease Control Directorate, WA Health
Ms Irene Passaris and Ms Helen Jackson, Community Health and Health Protection, ACT Health
Ms Sue Campbell-Lloyd and Mr Dennis Meijer, Immunisation Unit, NSW Health
Mr Michael Bachelor and Ms Helen Pitcher, Immunisation Unit, Department of Health Victoria
Ms Maureen Watson and Ms Angela Newbound, Immunisation Section, SA Health
Ms Lynne Andrewartha and Ms Kerry Nettle, Public and Environmental Health, Department of Health and Human Services, Tasmania
Ms Karen Peterson and Ms Vicki Bryant, Queensland Health Immunisation Program

Disease modelling

Professor Raina MacIntyre, Dr James Wood, Dr Anthony Newall and Dr Zhanhai Gao, School of Public Health and Community Medicine, University of New South Wales
Associate Professor Jodie McVernon and Ms Patricia Campbell, School of Population Health, University of Melbourne
Social science

Dr Nikki Turner and Dr Helen Petousis-Harris, Immunisation Advisory Centre, University of Auckland, New Zealand
Professor Mark Ferson and Ms Meredith Nirui, South Eastern Sydney Public Health Unit
Dr Peter Massey, Hunter New England Population Health, Tamworth
Professor Paul Kinnersley, Institute of Primary Care and Public Health, Cardiff University, UK
Dr Cath Jackson, Department of Health Sciences, University of York, UK
Professor Francine Cheater, School of Health and Life Sciences, Glasgow Caledonian University, UK
Dr Swati Shourie, Leeds Institute of Health and Social Work, UK
Dr Helen Bedford, UCL Institute of Child Health, UK
Dr Greg Rowles, Australian General Practice Network
Dr Claire Hooker and Associate Professor Ian Kerridge, Centre for Values Ethics and the Law in Medicine, University of Sydney
Professor Annette Braunack-Mayer, School of Public Health, University of Adelaide
Dr John Sinn, Royal North Shore Hospital
Associate Professor Rachel Skinner, Discipline of Paediatrics and Child Health, University of Sydney

Clinical studies

Professor Terry Nolan, University of Melbourne and Murdoch Childrens Research Institute
Professor Peter Richmond, Princess Margaret Hospital for Children, Perth
Associate Professor Helen Marshall, University of Adelaide and Women’s and Children’s Hospital, Adelaide
Professor Dominic Dwyer, Institute for Clinical Pathology and Medical Research (ICPMR), Westmead
Dr Peter Hay, Castle Hill Medical Practice

Peak committees

Australian Technical Advisory Group on Immunisation (ATAGI)
Communicable Diseases Network Australia (CDNA)
National Immunisation Committee (NIC)
Therapeutic Goods Administration (TGA)
Pharmaceutical Benefits Advisory Committee (PBAC)
Policy support for the Australian Technical Advisory Group on Immunisation and other peak immunisation groups in Australia

Overview

National immunisation policy in Australia is developed by the Australian Technical Advisory Group on Immunisation (ATAGI), a Ministerial Advisory Committee of the Australian Government Department of Health and Ageing. One of the key roles of NCIRS is to provide research and technical support to ATAGI in its various roles. Among the roles of ATAGI are provision of advice to the Pharmaceutical Benefits Advisory Committee (PBAC) in its evaluations of the cost-effectiveness of vaccines for inclusion on the National Immunisation Program (NIP) and production of The Australian Immunisation Handbook.

In addition, NCIRS sits on and has a role in providing technical support to the National Immunisation Committee (NIC), the Therapeutic Goods Administration (TGA) and the Australian Government Department of Health and Ageing. These activities are funded by the Australian Government Department of Health and Ageing.

Key activities

**Australian Technical Advisory Group on Immunisation (ATAGI)**

The Policy Support group within NCIRS provides a wide range of technical inputs to support ATAGI Working Parties and the production of The Australian Immunisation Handbook. NCIRS also provides technical secretariat support to ATAGI on issues not overseen by a specific ATAGI working party. During 2010–2011, NCIRS provided approximately 140 technical papers/reports to ATAGI.

**Working parties**

ATAGI working parties are formed to examine in detail the available evidence relating to control of a particular vaccine preventable disease and/or use of newly available vaccines.

The role of NCIRS includes literature searching, critical appraisal and systematic review of evidence regarding disease burden, vaccine effectiveness and safety, and implementation of vaccination programs; analysis of epidemiologic data for addressing specific policy-relevant issues; preparation of draft reports and documents; and, in some cases, disease modelling projects. These outputs are developed for review by working party members and subsequently ATAGI.

NCIRS supported ATAGI working parties examining issues related to the following vaccine preventable diseases and vaccines during 2010–2011:

- **pneumococcal disease** – the working party assessed the introduction of two new conjugate pneumococcal vaccines and their use in children in the Australian context. They also reviewed the current schedule recommendations regarding revaccination of adults aged 65 years and over under the national pneumococcal vaccination program for older Australians.

- **Haemophilus influenzae type b/meningococcal disease** – in light of supply issues with one brand of *Haemophilus influenzae* type b (Hib) vaccine, the ATAGI working party reviewed the literature on the use of other Hib vaccines in vulnerable populations. The working party also developed recommendations for use of a new combination Hib/meningococcal C conjugate vaccine and two recently registered 4-valent conjugate meningococcal vaccines. Updates to ATAGI on candidate serogroup B meningococcal vaccines
and their potential use in Australia have also been ongoing.

- **influenza** – NCIRS staff supported both ATAGI and the Department of Health and Ageing in numerous areas related to the control of influenza using influenza vaccines. Throughout 2010–2011 this included providing advice on the use of the pandemic vaccine (available from late 2009) and seasonal influenza vaccines. Senior staff also assisted in investigations into the unexpected adverse events (fever and febrile convulsions) that arose following use of one brand of the 2010 seasonal vaccine in young children. Data on the potential benefit of influenza vaccination for children from 6 months to under 5 years of age was also closely examined. Much of this information is presented on the Immunise Australia website (www.immunise.health.gov.au).

- **pertussis** – the working party reviewed and prepared a substantial body of work on vaccination against pertussis including evidence on the duration of effectiveness of acellular pertussis vaccines, the interval between doses across the childhood/adolescent schedule, and vaccination of close contacts of newborn infants (the ‘cocoon’ strategy) to reduce severe infant morbidity. On the basis of the evidence provided, and to address the ongoing pertussis epidemic in Australia, initiatives such as bringing forward the first dose of pertussis-containing vaccine from 2 months to 6 weeks of age and providing the adolescent dose in the first year of high school were undertaken.

- **human papillomavirus** – NCIRS staff worked extensively with ATAGI to develop clinical advice on the use of the 4-valent HPV vaccine in adolescent males, which also fed into advice provided to the PBAC. Work on gathering the latest data on the safety and effectiveness of HPV vaccines in females continued throughout this time.

- **rabies** – in supporting this joint ATAGI/CDNA working party, NCIRS staff reviewed a number of issues in relation to the use of post-exposure prophylaxis vaccination of persons who had either a potential rabies or Australian bat lyssavirus (ABLV) exposure. This included developing algorithms to guide pre- and post-exposure immunisation. The working party’s report was also forwarded to the Communicable Diseases Network Australia. The advice will be included in the 10th edition of The Australian Immunisation Handbook. Further details about the rabies working party are provided right.

- **compromised vaccines** – the working party developed guidelines to specifically assist jurisdictional immunisation program managers in providing best practice advice following the inadvertent administration of a compromised vaccine. This should help to ensure that nationally consistent practices are followed.

NCIRS staff assigned to ATAGI working parties also provide data analysis, literature review and synthesis, and technical report writing to support ATAGI in the development of advice documents for submission to the PBAC. These documents are broad ranging, highly technical, and often require a rapid turnaround. During 2010–2011, NCIRS provided technical input to 14 ATAGI documents providing advice to the PBAC on 6 vaccine types.

### ATAGI Rabies Working Party

The ATAGI Rabies Working Party was formed in April 2011 in response to a request from the Communicable Diseases Network Australia to provide advice on the use of rabies immunoglobulin in light of shortages arising from increased demand for rabies immunoglobulin and vaccine. These emanated from increased numbers of Australian travellers exposed to dog bites in Bali, an area that has recently become rabies endemic. Advice on the use of a four-dose rabies post-exposure prophylaxis schedule instead of the traditional five-dose vaccine schedule was also requested.

The Working Party consisted of 11 members with appropriate expertise, including Professor Charles Rupprecht, Director of the Rabies Program at the Centers for Disease Control and Prevention, Atlanta, and included three NCIRS staff members who prepared and presented the technical data.

The Working Party addressed a number of issues including:

- use of rabies immunoglobulin and potential scenarios for use when shortages exist
- need for rabies vaccination by region in Southeast Asia, the Indian subcontinent and Indonesia
- utility of various rabies vaccine schedules, including the modified four-dose schedule
- intradermal administration of rabies vaccine
- duration of protection and the need for rabies vaccine boosters
- use of four-dose vaccination schedules following potential ABLV exposures and treatment protocols.
The Australian Immunisation Handbook

The Australian Immunisation Handbook is a vital resource for health professionals delivering immunisations in Australia. It provides recommendations on the safe and effective use of vaccines. It is available in both hard copy and online (www.immunise.health.gov.au).

NCIRS is responsible for coordinating and drafting new editions of the Handbook, and interim chapter updates as required, for review by ATAGI and subsequently for endorsement by the NHMRC. This involves searching and collation of literature, evidence synthesis, technical writing (in consultation with ATAGI), editing and proofreading.

Production of the 10th edition of The Australian Immunisation Handbook commenced in early 2011 and was a major project for NCIRS leading into 2012 when it is anticipated that the Handbook will be available for public consultation. A team of NCIRS technical writers, editorial and library staff led by Dr Jane Jelfs and Associate Professor Kristine Macartney have all had considerable input into Handbook development.

Advice to other peak bodies

National Immunisation Committee

NCIRS provides input to the National Immunisation Committee (NIC) by providing reports on program evaluations, disease surveillance, adverse events, vaccination coverage and other research performed by NCIRS. Professor Peter McIntyre is the NCIRS representative on NIC, and Dr Robert Menzies and Mr Brynley Hull are members of the NIC Data Subcommittee which meets regularly to review and analyse data from the ACIR.

NCIRS also employs the National Indigenous Immunisation Coordinator and Assistant Indigenous Immunisation Coordinator who provide input to the NIC on issues relating to immunisation of Indigenous people (see the Indigenous research section of this report for more information).

Therapeutic Goods Administration

NCIRS routinely works with the TGA in analysing data on adverse events following immunisation (AEFI) reported to the TGA. Reports are published every 6 months (see the Adverse events following immunisation section of this report for more information). In addition, NCIRS has provided technical support to the TGA as required. For example, NCIRS members have been invited to participate in short-term specially convened TGA/ATAGI working groups that examine and provide advice on specific vaccine safety issues. During 2010–2011 NCIRS contributed to three of these groups:

- Intussusception following rotavirus vaccine: Members provided advice on the administration of rotavirus vaccines and the risk of intussusception. Advice on the continued use of Rotarix® and RotaTeq® under the NIP in Australia was provided on the Immunise Australia website in 2010.

- Adverse events following influenza vaccination in children: In 2010 an unexpected increase in febrile convulsions related to the use of one brand of seasonal influenza vaccine (Fluvax®, CSL) occurred. This safety concern led to a temporary suspension of the use of all seasonal influenza vaccines in children 5 years of age and younger. NCIRS staff had extensive input into the national investigation of this issue, as members of the working group.

- Adverse events from the 23-valent pneumococcal polysaccharide vaccine (23vPPV): In 2011, an increased rate of reporting of severe injection site reactions from 23vPPV was the subject of investigation of a specially convened TGA/ATAGI working group, which included a number of NCIRS members. Investigation of this issue led to a change in recommendations for revaccination with 23vPPV in adults without predisposing conditions.

See the Adverse events following immunisation section of this report for more detail on the work done by NCIRS for these working groups.

Australian Government Department of Health and Ageing

NCIRS regularly provides technical support for urgent enquiries made to the Department of Health and Ageing as part of its funding agreement. This includes, for example, guidance on immunisation queries received by the Department of Health and Ageing Immunisation Hotline. Department members have been able to readily access senior NCIRS staff throughout 2010–2011 when advice was required for urgent or emerging issues of importance to the national immunisation program.
Surveillance of vaccine preventable diseases

Overview

Appropriate surveillance (including data on total notified cases and more severe cases leading to hospitalisation and death) is vital to ensure that immunisation programs are working appropriately in the relevant age group(s).

NCIRS has a key role, through interaction with the Communicable Diseases Network Australia (CDNA), in developing and enhancing disease surveillance methodology aimed at improving the accuracy and relevance of the data collected.

For vaccine preventable diseases, NCIRS holds or has access to national datasets for notifications (from CDNA), hospitalisations and deaths (from the Australian Institute of Health and Welfare). For vaccine coverage, data come from the Australian Childhood Immunisation Register (ACIR), and for adverse events reports from the Therapeutic Goods Administration (TGA). NCIRS also conducts a national serosurveillance program in collaboration with the Centre for Infectious Diseases and Microbiology (CIDM) at 5-yearly intervals. These datasets all contribute to surveillance reports, often in combination. (See also the Australian Childhood Immunisation Register, Adverse events following immunisation and Serosurveillance sections of this report for further details.)

Key activities

General surveillance reports funded by the Australian Government Department of Health and Ageing

Vaccine preventable diseases in Australia, 2005 to 2007

Since 2000, NCIRS has been responsible for expert analysis of national surveillance data and the ongoing publication of comprehensive reports on the epidemiology of vaccine preventable diseases and vaccination coverage in Australia. Changes in the national immunisation schedules are also described in these reports.

This report, the fifth in this series, was published in Communicable Diseases Intelligence in December 2010* and includes national notification (2006–2007), hospitalisation (2005/2006 and 2006/2007) and death (2005–2006) data in a standard format for 16 diseases covered by population immunisation programs in Australia. This was the first report in the series which did not include vaccination coverage data; annual vaccination coverage reports are now published separately (see the Australian Childhood Immunisation Register section of this report).

This report showed the favourable overall trends towards improved control of these vaccine preventable diseases, particularly among children, but also highlighted some specific current issues.

Options for future development in the national surveillance of vaccine preventable diseases include further improvements in information capture in the existing source data systems and the potential use of complementary data sources and data linkage technology.
Acknowledgement — Data used in the production of this report were provided by the National Notifiable Diseases Surveillance System and the Australian Institute of Health and Welfare. Some jurisdictional-based data were provided by the Department of Health and Families of the Northern Territory and the Department of Health of South Australia. Many experts in the epidemiology of vaccine preventable diseases and epidemiological methods served as reviewers of various chapters of the report.


Vaccine preventable diseases and vaccination coverage in Aboriginal and Torres Strait Islander people, 2007 to 2010

Publication of regular reports on vaccine preventable diseases and vaccination coverage in Aboriginal and Torres Strait Islander people has been an ongoing responsibility for NCIRS since 2004. These reports bring together the relevant sources of routinely collected data on vaccine preventable diseases in Aboriginal and Torres Strait Islander people – notifications, hospitalisations, deaths, and childhood and adult vaccination coverage. The reports aim to inform providers and planners of immunisation services of the current status and future needs for vaccination programs in Aboriginal and Torres Strait Islander people.

The third report in this series is currently being prepared. The content coverage, format and distribution of this report are partly guided by the results from a survey of immunisation professionals and key stakeholders in Indigenous health, conducted by NCIRS in 2010–2011.

Acknowledgement — Data used in the production of this report were provided by the National Notifiable Diseases Surveillance System and the Australian Institute of Health and Welfare.

Research on specific vaccine preventable diseases

Timing of pertussis vaccine booster doses

In 2003, the fourth dose of diphtheria-tetanus-pertussis vaccine (DTPa) due at 18 months of age was removed from the Australian National Immunisation Program and an adolescent dose added. NCIRS investigated the effect of this change on vaccine effectiveness, timeliness of children receiving booster doses and the age distribution of pertussis cases. Vaccine effectiveness was found to be lower in children who did not receive an 18-month booster dose (82%, compared to 89% in children who did receive this dose) and was lowest in 3-year-olds (72%). Vaccine effectiveness was also found to be lower during the recent pertussis epidemic than for the entire 9-year period 2001–2009. The lower vaccine effectiveness and a recent rise in pertussis cases among 1- to 4-year-olds is of concern due to the role of this age group as transmitters of disease to unimmunised infant siblings. In 2010, a national recommendation was made that children be immunised with the DTPa booster as early as 3½ years of age.

These studies were presented at the Public Health Association of Australia 12th National Immunisation Conference in August 2010 and the National Pertussis Workshop in August 2011.

Pertussis vaccine effectiveness in hospitalised children

Vaccine effectiveness against severe disease resulting in hospitalisation is a key question in the context of record total numbers of pertussis cases, particularly in children. CDNA members provided data from jurisdictional notification databases for the period 2005–2009 including data on hospitalisations. For infants under 12 months of age, two doses of vaccine had high effectiveness (84.4%). Even one dose provided some protection (59.9%).

Collaborators – CDNA and NIC jurisdictional members

Pertussis mortality in Australia

The aim of this project is to provide a historical review of pertussis mortality in Australia to better understand the profile of pertussis cases and how this has changed over time. Data from the Australian Institute of Health and Welfare National Mortality Database and the National Notifiable Diseases Surveillance System are being used to describe pertussis deaths in Australia from 1967 through to 2011.
Epidemiology of pneumococcal serotypes following conjugate vaccine introduction

The World Health Organization (WHO) requested Australian data to contribute to an international review of changes in the epidemiology of pneumococcal serotypes after conjugate vaccine introduction. NCIRS collaborated with the Enhanced IPD Surveillance Working Group of CDNA to analyse data on invasive pneumococcal disease by serotype according to a specified template. Dr Robert Menzies attended an international meeting discussing the issue in Geneva in July 2010 and he and Professor Peter McIntyre attended a follow-up meeting in September 2011.

Collaboration with Communicable Diseases Network Australia

Case Definitions Working Group

Dr Robert Menzies is a member of this subcommittee whose aim is to develop national case definitions for nationally notifiable conditions, and update existing definitions as required.

Enhanced Invasive Pneumococcal Disease (IPD) Surveillance Working Group

The aim of this subcommittee is to enhance national conformity of IPD surveillance data and produce annual IPD surveillance reports. Dr Robert Menzies is a member of this group.

National Surveillance Committee

NCIRS staff have contributed to data collection standards and practices developed by the National Surveillance Committee. Contributions were made on important relevant issues including the national collection of hospitalisation data on the National Notifiable Diseases Surveillance System (NNDSS); variables to be included in the public NNDSS dataset for release on the web; enhanced pertussis surveillance; data release policy and improving data quality of NNDSS. Dr Aditi Dey is a member of this committee.

Varicella surveillance working group

At the beginning of 2010, CDNA formed a working group, chaired by Professor Peter McIntyre, to review varicella surveillance. The recommendations of the working group were endorsed by CDNA in February 2011 and included a diversified model of sentinel states and the use of multiple data sources – notifications, emergency department and hospitalisation data. This provides a potential model for other VPDs.

Working group for revising the Series of National Guidelines for influenza

NCIRS contributed to the revision of the CDNA Series of National Guidelines for influenza in both 2010 and 2011.

Polio Expert Panel

The Polio Expert Panel reviews cases of acute flaccid paralysis notified to the Australian Paediatric Surveillance Unit and/or identified through active hospital surveillance (see the Paediatric Active Enhanced Disease Surveillance section of this report). Professor Peter McIntyre is the CDNA member on the Panel.

Collaboration with the Australian Institute of Health and Welfare

The current memorandum of understanding (MOU) between NCIRS and the Australian Institute of Health and Welfare (AIHW) was signed in early 2010. Under this MOU, the Hospitals Unit of AIHW provides NCIRS with data from the National Hospital Morbidity Database (hospitalisations) and the Population Health Unit provides data from the National Mortality Database (deaths) for use in the vaccine preventable diseases reports produced by NCIRS (described previously). AIHW have provided NCIRS with technical advice on analysis of their data.
Overview

The Australian Childhood Immunisation Register (ACIR), the first complete purpose-built national childhood immunisation register in the world, is administered by Medicare Australia and records details of all vaccinations given to children under 7 years old.

ACIR data is used to measure vaccination coverage at the regional, jurisdictional and national level. Since 1998, NCIRS has received de-identified data from the ACIR on a quarterly basis and maintains a complete historical database of ACIR data. Ad hoc reports based on ACIR data are frequently required for ATAGI and TGA working parties and program evaluations. Research and surveillance activities related to the ACIR are reviewed and developed in consultation with relevant stakeholders, in particular the National Immunisation Committee.

Key activities

Projects funded by the Australian Government Department of Health and Ageing

Impact of rotavirus vaccine introduction on timeliness of other vaccines

In Australia, there are strict upper age limits by which infants should receive their first and final doses of rotavirus vaccine. This is the first time that such strict upper age cut-offs for infant vaccines have applied. Australia is in a unique position to assess rotavirus vaccine coverage and timeliness and whether this has any impact on the timeliness of other vaccines due at the same time.

High rotavirus vaccine coverage has been achieved rapidly in Australia with estimated national coverage by June 2010 of 82% by 12 months of age. Timeliness of both the third dose of DTP vaccine and the third dose of 7vPCV vaccine by 7 months of age improved in the period after the introduction of rotavirus vaccines. There was also a substantial decrease in the number of Indigenous children with vaccination delays of longer than 6 months. These results were presented at the Public Health Association of Australia 12th National Immunisation Conference in August 2010.

Impact of parental incentive payments

The Maternity Immunisation Allowance (MIA) was paid to parents of children aged 18–24 months who were fully immunised from 2001. It was not means tested after 2004, and from 1 January 2009, the MIA was split into two equal payments at 18–24 months and 4–5 years of age.

Two separate cohorts (a means-tested cohort and a non-means tested cohort) were tracked to assess the reduction in the percentage of children who were unimmunised, by each month of age, between the ages of 15 and 36 months.

Further analysis will examine the impact of the MIA by socio-economic status using ABS Socio-Economic Indexes for Areas (SEIFA).

Quarterly reports of ACIR data

NCIRS provides a review of quarterly ACIR data for each edition of Communicable Diseases Intelligence. These reports provide:

- immunisation coverage estimates in 3-month birth cohorts as at 1, 2 and 5 years of age, nationally and by jurisdiction
• data on hepatitis B, diphtheria-tetanus-pertussis, measles-mumps-rubella, *Haemophilus influenzae* type b (Hib) and polio vaccines

• trends in the proportion of children who are ‘fully immunised’ for these vaccines by age cohort.

### Annual national immunisation coverage reports

NCIRS has been publishing annual immunisation coverage reports in *Communicable Diseases Intelligence* since 2009. These reports are designed to inform policy makers and others of the most important trends and significant issues surrounding immunisation coverage in Australia.

The Immunisation coverage annual report, 2008,* was published in June 2010 and the Immunisation coverage annual report, 2009,** was published in June 2011. These reports provide an analysis of data obtained from the ACIR and comment on the coverage of individual National Immunisation Program (NIP) vaccines at the different age milestones and trends in timeliness of vaccine delivery. Vaccine uptake is also assessed with respect to Indigenous status and geographical locations.

These reports show that the Immunise Australia Program coverage target of 90% has been reached for children at 12 and 24 months of age but coverage is still lower at 5 years of age. A disparity still exists in vaccine coverage and vaccination timeliness between Indigenous and non-Indigenous children. Coverage is suboptimal for vaccines that are recommended for Indigenous children only (i.e. hepatitis A and pneumococcal polysaccharide vaccines) and vaccination is still more likely to be delayed in Indigenous children than in non-Indigenous children. A number of geographical areas have also been identified throughout Australia where immunisation coverage is lower than the national average.

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### Projects funded by NSW Health

#### Annual immunisation coverage reports for New South Wales

NCIRS developed a series of reports similar to the annual national immunisation coverage reports (described left) specific to New South Wales, including coverage for Aboriginal and Torres Strait Islander children and vaccination timeliness for all children. Data from the NSW Health Survey and the New South Wales School Immunisation Program are also used to calculate various measures of population coverage relating to adult influenza and pneumococcal vaccines and adolescent vaccination.

The first of these reports, which includes data for years up to and including 2009, was published in the *New South Wales Public Health Bulletin* in 2010.* The second report in the series, which analysed data to the end of 2010, was published in 2011.**

**Acknowledgement – Some data used in the production of these reports were provided by NSW Health.**

Overview

Surveillance for adverse events following immunisation (AEFI) is an integral part of the Australian National Immunisation Program, and underpins the safe use of all vaccines.

In Australia, national passive surveillance of adverse events (i.e. initiated by the reporter) occurs through voluntary reporting to the Therapeutic Goods Administration (TGA). Reports are made by state and territory health departments, health professionals, vaccine manufacturers and members of the public. All reports are assessed using internationally consistent criteria and entered into the Australian Adverse Drug Reactions System (ADRS) database by TGA staff. De-identified data are used by NCIRS for regular annual and biannual reports.

Key activities

Projects funded by the Australian Government Department of Health and Ageing

National reports on adverse events following immunisation

Since 2003, NCIRS has produced a comprehensive annual report and a supplementary report focusing on children aged under 7 years.

The supplementary report for the first 6 months of 2009 for children under 7 years of age was published in Communicable Diseases Intelligence in January 2010. The number of adverse events reported in children under 7 for the first 6 months of 2009 was much lower than for the corresponding period in 2008. Almost half the reported adverse events were in children under 1 year of age, and most were mild transient events, the most common being injection site reactions.

The annual report for 2009, including trends over the period 2000–2009, was published in Communicable Diseases Intelligence in September 2010. During 2009, there was an increase in the number of reported adverse events compared with previous years, attributed to the introduction of the pandemic (pH1N1) influenza vaccine in September 2009 after which reporting by members of the public and health professionals was actively encouraged. The types of adverse events reported in 2009 were similar to those in previous years.

The supplementary report for the first 6 months of 2010 for children under 7 years of age was published in Communicable Diseases Intelligence in January 2011.* There was a more than 7-fold increase in population-based reporting rates for specific AEFI in the first 6 months of 2010, entirely attributable to reports arising from the 2010 seasonal trivalent influenza vaccine and the pH1N1 influenza vaccine; 41% were from Western Australia which has had a funded state-based seasonal influenza vaccination program for all children aged 6 months to 5 years since 2008.

The annual report for 2010, including trends over the period 2000–2010, was published in Communicable Diseases Intelligence in December 2011.** The number of AEFI reports for vaccines administered in 2010 was the highest reported in any year, and a 63% increase over the number reported in 2009; this was almost entirely attributable to the large number of reports following seasonal influenza and pandemic H1N1 influenza vaccines.
Acknowledgement – Data used in the production of these reports were provided by the TGA.


Adverse events following influenza vaccination of children

In the influenza season of 2010, there was an increase in the number of reports of serious adverse events, predominantly febrile convulsions and fever, following influenza vaccination of children in Western Australia. This led to a nationwide emergency investigation into these adverse events into which NCIRS had substantial input. NCIRS collated and analysed available data and prepared a number of reports for the TGA/ATAGI working group investigating the incident.

The Working Group concluded that there is evidence to suggest that the risk for adverse events following administration of Fluvax® (CSL) may be higher than following either Vaxigrip® (Sanofi) or Influvac® (Baxter/Solvay). However, the available data were of variable quality. The Working Group recommended that options for enhanced surveillance of AEFI following influenza vaccine should be explored to provide more accurate and timely data on vaccine safety and contribute to both public and provider confidence in program safety.

NCIRS also initiated and coordinated work on two epidemiological studies required for the investigation: an analysis of the period of risk of febrile convulsions following influenza vaccination, and an analysis of the risk of re-presentation to a GP following influenza vaccination.

Reports on individual vaccines

NCIRS regularly produces reports analysing AEFI data to support ATAGI working parties examining particular vaccines or diseases. For example, an ATAGI working group was established in March 2011 in response to the recall of a batch of pneumococcal vaccine following reports of an increase in injection site reactions. NCIRS provided several data analyses including analysis of injection site reactions following 23vPPV immunisation.

Analysis of AEFI is also used to support program evaluations such as those of the national varicella and rotavirus vaccination programs (see the Program evaluation section of this report).

Analysis of AEFI related to HPV vaccination was provided for the Preventing Cervical Cancer (PCC) conference in November 2011.

Intussusception among Australian infants given rotavirus vaccines

In 2011, an Australian study was published by the Paediatric Active Enhanced Disease Surveillance (PAEDS) network showing an association between the currently registered rotavirus vaccines and intussusception (see the Paediatric Active Enhanced Disease Surveillance section later in this report). Two large international studies conducted in Mexico and Brazil also indicated an association. A working group was established by the TGA and the Australian Technical Advisory Group on Immunisation (ATAGI) in response to these reports. NCIRS provided data analyses for this working group, including intussusception hospitalisation rates by age group.

NCIRS is also involved in a national collaborative study investigating the association between receipt of rotavirus vaccine and intussusception. Data from most states and territories on intussusception hospitalisations in infants under 12 months old has been reviewed. NCIRS will be responsible for conducting a case control study using this data.

Collaborators – Professor John Carlin and Dr Katherine Lee, Murdoch Childrens Research Institute; Dr Megan Keaney and Dr Jane Cook, Therapeutic Goods Administration; Dr Jim Buttery and Professor Julie Bines, Royal Children’s Hospital, Melbourne.

Completeness and timeliness of TGA adverse events data

Adverse events following immunisation are reported from a number of sources (health authorities, healthcare providers, pharmaceutical companies and the general public). The events reported, the quality of information reported and the timing of reports vary. It is important that the lag time between onset of an adverse event and reporting to the TGA is minimised and that data completeness and timeliness are optimised to allow an effective and timely detection and investigation of serious adverse events. This project compared AEFI data for completeness and
timeliness among the various reporting sources. Results of this study were presented at the Australian Communicable Disease Control Conference in April 2011.

**Projects funded by NSW Health**

**Annual report on adverse events following immunisation in New South Wales**

NCIRS has developed a series of reports similar to the annual national adverse events reports (described above) specific to New South Wales.

The first of these reports, summarising data for 2009, was published in the *New South Wales Public Health Bulletin* in October 2010.* The second report, summarising data for 2010, was published in the *New South Wales Public Health Bulletin* in October 2011.**

Collaborators – Ms Sue Campbell-Lloyd, NSW Health

Acknowledgement – Data used in the production of these reports were provided by the TGA.


**Rotavirus and intussusception**

Following reports of an association between intussusception and receipt of rotavirus vaccines (see ‘Intussusception among Australian infants given rotavirus vaccines’ above), NSW Health commissioned a series of studies of New South Wales data.

The first was a study involving chart review of hospitalisations in New South Wales ICD-coded as intussusception between 2007 and 2010. The study found that intussusception in infants who had received rotavirus vaccination occurred at a younger age than in non-vaccinated infants. In one-quarter of the cases that occurred within 21 days of a rotavirus vaccine dose, the infant had been vaccinated beyond the recommended upper age limit.

The other two studies used self-controlled case series and case control approaches to estimate the risk of intussusception after receiving rotavirus vaccine. They had broadly consistent findings which suggested a small increase in the risk of intussusception 1 to 7 days after receipt of the first dose of rotavirus vaccine.

These studies were presented at the Australian Communicable Disease Control Conference in April 2011 and the Royal Australasian College of Physicians Annual Scientific Meeting in May 2011.

Collaborators – Ms Sue Campbell-Lloyd and Ms Sarah Moberley, NSW Health

**Projects jointly funded by the Australian and New South Wales governments**

**Adverse events clinical service**

Since 1997, specialist clinics have been held at The Children’s Hospital at Westmead (CHW) to advise parents and healthcare providers on re-vaccination of children who have previously experienced an adverse event following immunisation. The Adverse Events Clinic forms part of a national network including similar clinics in Melbourne, Adelaide and Perth, facilitating the exchange of clinical management and research ideas.

In 2010, the service provided through the Adverse Events Clinic at CHW was expanded. Weekly clinics are now coordinated through the CHW Outpatients Department by a dedicated Clinical Nurse Consultant (CNC) with support from a number of paediatricians from NCIRS. The specialist staff provide advice to parents and vaccinate patients through the outpatient setting, day stay and overnight wards.

During 2011 a total of 164 patients were seen, with 106 new patient referrals and 58 follow-up patients, who were either recommended to have subsequent vaccines administered under close
supervision or who elected to continue receiving vaccinations in the hospital setting. Clinic staff also provide a triage and referral service for adults, implemented in late 2010. A total of 34 patients were referred through this service, the majority (79%) seen through the Inject Clinic in the Immunology Department, Westmead Hospital. These patients ranged in age from 19 to 78 years. The majority of these patients (79%) were either new parents/grandparents who wanted dTPa vaccination or healthcare workers who required vaccination for employment.

Collaborators – Dr Jim Butter, Monash Medical Centre; Dr Nigel Crawford and Dr Jenny Royle, Royal Children’s Hospital, Melbourne; Associate Professor Mike Gold, Women’s and Children’s Hospital, Adelaide; Associate Professor Peter Richmond, Princess Margaret Hospital for Children, Perth.
Serosurveillance

Overview

Serological surveillance (serosurveillance) provides estimates of age-specific immunity against vaccine preventable diseases (VPDs) at population level. It is a useful tool for monitoring trends in population immunity before and after changes in immunisation programs and for disease modelling.

The National Serosurvey Program is coordinated by NCIRS and conducted in collaboration with the Centre for Infectious Diseases and Microbiology (CIDM) Public Health under the direction of Professor Lyn Gilbert. Ms Linda Hueston, Senior Scientist at CIDM, coordinates testing of the samples and development and refinement of specific assays required for the serosurvey that are not available in Australia.

Three serosurveys have now been conducted in Australia using sera collected in 1996–1999, 2002 and 2007. Each survey requires a bank of 7,000–10,000 sera obtained from diagnostic laboratories throughout Australia. The samples provided are residual from specimens submitted for testing that would otherwise have been discarded.

Preparation and planning has started for the fourth serosurvey. Approximately 10,000 sera will be collected during 2012; collection of these sera is expected to take 12 months. Sera will be tested for antibody levels to measles, mumps, rubella, pertussis, polio, meningococcal C, Q fever, hepatitis A and HPV.

This activity is funded by the Australian Government Department of Health and Ageing.

Key activities

Third serosurvey

Hepatitis B seroprevalence

Sera from the third serosurvey (2007) have been tested for hepatitis B virus surface antibody levels by age. Ninety per cent of infants aged 1 year and 60% of adolescents aged 14–15 years, currently targeted by the vaccination program, had immunity to hepatitis B. The results suggested that immunity in children vaccinated in the first year of the infant program is not optimal and that this group should be vaccinated in early adolescence using the current school-based program.

Pertussis seroprevalence

There have been considerable changes in the age pattern of pertussis notifications in recent years, particularly in adults and the elderly. The sera from the third serosurvey showed that there was a decrease in the proportion of high pertussis toxin antibody levels across all age groups in 2007, while the proportion of undetectable antibody levels increased, most likely indicating waning immunity. A paper describing the national results has been accepted for publication in *PLOS One* and a paper describing the New South Wales results was published in the *New South Wales Public Health Bulletin* in December 2011.

Tetanus seroprevalence

The first serosurvey showed low levels of immunity to tetanus in the elderly, particularly females, which supported the recommendation for a tetanus booster at 50 years of age. The profiles of tetanus antibody levels by age from the third serosurvey will
be compared with those from the first serosurvey to investigate the impact of this recommendation.

**Diphtheria seroprevalence**

The first serosurvey showed progressively lowering levels of diphtheria immunity with age. The profiles of diphtheria antibody levels by age from the third serosurvey will be compared with those from the first serosurvey to determine current trends in diphtheria immunity.

**Measles, mumps, rubella seroprevalence**

A birth cohort analysis suggests that seroprevalence in the group targeted in the 1998 Measles Control Campaign was lower in 2007; antibody levels to rubella remained stable in all cohorts. Immunity to mumps also appears to be stable, but at lower levels than are required to eliminate endemic transmission. Results were presented at the Public Health Association of Australia 12th National Immunisation Conference in August 2010. A paper describing the progress of Australia toward rubella elimination has been accepted by *Vaccine*.

**Pertussis seroprevalence in New South Wales during an epidemic**

A large pertussis epidemic occurred in New South Wales during 2009. Seroprevalence increased, suggesting that exposure during the epidemic and/or vaccination decreased the number of susceptible people in the population. This was particularly apparent for those aged 1–4 years and 35–44 years.

**Laboratories participating in the national serosurveillance program**

**Australian Capital Territory**

Royal Canberra Hospital (Immunoassay services)

**New South Wales**

Barratt and Smith Pathology, Penrith
Douglass Hanly Moir, North Ryde
Institute for Clinical Pathology and Medical Research, Centre for Infectious Diseases and Microbiology Laboratory Services, Westmead
Northern Rivers Pathology Service, Lismore
PALMS (Microbiology), Royal North Shore Hospital, St Leonards

Royal Prince Alfred Hospital (Microbiology), Camperdown
Southern Pathology, Wollongong
Symbion Laverty Pathology, North Ryde
The Children’s Hospital at Westmead (Blood bank)

**Northern Territory**

Royal Darwin Hospital (Pathology)

**Queensland**

Queensland Health Pathology Service, Cairns Base Hospital (Immunology/serology)
Queensland Health Pathology Service, Royal Brisbane Hospital (Microbiology)
Queensland Health Pathology Service, Townsville Hospital (Pathology)
Queensland Medical Laboratory (Immunology), West End
Sullivan and Nicolaides Pathology (Serology), Taringa

**South Australia**

Flinders Medical Centre (Microbiology and infectious diseases), Bedford Park
Institute of Medical and Veterinary Science (Infectious diseases), Adelaide
Women’s and Children’s Hospital (Microbiology and infectious diseases), North Adelaide

**Tasmania**

Northern Tasmanian Pathology Service, Launceston General Hospital
Royal Hobart Hospital (Microbiology)

**Victoria**

Gippsland Pathology (Symbion Health), La Trobe Regional Hospital Campus, Traralgon
Royal Children’s Hospital (Microbiology), Parkville
Royal Melbourne Hospital (Microbiology), Parkville
Victorian Infectious Diseases Reference Laboratory, North Melbourne

**Western Australia**

Pathcentre (Infectious diseases), Nedlands
Princess Margaret Hospital for Children (Microbiology), Perth
Western Pathology, Myaree
Paediatric Active Enhanced Disease Surveillance (PAEDS)

Overview

The Paediatric Active Enhanced Disease Surveillance (PAEDS) network conducts active, hospital-based surveillance to collect enhanced data on serious vaccine-related childhood conditions for which data are not readily available using existing surveillance mechanisms.

PAEDS is a joint initiative coordinated by NCIRS and the Australian Paediatric Surveillance Unit (APSU). It consists of a network of clinicians and public health researchers in four Australian tertiary paediatric hospitals: The Children’s Hospital at Westmead, Sydney; Royal Children’s Hospital, Melbourne; Women’s and Children’s Hospital, Adelaide; and Princess Margaret Hospital for Children, Perth.

PAEDS is funded by the Australian Government Department of Health and Ageing. In addition, from mid 2011, the state health departments of the participating sites, New South Wales, Victoria, Western Australia and South Australia, also agreed to contribute annual funding to PAEDS. This has enabled the expansion of PAEDS activities, including addition of new conditions for surveillance and increased capacity to rapidly respond to urgent issues. In addition, during late 2011, planning was underway to facilitate entry of a fifth PAEDS surveillance site in Brisbane, Queensland, in 2012.

During 2010–2011, as well as continuing to monitor the three existing conditions described below, the PAEDS group also submitted manuscripts for publication on complications of pandemic H1N1 influenza (a condition rapidly established for surveillance in 2009), added short-term surveillance of Guillain Barré syndrome to contribute to a global vaccine safety project, and gathered data from participating sites on febrile convulsions following vaccination with 2010 seasonal influenza vaccine.

Key activities

Conditions under ongoing surveillance

Acute flaccid paralysis

Surveillance for acute flaccid paralysis (AFP) has been conducted in PAEDS centres since 2007 and these centres contribute the majority of cases to the Polio Expert Panel of the Department of Health and Ageing. It is planned that AFP surveillance be broadened to include potential neurological AEFI.

Intussusception

PAEDS has monitored cases of intussusception (IS) since 2007 when rotavirus vaccines were introduced. Analysis of the PAEDS data conducted in 2010 suggested an increased risk of intussusception among young infants following the first, but not subsequent, doses of both brands of rotavirus vaccine. In 2010 this data was presented to peak immunisation advisory committees, including ATAGI, the World Health Organization Global Advisory Committee on Vaccine Safety (GACVS) and the US Advisory Committee on Immunization Practices (ACIP). PAEDS investigators were the first to publish a study showing an association between the currently registered rotavirus vaccines and IS.* Together with emerging data from studies in other countries (e.g. Mexico, Brazil and the USA), this study was used to formulate national and international recommendations about the risk–benefit profile and continued use of rotavirus vaccines.
A study commissioned by the Therapeutic Goods Association (TGA) will further examine the association between rotavirus vaccines and IS in 2012 and will incorporate PAEDS data.


Severe complications of varicella

PAEDS provides the only systematic prospectively collected data on hospitalised varicella in Australia, including risk factors and vaccination status. This, together with the collection of biologic samples to perform virus genotyping, will allow for a better understanding of the epidemiology of varicella since the introduction of varicella vaccines to the National Immunisation Program in 2005 and is also a potentially important means to estimate vaccine effectiveness.

Analysis of the data obtained to date was presented at the World Society for Pediatric Infectious Diseases (WSPID) conference in Melbourne in November 2011.

Additional surveillance activity

Analysis of influenza vaccine adverse events

The PAEDS network investigated the reported increased rates of fever/febrile convulsions in children, which occurred following administration of seasonal influenza vaccine in Australia in 2010, using data on all cases of febrile seizures presenting to the four participating hospitals in March–April 2010. PAEDS data contributed to the overall analysis that was conducted during the investigation, and which determined that the unexpectedly high risk was only associated with one brand of influenza vaccine, as reported by both the TGA and the Chief Medical Officer.

Additional data on all febrile convulsions during a pre-defined period in 2010 has been gathered for subsequent epidemiological investigation and analysis, using the self-controlled case series method. This analysis will be finalised in early 2012 and provides an excellent model for conducting national assessment of the incidence of febrile convulsions related to influenza and other vaccines in children.

Guillain Barré syndrome

The World Health Organization (WHO), in collaboration with the US Centers for Disease Control and Prevention (CDC) and Food and Drug Administration (FDA), began a novel worldwide collaborative study on the incidence of Guillain Barré syndrome (GBS) following pandemic H1N1 vaccine in early 2010. As part of this study, the PAEDS group has submitted data on GBS cases (confirmed using Brighton criteria) from each PAEDS site. It is anticipated that data from more than a dozen countries will be included in the final data set; results of the analysis are expected in 2012.

Planning for new studies: Hospitalised pertussis

During 2011, PAEDS investigators developed a protocol for active surveillance of hospitalised pertussis, including gathering data on the clinical and laboratory features of such cases. In addition, information on the vaccination history of pertussis cases and their contacts will be collected and analysed, and clinical samples will be obtained for genetic analysis (to be done at the University of New South Wales). Enhanced clinical and epidemiological data on pertussis is important to further inform vaccine strategies in the management of Australia’s sustained pertussis epidemic. Pertussis surveillance will commence in 2012.

PAEDS investigators and surveillance nurses at the annual PAEDS face-to-face meeting in Sydney, December 2011. Representatives of participating state Health Departments and the Australian Government Department of Health and Ageing were also present.
Overview

Evaluation of the conduct and impact of national vaccination programs provides essential information for planning and delivery of future programs.

Since 1999, NCIRS has had a role in evaluating vaccination programs and, from 2005, evaluation of national programs has become one of NCIRS’s core responsibilities. These evaluations follow a standard framework including evaluation of the planning and delivery process; description and assessment of the surveillance systems used to measure program effects; estimation of vaccination uptake in target groups; description and assessment of the adverse events following immunisation (AEFI) for the particular vaccine(s); and an assessment of the effect of the vaccination program on the disease burden through analysis of routine national surveillance data.

Key activities

Evaluation of the national rotavirus vaccination program

Rotavirus vaccine was added to the Australian National Immunisation Program (NIP) in 2007 for children between 2 and 6 months of age but with strict upper age limits. There was strong stakeholder collaboration reported across all sectors which was fundamental in facilitating the delivery of the program. Uptake of the vaccine was rapid, with coverage sustained at relatively high levels despite the strict upper age limits restricting achievable coverage, particularly for Indigenous children. Reported adverse events following immunisation were mainly mild and transient in nature. The impact of this vaccination program on hospitalisations and strain shift is comparable to that observed overseas; however, coverage achieved in Australia is better than that documented in other countries. There were marked reductions in the number of rotavirus and non-rotavirus gastroenteritis cases in the first 3 years following the commencement of the program, predominantly in children under 5 years of age which included the target group for vaccination.

The findings from the process evaluation were presented at the Primary Healthcare Research Conference in July 2011 and the results from the outcome analyses were presented at the World Society of Pediatric Infectious Diseases (WSPID) conference in Melbourne in November 2011.

Some of the resources used for the national rotavirus vaccination program.
Evaluation of the national varicella vaccination program

Varicella vaccine was added to the Australian NIP in 2005 for children at 18 months of age with a school-based catch-up program for one cohort of adolescents aged 10 to 13 who had not previously had the vaccine or varicella disease. There was strong stakeholder collaboration across all sectors which facilitated delivery of the program. Uptake of the 18-month dose was rapid within the first year, though coverage has stabilised at around 83%. The proportion of unvaccinated adolescents with natural immunity remains unknown. Reported adverse events were predominantly mild and transient in nature. The routine childhood program has effectively reduced the burden of severe varicella requiring hospitalisation in the targeted age group (1–4 years of age) and, to a lesser extent, in age groups not targeted by the vaccination program.

Findings from the assessment of the program’s impact on varicella disease were presented at the Public Health Association of Australia 12th National Immunisation Conference in August 2010 and the Communicable Disease Control Conference in April 2011. A letter to the editor was also published in the Medical Journal of Australia.

Future evaluations

HPV vaccination program

HPV vaccine was added to the Australian NIP in 2007, primarily as a school-based program for girls 12 to 13 years of age with a time-limited catch-up program for women up to 26 years of age delivered through general practice. NCIRS is working with a collaborative group to evaluate this program. Collaborators include Professor John Kaldor (The Kirby Institute), Dr Julia Brotherton (Victorian Cytology Service), and Dr Christine Selvey and Dr Rosemary Lester (Communicable Diseases Network Australia).

Hepatitis A

In 1999, a hepatitis A immunisation program commenced in north Queensland for Indigenous children aged 18 months to 6 years. In 2005, this was expanded to include all Indigenous children aged 12 to 24 months in the Northern Territory, Queensland, South Australia and Western Australia. NCIRS is planning an evaluation of the hepatitis A programs in these states.

Review of school-based vaccination in Australia

Voluntary school-based vaccination programs have been implemented in Australia since the 1970s and over the past decade have evolved to become the primary method of delivering nationally recommended adolescent vaccines in Australia. These programs are operated by state and territory governments and offer nationally funded vaccines to adolescents in specific school grades using local teams of trained vaccine providers.

This review documented the history and current operation of school-based vaccination programs in Australia. Current gaps in evidence include a detailed understanding of how procedural factors influence uptake, best ways to maximise consent form return and standardisation of the reporting of coverage data.

This work was presented at the annual meeting of the New South Wales Department of Health Immunisation Network in May 2011 and the 7th National Immunisation Conference of New Zealand in August 2011.

National meeting of immunisation program evaluators

In April 2011, coinciding with the national Communicable Disease Control Conference, NCIRS organised a half-day meeting to bring together people involved in the evaluation of immunisation programs around Australia. Attendees included representatives from the Australian Government Department of Health and Ageing Surveillance Branch, Queensland Health, the Victorian Infectious Diseases Reference Laboratory, Women’s and Children’s Hospital Adelaide, the University of New South Wales and NCIRS. The meeting aimed to foster awareness and collaboration between these groups. Presentations on the day described evaluation studies that have been conducted on school-based vaccination and rotavirus, varicella, HPV and pertussis vaccination programs.
Disease modelling

Overview

Mathematical modelling is an important tool that can be used to help predict the impact of vaccination programs and the resultant changes to disease epidemiology both in those vaccinated and in the wider population via herd protection. Information produced by NCIRS (including analyses of epidemiological data, vaccine coverage estimates and results of serosurveillance studies) is used to design and validate these models.

This work is a collaboration between NCIRS and the modelling group at the School of Public Health and Community Medicine at the University of New South Wales (UNSW), led by Professor Raina MacIntyre.

This group undertakes a range of modelling studies related to vaccine preventable diseases, including evaluations of the effectiveness and cost-effectiveness of new vaccines and more general health economic evaluations; modelling the impact of modifications to existing vaccination schedules and the effect of control strategies for specific diseases such as pandemic influenza and tuberculosis; and modelling the progress towards elimination of diseases such as measles and rubella.

These activities are funded by the Australian Government Department of Health and Ageing.

Key activities

Projected impact of changes in the pertussis vaccine schedule

The NCIRS/UNSW modelling group is undertaking two projects to inform thinking about the most effective way to combat pertussis in Australia.

The first aims to apply similar techniques to those used in a study estimating pertussis incidence and reproduction number in five European countries, based on national serosurvey data. The first stage is to adapt the study methods to produce separate incidence estimates from each of the three serosurveys conducted in Australia. This method will then be extended to simultaneously fit to all three serosurveys with the aim of achieving more consistent estimates.

The second project aims to rebuild a previous model developed for Australia in 2004 by Professor Herb Hethcote (Department of Mathematics, University of Iowa) in consultation with NCIRS, and to establish whether its predictions are consistent with the patterns observed in the recent large outbreak of pertussis. The new model will then be used to assess the influence of duration of immunity and to examine proposed changes to the Australian vaccine schedule.

Impact of the varicella vaccine catch-up campaign

Since November 2005, varicella vaccination has been included in the Australian National Immunisation Program for children at 18 months of age, with a catch-up dose funded for children 10 to 13 years of age who haven’t previously had varicella disease or vaccination.

The NCIRS/UNSW modelling group examined the impact of the varicella catch-up program using a realistic, age-structured (RAS) deterministic model of varicella-zoster transmission. Varicella and zoster hospitalisation data were used to calibrate the model and model parameters were determined based on recent evidence from the literature and...
post-vaccination data from Australia. Base-case comparisons of model-based predictions of the effect of the current adolescent catch-up campaign have been completed and sensitivity analysis with respect to uncertain parameters is currently underway.

Estimates of MMR vaccine coverage in Australia

This study aims to estimate measles-mumps-rubella (MMR) vaccine coverage in Australia using antibody data on all three infections obtained from Australian serosurveys. This project builds on methods used for analysis of serosurvey data in Europe. Preliminary results indicate that data from multiple time-points can be used to expand the number of parameters estimated by this approach.

Mumps incidence in Australia

Incidence of mumps in adults has been rising in Australia and, with recent large epidemics in the UK and the USA and schedule changes with MMR vaccine, it is timely to analyse future trends in mumps epidemiology in Australia. This study aims to compare predictions of mumps incidence following two- or three-dose vaccination programs. A mathematical model of mumps transmission was developed, with parameters derived from a literature review, ACIR coverage data and the first NCIRS serosurvey.

Rubella in Australia – are we at elimination?

Since the early 2000s, rubella incidence in Australia has been at an all-time low. More importantly, cases of congenital rubella syndrome (CRS), which can cause serious congenital abnormalities in infants, have almost disappeared, with the last case of local acquisition recorded in 2003. This raises the question as to whether we have already achieved or are on the verge of rubella elimination in Australia? The NCIRS/UNSW modelling group investigated this question using serosurveillance data which suggests that population immunity is already sufficient to eliminate endemic transmission of rubella. While of itself this is perhaps not enough to claim elimination status, this research strongly suggests this is the case, with the underlying research now accepted for publication in the journal Vaccine. Follow-up work including more rigorous calibration of rubella transmission models to historical rubella and CRS notifications is being undertaken to assess future risk of CRS in both migrant and Australia-born residents.
Overview

Aboriginal and Torres Strait Islander Australians experience a greater burden of many infectious diseases than non-Indigenous Australians and generally have lower rates of vaccine coverage and protection against these diseases. NCIRS undertakes a wide range of research related to vaccine preventable diseases in Aboriginal and Torres Strait Islander people with the aim of enhancing service delivery and policy development around immunisation programs for the Indigenous population.

Projects are generated through federal programs, state and territory initiatives and from consultation with health professionals working within the National Aboriginal Community Controlled Health Organisation (NACCHO) and its affiliates.

Collaboration also occurs with other centres such as the Sax Institute and the Menzies School of Health Research, Darwin.

Key activities

National Indigenous Immunisation Coordinator

Since 2007, NCIRS has supported the role of the National Indigenous Immunisation Coordinator (NIIC) held by Ms Telphia Joseph. The role of the NIIC is to provide feedback to the National Immunisation Committee (NIC) on issues related to immunisation of Indigenous people and facilitate interaction between a range of national, state and local authorities and groups involved in the provision of health services to the Indigenous community.

Other activities undertaken by the National Indigenous Immunisation Coordinator during 2010–2011 included presentations to a number of Department of Health and General Practice training meetings; participation in and chairing of the Western Sydney Aboriginal Immunisation Committee; and key presentations to the Public Health Association of Australia 12th National Immunisation Conference and the International Papillomavirus Conference in 2010.

The NIIC has also provided input to meetings of relevant state organisations (e.g. the NSW and Queensland Aboriginal and Torres Strait Islander Immunisation Advisory Groups) regarding issues such as principles for the follow-up of Aboriginal children reported as overdue for immunisation and the potential employment of Aboriginal Health Education Workers in Area Health Services.

Another important collaboration of the NIIC is with the Close the Gap Project Officers (CTGPO) employed through the General Practice Networks in a project aimed at improving the notification rate for Aboriginal and Torres Strait Islander females on the National HPV Register.

The NIIC is regularly invited to participate in various community projects and to provide educational workshops aimed at improving vaccination coverage in specific groups. For example, the NIIC was invited by David Beaumont, director of the educational program “imodel”, to co-facilitate workshops being run in collaboration with the National Aboriginal Sporting Chance Academy (NASCA) which aids young people to take responsibility for their own health and welfare. The workshops covered the importance of vaccine boosters and HPV vaccination and addressed any concerns of the girls attending. The majority of the 27 girls at the camp were up to date for boosters and HPV vaccination.
A part-time assistant Indigenous Immunisation Coordinator, Mr Brendon Kelaher, was employed by NCIRS in late 2011 to assist the NIIC.

**Vaccination for our Mob**

The second edition of *Vaccination for our Mob* is being prepared. This is a condensed version of the report *Vaccine preventable diseases and vaccination coverage in Aboriginal and Torres Strait Islander people, Australia, 2003 to 2006* (see the Surveillance of vaccine preventable diseases section of this report). This version of the report is targeted at Aboriginal health workers, and providers and planners of immunisation services for Indigenous people.

**Haemophilus influenzae type b (Hib) disease in Indigenous children**

This analysis of Hib disease in Indigenous children provided an update to a previous analysis for 1993–2005 done in 2006. Since then there have been changes in vaccination policy and the type of Hib vaccines used for Indigenous children. This study showed that Hib disease continued to decrease in non-Indigenous children between 2006 and 2008, but no further decrease was observed in Indigenous children, resulting in a further widening of the disparity in disease burden between Indigenous and non-Indigenous children. The majority of Indigenous children with Hib disease are incompletely vaccinated or unvaccinated.

**Evaluation of the hepatitis A vaccination program for Aboriginal children**

In 1999, a hepatitis A vaccination program commenced in north Queensland for Indigenous children aged 18 months to 6 years. Since 2005, hepatitis A vaccine has been recommended and funded for Aboriginal and Torres Strait Islander children in the Northern Territory, Queensland, South Australia and Western Australia as part of the National Immunisation Program.

An evaluation of the Hepatitis A program in those jurisdictions where it was implemented is being planned to provide information to assist in the implementation of national immunisation programs in the future. NCIRS began preparing an evaluation proposal for discussion at relevant national committees and scoping the required methods and resources to undertake this evaluation.

**Building research capacity for health interventions to improve Aboriginal health**

In order to conduct vital research into improving Aboriginal health in the future, it is necessary to build Indigenous research capacity and train independent researchers in this field. In 2005, the Sax Institute invited Professor Peter McIntyre and Dr Julie Leask from NCIRS to participate as investigators in the ‘Making a difference: building research capacity for health interventions to improve Aboriginal health’ NHMRC Capacity Building Grant led by Professor Sandra Eades. Through this grant, which ends in early 2012, 11 early career researchers, including Telphia Joseph from NCIRS, have been mentored.

**Evaluation of Aboriginal Medical Services’ contribution to immunisation**

According to the Australian Childhood Immunisation Register (ACIR), 10% of Aboriginal and Torres Strait Islander children nationally are immunised by an Aboriginal Medical Service (AMS). However, it is believed that this does not reflect the true contribution by AMSs. To establish if this figure correctly shows AMS contribution to immunisation NCIRS is conducting a study in New South Wales that aims to describe the range of ways in which AMSs support and deliver immunisation to Aboriginal and Torres Strait Islander children under the National Immunisation Program and determine how immunisations undertaken through each AMS are reported to the ACIR. The study includes a written questionnaire and face-to-face interviews with AMS clinic staff involved in immunisation; this will continue in 2012. This study is being conducted through a Masters of Philosophy and is a result of Telphia Joseph participating in the Capacity Building Grant led by Professor Sandra Eades (see above).
Study of Environment on Aboriginal Resilience and Child Health (SEARCH)

The SEARCH project is a collaboration between the Aboriginal Health and Medical Research Council (AHMRC) and the Sax Institute through the Coalition for Research to Improve Aboriginal Health. It is a cohort study of about 2,000 children in 800 Aboriginal families recruited from Aboriginal Medical Services across New South Wales, predominantly in urban areas. It is hoped that the study will stay in contact with these families for up to 20 years. SEARCH will gather information on ear infections, vaccinations, mental health, injury, environmental health and risk factors for later chronic diseases to provide detailed descriptions of the health of urban Aboriginal infants, children, adolescents and their families. The study aims to assess the determinants that result in good mental, emotional and physical health and to trial strategies to improve health outcomes. SEARCH has primarily been funded through competitive grants from the National Health and Medical Research Council.

One of the sub-studies in the SEARCH project is a controlled trial to examine whether a community appointed health broker who works directly with families can improve the ear health of Indigenous children. As part of this trial, NCIRS is contributing to the assessment of morbidity due to otitis media in Indigenous children, otitis media prevention and treatment, and vaccination coverage and timeliness.

Collaborators – Coalition for Research to Improve Aboriginal Health (CRIAH); Aboriginal Health and Medical Research Council of New South Wales; Sax Institute; School of Public Health, University of Sydney; Division of International Health, University of Queensland; National Centre for Epidemiology and Population Health, Australian National University; the George Institute for International Health; Woolyungah Indigenous Centre, University of Wollongong; the Baker IDI Heart and Diabetes Institute; National Centre in HIV Social Research, University of New South Wales; University of Western Sydney; Aboriginal Medical Service Redfern; Aboriginal Medical Service Western Sydney; Riverina Medical and Dental Aboriginal Corporation.
Social science

Overview

To maintain high immunisation coverage it is important to understand the community's beliefs, attitudes and practices regarding vaccination programs in Australia and to find the most effective ways of addressing barriers. The NCIRS Social Science Unit aims to support the optimal uptake of safe, effective vaccines. This includes conducting research and collating evidence on knowledge, attitudes and behaviours in target groups primarily within the National Immunisation Program (NIP); contributing to the evidence on best practices in communicating vaccine risk and benefit; and generating and synthesising knowledge about how best to deliver immunisation programs. The Unit's strategic focus over the 2011 to 2015 period is on safety and attitudes, communications, ethics and service delivery. Research methods range from randomised trials to quantitative surveys of populations to in-depth qualitative investigations.

Social research at NCIRS contributes to other work done by NCIRS in Indigenous health, program evaluation, policy development and communication. An integral role of NCIRS is the provision of advice based on this research to external researchers, health professionals and government.

Key activities

Projects funded by the Australian Government Department of Health and Ageing

MMR Decision Aid

Decision aids are evidence-based tools designed to support informed decision-making. NCIRS first developed the online MMR Decision Aid in 2005 to assist consumers to make informed decisions about the MMR vaccine. It has since become a valued resource for many thousands of parents around the world and recently the German government developed a similar one.

The Decision Aid was adopted by collaborators at the University of Leeds, UK, who evaluated it in a randomised trial (see also ‘Evaluation of the MMR Decision Aid’ below). Information in the Decision Aid was further updated by NCIRS during 2011, including the addition of the latest information relating to the controversy surrounding MMR vaccine and autism.

Strategies to improve vaccination coverage

Even in an era of high immunisation coverage, sub-optimal vaccination rates still occur within certain groups. This project examined what is currently known about strategies used to increase vaccination coverage across a range of child and adult target groups.

Researchers consolidated and reviewed all Australian studies related to these strategies, from peer-reviewed literature, grey literature and conference proceedings, since 1997. The
review showed gaps in the evidence regarding vaccine target groups and types of strategies. It also revealed a need to increase the capacity of program managers to evaluate their local programs.

**Vaccine communication guidelines for primary care providers**

There is clear evidence that primary care providers are the most important influence on parents’ decisions about vaccinating their children. Poor provider communication can set questioning or concerned parents on a path to active opposition. Although many studies point to the need for good physician–parent communication, there are currently no evidence-based guidelines to address this.

NCIRS commenced a project in 2009 which aims to develop evidence-based, theoretically driven communication guidelines for primary care providers. The project involves an international collaboration of experts in decision science and patient–doctor communication.

The group reviewed the literature on vaccine decisions and guidelines were developed. The guidelines have been field tested in training sessions with over 150 immunisation providers and are now forming the basis of training sessions provided by NCIRS. It is planned that they will be published in 2012.

**Parental attitudes to seasonal influenza vaccination of children**

This study examines how parents perceive and respond to influenza in children. It involves three parts: a review of worldwide literature exploring parental attitudes to influenza vaccination of children; content and discourse analysis of media messages on influenza and vaccination; and interviews with parents on their perceptions of influenza, the perceived risks and benefits of immunisation, and their information needs.

This work forms part of a PhD project. Preliminary results were presented in August 2010 at the Public Health Association of Australia 12th National Immunisation Conference and The University of Sydney Postgraduate Research Student Conference (at which PhD candidate Catherine King was awarded the Discipline of Paediatrics and Child Health Prize for her presentation). Results of a survey of parents’ intention to receive H1N1 influenza vaccine were published in the *Medical Journal of Australia* in October 2010. A manuscript about parents’ intentions and behaviour regarding seasonal influenza vaccination for their children, from the same survey, was submitted to a peer-reviewed journal in December 2011.

Acknowledgement – KU Children’s Services.

**Projects funded by external grants**

**Impact of influenza in carers of children**

Influenza in children affects not only the child but can have social and psychological impacts on the child’s primary caregivers, especially if the child has a severe influenza illness.

This study aimed to measure the impact of influenza in children on the quality of life of primary caregivers and to explore in depth the psychosocial impact of the illness. A validated quality-of-life questionnaire was given to primary caregivers of children with influenza-like illness. Qualitative semi-structured interviews were conducted with a sub-sample of parents to explore the social and psychological impact on the family of severe influenza-like illness in their child.

This study formed part of a PhD project and was funded under an ARC Linkage grant ‘Social, economic and health benefits of vaccinating children in day care centres against influenza’. Results of the study and a systematic review on measurement of quality of life in parents of children with diseases were presented by PhD candidate Maria Chow at the 18th Annual Conference of the International Society for Quality of Life Research in Denver, Colorado, in November 2011.

Acknowledgements – KU Children’s Services

[Image of a presentation by Maria Chow and her supervisor, Dr. Angela Morrow, in Denver, Colorado]
Protecting babies from the effects of whooping cough and influenza

Vaccination of mothers is an emerging strategy to protect newborn infants from two significant diseases: pertussis and influenza. The youngest infants are the ones most likely to be hospitalised or die from pertussis. Vaccinating new mothers against pertussis eliminates a primary source of transmission: from carer to child. Similarly, influenza infection during pregnancy often results in serious ramifications for the mother and baby. This risk could be reduced by vaccinating pregnant women against influenza. It is essential to use the most effective means of communicating vaccine risk and benefit to mothers.

This project is looking at pregnant women's decision-making about influenza vaccination during pregnancy and pertussis booster vaccinations. Study findings and a review of the available evidence on safety and efficacy of the vaccines were used to develop a decision aid to help women make informed decisions about vaccination during pregnancy.

Women attending antenatal clinics at two urban hospitals and one regional hospital were surveyed about their vaccination status and attitudes to influenza and pertussis vaccination; in-depth interviews with a sub-group of respondents were also completed.

Preliminary findings suggest that healthcare professionals are influential in pregnant women's decisions to accept influenza vaccine, and other factors such as disease risk perception and previous experience with influenza also play a role. These findings were presented at the Hunter New England Immunisation Conference in December 2011.

This study forms part of a PhD project and is funded by a grant from the Financial Markets Foundation for Children.

Acknowledgements – Dr Richard Bellingham, Department of Obstetrics and Gynaecology Westmead Hospital and staff at Westmead Hospital Antenatal Clinic; Dr Robert Ogle, Royal Prince Alfred Women and Babies and staff at Royal Prince Alfred Hospital Antenatal Clinic and Birth Centre; Dr Ken Apen, Department of Obstetrics and Gynaecology, and Ms Chris Coombs, Director of Nursing, Tamworth Rural Referral Hospital, and staff at Tamworth Rural Referral Hospital Antenatal Clinic.

Influenza vaccination

Influenza is a viral illness that causes much social disruption. Children in day care settings tend to be infected more often. As part of the PIVOT study (Paediatric Influenza Vaccine Outcomes Trial), the social science team studied parents’ views about influenza and influenza vaccine, and measured the quality of life impact of influenza-like-illness (ILI).

Detailed, contextual information on the knowledge, attitudes and behaviours of Australian parents in relation to influenza and influenza vaccination is currently lacking. In particular, there is a paucity of information about how seriously influenza is viewed by parents, parents’ willingness to vaccinate their children, and who and what information sources they trust. PhD candidate Catherine King conducted 42 in-depth semi-structured interviews with parents of children attending childcare centres in the Sydney metropolitan area during 2010. Initial qualitative analysis of parents’ views on the perceived disease severity of both seasonal and H1N1 influenza, and attitudes and beliefs about influenza vaccination, indicate that, despite the intense media coverage of H1N1 pandemic influenza, there is a great need for further education of parents about the severity of influenza and information on influenza vaccination in children. It is hoped that by identifying potential barriers to acceptance of influenza vaccination among parents, this study will lead to the development of targeted resources for parents.

PhD candidate Maria Chow has used two standardised questionnaires to measure the quality of life (QoL) of parents of children before and after their ILI episodes. Parents had significantly lower QoL during their child's illness than before their child had ILI and lower QoL than parents whose children did not have ILI. Further in-depth interviews with parents of children with severe ILI showed that common experiences by parents included sudden changes in daily life, emotional impact such as distress and frustration, social isolation and relationship changes. Friend and family support during the child’s illness was viewed as crucial. A new questionnaire was developed by Maria to measure parents’ QoL change during the child’s ILI period. This is the first ILI-specific questionnaire available and it is hoped that parents’ QoL changes can be more accurately and specifically measured, to complement hospitalisation data and economic evaluation when calculating disease burden.
Projects with other collaborators

Understanding under-immunisation in children from disadvantaged population groups

Barriers to immunisation result from both the attitudes that parents have towards vaccination and the physical access that parents have to vaccination services. Much is known about attitudinal barriers but there have been fewer studies on the barriers to getting children immunised on time that are faced by financially deprived or socially isolated families.

This study, which began in 2009, used qualitative in-depth interviews with parents from disadvantaged population groups whose children are under-immunised or not up-to-date with immunisations, to explore barriers to immunisation and find potential ways to assist parents.

This is a three-city study, led by NCIRS, involving researchers from the University of Auckland (Immunisation Advisory Centre), the University of Leeds and the South Eastern Sydney Public Health Unit. It was funded under the University of Sydney's International Program Development Fund. The project involved the capacity building of three postgraduates in undertaking qualitative research. The Sydney interviews were undertaken as a Master of Public Health honours project. The data analysis has been ongoing and early findings have informed campaign planning.

NSW Child Health Survey

The success of vaccination as a public health measure depends on public confidence in vaccines. Analysing trends in public confidence allows health authorities to respond appropriately to any decline in confidence that would negatively impact vaccination coverage.

This study is tracking changes in parental attitudes to vaccination over time using data from the New South Wales Health Survey program, an ongoing survey program collecting information regarding Australian children. NSW Health has provided NCIRS with data from the immunisation module of the health surveys conducted in 2004, 2007 and 2010.

Analysis of this data will detect changes in levels of support for immunisation and concern about vaccine safety. It will also identify any demographic factors predictive of high support for vaccination. Survey questions developed by NCIRS have been further developed for other populations.

Collaborators – Ms Margo Barr and Mr Michael Giffin of the Health Survey program, NSW Health.

Journalists’ experiences and media representation of pandemic influenza in Australia

The mass media is a critical component in public communication strategies during an influenza pandemic and has a strong influence on the way a pandemic is represented. Effective intra-pandemic communication between health experts and the media is vital.

NCIRS investigated the factors that influenced journalists’ coverage of avian influenza and a pandemic threat. In 2008, NCIRS conducted in-depth interviews with 16 journalists, editors and news producers in print, radio and television. This provided valuable information about the framing of pandemic risk, source credibility and suggestions provided by journalists on how best to work with the media during an emerging pandemic. The findings were presented at the Australasian Conference of Medical Writers in 2009 and were published in BMC Public Health in 2010. A separate analysis was published in Influenza and Other Respiratory Viruses in December 2011.

Decision tool for HPV vaccine and cervical cancer prevention

With the availability of HPV vaccines and new knowledge about the prevention of cervical cancer, young women must make choices based on a range of information. This study involves the development and evaluation of an evidence-based decision tool for women participating in cancer screening programs. The tool includes an extensive component to assist women to decide on whether or not to receive the HPV vaccination. Cancer Council funding was awarded for the project which commenced in 2009.

This study is a collaboration led by researchers at the School of Public Health, University of Sydney.

Collaborators – Associate Professor Lyndal Trevena, Associate Professor Alex Barratt, Dr Kirsten McCaffery and Dr Tim Dobbins, School of Public Health, University of Sydney; Dr Julia Brotherton, Victorian Cytology Service.
Evaluation of the MMR Decision Aid

NCIRS has collaborated on a randomised trial to determine whether the MMR Decision Aid (see above) improves the quality of parental decisions about the MMR vaccine. Preliminary results from a pilot study (published in 2008) indicated that the MMR Decision Aid is highly acceptable to parents and may increase informed decision-making about the MMR vaccine. Analysis by the Leeds team is ongoing and a researcher from that study presented early findings at NCIRS in November 2010. Dr Julie Leask from NCIRS also presented the findings to a meeting in Germany in May 2011 and the German government has adopted its own version of the decision aid.

Collaborators – Dr Cath Jackson, University of Leeds, UK; Associate Professor Lyndal Trevena, School of Public Health, University of Sydney.

The Mums and Whooping Cough Study

This study commenced in the maternity unit of Royal North Shore Hospital (RNSH) in December 2009, led by Dr John Sinn (RNSH) in collaboration with NCIRS.

The study aims to examine what factors (including knowledge, attitudes, intentions, and perceived susceptibility to and severity of pertussis) and what types of information influence new mothers to take up the pertussis vaccine. It will also investigate the feasibility of implementing routine pertussis booster vaccination to new mothers in the maternity ward.

Mothers were recruited by a research midwife at the hospital and both mothers and midwives were surveyed regarding perceptions, beliefs and practices about pertussis vaccination. Results of the midwife surveys were published in Vaccine in August 2011.

The study will continue in 2012 with an electronic version of the questionnaire completed via an iPad.

A pilot study was undertaken in September 2011 to determine the feasibility of vaccinating the partners of mothers in the maternity ward.

Awareness and attitudes of parents toward adult pertussis vaccination

Despite high childhood vaccination coverage and specific pertussis vaccination recommendations for adults, pertussis persists in Australia. This Masters research project aimed to quantify the awareness and attitudes of adult carers of young children toward adult pertussis vaccination. Parents and carers of children attending randomly selected childcare centres in Sydney completed a self-reported questionnaire. This group indicated strong support for immunisation and willingness to be vaccinated, but only partial awareness of the current adult pertussis immunisation recommendations, with relatively low self-reported vaccine uptake.

Other projects

Improving the vaccination consent experience for parents

The Western Australian Department of Health sought to improve vaccination consent materials and processes. A study was undertaken in 2011 that reviewed the literature on consent for immunisation, and surveyed parents and providers. NCIRS provided expert advice on the survey design and interpretation.

Collaborators – Dr Paul Effler and Ms Palee Kaur, Communicable Disease Control Directorate, WA Department of Health; Mr Kim Clarke and Ms Tanyana Jackiewicz, Telethon Institute of Child Health Research.

International collaborations on vaccine risk perception and communication

Dr Julie Leask contributed to the inaugural meeting of the MOTIV (Motors of Trust in Vaccination) Think Tank in December 2010. The Think Tank was established to further an understanding of the diverse factors that influence and drive vaccination decision making and establish a global research agenda. A paper was published in Nature that summarised the global perspective on shifts in vaccine acceptance and summarised the findings of the Think Tank.
Dr Leask was an invited speaker at a meeting of international experts in communication, media and risk perception at the University of Erfurt, Germany, in May 2011. The meeting addressed contemporary challenges in vaccine programs, including the Web 2.0 environment and vaccine safety issues. A paper summarising the meeting has been published in Vaccine.

Dr Leask was invited to advise the Decade of Vaccines Collaboration and their Research and Development Working Group in contributing to a Global Vaccine Action Plan which was presented at the World Health Assembly in May 2012. The Decade of Vaccines Collaboration is an initiative of WHO, UNICEF, Bill and Melinda Gates Foundation and the National Institutes for Allergy and Infectious Diseases.

**Ethical issues in immunisation**

The *Journal of Paediatrics and Child Health* commissioned Dr Julie Leask to write a review for a special edition on ethical issues in immunisation. The article focused on ethical issues pertaining to individual and community consent for immunisation and was published in September 2011.

**RACP policy on immunisation**

NCIRS assisted in the development of the Royal Australasian College of Physicians’ (RACP) new policy on immunisation, covering issues surrounding consent, management of vaccine adverse events and compensation, vaccine refusal and communication of risk with parents. NCIRS worked with Professor Henry Kilham who is the paediatrician on the College’s Ethics Advisory Group.
Clinical research at NCIRS focuses on trials of vaccines addressing immunogenicity and/or safety. We concentrate on phase II, III and IV studies. We study both registered vaccines and those in development and particularly address diseases of high morbidity and/or mortality in Australia such as pertussis, meningococcal disease, pneumococcal disease, influenza and varicella. The age spectrum of trial participants is extensive: infants, children, teenagers, adults and the elderly.

Our research is also expanding into understanding the epidemiology and control of pathogens of particular or potential relevance to Australia such as Ross River virus, Dengue virus, Hendra virus, Lyssa virus, Kunjin virus and Murray Valley encephalitis virus, the latter four viruses because we are developing a strategic research program around the burden and prevention of encephalitis in Australia.

**Studies conducted**

**Investigator-initiated research**

Investigator-initiated research includes both competitive grant-funded studies and studies supported by vaccine manufacturers.

NCIRS leads a multicentre randomised control trial to investigate safety and immune responses following vaccination with acellular pertussis vaccine at birth. The study involves four sites in Sydney, Adelaide, Melbourne and Perth. It will compare immune responses in infants given acellular pertussis vaccine at birth followed by the routine immunisation schedule, with the responses in infants given the routine vaccine schedule only. This study will also examine the influence of maternal antibodies on infant responses to the vaccine. It is possible that a birth dose of pertussis vaccine may protect infants who are too young to be protected by the current pertussis vaccine schedule which begins at 6 weeks of age.

As at December 2011, 420 of the total target of 440 infants had been enrolled at the four sites.

**Funding – National Health and Medical Research Council grant**

Collaborators – Professor Terry Nolan, University of Melbourne and Murdoch Childrens Research Institute; Professor Peter Richmond, Princess Margaret Hospital for Children, Perth; Associate Professor Helen Marshall, University of Adelaide and Women’s and Children’s Hospital, Adelaide.
Safety follow-up of children given influenza vaccines in 2010 and 2011, Australia and New Zealand

Children who received influenza vaccines at The Children’s Hospital at Westmead have been actively followed up after vaccination to determine the rate of fever and other adverse events. This was on the background of a higher rate of fever/febrile convulsions associated with a local brand of influenza vaccine in 2010. This study found that the rate of fever (6–7%) occurring within 48 hours of one or other of two non-local brands of seasonal influenza vaccine in children under 5 years old was lower than the rate associated with the brand of concern in 2010.

We also collaborated with colleagues from New Zealand who led a GP-based retrospective safety study of three influenza vaccines in young children and similarly found the Australian vaccine was more reactogenic in terms of fever than the other two products.

In another study, children over 5 years old who received influenza vaccines in 2011 were enrolled into a study led by Dr Jim Buttery. A total of 107 children were enrolled into ‘Flusafe’ from The Children’s Hospital at Westmead with no reports of febrile convulsions. The study was conducted in association with CSL Biotherapies and the Royal Children’s Hospital, Melbourne. Data for the total cohort of 361 children showed no febrile convulsions and fever (>38°C) in 1–2% of recipients given either Vaxigrip® or Influvac® vaccines.

Funding – Australian Government Department of Health and Ageing; CSL Biotherapies; Sanofi-Pasteur

Collaborators – Dr Jim Buttery, Royal Children’s Hospital, Melbourne; Dr Nikki Turner and Dr Helen Petousis-Harris, Immunisation Advisory Centre, University of Auckland, New Zealand; CSL Biotherapies; Sanofi-Pasteur

Influenza vaccination of children in day care centres: Paediatric Influenza Vaccine Outcome Trial (PIVOT)

This study ran as a cohort study during the 2010 influenza season, when children were routinely recommended to receive influenza vaccination, and as a randomised control trial during the 2011 influenza season. The aims were to determine the social, economic, and health benefits of influenza vaccination in children aged 6–36 months. Parents were asked to report whenever their study-enrolled children had an influenza-like illness (ILI). The health outcomes of all ILI events were determined and the health, social and economic impacts upon families were determined by detailed interview of parents of children with ILIs. If vaccination provides strong protection against influenza in infants then there may also be secondary benefits for parents and day care centre staff. The results of this study will inform decisions regarding routine implementation of influenza vaccine for young children. The innovative trial design involved collection of nasal swabs from symptomatic children by parents who then posted the sample to the laboratory for PCR analysis.

This study is now complete and analysis is ongoing; three PhD students worked on the project and several publications resulted with more underway. The 2011 trial gave a positive result with clear evidence of efficacy if aged 2–3 years.

Funding – Australian Research Council; Sanofi-Pasteur; KU Children’s Services

Collaborators – Associate Professor Stephen Lambert, Associate Professor Theo Sloots, Associate Professor Michael Nissen, Queensland Paediatric Infectious Disease Service (QPID)

Influenza in patients with recurrent ischaemic vascular events

During the annual winter epidemics, influenza is a cause of significant morbidity and mortality, particularly in the elderly, and there is some evidence that influenza contributes to deaths and to cardiac and stroke hospitalisations in those with underlying ischaemic disease.

To investigate whether influenza infection is a significant and unreognised underlying precipitant of acute ischaemic events during the winter season, a case-control study with 274 cases and 284 controls was conducted at Westmead Hospital during the winter seasons of 2008, 2009 and 2010. The study was completed in 2011. This was an investigator-driven study designed and led by Professor Raina MacIntyre. The results will be presented at conferences in 2012.

Funding – GlaxoSmithKline

Collaborators – School of Public Health and Community Medicine, University of New South
Resistance of 2009 H1N1 influenza A with different doses of oseltamivir*

The main purpose of this study was to assess the frequency of emergence of oseltamivir resistant influenza viruses, and their virological characteristics, in patients (aged 5 years or older) whose influenza was treated with standard or double doses of the antiviral, oseltamivir. This was a randomised control trial and involved collecting viral respiratory swabs from enrolled patients at day 1 and day 5 (end) of treatment. A rapid test for virus antigen detection and PCR methods for virus identification and testing of antiviral susceptibility were used. Fifty-one subjects were enrolled during the 2010 and 2011 influenza seasons. Follow-up is now complete. Isolated (i.e. single) examples of resistance developing were observed in both groups.

The study was registered with the Australian and New Zealand Clinical Trials Registry (ACTRN12610000004066).

Funding – Roche

Collaborators – Professor Dominic Dwyer, Institute for Clinical Pathology and Medical Research (ICPMR), Westmead Hospital; Dr Peter Hay, Castle Hill Medical Practice

* An unblinded randomised study of A/H1N1 2009 resistance under standard and double dose oseltamivir treatment

Evolution of pertussis epidemics and effect of genotypes on infection outcomes and immunisation

NCIRS is involved in a very important study examining the disease severity of pertussis cases in relation to the infecting genotypes of Bordetella pertussis. The rationale is that vaccine pressure may have driven the selection of B. pertussis strains that are more likely to cause severe disease and/or are more transmissible. In this study epidemiologic, clinical and vaccine history data from pertussis cases in Sydney and Adelaide will be matched to the infecting genotype.

Retrospective clinical data has been matched to genotype and preliminary results suggest more severe disease in young infants who have presence of a pertussis toxin (ptxP3). Collection of prospective clinical data on pertussis cases in western Sydney and Adelaide has commenced.

Funding – National Health and Medical Research Council project grant

Collaborators – Dr Vitali Sitchenko and Professor Lyn Gilbert, Institute for Clinical Pathology and Medical Research (ICPMR), Westmead Hospital; Professor Ruiting Lan, University of New South Wales; Associate Professor Helen Marshall, University of Adelaide and Women’s and Children’s Hospital, Adelaide

Vaccination of immunosuppressed children with quadrivalent human papillomavirus (HPV) vaccine

Genital HPV is the necessary cause for cervical cancer, as well as a major contributing cause of several other cancers and conditions. There are now effective vaccines against the main oncogenic HPV types, HPV16 and 18. There is little research on the use of this vaccine in those who are immunosuppressed. Therefore, information on the immunogenicity, safety and duration of immunity of HPV vaccine when administered to immunosuppressed children is needed.

This is an investigator-driven study designed by Professor Raina MacIntyre. It is a phase II clinical trial of immunogenicity and duration of immunity of HPV vaccine in immunosuppressed children, comprising bone marrow transplant recipients, liver and renal transplant recipients, and children with inflammatory bowel disease or juvenile chronic arthritis who are on long-term immunosuppressive medication.

The study is ongoing, and was funded by the investigators. Laboratory testing will be done by Merck USA.

Collaborators – School of Public Health and Community Medicine, University of New South Wales; The Children’s Hospital at Westmead (Haematology, Gastroenterology); Sydney Children’s Hospital (Renal medicine); Women’s and Children’s Hospital, Adelaide
Sponsored research

Adjuvanted influenza vaccines in children*

Children have the highest attack rates of influenza and are the most effective transmitters in the community. Although trivalent inactivated seasonal influenza vaccines have a long track record of immunogenicity and safety in older children, they produce a sub-optimal immunogenic response in previously unvaccinated children, especially in the very young. Novartis MF59 adjuvanted subunit seasonal influenza vaccine (Fluad®) has been shown to be more immunogenic than non-adjuvanted flu vaccines in vulnerable subjects, such as very young children, adults at risk and the elderly.

This multicentre study examines the safety, tolerability, and immunogenicity of Fluad®, compared to the non-adjuvanted influenza vaccines, Agriflu® and Fluzone®, in children up to 6 years of age. Follow-up of 28 subjects enrolled by NCIRS staff between 29 April and 20 May 2011 will continue until mid-2012.

Sponsor – Novartis

* V70_29: A phase III, observer-blind, randomised, multicentre study to evaluate the safety, tolerability, and immunogenicity of Fluad® and Agriflu® compared to the non-adjuvanted trivalent influenza vaccine Fluzone® in children 6 to <72 months of age

Influenza resistance information study (IRIS)

Some isolates of 2009 H1N1 influenza A virus have been found to be resistant to the antiviral oseltamivir. This is a worldwide study examining the frequency of resistance to oseltamivir in influenza isolates from patients attending GPs and hospital emergency departments with influenza-like illness. PCR methods were used for virus detection, identification and testing for oseltamivir resistance. The study continued in 2010 and 2011 but recruitment proved very difficult, less than 10 children being enrolled in each of the 2 years; no examples of viral resistance were found in NCIRS enrollees.

Sponsor – Roche

Pre-pandemic H5N1 influenza candidate vaccine*

A leading contender for the next influenza pandemic is H5N1, an avian virus. Since 1997, H5N1 influenza has been spreading through the wild and domesticated avian populations of Eurasia and parts of Africa and has caused severe and often fatal infections in hundreds of people, particularly in Southeast Asia. If this virus develops the capability to easily transmit between humans control will largely depend on the rapid production and worldwide distribution of ‘pre-pandemic’ and strain-specific pandemic vaccines.

The aim of this multicentre study was to assess the booster response of a H5N1 influenza candidate vaccine, following a two-dose primary vaccination. Six sites enrolled 113 subjects. Follow-up of four subjects enrolled at NCIRS in late 2011 will continue until late 2012.

Sponsor – GlaxoSmithKline

* H5N1-013: A phase II, nonrandomised, open-label study to evaluate the safety and immunogenicity of the adjuvanted (pre) pandemic H5N1 influenza candidate vaccine following a heterologous prime-boost schedule (6 months apart) in children aged 6 to 35 months

Ross River virus vaccine*

Ross River virus (RRV) is a mosquito-borne pathogen for which macropods (kangaroos and wallabies) are the main animal host. Infection of humans results in a febrile illness with rash and arthralgia (which may last more than a year) as the main symptoms. In Australia an average of 5,000 RRV cases are notified each year.

This multicentre study aims to verify the adequacy of the immune response produced by a 2.5 μg dose of aluminium-adjuvanted RRV vaccine. Seventeen sites enrolled 1,898 subjects. Follow-up of 54 subjects enrolled by NCIRS staff between 31 May and 12 September 2011 will continue in 2012.

Sponsor – Baxter

* RRV880801: A phase 3 study to assess the immunogenicity, safety, and consistency of lot manufacture of Ross River virus (RRV) vaccine in healthy male and female subjects 16 years of age and older
**Dengue vaccine**

Dengue fever is a significant public health issue affecting countries which are home to 2.5 billion people. Sanofi Aventis is developing a chimeric yellow fever–dengue vaccine. This current randomised control trial compares the immune responses produced by four different batches of the candidate vaccine in adults aged 18–60 years residing in dengue-free areas. A total of 716 subjects were enrolled; 137 at the NCIRS site. Follow-up of subjects for safety and immunogenicity will continue into 2012.

**Sponsor – Sanofi Aventis**

* CYD17: Lot to lot consistency and bridging study of a tetravalent dengue vaccine in healthy adults in Australia

**Combined Haemophilus influenzae type b–meningococcal serogroup C vaccine**

The combination of conjugated meningococcal serogroup C polysaccharide (MenC) with conjugated **Haemophilus influenzae** type b (Hib) polysaccharide in a single vaccine will reduce the number of vaccine injections required, and facilitate the incorporation of meningococcal C vaccine into childhood immunisation schedules at 12 months.

This is a multicentre study evaluating the immunogenicity of a combined Hib–Men C vaccine given once at 12 months of age compared to the current standard practice of giving the two components in separate vaccinations. The study began in September 2006 and 160 children aged 12–18 months were enrolled at NCIRS. The long-term follow-up phase which involves annual blood sampling commenced in September 2007 and will continue yearly until late 2012.

Results for the immediate post-vaccination period and 1-year follow-up were published in the **Pediatric Infectious Disease Journal** in 2011 and results of the second year of follow-up were presented at the Australian Communicable Disease Control Conference in April 2011.

**Sponsor – GlaxoSmithKline**

* A phase III, open, randomised, controlled, multicentre study to demonstrate the non-inferiority of the meningococcal serogroup C and the **Haemophilus influenzae** type b immune response of GlaxoSmithKline (GSK) Biologicals’ conjugate Hib-MenC vaccine co-administered with GSK Biologicals’ measles-mumps-rubella vaccine, Priorix™, versus MenC-CFM197 conjugate vaccine co-administered with GSK Biologicals’ Hib vaccine, Hibera™, and Priorix™ in 12- to 18-month old toddlers primed in infancy with a Hib vaccine but not with a meningococcal serogroup C vaccine; and to evaluate antibody persistence up to 5 years after the administration of the Hib-MenC vaccine.

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**Collaborations**

**NHRMRC Centre of Research Excellence – Immunisation in under-studied and special-risk populations: closing the gap in knowledge through a multidisciplinary approach**

NCIRS is the major contributor to this new $2.5 million NHMRC Centre of Research Excellence (CRE) commencing in 2012. The CRE is led by Professor Raina MacIntyre, Head of the School of Public Health and Community Medicine at the University of New South Wales and Senior Principal Research Fellow at NCIRS.

Further details of this CRE are included later in this report.

**NHRMRC Centre of Research Excellence in Critical and Emerging Infectious Diseases**

The Centre of Research Excellence (CRE) in Critical and Emerging Infectious Diseases was established in 2011 at the University of Sydney’s Westmead Millennium Institute. NCIRS is one of the groups collaborating in this CRE.

The CRE will increase capacity in multidisciplinary research into infectious diseases in critically ill patients. CRE researchers will investigate life-threatening infections, such as septic shock, severe pneumonia and encephalitis, that precipitate or complicate most admissions to intensive care units. The group will also study the ecology of major infections, including antibiotic resistance, and the ethical and legal issues associated with diseases affecting the most seriously ill. Innovative microbiological, clinical, informatics and ethicolegal approaches to the diagnosis, surveillance and management of critical infections will bring benefits to both patients and the hospital system.

Researchers will work closely with the new Sydney Institute for Emerging Infections and Biosecurity (see below).
The Sydney Institute for Emerging Infections and Biosecurity (SEIB)

SEIB is a multidisciplinary institute which incorporates the Sydney branch of the National Centre for Biosecurity. SEIB was established in 2010 in response to the risk posed to humans and animals by emerging and re-emerging infectious diseases, including HIV, avian and H1N1 influenza, SARS, Hendra virus, drug-resistant tuberculosis and other drug-resistant infections. SEIB brings together researchers, educators and professionals from across the biological and social sciences. Professor Robert Booy, Head of Clinical Research at NCIRS, is one of the collaborating investigators.

SEIB facilitates research and knowledge exchange for improved understanding of the complex interactions that fuel the emergence and spread of infectious diseases. It focuses on improved detection and management of infectious diseases in Australia and Southeast Asia to combat and lessen the resultant health and socioeconomic impacts, and encourages a comprehensive approach to biosecurity that includes food and water safety and security and ecological integrity and sustainability.

SEIB provides an independent, expert resource for government, professionals and the public.

Other collaborations

The NCIRS Clinical Research division also has research collaborations with the following groups:

- Professor Ziad Memish, Ministry of Health, Riyadh, Saudi Arabia
- Professor Jonathan Nguyen-Van-Tam, University of Nottingham, UK
- Dr Elizabeth Haworth, University of Oxford, UK
- Professor Martin Hibberd, Genome Institute of Singapore
- Dr Shamez Ladhani, Health Protection Agency, UK
- Professor Mike Levin and Professor Simon Kroll, Imperial College, University of London and Centre for Child Health, Queen Mary School of Medicine and Child Health, University of London, UK
- Dr Hugh Reyburn, Joint Malaria Project, Tanzania, and London School of Hygiene and Tropical Medicine, UK
- Dr George Mtove, Muheza Hospital, Tanzania
- Professor Paul Heath, St Georges Hospital Medical School, University of London, UK
- Professor Russell Viner and Dr Deborah Christie, University College, University of London, UK
- Dr Abdul Aziz R Seroji, Institute of Hajj and Umrah Research, Mecca, Saudi Arabia
- Professor Mohammad A Muhit, University of South Asia, Dhaka, Bangladesh

Professor Robert Booy’s team ran a pilot study among Australian pilgrims at the 2011 Hajj to test the effectiveness of face masks in protecting against influenza
Health professional support

Overview

NCIRS provides evidence-based resources and advice for Australian health professionals working in the area of immunisation. Support for health professionals is provided through many avenues, including the NCIRS website, fact sheets, the Australian Immunisation Professionals email discussion group, newsletters and workshops.

Key activities

NCIRS fact sheets

NCIRS provides fact sheets in two categories – vaccine preventable diseases and vaccine safety. During 2010 and 2011 new fact sheets on topics including adult vaccination, influenza vaccines and pandemic H1N1 2009 influenza vaccine were developed, and the fact sheet on HPV vaccines was updated. The full set of NCIRS fact sheets is available from the NCIRS website (under ‘Immunisation resources’) at www.ncirs.edu.au/immunisation/fact-sheets/index.php

NCIRS-AIP (Australian Immunisation Professionals) email discussion group

The Australian Immunisation Professionals email discussion group (NCIRS-AIP) was established in December 2003 to provide a forum for immunisation service providers and other interested health professionals to discuss issues related to immunisation. By December 2011, NCIRS-AIP had over 500 members.

During 2010–2011 NCIRS staff provided comprehensive responses to more than 100 specific queries raised by NCIRS-AIP members. Numerous other AIP members contributed to online discussions. A range of other information to support health professionals working in the area of immunisation, such as newsletters from relevant international organisations, media items, and notices of workshops and conferences, were also circulated to members. NCIRS also provides administrative support for the group. Guidelines stipulating conditions of membership and use of NCIRS-AIP were adopted in 2011.

NCIRS website

The NCIRS website provides information and resources that are accessed by health professionals, students, the media, parents and the general public. Resources provided on the NCIRS website include fact sheets on vaccine preventable diseases and vaccine safety, Australian vaccination coverage estimates, an MMR decision aid for parents, educational slide presentations and a comprehensive list of publications produced by the Centre. The website also provides a description of the research groups within NCIRS. NCIRS strives to provide resources based on the latest evidence and resources are updated as new information and vaccines become available.

In January 2011, the NCIRS website was accepted into the World Health Organization’s Vaccine Safety Net Project. The NCIRS website was assessed by WHO evaluators against a set of credibility and content criteria established by the WHO Global Advisory Committee on Vaccine Safety. These criteria have been developed to assist readers in identifying websites which provide information on vaccine safety that complies with good information practices. The NCIRS website will now be re-assessed by WHO evaluators every 2 years.
Other support activities

As well as responding to queries from health professionals through the NCIRS-AIP email group, NCIRS staff also provided expert advice and information to almost 500 enquiries from health professionals via telephone and email.

NCIRS provides further support for health professionals through invited presentations to Divisions of General Practice (via State Based Organisations), the Australian General Practice Network, Public Health Units and hospitals. Topics covered in these presentations have included recent changes and updates in immunisation practice, identification and management of adverse events following immunisation, and an overview and statistics from the Adverse Events Clinic run by NCIRS.

NCIRS also provides, as required, expert advice on communication and education materials produced by state and federal health departments. For example, in 2010 NCIRS provided updated statistics for the Understanding childhood immunisation booklet published by the Australian Government Department of Health and Ageing and worked with NSW Health to produce a set of fact sheets related to pandemic influenza vaccination.
Overview

NCIRS provides and supports a range of educational activities for immunisation researchers, providers and other professionals. This includes hosting workshops, membership on conference organising committees, and presentations by NCIRS staff at national and international conferences. A full list of conference presentations provided by NCIRS staff is provided later in this report.

NCIRS also plays a significant role in the development of the next generation of researchers in immunisation and vaccine preventable diseases by providing comprehensive training for postgraduate students.

Meetings and workshops

Master of Public Health workshops

Since 2001, NCIRS has conducted an annual ‘Vaccines in public health’ workshop as an elective subject of the Master of Public Health (MPH) course at the University of Sydney. Participants include students enrolled at the University of Sydney as well as health professionals from external organisations.

Topics covered in the workshop include basic immunological and epidemiological principles, Australian and global epidemiology of vaccine preventable diseases, information on the National Immunisation Program, vaccination program delivery, assessment of disease burden, economic assessment, adverse events, and risk communication.

Public Health Association of Australia National Immunisation Conference and pre-conference workshop

In August 2010, the 12th National Immunisation Conference run by the Public Health Association of Australia (PHAA) was held in Adelaide. This conference is the pre-eminent national focus for immunisation professionals in Australia. Professor Peter McIntyre (chair), Associate Professor Kristine Macartney and Dr Julie Leask from NCIRS were part of the conference organising committee. Over 30 NCIRS staff members attended the conference and participated in presentations or poster displays.

Professor Peter McIntyre, Professor Robert Booy, Associate Professor Kristine Macartney, Dr Julie Leask and Ms Telphia Joseph presented in plenary sessions. Other NCIRS staff also provided 20 oral and 5 poster presentations at the conference, as well as being collaborating authors on a number of others. Details of presentations are included in the presentations list later in this report.

NCIRS also provides high level support for the 1-day pre-conference workshop for immunisation providers held in association with each national immunisation conference. NCIRS staff were members of the organising committee and also provided presentations on the very successful day at the 2010 conference (for details see the presentations list later in this report).
Meningococcal Vaccines Workshop

This workshop was convened and chaired by Professor Robert Booy (NCIRS) in collaboration with Associate Professor Ross Andrews (Menzies School of Health Research, Northern Territory). Dr Jane Jelfs from NCIRS played a major coordinating role. The workshop was held in Melbourne in November 2011, just prior to the World Society for Pediatric Infectious Diseases (WSPID) conference, and brought together seven internationally renowned clinicians and researchers who presented on diverse topics pertinent to meningococcal disease, its epidemiology, long-term sequelae and possible prevention.

Presenters at the workshop were Professor Lee Harrison, University of Pittsburgh, Pennsylvania; Professor Russell Viner, University College London, UK; Professor Andrew Pollard, University of Oxford, UK; Professor Ray Borrow, Head of the Vaccine Evaluation Unit, Manchester, UK; Associate Professor Monica Lahra, Director of the Australian National Neisseria Network; Professor Peter Richmond, Princess Margaret Hospital for Children, Perth; and Associate Professor Jodie McVernon, University of Melbourne.

The event was very well attended and well received. Feedback from attendees was universally positive focusing on the quality and immediacy of presentations, their coherence and relevance to disease prevention.

National Pertussis Workshop

With issues of pertussis control foremost in the minds of many in Australia and overseas, NCIRS organised the National Pertussis Workshop to discuss current and future strategies to prevent severe pertussis. The workshop was held in Sydney in August 2011 with 150 attendees. Four highly renowned international speakers attended the conference: Professor Scott Halperin, Canadian Center for Vaccinology; Dr Tom Clark, Centers for Disease Control and Prevention, USA; Dr Camille Locht, Institut Pasteur de Lille, France; and Dr Kathleen Harriman, Department of Public Health, California. A number of Australian experts, including NCIRS staff, also provided presentations. Topics covered at the workshop included: an overview of pertussis in Australia; how well are our current vaccines working?; ‘cocooning’ young infants to protect against pertussis; new strategies to protect against pertussis – immunising newborns or pregnant women; and a look at new vaccines in development. The workshop concluded with a panel discussion on the next steps for pertussis control in Australia and North America. Further information about the workshop can be found on the NCIRS website (www.ncirs.edu.au/news/archive.php).

Haemophilus influenzae symposium

An intimate symposium was organised by NCIRS to allow interested parties to hear Dr Mary Slack, the Head of the Haemophilus Reference Unit and WHO Collaborating Centre for Haemophilus influenzae, discuss surveillance issues in the UK and Europe. Several other key speakers from Australia presented on laboratory and surveillance issues including Streptococcus pneumoniae issues, H. influenzae type b (Hib) disease and H. influenzae (Hi) in Indigenous children. Speakers included Associate Professor Vicki Krause, Associate Professor Amanda Leach, Professor Geoff Hogg, Professor Lyn Gilbert, Professor Peter McIntyre, Professor Robert Booy and Dr Robert Menzies.

Preventing Cervical Cancer: Integrating screening and vaccination

NCIRS collaborated with the Victorian Cytology Service to organise the national PCC2011 conference, Preventing cervical cancer: integrating screening and vaccination, held in Melbourne in
November 2011. The conference brought together international and Australian experts in cervical screening, vaccination and cancer epidemiology to debate and explore current and future directions in the prevention of cervical cancer. NCIRS staff, Dr Melina Georgousakis and Associate Professor Kristine Macartney, gave presentations on the cost-effectiveness of HPV vaccination of boys and HPV vaccine safety, respectively. Further information about the workshop can be found at www.pcc2011.org.au/.

Northern Australia Immunisation Group

The Northern Australia Immunisation Group was first convened by NCIRS in 2004; meetings are organised annually to coincide with national immunisation or communicable disease conferences. The group aims to facilitate discussion and collaboration between stakeholders with an involvement in immunisation and vaccine preventable diseases among Indigenous people in remote areas, and serves as a forum for more detailed discussion of research, policy and practice issues relevant to Indigenous people in Northern Australia. Participants include Immunisation Coordinators and communicable disease staff from Queensland, the Northern Territory, South Australia, Western Australia and the Australian Government Department of Health and Ageing; representatives from the Australian General Practice Network; and researchers from Menzies School of Health Research and the Telethon Institute for Child Health Research, as well as NCIRS staff. A meeting was held during the Communicable Disease Control conference in Canberra in April 2011. Issues discussed included data linkage studies in Western Australia, the impact of Synflorix® vaccine in the Northern Territory, and increasing rates of invasive pneumococcal disease in Indigenous adults in Western Australia.

Postgraduate training

A vision of NCIRS is to play a significant role in the development of the next generation of researchers in our areas of expertise. To that extent, NCIRS has sought to support and train high level professionals in immunisation research and surveillance, through higher degree and professional program training and supporting professional development of staff. NCIRS provides a number of opportunities for students and professional trainees to take on research projects in the fields of immunisation and vaccine preventable diseases, under the guidance of senior NCIRS staff. The NCIRS academic group, led by Dr Julie Leask, was formed in 2009 to provide a focal point of coordination and communication across our academic areas including postgraduate support, teaching and investigator-driven research. Monthly meetings give students and staff a supportive environment to present research plans and work in progress. In 2010, a needs assessment of NCIRS staff and students led to a half-day forum on systematic reviews with two invited experts, Dr Angela Morrow and Dr Allison Tong, hearing staff present their projects. In 2011, 12 staff attended a 2-day writing workshop provided by Dr Elisabeth Heseltine to develop academic writing skills.

Higher degree research

NCIRS offers a variety of research projects suitable for honours, masters and PhD candidates, as well as short-term projects for undergraduates, in a range of areas including epidemiology, social sciences, evaluation, systematic reviews and clinical trials. NCIRS also supports a number of students who carry out research projects under joint supervision with one of our collaborators, including the Discipline of Paediatrics and Child Health, The Children’s Hospital at Westmead Clinical School, and School of Public Health, University of Sydney; and School of Public Health and Community Medicine, University of New South Wales.

Professional trainees

NCIRS is an accredited site for advanced training towards the Fellowship of the Australasian Faculty of Public Health Medicine. The Public Health Medicine Registrar position at NCIRS offers in-depth training experience that addresses multiple public health medicine curriculum areas, including research and evaluation, epidemiology,
information management, policy, communication, and Indigenous health, in the context of national surveillance and control of vaccine preventable diseases.

NCIRS is also a host site for trainee placement in the New South Wales Public Health Officer Training Program, which is a service-based multidisciplinary training program that offers supervised experience for people who have completed postgraduate studies in public health. At NCIRS, trainees are offered projects and supervised learning in the areas of national surveillance and control of vaccine preventable diseases. This provides trainees with the basis for acquisition of a wide range of public health competencies and for completion of the academic requirements towards a Professional Doctorate in Applied Public Health awarded by the University of New South Wales.

NCIRS also supervises students in the Master of Applied Epidemiology (MAE) program based at the National Centre for Epidemiology and Population Health at the Australian National University.

Other educational resources

Journal Club

NCIRS actively identifies relevant and topical literature from Australia and overseas that explores all aspects of immunisation and vaccine preventable diseases. Recent peer-reviewed articles are critiqued by NCIRS staff in weekly Journal Club forums and items that are considered ‘hot topics’ are also discussed by the group. Summaries of these Journal Club presentations are circulated to the NCIRS-AIP email discussion group and provided on the NCIRS website at www.ncirs.edu.au/immunisation/journal-club/index.php.

External experts are also invited to speak on topics of interest relating to immunisation. NCIRS hosted a range of excellent guest speakers for Journal Club during 2010–2011 including Dr Nathalie Garçon and Dr Marcelle Van Mechelen, GlaxoSmithKline; Dr Yang Peng, Beijing Center for Disease Prevention and Control (CDC), China; Mr Neil Thomson, Director, Indigenous HealthInfo; Dr Swati Shourie, University of Leeds, UK; Dr Heather Gidding, The Kirby Institute; Dr Sarah Larney, Centre for Health Research in Criminal Justice, Justice Health; Associate Professor Helen Marshall, Vaccinology and Immunology Research Trials Unit, Women’s and Children’s Hospital, Adelaide; Professor David Durrheim, University of Newcastle and Health Protection, Hunter New England Area Health Service; and Dr Rosalyn Singleton, Director of the Immunization Program for Alaska Native Tribal Health Consortium.

Educational slide sets

Vaccine preventable diseases in Australia, 2005 to 2007

This slide set was developed as an educational tool based on NCIRS’s report Vaccine preventable diseases in Australia, 2005 to 2007 published in Communicable Diseases Intelligence in December 2010 (see the Surveillance of vaccine preventable diseases section for further details on this report.) The slide set is intended for use by immunisation coordinators, educators, epidemiologists and academics/researchers when presenting the epidemiology of key vaccine preventable diseases in Australia for which there is a national vaccination program. Slides include data tables and figures from the VPD report with accompanying speaker’s notes. It is available to download from the NCIRS website.
NCIRS is the major contributor to this new $2.5 million NHMRC Centre of Research Excellence (CRE) commencing in 2012. The CRE is led by Professor Raina MacIntyre, Head of the School of Public Health and Community Medicine at the University of New South Wales and Senior Principal Research Fellow at NCIRS.

It brings together an international team of experts in vaccine research, spanning clinical research, epidemiology, modelling, health economics and social sciences, who have a strong record of previous collaboration. Other chief investigators are Professor Peter McIntyre, Professor Robert Booy, Dr Julie Leask, Dr Nicholas Wood and Dr Robert Menzies (NCIRS), Associate Professor Philippe Beutels (University of Antwerp, Belgium), Professor Cheryl Jones (University of Sydney and The Children’s Hospital at Westmead), Professor John Kaldor (The Kirby Institute) and Professor Dominic Dwyer (Director, Institute of Clinical Pathology and Medical Research, Westmead Hospital).

Critical research gaps exist in areas which are not commercially viable or too complex because of the mixed methodology required. This is particularly so in special-risk and under-served populations such as Aboriginal and Torres Strait Islander Australians, refugees, migrants, travellers, pregnant women, the very young and the very old.

Over 5 years the CRE will focus on addressing research gaps in these vulnerable populations, using novel multidisciplinary methods spanning both quantitative and qualitative research. The CRE will also develop Australian research capacity among identified, talented postdoctoral researchers and translate its findings into policy and practice to improve the population health impact of vaccination programs across the whole of life.
Awards and achievements

**Ms Maria Chow**
University of Sydney International Student Scholarship for her PhD studies  
One of seven students awarded a Prize of Excellence at the University of Sydney 2011 Postgraduate Research Student Conference  
New Investigator/Student scholarship to attend the Annual Conference of the International Society for Quality of Life Research in Denver, USA, in October 2011  
Travel scholarship from the Sydney Medical School to work as an intern at the Immunization Policy Unit, World Health Organization, Geneva, Switzerland, from July to September 2012

**Dr Spring Cooper Robbins**
Early Career Award for one of the best presentations at the Public Health Association of Australia 12th National Immunisation Conference in August 2010

**Dr Gulam Khandaker**
Competitive scholarship to attend and present his research findings at the Australasian Society for Infectious Diseases (ASID) annual scientific meeting in May 2010

**Ms Catherine King**
Discipline of Paediatrics and Child Health Prize for her presentation at the University of Sydney Postgraduate Research Student Conference in August 2010

**Dr Julie Leask**
University of Sydney Postdoctoral Fellowship for 2012–2015 entitled ‘Improving communication about immunisation through social sciences research’. The fellowship will be undertaken with the School of Public Health at the University of Sydney.
Discipline of Paediatrics and Child Health, The Children’s Hospital at Westmead Clinical School, Excellence in Postgraduate Supervision award, December 2011 (pictured left receiving her award from Professor Kathryn North, Dean of the Clinical School)

**Dr Kristine Macartney**  
Conjoint title of Associate Professor in the Sydney Medical School – The Children’s Hospital at Westmead Clinical School, awarded 2010  
Appointed the vaccine expert on the Advisory Committee on the Safety of Medicines in 2010

**Dr Rob Menzies**  
Conjoint title of Senior Lecturer in the Sydney Medical School – The Children’s Hospital at Westmead Clinical School, awarded 2010

**Dr Tom Snelling**  
Frank Fenner NHMRC Early Career Fellowship, awarded 2011

**Dr Nicholas Wood**  
Paediatric Research Society of Australia and New Zealand (PRSANZ) Research Award at the Royal Australasian College of Physicians 2011 Congress

**Dr J Kevin Yin**  
Conference scholarship, issued by The Fogarty International Center of the US National Institutes of Health, to present his work at the Multinational Influenza Seasonal Mortality Study (MISMS) Oceania Regional Meeting and Workshop in Melbourne in March 2010  
2011 Chinese Government Award for Outstanding Self-Financed Chinese Students Abroad. This award is set up by the China Scholarship Council to honour overseas Chinese students with outstanding academic accomplishments and it is considered to be the highest award for Chinese PhD candidates studying abroad around the world.  
2011 Young Investigator Award Finalist (one of the two candidates shortlisted in the Clinical Research category) at The Children’s Hospital at Westmead

Dr Kevin Yin, Research Assistant at NCIRS


4. Marshall H, **McIntyre P**, Roberton D, Dinan L, Hardt K. Primary and booster immunization with a diphtheria, tetanus, acellular pertussis, hepatitis B (DTPa-HBV) and *Haemophilus influenzae* type b (Hib) vaccine administered separately or together is safe and immunogenic. *International Journal of Infectious Diseases* 2010;14:e41-9.


11. Gao Z, Gidding HF, Wood JG, **MacIntyre CR.** Modelling the impact of one-dose vs. two-dose vaccination regimens on the epidemiology of varicella zoster virus in Australia. *Epidemiology and Infection* 2010;138:457-68.


Bold indicates individual was a staff member or student at NCIRS when research included in the publication was conducted.
Presentations by NCIRS staff 2010–2011

National


4. Booy R. Treatments and vaccines: trials and tribulations. World Congress of Internal Medicine (WCIM); 2010 March; Melbourne, Australia.

5. Yin J, Booy R. Assessing cross protection from 2009 pandemic H1N1 influenza through absenteeism of school teachers including comparison with 2007 experience. Multinational Influenza Seasonal Mortality Study (MISMS) Oceania Regional Meeting and Workshop; 2010 March; Melbourne, Australia.


7. Leask J. Risk communication. NSW Department of Health, Population Health, Bug Breakfast; 2010 April; Sydney, Australia.

8. McIntyre P. Viral vaccine preventable diseases in Australia. Viruses in May 2010; 2010 May; Katoomba, Australia.

9. McIntyre P. H1N1 and pregnancy. Sydney Institute for Emerging Infectious Diseases and Biosecurity H1N1 Workshop; 2010 May; Sydney, Australia.


15. Hull B. Coverage data and ACIR – background and current arrangements. 12th National Immunisation Conference, Pre-conference seminar; 2010 August; Adelaide, Australia.

16. Leask J. The perfect immunisation encounter. 12th National Immunisation Conference, Pre-conference seminar; 2010 August; Adelaide, Australia.

17. McIntyre P, Jelfs J. Hot topics now and for the future. 12th National Immunisation Conference, Pre-conference seminar; 2010 August; Adelaide, Australia.


22. Hull B, Macartney K, Menzies R. Rotavirus vaccine coverage and the impact of the vaccine on the timeliness of other NIP vaccines recommended at the same age. 12th National Immunisation Conference; 2010 August; Adelaide, Australia.


32. Wiley K, Leask J, Craig J. Awareness and attitudes toward adult pertussis vaccination recommendations in parents and carers of four and five year old children. 12th National Immunisation Conference; 2010 August; Adelaide, Australia.


38. Leask J, Chow MY, King C, Booy R. Caregivers’ intentions regarding seasonal influenza and H1N1 vaccines for their children. 12th National Immunisation Conference; 2010 August; Adelaide, Australia.


40. Wood N. Ten year clinic experience of adverse events following immunisation at The Children’s Hospital, Westmead. 12th National Immunisation Conference; 2010 August; Adelaide, Australia.


44. Leask J. That we are too soft on the anti-vaccination lobby [plenary; conference debate, negative]. 12th National Immunisation Conference; 2010 August; Adelaide, Australia.


54. Wood N. The Children’s Hospital at Westmead adverse events clinic: 10 year experience. Immunisation update for South Eastern Sydney Illawarra Public Health Unit Randwick Office; 2010 September; Randwick, Australia.

55. Georgousakis M. The wonderful world of science from the eyes of a scientist. Murilla Community Centre Annual General Meeting; 2010 October; Brisbane, Australia.

56. Booy R. Chain of protection: introduction to herd immunity and a new website. Immunisation Nurses Special interest Group (INSIG) Study Day; 2010 October; Melbourne, Australia.

57. Cannings K. Travel medicine and immunisation update (covering AEFI, cold chain and the school program) for GP Network Northside; 2010 October; North Ryde, Australia.

58. Wood N. Adverse events following immunisation. Immunisation update for Sydney West Public Health Unit Parramatta Office; 2010 October; Westmead, Australia.

59. Cannings K. Adverse events following immunisation. Immunisation update for South Eastern Sydney Illawarra Public Health Unit Illawarra Office. Illawarra Division of GP; 2010 November; Wollongong, Australia.

60. Cannings K. Updates and changes to immunisation and adverse events following immunisation. Immunisation update for The College of Nursing; 2010 November; Burwood, NSW, Australia.

61. Cannings K. Adverse events following immunisation and immunology 101. General Practice NSW Immunisation Network Forum; 2010 November; Surry Hills, Australia.

62. Cannings K. Adverse events following immunisation. Immunisation update for NSW Central West Division of General Practice; 2010 November; Orange, Australia.

63. Wood N. Immunology 101, Immunisation update for NSW Central West Division of General Practice; 2010 November; Orange, Australia.

64. Ward K. About NCIRS. General Practice Victoria Immunisation Network Meeting; 2010 November; Melbourne, Australia.

65. Ward K. About NCIRS. WA General Practice Network DIPON meeting; 2011 February; Perth, Australia.

66. Macartney K. Vaccine safety and effectiveness in pregnancy. Influenza Specialist Group Annual Scientific Meeting; 2011 February; Melbourne, Australia.


81. Snelling T. The impact of rotavirus vaccination in Australia; the early years. Viruses in May 2011; 2011 May; Katoomba, Australia.


88. Leask J. Refusal and acceptance of vaccination: getting the questions right [poster]. University of Sydney Medical School Reproductive, Maternal and Child Health Research Theme Day; 2011 June; Sydney, Australia.

89. Wood N, Marshall H, McIntyre P. Immune responses to acellular pertussis vaccination at birth [poster]. University of Sydney Medical School Reproductive, Maternal and Child Health Research Theme Day; 2011 June; Sydney, Australia.

90. Wiley KE, Ho J, Leask J, Wood N, Cooper Robbins SC. Self-reported uptake of influenza vaccination among pregnant women and factors that influence their decisions [poster]. University of Sydney Medical School Reproductive, Maternal and Child Health Research Theme Day; 2011 June; Sydney, Australia.


92. McIntyre P. Overview of NCIRS. Travel Medicine Annual Workshop; 2011 June; Sydney, Australia.


94. Jelfs J. Rabies. Travel Medicine Annual Workshop; 2011 June; Sydney, Australia.

95. Jelfs J. Meningococcal disease. Travel Medicine Annual Workshop; 2011 June; Sydney, Australia.


97. McIntyre P. Adult epidemiology: disease incidence in Australia. University of NSW forum on adult vaccination against pneumococcal disease; 2011 August; Sydney, Australia.

98. Menzies R. Adult epidemiology: vaccine effectiveness. University of NSW forum on adult vaccination against pneumococcal disease; 2011 August; Sydney, Australia.

99. Ridda I. Immunogenicity, efficacy and effectiveness: frailty, age and immunogenicity. University of NSW forum on adult vaccination against pneumococcal disease; 2011 August; Sydney, Australia.

100. Menzies R. Adult pneumococcal immunisation: coverage in Australia. University of NSW forum on adult vaccination against pneumococcal disease; 2011 August; Sydney, Australia.

101. Macartney K. Adult pneumococcal immunisation: adverse events. University of NSW forum on adult vaccination against pneumococcal disease; 2011 August; Sydney, Australia.


105. Macartney K. Human monovalent rotavirus vaccine and intussusception: an increased risk in Australian infants [poster]. 7th World Congress of the World Society for Pediatric Infectious Diseases - WSPID; 2011 November; Melbourne, Australia.
106. Menzies R. Hib disease in Indigenous Australian children before and after PRP-OMP vaccines [poster]. 7th World Congress of the World Society for Pediatric Infectious Diseases - WSPID; 2011 November; Melbourne, Australia.

107. Wood N, Marshall H, McIntyre P. Waning of pertussis antibodies to 4 years among infants who did and did not receive monovalent acellular pertussis vaccine at birth [poster]. 7th World Congress of the World Society for Pediatric Infectious Diseases - WSPID; 2011 November; Melbourne, Australia.

108. Wood N. How useful are meningococcal skin scraping tests? [poster]. 7th World Congress of the World Society for Pediatric Infectious Diseases - WSPID; 2011 November; Melbourne, Australia.


110. McIntyre P. Impact of vaccines on serious infections in young infants, 28th Annual Scientific Meeting of the Australasian College for Emergency Medicine; 2011 November; Sydney, Australia.

111. Booy R. Vaccine safety – communicating benefit vs risk at the personal and public health level. Sydney Emerging Infections and Biosecurity Institute (SEIB) Colloquium; 2011 November; Sydney, Australia.

112. Leask J. Social media and public health communication. Sydney Emerging Infections and Biosecurity Institute (SEIB) Colloquium; 2011 November; Sydney, Australia.


1. McIntyre P. Immunisation of pregnant women. WHO SAGE Pertussis Working Group meeting; 2010 February; Geneva, Switzerland.


5. McIntyre P. H1N1 infections during pregnancy. International Neonatal and Maternal Immunization Symposium; 2010 March; Eskisehir, Turkey.


13. Khandaker G, Zurynski Y, Elliott EJ, Rashid H, Booy R. Possible harms of oseltamivir: interpreting safety in the context of the H1N1 09 pandemic. 28th Annual Meeting of the European Society for Paediatric Infectious Diseases (ESPID); 2010 May; Nice, France.


21. McIntyre P. Pertussis control. First advanced vaccinology course in India; 2010 September; Chennai, India.

22. McIntyre P. Adverse events – science and practice and Adverse events – reporting network. First advanced vaccinology course in India; 2010 September; Chennai, India.

23. McIntyre P. Overview of early infant immunization. Ninth international Bordetella symposium; 2010 September; Baltimore, USA.

24. Booy R. The use of antivirals at extremes of age: under 1 year and over 65 years. The 5th Asian Congress of Pediatric Infectious Diseases; 2010 September; Taipei, Taiwan.


28. McIntyre P. Influenza and Aboriginal and Torres Strait Islander people in Australia. 4th International Meeting on Indigenous Child Health; 2011 March; Vancouver, Canada.

29. McIntyre P. Trends in invasive pneumococcal disease in Aboriginal and Torres Strait Islander children in northern Australia. 4th International Meeting on Indigenous Child Health; 2011 March; Vancouver, Canada.


32. Booy R. Neurologic complications of pandemic influenza A (H1N1) 2009: surveillance results from 6 major paediatric hospitals in Australia. XIII International Symposium on Respiratory Viral Infections; 2011 March; Cairo, Egypt.

33. Leask J. Surfing the communication wave. Risk 2.0: Risk perception and communication regarding vaccination decisions in the age of web 2.0, international small group meeting; 2011 May; Erfurt, Germany.

34. Ward K, Quinn H, McIntyre P. Adolescent school-based immunisation in Australia. 7th New Zealand National Immunisation Conference; 2011 August; Rotorua, New Zealand.

35. Cannings K, Wood N. The Children’s Hospital at Westmead Immunisation Adverse Events Following Immunisation Clinic: 10 year experience. 7th New Zealand National Immunisation Conference; 2011 August; Rotorua, New Zealand.


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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>ACIR</td>
<td>Australian Childhood Immunisation Register</td>
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<tr>
<td>AEFI</td>
<td>Adverse event following immunisation</td>
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<tr>
<td>AHMRC</td>
<td>Aboriginal Health and Medical Research Council (NSW)</td>
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<td>AIHW</td>
<td>Australian Institute of Health and Welfare</td>
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<td>APSU</td>
<td>Australian Paediatric Surveillance Unit</td>
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<td>ARC</td>
<td>Australian Research Council</td>
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<td>ATAGI</td>
<td>Australian Technical Advisory Group on Immunisation</td>
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<td>CDNA</td>
<td>Communicable Diseases Network Australia</td>
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<tr>
<td>CIDM</td>
<td>Centre for Infectious Diseases and Microbiology Public Health</td>
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<tr>
<td>DTPa</td>
<td>Diphtheria–tetanus–acellular pertussis vaccine</td>
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<tr>
<td>dTpa</td>
<td>Diphtheria–tetanus–acellular pertussis vaccine, reduced antigen content formulation</td>
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<td>GP</td>
<td>General practitioner(s)</td>
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<td>Hib</td>
<td><em>Haemophilus influenzae</em> type b</td>
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<td>HPV</td>
<td>Human papillomavirus</td>
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<tr>
<td>IPD</td>
<td>Invasive pneumococcal disease</td>
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<tr>
<td>MMR</td>
<td>Measles–mumps–rubella vaccine</td>
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<td>NACCHO</td>
<td>National Aboriginal Community Controlled Health Organisation</td>
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<td>NCIRS</td>
<td>National Centre for Immunisation Research and Surveillance of Vaccine Preventable Diseases</td>
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<td>Australian Immunisation Professionals email discussion group</td>
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<td>NHMRC</td>
<td>National Health and Medical Research Council</td>
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<td>National Immunisation Program</td>
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<td>NNDSS</td>
<td>National Notifiable Diseases Surveillance System</td>
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<td>NSW</td>
<td>New South Wales</td>
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<td>PAEDS</td>
<td>Paediatric Active Enhanced Disease Surveillance</td>
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<td>Pharmaceutical Benefits Advisory Committee</td>
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<td>7vPCV</td>
<td>7-valent pneumococcal conjugate vaccine</td>
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<td>PCR</td>
<td>Polymerase chain reaction</td>
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<td>Public Health Association of Australia</td>
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<td>23vPPV</td>
<td>23-valent pneumococcal polysaccharide vaccine</td>
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<td>Therapeutic Goods Administration</td>
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<td>University of New South Wales</td>
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<td>VPD</td>
<td>Vaccine preventable disease</td>
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<td>WHO</td>
<td>World Health Organization</td>
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