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# Northern Territory Human Papillomavirus Vaccination Program update

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## HPV

Human papillomaviruses (HPV) are small, non-enveloped DNA viruses that can affect cutaneous and mucosal epithelial tissues. Over 100 different types of HPV can be linked to anal, vaginal, vulval, penile and head and neck cancers. Up to 40 of these HPV types can infect the anogenital epithelium. These HPV types are classified as high risk (oncogenic) or low risk (non-oncogenic). High-risk HPV types 16 and 18 are linked to 70% of cervical cancers in Australia. Some low risk HPV types can cause genital warts. Types 6 and 11 are linked to approximately 90% of genital warts cases. GARDASIL® (1 of the 2 HPV vaccines) is highly effective in protecting against persistent infection caused by, HPV types 6, 11, 16 and 18, in women who have not been previously infected with these types.[1] The vaccine is given as 3 doses over a 6 month period. The National HPV Program commenced in April 2007 and the catch up program will end in June 2009. The vaccine will be provided to girls aged 12 years as the ongoing cohort.

## 2007

In 2007, girls in Year 10, 11 and 12 were vaccinated through a school-based program. From July 2007 women aged 18-26 years were offered the vaccine through their general practitioner. To assist coverage in remote areas all females aged 10-26 years were targeted for vaccine in remote communities. The age of 10 years was chosen to

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coordinate the first dose with routine school screening and to optimise coverage through higher school attendance rates in the younger age group. Prior to the vaccines being given a series of targeted education sessions were held for health staff, students and other stakeholders across the Northern Territory (NT). The NT Immunisation Database has entered a total of 19,560 HPV vaccine encounters between April 2007 – February 2008 across all age groups being offered the vaccine (10-26 years). This includes 9,054 first dose encounters, 6,805 second and 3,701 third and final dose encounters.[2]

## Urban Program

The program was rolled out in 23 urban schools across the NT with vaccinations occurring between April and September 2007. The first dose of the vaccine was given to 75% of eligible students. Of those, 65% received dose 2 and 59% dose 3.[3] Catch up clinics were held and continue to be held in all regions for girls who missed doses given at school.

## Remote Program

Additional nurses were employed to help facilitate this large program. In the Top End, 20 remote communities and in Central Australia, 12 communities were visited on various occasions between April and December 2007. Females in the 10-17 year age group were prioritised to ensure high vaccine coverage in girls before exposure to HPV infection. Females aged 18-26 years have been vaccinated when resources and staff have been available. The 10-17 year cohort was offered dose 1 and 2 in all communities by December 2007, with many completing the 3 dose course. Data from the start of the program to the end of February 2008 showed 66% of 10-17 year olds had dose 1, 55% dose 2 and 31% dose 3. In females aged 18-26 years, coverage was 35% for dose 1, 23 % for dose 2 and 9% for dose 3. This is an ongoing catch up program, which will finish in June 2009.

## Education-Remote

As HPV vaccine is a new vaccine, education of the community, staff and vaccine recipients has been a priority for the program. During remote community visits, HPV Immunisation Support Nurses educate staff and the community about the program before vaccines are given. Community 'women's meetings' or school education sessions were held according to community needs. Culturally appropriate resources have been developed for women in remote communities. They include a Yolngu Matha language audio CD titled "HPV vaccine story for women" which was developed in conjunction with the Aboriginal Resource Development Service (ARDS). An educational flip-chart and an Indigenous specific brochure were also produced. Additional resources in Central Australian languages are being developed. As an added incentive to finish the course, colourful silicone wristbands were distributed to girls who completed all the 3 doses. These have proven to be popular and worn with great pride (see Figure 1).

**Figure 1. HPV Incentive Wristbands**

## Vaccine Wastage

Less than 1% of vaccines distributed between April – December 2007 have been wasted with cold chain issues related to transport, freezing and fridge breakdowns being the most common causes. A number of vaccines drawn up in advance and not used during the school program were discarded. Maximum limits were placed on ordering to reduce large vaccine losses that may result from associated fridge breakdowns. This has been an effective intervention.

## Adverse Events

A total of 6 adverse events following HPV immunisation have been reported in the NT from April 2007 to February 2008. This is a rate of approximately 0.7 per 1000 vaccinations given.

The reported adverse events were minor with rash (2), vasovagal (2, 1 with neurological symptoms), pain and heaviness in arm (1), and headache and abdominal pain (1) reported. No cases of anaphylaxis were reported in the NT. 'The current estimated rate of anaphylaxis based on doses given in Australia is 5.1 per million'.[4]

## 2008

The HPV Urban Catch Up Vaccination Program continues in 2008 for females aged 12-26 years. Girls in years 7, 8, 9, 10 will be offered HPV vaccine in urban schools, with the first dose being administered in late February/March 2008 and the final dose in October. In an attempt to reduce the number of health visits to schools HPV vaccine will be offered in conjunction with other school vaccines given to the same age groups (this includes chickenpox, diphtheria-tetanus-pertussis and pneumococcal vaccines for Indigenous students).

In remote areas, Immunisation Support Nurses will continue to offer clinical assistance. The vaccine will be offered to all females aged 10-26 years. From 2008 in an attempt to decrease the need for multiple consent forms and to increase vaccine coverage, dose 1 HPV vaccine may be incorporated into Healthy School Aged Kids Screening.

## 2009

National funding for the catch-up component of the program ceases at the end of June 2009. From July 2009, the HPV vaccine will only be funded for and routinely offered to girls in year 7 (12 years of age) and females aged 10 years in remote communities.

## Vaccine errors

When the program commenced in 2007, an accelerated vaccine schedule was introduced. Vaccines were to be administered at 0, 1 and 4 months. This is no longer recommended and vaccine should be given at 0, 2 and 6 months. Unfortunately multiple vaccine errors were reported by providers and via the database in the program. The majority of errors relate to incorrect spacing of vaccine doses. Vaccines have been given too early and so repeat doses have been required. While there have been no adverse events following these episodes this does not reflect best practice. Please contact the Centre for Disease Control (CDC) Database or the Immunisation Support Nurses with enquiries regarding dosing or any other program issues. From 2008 the accelerated program should not be used and the following schedule is recommended.

**The recommended schedule is to give Gardasil® at 0, 2, 6 months.**

## Conclusion

Since the announcement of this national immunisation program by the Australian Government in November 2006, the NT HPV Vaccination Program has thus far been successfully implemented. Due to the excellent cooperation between schools and providers, the urban school program achieved excellent coverage rates and a smooth rollout. Although there were well known difficulties in remote areas due to staffing and resource issues, some communities were very proactive and had great involvement from 'strong women' and girls in the community. We are strengthening our program in remote communities this year and will strive to work with communities to improve coverage in 2008.

Thank you to all the skilled, enthusiastic and relentless staff in all regions who have worked on this program to protect women from HPV, genital warts and cervical cancer. We look forward to increasing vaccine coverage in 2008-09.

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# An analysis of the impact of falls & falls prevention activities in the NT

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Key words: Falls, Northern Territory, cost, deaths, hospitalisation, plans, network

## Abstract

*The Northern Territory (NT) has the highest per capita falls hospitalisation rates in the nation. Each year there are around 1200 falls hospitalisations and 7 deaths attributed to a fall. In 2001, falls hospitalisations cost $2 million. The number of falls is likely to triple by 2025 as the NT population ages. Falls are not currently recognised as a significant public health issue in the NT and there is no coordinated approach to falls prevention. This paper describes the impact of falls on the NT community and gives an overview of the response to falls nationally and in the NT. The paper identifies the need for a coordinated approach and suggests convening falls forums in the NT as a way forward.*

## Introduction

Falls are an under recognised public health issue in the (NT) and are a significant cause of morbidity. The NT has higher rates of falls hospitalisations than the rest of Australia where falls are acknowledged as a major public health problem with well developed plans, networks of coordinated organisations and dedicated funding to address the issue. The NT is behind in its understanding of, and response to, falls. This paper will seek briefly to describe the impact of falls on the NT community and give an overview of the response to falls nationally and in the NT.

## The burden of falls in the NT

Falls are the second leading cause of hospitalisation due to injury and the fifth leading cause of death by injury in the NT.[1]

Fall related hospital admissions to NT public hospitals are increasing. The annual average number of hospital separations due to falls was 780 over the period 1992-2001. This increased to 1161 over the period 2005-2006. This increase was not due to either a change in coding practice or population growth. Between 1992-2001 the average yearly admission rate due to falls was 561/100,000 population. In 2005-2006 this rate had increased by 38% to 774/100,000.

The age-standardised rates of falls hospitalisations for all males and females in the NT are greater than the Australian rates. See Table 1. The pattern of hospitalisation in Indigenous people in the NT differs to that usually seen in there being substantially higher rates amongst people under the age of 65 years. For people over the age of 65 in the NT, Indigenous age standardised rates are less than

**Table 1. Fall hospitalisations by sex and Indigenous status (NT only) for Australia, 2003-2004,[2] and the NT, 2005-2006[3] (age standardised rate per 100,000 population)***

| | Males | | | Females | | |
|---|---|---|---|---|---|---|
| Age group | Australia | NT non-Indigenous | NT Indigenous | Australia | NT non-Indigenous | NT Indigenous |
| 0-14 | 721 | 721 | 859 | 490 | 514 | 610 |
| 15-24 | 438 | 463 | 519 | 137 | 113 | 358 |
| 25-44 | 288 | 308 | 993 | 154 | 148 | 951 |
| 45-64 | 354 | 468 | 852 | 382 | 515 | 1114 |
| 65+ | 1617 | 2146 | 1002 | 2764 | 4000 | 1611 |
| Average | 579 | 681 | 869 | 601 | 787 | 920 |

* The National and NT Falls reporting periods are different as CDC accessed the latest data available for the NT and the most current National reports were from 2003-2004.

**Table 2. Mean length of stay (days) for fall injury by age, Australia (2003-2004)[2] and NT (2005-2006)[3]**

| Age Group | Australia 2003-2004 | NT 2005-2006 | NT Female non Indigenous | NT Female Indigenous | NT Male non Indigenous | NT Male Indigenous |
|---|---|---|---|---|---|---|
| 0-14 | 1.6 | 3.4 | 2.5 | 4.4 | 2.9 | 4.1 |
| 15-24 | 2.3 | 4.2 | 2.6 | 4.4 | 4.4 | 4.2 |
| 25-44 | 3 | 5.5 | 6.4 | 4.5 | 6.3 | 5.4 |
| 45-64 | 4.6 | 7.6 | 5.6 | 8.2 | 9.1 | 7.4 |
| 65+ | 9.7 | 14.0 | 13.5 | 10.0 | 15.4 | 16.6 |

the national average. However, the rate is substantially greater for non-Indigenous people over 65 years in the NT than in the whole of Australia.

In the NT, falls were responsible for 6% of all hospitalisations in the elderly (65+) non-Indigenous population, but accounted for 20% of patient bed days in that group. The mean length of stay for NT falls admissions in all age and population groups is higher than the national average and is particularly so in people over the age of 65. See Table 2.

The cost of falls injury is substantial. During the years 1992-2001, in-patient costs for falls hospitalisations averaged $2,080,000 per year with an additional $100,000 per year for interstate hospital transfers.[1]

The risk and burden of injury from falls is much greater in the older population. Australian and overseas studies of community dwelling older people have identified that approximately 1 in 3 people aged 65 years and over fall each year, with 10% having multiple falls and over 30% experiencing injuries requiring medical attention. The rate of falls and associated injury is even higher for older people in residential aged care and acute care settings.[4]

This burden will increase in the NT as its population ages. The NT population is experiencing the most rapid rate of ageing of all the states and territories of Australia. Projections suggest that the percentage of the NT population aged 65 years and over is likely to double by 2031 and triple by 2051. It is estimated that this will result in a near tripling of fall related hospital costs by 2031 and a seven-fold increase by 2051.[5]

## The National Falls Prevention framework

In 2005, the Australian Government endorsed the *National Injury Prevention and Safety Promotion Plan 2004-2014* and the related *National Falls Prevention for Older People Plan: 2004 Onwards* (the Plan). The Plan was developed by the National Falls Prevention Working Group, which had NT representation in the then Director of Aged and Disability Services. The Plan identifies the following key priorities for action:

- generating a low risk population and promoting independence,
- improving outcomes through local partnerships,
- creating safer environments and products,
- enhancing the capacity of workers in the health and related sectors in the prevention of falls and fall related injury in older people,
- Developing and managinge knowledge through research, information dissemination and training.

The Plan highlights the need to work across sectors and promote collaboration and coordination between the health system, local government, community organisations, transport operators and the building, leisure and fitness industries to prevent falls and minimise fall related injury in older people.

Since the disbanding of the National Public Health Partnership and its sub-committees, the Australian Population Health Development Principal Committee (APHDPC) has assumed oversight of injury prevention. The sole injury prevention focus of the APHDPC at present is falls prevention and it has directed the National

† The NT is currently represented on the Round Table by the Centre for Disease Control Safety and Injury Unit.

Injury Prevention Working Group (NIPWG) to develop a national implementation plan for falls prevention. The National Falls Round Table[†], which replaced the Falls working group, has been developing priorities and providing advice in relation to an implementation strategy for the Plan. It is currently considering the following actions for inclusion in the implementation strategy:

- progressing the supplementation of residents of aged care facilities with vitamin D and calcium, as well as those aged 65 years and over with an identified vitamin D deficiency,
- promoting implementation of the Australian Council for Safety and Quality in Health Care Falls Prevention Best Practice Guidelines within residential aged care facilities,
- updating the Australian Council for Safety and Quality in Health Care Falls Prevention Best Practice Guidelines for Australian hospitals and residential aged care facilities,
- updating the 2004 analysis of falls prevention research in hospital, residential aged care and community settings,
- progressing the development of a national resource to inform consistent practice in community settings, and
- identification of agreed national process, impact and outcome indicators.

It is expected that the Implementation Strategy for the *National Falls Prevention for Older People Plan: 2004 Onwards* will be considered at the meeting of the APHDPC in early February 2008.

## What is going on in the NT?

The NT has a limited range of government and non-government organisations that deliver falls prevention programs mainly in the larger urban centres. A number of organisations deliver nationally recognised falls programs, such as the Tai Chi group exercise, muscle strengthening and balance training programs, prescribed home hazard assessment and modification, and the risk factor screening and intervention programs. The majority of these programs are run by non-government organisations, such as the Council of the Ageing, Arthritis & Osteoporosis NT, Masonic Day Therapy Services and the Alzheimer Association within their existing funding resources.

Within the NT Department of Health and Community Services (DHCS), the main falls activity is conducted by the Aged Care Assessment Team (ACAT) who respond to referrals for patients that have been admitted to hospital with a fall related injury. The ACAT conduct an assessment of the persons situation and then are able to offer some interventions or provide further referrals. Specialist interventions such as cardiac pacing are available through NT Cardiac. The Medication Management Review Scheme funded by the Commonwealth is available in the NT, but there are few providers and the scheme reportedly has a poor uptake.

There remain a number of gaps in the NT falls prevention framework:

- no coordinated approach to falls prevention in the NT,
- no dedicated falls prevention funding,
- no lead agency to coordinate activities,
- no referral pathway out of Emergency Departments beyond routine medical clinic referral and the acute medical clinic referral,
- limited specifically targeted activities and resources for Aboriginal and Torres Strait Islander communities,
- limited geriatrician services,
- lack of falls prevention programs outside urban centres, and
- limited availability of step down facilities to reduce acute hospital stay.

## Conclusion

There has been a perception that falls in general, and in particular, in the elderly, are not a major public health issue in the NT. However, this report demonstrates that the NT has higher rates of falls hospitalisations than the rest of the country especially in Indigenous people under 65 years and non-Indigenous people over the age of 65 years.

Falls are a serious health issue that can have a devastating impact on the quality of life for Territorians. They also have substantial financial costs: in-patient costs alone were in excess of $2m per year in 2001 and are likely to triple in the next 25 years as our population ages.

There is a substantial body of evidence concerning effective falls prevention initiatives and a well developed network of falls prevention programs and organisations within the rest of Australia. In the NT, there are a number of agencies doing good individual work in responding to the needs of people who have suffered falls and in prevention activities. However, there is a lack of a coordinated approach and a lack of focus and resources within Government in relation to falls as a public health issue.

The Safety and Injury Unit of the CDC proposes to convene falls prevention workshops in the Top End and Central Australia early in 2008. The purpose of these workshops will be to better map the current activities and gaps, canvass opinion on the need for a more coordinated approach to falls prevention in the NT, and hopefully, to determine a way forward to do so.

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# 2008 Influenza Vaccination

The 2008 influenza vaccine is now available. The composition of the vaccine is different from last year. It contains 3 new antigens:

- Influenza A/ Solomon Islands (H1N1),
- Influenza A/Brisbane (H3N2), and
- Influenza B/Florida.

The 2008 influenza vaccine is available free from community care centres, remote clinics and general practitioners for people at high risk of complications from influenza. Those who are eligible for free vaccine include:

- all non-Indigenous adults aged 65 years and over,
- all Indigenous adults aged 50 years and over, and
- Indigenous people aged 15-49 years with chronic conditions such as chronic lung disease (including 2 or more episodes of pneumonia), chronic liver disease, chronic heart disease (including congenital heart disease, chronic renal failure, diabetes and other chronic metabolic diseases requiring regular medical follow-up, haemoglobinopathies, severe asthma (requiring frequent hospitalisation), children less than 10 years old on long term aspirin therapy).

The vaccine is strongly recommended for all staff providing health care throughout the Territory, staff and residents of nursing homes, pregnant women, all individuals over the age of 6 months with chronic conditions and household members of persons in high risk groups.

Individuals not eligible for free vaccine can obtain a prescription for the vaccine from their general practitioner.

The Department of Health in Western Australia are conducting a case control study in Perth to determine the effectiveness of vaccinating children aged 6 months to 5 years with influenza vaccine. Those children receiving the vaccine for the first time require 2 doses of influenza vaccine 1 month apart. This study will provide data to inform the national immunisation program and possible funding for influenza vaccination in children nationally in the future.

If you are a health care provider reading this don't delay, get your 2008 influenza vaccine as soon as possible. Department of Health and Community Services employees have been offered influenza vaccine via special clinics. If you have not accessed one of these clinics and still require vaccination contact CDC on 89228564, infection control staff or your regional staff vaccination clinic.

# An estimate of rotavirus vaccine efficacy following an outbreak of rotavirus gastroenteritis in Central Australia

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## Abstract

*Rotavirus is a leading cause of gastroenteritis in infants and young children, with an estimated 600,000 deaths worldwide and approximately 2 million hospitalisations. Each year in the Northern Territory (NT) hundreds of children develop rotavirus gastroenteritis. Many of these children require evacuation from remote communities to regional hospitals at considerable social and economic costs.*

*In March 2007 an outbreak of rotavirus occurred in the Central and Barkley regions of the NT. This occurred 7 months after the NT Government introduced rotavirus vaccine into the NT Childhood Immunisation Schedule. The outbreak enabled an estimate of vaccine efficacy to be calculated in a population with a known high burden of disease. Coverage rates of the vaccine were also reviewed.*

*The results demonstrated that 2 doses of the live, attenuated rotavirus vaccine was 81% effective in preventing severe disease requiring hospital admission. Coverage was 73% for at least 1 dose of vaccine with 55% of eligible children being fully vaccinated.*

*The results justify the early introduction of the vaccine into the NT Immunisation Schedule and were comparable to previous vaccine efficacy studies.*

## Background

Rotavirus is a leading cause of gastroenteritis in infants and young children, with an estimated 600,000 deaths worldwide and approximately 2 million hospitalisations each year.[1] In Australia, rotavirus infections account for approximately half of all hospital admissions for gastroenteritis in children under 5 years. Indigenous children suffer higher rates of infection and are hospitalised 3-5 times more with severe rotavirus gastroenteritis than their non-Indigenous peers.[2]

Each year in the NT hundreds of children develop rotavirus gastroenteritis. Notification rates of 2.75 per 100 per year in Indigenous children and 0.98 per 100 per year in non-Indigenous children have been reported.[3] Many of these children require evacuation from remote communities to regional hospitals at considerable social and economic cost.[2] A rotavirus out break in 2001 led to over 45% of hospital beds in Alice Springs Hospital being occupied by children with gastroenteritis.[3,4]

In October 2006 the NT Government introduced rotavirus vaccine into the NT Childhood Vaccination Schedule for all NT children born after 1 August 2006 at an estimated cost of $400,000 annually. In July 2007 the vaccine was then introduced into the National Immunisation Program (NIP) and funded federally. In both cases there was a short lead time between decision making and vaccination start date. In the NT this was 6 weeks.

Of the 2 available vaccines the NT chose to use Rotarix® in its Childhood Schedule. This is a 2 dose oral vaccine administered at 2 and 4 months (8 and 16 weeks). It is important to note that unlike other NIP vaccines, there are upper limits for both the first and final doses of rotavirus vaccines therefore restricting catch-up vaccination.[5]

Monitoring of any recently introduced vaccine is essential to allow parents, health care providers, and decision makers to fully appreciate the health benefits of a new immunisation program. Such monitoring also provides information as to whether the performance of the new vaccine in routine use in the NT setting is equal to that seen in pre-licensure trials. Other objectives of monitoring include to:

- establish epidemiologic patterns of rotavirus disease after vaccination implementation,
- demonstrate the impact on morbidity and mortality,
- continue strain surveillance, and
- monitor adverse events following immunisation.

Several approaches can be used to assess vaccine efficacy. These can include monitoring trends in diarrhoea and rotavirus disease burden using an active surveillance system or secondary data sources, using a case control study design or by measuring vaccine effectiveness during an outbreak situation. Of these options, outbreak investigation offers a simple and timely means of measuring vaccine efficacy.[6]

Efficacy alone will not determine the overall success of an immunisation program. This success will depend on the overall population immunity level achieved. This population immunity is a function of uptake and efficacy.[7]

In March 2007 an outbreak of rotavirus occurred in the Central and Barkley regions of the NT. There were 70 children aged between 2 months and 5 years notified after admission to Alice Spring Hospital (ASH) over a 6-week period. Although this outbreak was very early after the introduction of funded vaccine in the NT, it provided an opportunity to assess vaccine efficacy in an Australian population with high rotavirus disease burden. It also provided an opportunity to estimate rotavirus vaccine coverage rates in the affected population to evaluate the implementation of this new immunisation program.

## Aim

The aim of this study was to estimate the rotavirus vaccine efficacy by comparing the immunisation status of infants admitted to ASH with rotavirus infection during an outbreak in March 2007. Serotype data of cases was also collected to compare efficacy data with other studies and a third aim was to estimate rotavirus vaccine coverage rates in the regions affected by the outbreak to determine the success of the program.

## Methods

A retrospective study was carried out following an outbreak of rotavirus gastroenteritis identified in the Central and Barkly regions of the NT.

### *Definitions*

Children were recruited for the study if they had been admitted to ASH during the outbreak period.

The outbreak period, defined as when 5 or more cases of rotavirus gastroenteritis were notified during a consecutive 7-day period between 29/3/2007 and 12/5/2007. Data collected were analysed using an Excel extract from the Northern Territory Notifiable Disease System (NTNDS).

A case was defined as a child, eligible for rotavirus vaccine, admitted to ASH with a diagnosis of rotavirus infection confirmed by detecting antigen on at least 1 stool sample using enzyme immunoassay (EIA) testing.

EIA testing was carried out in ASH laboratory. Where adequate specimens were available, stool samples were also referred to Murdoch Children's Research Institute, Royal Children's Hospital, Melbourne for serotyping.

A calculation of coverage and efficacy was performed based on the valid dosing regimen according to the NT Childhood Vaccination Schedule. Doses were considered valid if the first dose was given between 8 and 14 weeks of age, and the second dose given between 16 and 24 weeks of age with at least 4 weeks between doses.

Children were recorded as having received at least 1 dose of vaccine if they had received either 1 or 2 valid doses of vaccine according to the restrictions above and at least 2 weeks prior to the start of the outbreak on 29/3/2007. Children were recorded as being fully immunised if they had received 2 valid doses of rotavirus again as least 2 weeks before the start of the outbreak.

### *Vaccination Status*

The vaccination status of children admitted during the outbreak was established by reviewing both the information on the NTNDS and a child's vaccination records on the NT Childhood Immunisation Database (CID). The CID receives monthly notifications from remote and urban providers on immunisations given in the preceding month.

### *Analysis*

Vaccine efficacy was calculated using the following basic formula:

$$VE = \frac{ARU-ARV}{ARU} \times 100$$

Where VE = vaccine efficacy
ARU = attack rate in the unvaccinated population
ARV = attack rate in the vaccinated population

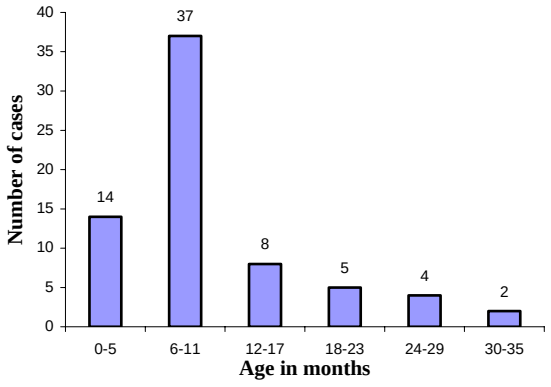
Vaccine coverage rates were calculated using the NT CID to establish the total number of children vaccinated between 1/8/2006 and 15/3/2007 (2 weeks prior to the outbreak) in the areas affected by the outbreak, with the denominator being determined from the Australian Childhood Immunisation Register (ACIR) Medicare enrolments. Medicare birth registration lag reports show that in the NT 100% of children are registered with Medicare in 85 days or less after birth.[8]

Children from the Alice Springs urban and rural areas, Barkly and the Anangu Pitjantjatjara Yankunytjatjara (APY) lands were included in the coverage estimation and efficacy calculations as the outbreak contained children from all these areas.

## Results

During the outbreak period, 70 children were admitted to ASH with a diagnosis of rotavirus gastroenteritis based on an EIA test performed at ASH. The age distribution Figure 1 shows 20% (14/70) of children notified were under 6 months of age, 71.4% (50/70) were between 6 and 24 months and 5 children were admitted under 8 weeks of age.

**Figure 1. Age distribution of rotavirus cases admitted to Alice Springs Hospital**




Of those diagnosed with rotavirus, 53/70 (76%) had a sample sent for serotyping to Murdoch Children's Research Institute, Royal Children's Hospital, Melbourne. Of these 53, 13 were from children in the age range who were eligible to receive vaccine. A G9P(8) serotype was found in 45 specimens, with the remaining 8 samples having insufficient material for assessment. No other serotypes were found, making this a single strain outbreak.

Of the 70 children admitted to ASH during the outbreak, 19 children were eligible for at least 1 dose of Rotavirus® vaccine with 13 being eligible for 2 doses.

The total cohort numbers as extracted from Medicare enrolments of children eligible for 1 dose was 441 with 287 children eligible for 2 doses of vaccine (Tables 1 and 2).

Simple 2x2 tables can be used to calculate vaccine efficacy and coverage.

**Table 1. Outcomes for Children eligible for at least 1 dose of vaccine.**

| | Vaccinated | Non-vaccinated | |
|---|---|---|---|
| **Hospitalised** | 10 | 9 | 19 |
| **Non-hospitalised** | 311 | 111 | 422 |
| **Total** | 321 | 120 | 441 |

**Table 2. Outcomes for Children fully vaccinated.**

| | Vaccinated 2 doses | Vaccinated 1 dose | Non-vaccinated | |
|---|---|---|---|---|
| **Hospitalised** | 3 | 3 | 7 | 13 |
| **Non-hospitalised** | 154 | 55 | 65 | 274 |
| **Total** | 157 | 58 | 72 | 287 |

**Table 3. Vaccine efficacy and coverage rates**

| Vaccine Status | Vaccine coverage rate (%) | Efficacy (%) | 95% CI |
|---|---|---|---|
| **At least 1 dose (n=321)** | 72.8 | 58.8 | 11.2, 82.8 |
| **Fully vaccinated (n=157)** | 54.7 | 80.6 | 27.2, 94.8 |

## Discussion

This evaluation has demonstrated that 2 doses of the live, attenuated rotavirus vaccine had an efficacy of 81% in preventing severe disease requiring hospital admission during a recent outbreak in Central Australia. These encouraging results contrasted to the coverage rates, which ranged between 73% for at least 1 dose of vaccine but dropped to 55% of eligible children being fully vaccinated (Table 3).

In previous studies rotavirus vaccine efficacy has ranged between 85-100% for severe rotavirus gastroenteritis.[9,10,11] Efficacy in this study for children having received 2 doses of vaccine was 81% which approaches the reported lower range of protection. It is recognised that in populations with a high rotavirus disease burden, such as the community where this outbreak occurred,[3] it can be more challenging for rotavirus vaccine to provide protective efficacy against rotavirus gastroenteritis.[12] This makes the above results even more encouraging.

Of the 2 rotavirus vaccines currently licensed for use in Australia, the NT chose to use Rotarix® in its immunisation program. Rotarix® is a live attenuated vaccine containing a single rotavirus strain of G1P(8) specificity.[13] Many previous studies have shown that Rotarix® despite only containing 1 serotype, is efficacious in protecting against severe rotavirus gastroenteritis caused by a number of different rotavirus serotypes.[11] This current study was unique with all isolates from the outbreak being G9P(8) serotype allowing type specific comparisons. A recent study in Brazil where 60% of rotavirus gastroenteritis was caused by the G9 serotype also showed an efficacy of 81%.[10] This Brazilian study had also been unique, when compared to other trials, in which the majority of isolates had been G1.

Pooled analysis from 4 Phase II and III studies has shown Rotarix® to have a vaccine efficacy of 83.76 (95%CI 71.2; 91.3) against type specific G9P(8)[9] and the table below shows the results from the Phase III trials. It is encouraging that in the NT population our results are similar and this supports the data that Rotarix® is efficacious against strains other than G1P(8).

Studies have also been carried out to examine the protective benefit of at least 1 dose of vaccine. An efficacy of 81.1% (95%CI 68.4, 95.3)[12] was noted in one study in Latin America and a meta-analysis estimate of vaccine efficacy after 1 dose was 62.5% for severe rotavirus gastroenteritis.[15] This is comparable to the results seen in our study of 58.8% for 1 dose when using the NT Childhood Immunisation Schedule.

The coverage rates for rotavirus vaccine in this study were 72.8% for 1 dose, while encouraging in a new program, dropped to 54.7% for 2 doses. Rotavirus vaccine has strict timing requirements and coverage rates can therefore be affected by a lack of timeliness in vaccination. The NT has for many years now, had higher than national coverage rates for childhood immunisation especially in the under 12 month age groups.[7] This coverage data does not however reflect the timeliness of vaccine administration and a recent study showed that the highest proportion of children with delayed vaccination was found in Indigenous infants in remote and very remote areas.[16] It is presumed the low coverage rates seen in this study reflect in part poor timeliness in receiving vaccine but also may be due to vaccine not being uniformly available at the start of the program.

In the NT the new program was introduced in October 2006 with a very short lead time of 6 weeks from decision making to vaccination start date. As part of any new immunisation program vaccine has to be procured and distributed, education around administration and timing given, data collection established, new schedules developed and surveillance for adverse events

**Table 4. Rotarix serotype specific efficacy against G9 in GSKs Phase III clinical studies [13,14]**

| xPhase III Study | All rotavirus gastroenteritis | | Severe rotavirus gastroenteritis | |
|---|---|---|---|---|
| *(n=number of patients)* | Efficacy (%) | 95% CI | Efficacy (%) | 95% CI |
| European (n=3,874) | 75.6 | 51.1; 88.5 | 94.7 | 77.9; 99.4 |
| Latin American (n=20,169) | Not studied | Not studied | 90.6 | 61.7; 98.9 |

initiated. The minimum recommended time frame for this is 6 months.[17]

It is recognised that this study has several limitations including the small numbers of children included and the use of hospital admission and EIA as the only components of the case definition. Another limitation in using a method such as this to estimate effectiveness is that it is impossible to ensure that vaccinated and non-vaccinated cases had an equivalent risk of exposure to rotavirus. In this study a large area was deemed 'at risk' of exposure, including many remote isolated communities in Central Australia. Some of these communities may not have been exposed during the outbreak and individuals within communities may also have had varying risks of exposure, i.e. absent from the community at the time of the outbreak or increased rates of infection among family or social groups. These biases can be controlled during the planning phase of a case-control study but can only be noted using this method.

Assumptions were also made that immunisation coverage rates for all communities were similar. Medicare data is extracted from ACIR using postcode to differentiate areas. In the NT many small communities and regional areas spread over thousands of kilometres can be covered by the same postcode. This allows aggregate regional coverage rates to be determined rather than individual communities. The Alice Springs urban, remote, Barkly and APY lands were all included together to determine coverage.

Co-morbidities were also not taken into account when looking at the reasons for hospital admissions. Other pathologies may have resulted in the admission of the child with rotavirus being a secondary diagnosis.

All these factors have the potential to affect the efficacy rates seen in this study and reduce the ability to compare these results with previous clinical trials and case control studies. Despite these limitations this study does however allow an estimate to be gained of the efficacy of the rotavirus vaccine in this population. It also identifies weaknesses in the current program with the low coverage rates identified.

Although an outbreak of rotavirus gastroenteritis occurred soon after the introduction of a funded vaccine program, these results have shown the vaccine to be highly efficacious in those children who were vaccinated and hence has justified the NT Government's decision to introduce the vaccine prior to it being nationally funded. Despite the low coverage rates and the slightly lower than previously documented efficacy rates, this study provides encouraging results. Ongoing studies are essential to monitor the long-term impact of the vaccine in reducing the number of clinic visits and hospitalisations due to rotavirus in the NT along with a reduction of all cause admission for gastroenteritis, which has been seen in other studies. Further education is essential around the timeliness of vaccination and in future longer lead times prior to immunisation programs commencing would ensure universal vaccine availability and appropriate education being disseminated.

## Acknowledgements

I would like to thank Vicki Krause, Rosalie Schultz, Peter Markey and staff at CDC Darwin and Alice Springs for their time, input, knowledge and assistance with the production of this report.

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# Guidelines for the Control of Tuberculosis in the Northern Territory 4th Edition, April 2008

## *What's new in this version of the guidelines?*

The last version of these guidelines was produced by the Northern Territory Centre for Disease Control in 2002. The 2008 edition has been updated to reflect more recent contributions to the field of TB control and also includes some changes to practice that have evolved through discussion among members of the NT TB Control Units and other interested parties. Major changes are summarised here and are explained in detail throughout the updated chapters.

### *The use of nucleic acid amplification tests (NAAT) in the diagnosis of tuberculosis (Chapter 2)*

These tests can be used to rapidly determine whether a patient's specimen contains *Mycobacterium tuberculosis*. This should be considered a supplemental test and does not replace smear microscopy or culture. Its use should be a decision between the treating clinician and the pathologist.

### *The maximum doses of pyrazinamide and ethambutol in the 3 weekly dosage regimen have been increased*

Drug doses are more closely in line with WHO and other international recommendations and differ slightly from the *Therapeutic Guidelines: Antibiotic, Version 13, 2006*.

### *Ethambutol can be discontinued once the organism is known to be sensitive to isoniazid and rifampicin even if this is prior to 2 months (Chapter 4)*

Ethambutol is used in the intensive phase of treatment to prevent the emergence of drug resistance before sensitivities are known. In situations where isolates are fully sensitive this can then be stopped.

### *Multidrug-resistant TB (MDR-TB)*

MDR-TB is defined as high level resistance to both rifampicin and isoniazid, with or without additional drug resistance. The general principles involved in treating MDR-TB are covered in Chapter 4.

### *Management of relapse and treatment failure and smear negative/culture negative pulmonary TB (Chapter 4)*

These 2 new sections have been added, to the Treatment of Tuberculosis chapter.

### *Latent Tuberculosis Infection (LTBI) – Diagnosis (Chapter 6)*

This chapter, previously titled Mantoux (Tuberculin) Testing, has been expanded to include information on Interferon-gamma Release Immunoassays (IGRAs). IGRAs are not currently recommended for use in Australian TB programs and further clinical and economic

evaluation is required before further recommendations for their use can be made. An overview of the test, its indications and interpretation is provided.

An overview of Heaf testing has also been provided for reference and use in clients coming from the UK.

***Dual skin testing is no longer available (Chapter 6)***

Dual skin testing was used in an attempt to distinguish true tuberculosis infection from sensitisation due to non-tuberculous mycobacteria (NTM). The test involved testing with both PPD-human and PPD-avian at the same time in opposite arms. PPD-avian is no longer available.

***Lifetime Risk of Reactivation Tuberculosis (Chapter 7)***

The lifetime risk of reactivation table now included in this chapter, gives an estimation of the risk of developing tuberculosis on the basis of Mantoux size, age, recent conversion of skin test and other risk factors. It can be used as a guide to decision making regarding treatment of LTBI.

***Short-course rifampicin based regimens for the treatment of LTBI (Chapter 7)***

Rifampicin alone, given daily for 4 months can be an alternative for the treatment of LTBI where isoniazid use is contraindicated or not appropriate. This regimen should only be prescribed and monitored by senior staff of TB Control Units.

***Changes to School Screening (Chapter 10)***

The recommendations for school screening have been changed and are based on data that shows primary outcome measures are best achieved in screening overseas-born students attending urban schools, Indigenous students in urban schools and students in communities where there has been a case of pulmonary TB in the previous 3 years (in certain communities in the previous 10 years). A CDC staff member should be involved in the school screening process.

***Prisoners in Correctional Facilities and Detention Facilities (Chapter 10)***

New flow charts have been added to this chapter and highlight the increasing workload of the Darwin TB Unit in relation to Illegal Foreign Fisherpersons (IFF). These figures set out clearly the procedures for health assessments of IFF and describe their ongoing management.

These guidelines will be distributed to Department of Health and Community Services centres shortly and will be available in print to other practitioners on request to the:

Research Project Officer, Centre for Disease Control on Ph: 8922 8089.

Or alternatively at www.nt.gov.au/health/publications.

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## Addendum to article on HTLV1 and Tuberculosis in Central Australian Aboriginal people (Bulletin 14 no 3, Sept 2007 pp 5-8)

***Rosalie Schultz, Vicki Krause, CDC***

Discussion arising from this article has led to the de-notification of one of the tuberculosis (TB) relapse cases in a person with HTLV1–tuberculosis co-infection.

This client did not complete treatment following her initial diagnosis. Thus the new diagnosis was not a relapse as reported, but a predictable recrudescence of partially treated disease.

Therefore number of cases of tuberculosis notified in Alice Springs and Barkly regions is 88; with 78 Aboriginal. 20 were tested for HTLV1 and 11 were positive (55%).

The discussion and conclusions of the article are not altered and there is no inference that HTLV-1 may predispose to relapse of fully treated TB.


CENTRE FOR DISEASE CONTROL

# *Pertussis (Whooping cough)*

## What is pertussis?

Pertussis is a highly contagious disease of the respiratory tract (nose and throat) caused by the bacteria *Bordetella pertussis*.

## How is it spread?

The bacteria are found in respiratory secretions of infected people. These people can pass the infection to other people by coughing or sneezing. Pertussis can also be spread by direct contact with infected mouth or nose secretions eg. by sharing eating utensils during a meal, sharing food or kissing.

## What are the symptoms?

The symptoms generally develop 7 to 10 days after exposure, but may take up to 20 days.

Pertussis usually starts with cold-like symptoms and an irritating cough, or the cough may be the first symptom. The irritating cough gradually changes over 1-2 weeks into episodes of coughing bouts, often followed by dry retching or vomiting. These coughing bouts can be very severe and frightening.

In some people, particularly children, they may end with a crowing noise (the whoop) as air is drawn back into the chest, and the child may vomit.

Very young babies may hold their breath instead of whooping and may sometimes turn blue. Adolescents and adults may only have a persistent cough.

## How serious is pertussis?

Pertussis kills about 295,000 children worldwide, each year and other children are left with brain damage. In Australia, between 1993 and 2005, 16 of the 18 people that died from pertussis were aged less than 1 year*. Death from pertussis is rare in children over 10 years of age. The most common complication of pertussis in infants is pneumonia that can be complicated by siezures and prolonged decreased oxygen to the head causing brain damage.

## What is the infectious period?

A person is infectious during the cold-like symptoms in the early stages, through to 5 days after starting antibiotics or, if left untreated, for the first 3 weeks of coughing.

## Who is at risk?

Pertussis can affect any age group, however, because of early childhood immunisation, pertussis now occurs mainly in adolescents and young adults. Adults can give the infection to young babies before they are fully protected by vaccination. These young babies are at risk of severe disease. One attack of the disease usually produces long-term immunity, though second attacks in the same individual have occurred.

## What is the treatment?

An antibiotic called azithromycin (or erythromycin for pregnant contacts) is usually prescribed to prevent the disease from being passed on to others, however it has little effect

*Australian Immunisation Handbook, 9th Edition 2008 (NHMRC) http://immunise.health.gov.au/internet/immunise/publishing.nsf/Content/Handbook-home

on the course of the illness for the individual. The coughing may last for weeks or months.

## How can pertussis be prevented?

Immunisation works to prevent a person contracting disease or it can reduce the severity of the illness. The pertussis component is combined with diphtheria and tetanus vaccine (DTPa) (and sometimes hepatitis B and polio vaccine) and is given as an injection.

The DTPa containing vaccine is given at 2, 4 and 6 months of age with a booster at 4 years. Those few children who develop pertussis, even though they have been immunised, have a much milder infection with fewer complications than those children who do not receive the vaccine at all.

Because of waning immunity during adolescence, a booster vaccine formulated for adults (dTpa vaccine consisting of adult diphtheria, tetanus and acellular pertussis) is given at 13 years (see below).

The series of 3 vaccines at 2, 4 and 6 months provides about 90% protection against pertussis but this falls to about 80% after 3 years. The booster doses act to ensure that protection lasts for as long as possible and to reduce the risk of infecting young infants.

In 2003 the dTpa vaccine became available for use in Australia and is given as a pertussis booster. It is recommended for:

- 13 year olds as part of a free school program,
- adults working with young children (eg. health and child care workers),
- other child carers (eg. grandparents),
- couples who are planning a pregnancy, and
- parents who have recently had a new baby.

It is available from GPs and incurs a cost.

## Minimum interval between dTpa and other tetanus containing vaccines

The dTpa vaccine can be administered at any time following a previously administered dose of tetanus toxoid containing vaccine.

## How can it be controlled?

People with pertussis should stay away from work, school and child care for at least 5 days after starting the course of antibiotics.

Preventive antibiotic treatment is only recommended for the following household or institutional contacts of pertussis cases who have spent more than 1 hour with the infected person:

- all household members when the household includes an infant aged <24 months who has received less than 3 doses of pertussis vaccine, and
- any woman in the last month of pregnancy.

Further advice should be sought from your regional Centre for Disease Control regarding:

- pertussis cases that have attended school or child care centres, and
- unvaccinated health care worker contacts who are caring for children under the age of 2 years.

**For more information contact your nearest Centre for Disease Control.**

| | |
|---|---|
| Darwin | 8922 8044 |
| Katherine | 8973 9049 |
| Nhulunbuy | 8987 0359 |
| Tennant Creek | 8962 4259 |
| Alice Springs | 8951 7540 |

# Mosquito-borne disease warning for the Top End of NT 28 March 08

***Peter Whelan, Medical Entomology***

The Northern Territory (NT) Department of Health and Community Services (DHCS) has issued a warning for the potentially fatal Murray Valley encephalitis (MVE) virus disease and Kunjin virus disease for the Top End of the NT, including the Katherine region, for April to June 2008.

Historically, March to June is the peak period for MVE virus and Kunjin virus activity across the Top End. Testing of sentinel chickens so far this year indicates seroconversion to both MVE virus and Kunjin virus in February and March near Leanyer swamp, the Adelaide River floodplain, Katherine, and Nathan River, and activity of Kunjin virus on Groote Eylandt and Jabiru in March. There is also some early indication of Kunjin virus activity in the Alice Springs area and MVE in Tennant Creek. This suggests widespread activity of both viruses circulating in local mosquitoes in the Top End to as far south as Tennant Creek, with Kunjin virus activity extending south to the Alice Springs area.

This is consistent with recent chicken seroconversions in the north-west of Western Australia (WA) and consequent WA Health mosquito-borne disease warnings. There has also been MVE seroconversions in chickens in inland New South Wales and northern Victoria indicating a continuing risk in these areas, as well as possibly inland Queensland affected by rains earlier in the year.

There have been no cases of MVE (or the related Kunjin virus disease) in the NT since 2005. However, be aware of the current risk, and promote mosquito protection where appropriate.

Usual symptoms of MVE virus disease include severe headache, high fever, drowsiness, tremor and seizures - especially in young children - and in some cases the condition progresses to delirium and coma, leading to paralysis, brain damage, with a 25% mortality rate. Kunjin virus disease causes a milder disease, with fever and severe headache. People experiencing the early symptoms of both diseases should seek urgent medical attention. Only about 1 in 1000 persons who get bitten by infected mosquitoes will contract these diseases. On average there are 1 to 2 human cases of these diseases in the NT each year. People most at risk are those with no prior exposure to these viruses, including babies, young children, tourists or people from southern Australia. Long-term residents are, however, also at risk.

These viruses are transmitted by the bite of the common banded mosquito, which is likely to breed in high numbers following the recent heavy rains across the Top End. This mosquito breeds in flooded grassy and swamp areas and numbers will persist over the early dry season near the longer lasting swamp areas. It bites after sundown, with a peak in the first 2 hours of the night. There is little risk of exposure to infected mosquitoes during the day.

This warning particularly applies to people visiting or living in rural areas or towns within 5 kilometres of wetlands, river and creek systems in the Top End and north-west WA, especially at night. The risk is likely to be highest near seasonal and temporary wetlands, coastal brackish swamps, billabongs, river floodplains and heavily vegetated dams and drains.

Urban areas within 5 kilometres of swamps and wetlands or other areas with poor drainage or creeks are also at risk, particularly when common banded mosquitoes are causing pest problems.

There is no need to avoid travel to the wetland risk regions if normal mosquito self-protection is observed.

People are advised to take extra precautions against being bitten by mosquitoes until the end of June when virus activity is expected to return to a minimum.

## Precautions against being bitten by mosquitoes include:

- Avoid outdoor exposure from dusk and at night in risk areas and all areas of high mosquito activity.

- Ensure all insect screens are installed and mosquito proof. Use mosquito nets and mosquito-proof tents at night in all areas when camping or in unscreened areas.
- Wear protective light-coloured clothing with long sleeves, long trousers and socks between dusk and dawn.
- Use a protective repellent containing di-ethyl toluamide (DEET) or picaridin as a supplement to protective clothing when outdoors at night in areas of mosquito activity, or when mosquitoes are active in the day. The most effective and long-lasting formulations are those in lotions or gels. Most natural or organic repellents are not as effective as DEET or picaridin.
- Ensure children are adequately protected against mosquito bites.
- Ensure all artificial receptacles that collect rain water are emptied or made unsuitable for mosquito breeding.

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# Personal mosquito protection while overseas

*Peter Whelan, CDC, Darwin*

## Introduction

These brief notes are aimed at minimum self-protection measures that can be taken by intending travelers to nearby countries in Southeast Asia to reduce exposure to dengue, malaria, and Japanese encephalitis vector mosquitoes. A brief inquiry should also be made on the current status and seasonality of these diseases in the intended country of destination to determine the need and level of protection required. Websites such as smarttraveller (http://www.smartraveller.gov.au/index.html) provide travel advisories including general health advisories and the World Health Organization (http://www.who.int/countries/en/) and Centers for Disease Control and Prevention (http://wwwn.cdc.gov/travel/default.aspx) provide information about disease risk by country. The destination country should be assessed to determine the risk of various vector borne diseases in either urban or rural settings, and your specific risk of exposure to mosquitoes in your intended locations of stay. For example, malaria or Japanese encephalitis are not significant potential problems in urban areas in cities unless on the outskirts and close to rice paddies, swamps, marshes or rivers with vegetation. Further consultation with a travel medicine doctor may then be required. This service is provided by some General Practitioners and services such as Travel Doctor at the Health Services Australia Group.

## Precautions

- Take the malaria prophylaxis drugs recommended by a travel medicine doctor if traveling to a potentially malarious locality. Begin the drug course a few days before you go to ensure there are no adverse drug reactions. Consider a Japanese encephalitis vaccination* if intending to stay in a rural area with possible mosquito exposure and history of outbreaks or cases during the season of intended stay.
- Use air-conditioned accommodation wherever possible or fully screened accommodation with fans. Keep any insect screens and other mosquito access routes closed night and day to prevent mosquito entry. In addition, spray aerosol residual insecticide in room behind and in cupboards, under bed, under tables, in any dark corners, on anything black in room, on insect screens around holes or gaps, and around windows and doors if not completely sealed. Any type of spray pack labeled for residual use i.e. crack and crevice treatment can be used. The best contain lambda cyhalothrin or bifenthrin, but permethrin, deltamethrin, or propoxur as active ingredients are acceptable. Take a permethrin-impregnated mosquito net if not using sealed air-conditioned accommodation, and particularly if in a rural area.
- Take insecticide impregnated long pants to protect against dengue mosquito attack if

* The availability of Japanese encephalitis vaccine has been problematic in recent months and may not be readily accessible in Australia making mosquito protection methods of utmost importance.

warranted. In risk countries and seasons, wear impregnated pants all day and evening at all times except in room after room treatment. Take additional insecticide for retreatment if staying longer than 1 wash of pants. Use light coloured long sleeved clothing in risk situations.

- Use personal repellant on legs and socks, day and evening in risk situations. Use DEET based or Picaridin based repellent. DEET based repellents should contain at least 10% DEET or greater. Reapply repellent every 2 to 3 hours. Avoid placing legs under dark tables especially in evenings unless protected as above.
- Check out accommodation locality, both inside the grounds and outside the boundary, especially for any water storages or containers with water where dengue mosquito can breed. Notify responsible person at premises of need to empty the containers or have them treated with an appropriate insecticide.
- Avoid accommodation within 1 km of rice field areas, rivers, creeks with slow moving water and irregular vegetated edges, and coastal swamps or lagoons.
- Basic precautions and personal protection can prevent most mosquito borne diseases.

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# Zika virus disease

***Peter Whelan[1] and Julie Hall[2]***

***[1]Medical Entomology, CDC, NT Department of Health and Community Services, [2] Office of Health Protection Department of Health and Ageing.***

## The virus and vectors

Zika is a flavivirus that is similar to the dengue virus, causing similar but milder symptoms. It was first identified in 1947 in rhesus monkey serum from Zika forest in Uganda. It is a disease of monkeys and humans transmitted by mosquitoes. *Aedes africanus* is the vector in forest areas in Africa, while *Aedes aegypti,* the dengue mosquito, is the probable vector in other areas.

## The illness

Traditionally, the illness caused by Zika virus was termed "Zika Fever". It is relatively common in areas of Africa. In 1978, it caused a small outbreak of acute fever in Indonesia, with other symptoms including malaise, abdominal pain, dizziness, anorexia and rash. However fever has been an inconsistent feature of a recent Zika outbreak in Yap. From the limited cases reported in the literature, Zika is not believed to have long-term health effects in people. Information suggests that pregnant women/ babies at no greater risk than others.

Medication for fever and pain includes paracetamol, with avoidance of ibuprofen and aspirin to avoid any possible haemorrhagic syndromes.

## The distribution

Zika disease or antibody has occurred across west and central Africa, Pakistan, India, Vietnam, Thailand, Philippines, Malaysia, Indonesia and Micronesia.

## The Yap outbreak

In 2007 an outbreak caused by the Zika virus occurred on the island of Yap and associated islands (Yap) in the Federated States of Micronesia in the western Pacific.

The Yap outbreak started in April 2007 and peaked in late May, with continuing cases to July. At June 29 2007, there were a total of 42 cases confirmed as Zika by PCR and IgM analysis by the US Centers for Disease Control (CDC) laboratory. An additional 65 probable cases occurred. Because the disease is mild, many more infections are thought to have

occurred in the community that did not seek medical attention. An initial assessment in the community indicated that a significant proportion of the population was affected. Geographically, cases occurred all over the island of Yap. No patients were admitted to the hospital and there were no deaths.

## The symptoms

In the recent Yap outbreak the symptoms were mild and generally lasted for 4-7 days, consisting of:

- a maculopapular rash that is sometimes pruritic, involving the trunk and extremities.
- conjunctivitis; and
- joint pain, which can affect both large joints and the smaller joints of the hands and feet.

Other symptoms noted in the Yap outbreak included retro-orbital eye pain, myalgia, lower extremity oedema, lymphadenopathy, and diarrhoea. Some patients also had a low-grade fever.

A breakdown of symptoms in the Yap outbreak were:

- rash 80%
- subjective fever or chills* 70%
- conjunctivitis 65%
- headache 40%
- retro-orbital pain 30%
- arthralgia 35%
- arthritis 25%
- myalgia 25%
- oedema 20%
- dizziness 10%
- abdominal pain 8%

The illness appeared less severe in children. Females presented with illness more often than males in the ratio 2:1.

## Differential diagnosis

Dengue and other flaviviruses, Chikungunya and other alphaviruses, rubella, measles, Reiter's syndrome, allergic reaction, conjunctivitis, arthritis, gout.

## Virus tests

Testing is by PCR and IgM analysis.

Rapid tests used in Yap for Dengue have given false positive results on patients with Zika virus (PanBio and Pentax).

## Disease control

Disease control relies on environmental campaigns to reduce *Aedes aegypti* numbers by reducing breeding in all manner of water bearing receptacles, including water drums, wells, water-tanks, old tyres, seashells, coconut shells, bamboo stumps, or anywhere where rain can accumulate. Artificial receptacles can be removed, stored upside down or under cover, or treated with an insecticide. Transmission can be reduced by avoiding mosquito bites by wearing long clothing, staying within screened areas, and using mosquito repellents and coils, especially when ill. In order to reduce the risk of infecting other communities or other countries during outbreaks, ill individuals can be advised not to travel.

## Risk to Australia

Australians traveling to affected area are at risk and should:

- Take precautions to avoid mosquito bites.
- If unwell with symptoms consistent with Zika or dengue, inform treating physician that they have been in a Zika affected area so that an accurate diagnosis can be made.

Importation of Zika to Australia.

- Competent vectors able to transmit Zika exist in Australia only in north Queensland. It is uncertain how infectious to mosquitoes an infected person is and over what time period, although this may be similar to dengue.
- Travel to and from Australia to Zika-affected areas is low. Likelihood of importation is therefore possible but low. Consequences on importation, given the apparent benign nature of the illness, is low. Overall risk to Australia of imported Zika is therefore considered to be very low.

*High fever was not common, fever was usually subjective or low grade

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# Standard Operating Procedure – for Environmental Health Response to Water Quality Failures

***Xavier Schobben & Dagmar Schmitt, Environmental Health Program, CDC Darwin***

## Background

The Environmental Health Program (EHP) of the Department of Health and Community Services, has a key role in both the establishment of water quality standards and targets and monitoring compliance of drinking water supplies in the interest of public health. The EHP works closely on this issue with the Power and Water Corporation (PWC), which has the primary responsibility for providing safe water to major and minor urban centres and remote communities in the Northern Territory (NT). This collaboration has resulted in the development and implementation of a monitoring program for chemical, radiological and microbiological parameters in drinking water supplies operated by PWC.

This monitoring program is based on recommendations made in the *2004 Drinking Water Guidelines* (ADWG), but also addresses the need for monitoring specific water quality characteristics that are problematic in the NT and not described in the ADWG in great detail. All sampling results from this monitoring program are reported to the EHP, via the *PWC Drinking Water Triggers and Protocol*. This protocol defines the agreed reporting triggers for aesthetic and health related parameters in drinking water supplies managed by PWC and outlines the reporting protocol to the Department of Health and Community Services (DHCS).[1]

The *PWC Drinking Water Triggers and Protocol*, and the monitoring program are prescribed pursuant to the requirements of Section 49 of the *Water Supply and Sewerage Services Act 2000.* Under the Act [2] the:

- Minister of Health and Community Services may specify the minimum standards for drinking water quality that a licensee must meet in providing water supply to customers;
- Licensee is required to meet minimum standards for drinking water quality;
- Chief Health Officer (CHO) may in an emergency give directions to a licensee to achieve minimum standards.
- CHO may approve the methodology for monitoring compliance with minimum standards.

## Microbiological Water Quality Failures

Microbiological water quality failures in drinking water supplies managed by PWC are reported to the EHP via the agreed protocol. These failures require an immediate response since they may represent an immediate threat to public health.

A microbiological failure is defined as the detection of ≥1 cfu *Escherichia coli* in a 100ml sample. The ADWG prescribes *E coli* as the specific indicator of faecal contamination and states it should not be detected in a 100ml water sample and that any detection in a drinking water supply requires immediate action.[3]

On notification of a water quality failure, EHP officers assess the magnitude of the failure and

decide what immediate action is to be taken. Water quality failures where <5 cfu *E coli*/100ml are detected in only 1 of several samples in a reticulated water supply are seen as a low risk minor microbiological failure. PWC follows a routine response plan agreed with EHP officers to rectify any minor water quality failure. In the case of low risk minor microbiological failures, PWC will instruct their operators to carry out the following:

1. Undertake a sanitary inspection of the water intake, holding tanks and reticulation.
2. Timely disinfection of the holding tanks by hand with chlorine to achieve a chlorine residual of 1 mg/L.
3. Taking follow up samples to check for any *E coli* in the holding tanks and reticulation.

A decision whether or not a precautionary notice will be issued, following a microbiological failure, will be made on a case by case basis. The detection however of *E coli* >10 cfu/100 ml in a reticulated water supply, will result in the immediate issuance of a precautionary notice.

## Standard Operating Procedure - Environmental Health Response to Water Quality Failures

Section 46 of the *Water Supply and Sewerage Services Act* provides the imprimatur for the CHO or his delegates, to act upon notification of any contaminated water supplies. The Act states [2]:

1. The CHO may, for the purposes of ensuring minimum standards of drinking water, give directions to a licensee regarding emergency precautions that the licensee must implement in an emergency.
2. A licensee must comply with a direction given to the licensee under subsection
3. A licensee must notify the CHO as soon as possible after he or she becomes aware of an incident that may adversely affect the ability of the licensee to comply with minimum standards specified in respect of drinking water quality standards.

Licensees, such as PWC cannot issue precautionary advice notices and require the EHP to assess the magnitude of the microbiological water failure and issue the precautionary advice if appropriate.

A Standard Operating Procedure (SOP) was prepared in July 2007 to formalise and clarify required procedures to ensure a prompt and consistent EHP response to water quality failures notified by PWC and the issuing of precautionary notices. Although the SOP applies mainly to PWC managed supplies, the principles also apply to reticulated water supplies managed by other organisation such as Nhulunbuy, Jabiru and Alyangula.[4]

## Issuing Precautionary Advice 1 – Issuing the Water Boil Alert

Actioning a water quality failure in the case of minor and major urban centres is initiated by a phone call or email to the Director Environmental Health and the Senior Policy Officer Environmental Health (Water portfolio) from the Water Services Branch of PWC and for remote community water supplies, through the automatic notification of water quality failures from the Department of Primary Industry, Fisheries and Mines (DPIFM) laboratory.

Following the initial laboratory report detailing numbers and locations of *E coli* present in the drinking water supply, PWC will advice EHP action officers of the extent of the failure and all the associated facts, as well as proposed actions to be taken to minimise any further public health risks.

The actioning officer, usually the Director of Environmental Health or the Senior Policy Officer Environmental Health (water portfolio), will immediately contact key stakeholders in the affected community, including the Community Council, Health Centre, Police station and local and regional school representatives by phone and advise them that a precautionary notice in relation to the drinking water supply will be emailed and faxed to them shortly for their information and distribution throughout the community.

The actioning officer will then draft a Precautionary Advice Number 1, also known as a *Water Boil Alert*. This advice is in a standard form and kept electronically in the Environmental Health database and outlines that drinking water quality testing has identified *E coli* in the water supply, and that this sentinel indicator organism is an indication of faecal

contamination and the possible presence of other microbiological pathogens that may cause diarrhoea. The advice further advises on the actions being undertaken by PWC in addressing the situation, which normally includes flushing of water lines and holding tanks and maintaining appropriate chlorine levels to kill any bacteria present. The Precautionary Advice generally outlines that these standard measures are designed to kill the bacteria quickly and that follow up testing will be carried out, to ensure the water is safe to drink. The notice also advises consumers to either purchase bottled water for drinking and oral hygiene purposes or alternatively to boil the water for 3 minutes and allow to cool, prior to consumption. The Precautionary Advice indicates that DHCS will lift and cancel the precautionary notice as soon as the drinking water supply is safe, and provides a contact name and phone number for further information.

The action officer then phones line management contacts and sends copies of the precautionary notice, the media release accompanying the notice and a newsflash of the water quality failure to the CHO, Assistant Secretary, Health Services and the Director Centre Disease Control. Health Services Executive then consider, endorse and send the documents to Ministerial Liaison and Media and Communications distributes the Media Release widely to all relevant print and electronic media outlets, including the *NT News* and the ABC.

## Action by Power and Water Corporation

PWC responds quickly to water quality failures and will liaise with the community's essential services officer to locate and rectify the problem, as well as keeping EHP officers informed of progress made. PWC officers will travel to the community and undertake resampling once the water failure has been rectified. Resampling occurs usually a day or two after the initial failure and the EHP actioning officer will be advised of the results as soon as they are available. Once the problem is rectified and *E coli* is not detected in the drinking water supply, the EHP actioning officer will issue Precautionary Advice Number 2, which cancels the previous advice and indicates that the water is safe to drink and use.

## Issuing Precautionary Advice 2 – Lifting the Water Boil Alert

The process is essentially the same as issuing Precautionary Advice Number 1. Precautionary Advice Number 2 is also available in standard format. Contact is established with PWC and the same stakeholders as Precautionary Advice Number One and the formal advice notice is issued. A Newsflash and Media Release advising of the lifting of the Water Boil Alert are issued, following the same process as for Precautionary Advice Number 1. Precautionary Advice Number 2 states that this is the second and final advice notice issued by DHCS and that the previous advice is now cancelled. The advice states that water quality sample results verified that the community supply is now free of any bacteria and the water is safe to drink.

## Conclusions

Once Precautionary Advice Number 2 is issued, PWC continues monitoring and reporting on drinking water supply results as agreed with DHCS in the *Monitoring Program* and the *PWC Drinking Water Triggers and Protocol.*

The establishment of the S*tandard Operating Procedure –Response to Water Quality Failures* and the associated standard forms for Precautionary Advices 1 and 2, news flashes and media releases, ensures that the Environmental Health Program response to water quality failures in NT community drinking water supplies are timely, consistent and effectively contribute to the safety of community drinking water supplies.

## References

1. Power and Water Corporation. *Power and Water Corporation Dinking Water Reporting Triggers and Protocol.* Power and Water Corporation. 2007 Darwin.
2. Northern Territory of Australia. *Water Supply and Sewerage Services Act.* Northern Territory Government. 2000. Darwin.
3. Australian Government. *Australian Drinking Water Guidelines.* Australian Government. 2004. Canberra.
4. Department of Health and Community Services. Standard Operating Procedure for Environmental Health Response to Water Quality Failures. Environmental Health Program: Department of Health and Community Services. 2007 Darwin.

# Signage of Effluent Outfall Dispersal Zones – Buffalo Creek and East Point, Darwin.

*Xavier Schobben and Dagmar Schmitt, Environmental Health Program, CDC*

## Background

Power and Water Corporation (PWC) is licensed to discharge sewage effluent to the environment under Section 14 of the Northern Territory (NT) *Water Act*.[1] In the Darwin Region PWC is operating 5 licensed waste water treatment plants (WWTP) and associated outfalls. The Leanyer Sanderson WWTP has its effluent outfall dispersal zone at Buffalo Creek and the Ludmilla WWTP has an outfall located at East Point.

WWTP outfalls in the NT typically deliver, secondary treated sewage effluent to the receiving water body. Secondary treated sewage effluent is greatly reduced in biological oxygen demand (BOD) and pollutants such as pathogens and other nutrients. Where a *Water Act* licence has been issued, the mixing zone for the activity must be defined through appropriate modelling coupled with an agreed program of ambient monitoring and model verification.[2] Within some mixing zones, health based recreational water quality guidelines may not always be met. The water quality within the mixing zone is variable and depends on WWTP operation and resultant effluent treatment levels, seasonal changes, tidal movements and the dilution and dispersion of effluent in the receiving water body.[3]

It is therefore considered that signposting of outfalls be part of standard due diligence in areas where receiving waters are at risk of not meeting appropriate health based recreational water quality guidelines. Signage at effluent outfalls advises the public as a precautionary measure, not to undertake recreational activities such as collecting shellfish, swimming, diving or other water sports within an indicated water receiving zone.

## Signage of Effluent Outfalls in Darwin

During 2007 the Department of Health and Community Services (DHCS), PWC, Natural Resources, Environment and The Arts (NRETA) in conjunction with the Larrakia Nation developed signage protocols for effluent outfalls where water quality may pose a risk to recreational users or fishers. PWC developed the signs for Buffalo Creek and East Point in consultation with officers from NRETA, DHCS, and the Top End Conservation Aboriginal Alliance. The Darwin Harbour Advisory Committee was also consulted and invited to provide feedback. The signs inform the public of the Buffalo Creek and East Point outfalls, their associated effluent dispersion zones, and the possibility of poor water quality within those zones. The signs recommend no swimming or taking of shellfish such as “longbums”, or “pippies”, and use appropriate symbols, in accordance with Australian Standard 2416-2002 Design and Application of Water Safety.

Signs advising the public of the effluent outfalls at Buffalo Creek and East Point were erected in March 2008. Picture 1 shows the sign at Buffalo

Picture 1


Picture 2

Creek, placed at the boat ramp, Picture 2 shows the sign at East Point, located adjacent to the car park nearest to the East Point outfall.

## Acknowledgements

We would like to thank Alex Donald from PWC for the photos of the erected signs at Buffalo Creek and East Point.

## References

1. Northern Territory Government. *Water Act.* 2004. Darwin.
2. Natural Resources, Environment and The Arts (NRETA). *A Report on the Larrakeyah Sewage Outfall.* August 2006 NRETA. Darwin.
3. Background information provided by staff and officers of PWC and NRETA.

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# Letter to the Editor

Dear Editor

I thought Dr Kathryn Roberts article on Rheumatic fever in the December CDC Bulletin was an excellent overview, particularly for health staff unfamiliar with this significant health problem. Table 4 was obviously accidentally transcribed from Table 5, however the case studies were very interesting. One important point though is that the article Dr Roberts refers to **monthly** pan benzathine penicillin. We are promoting the "moon" strategy to assist patients to remember when needles are due, which is consistent with evidence that **4 weekly** needles are required rather than monthly. I think its important we all use the same terminology and thereby give the same advice. I would suggest that all information on ARF/RHD refers to **4 weekly** pan benzathine as the recommended treatment.

Yours

Dr. Christine Connors
Program Director PCD

# CDC Conference 2008

The annual Centre for Disease Control Conference will be held in Darwin on 23 - 25 September. Any staff members wishing to offer presentations please contact Tracy Ward the coordinator on 89228044. Those interested in attending please keep the dates free and advise Tracy so we can keep you up to date as the program unfolds.

# 9th Edition of *The Australian Immunisation Handbook* and 4th Edition of *Myths and Realities* have been officially launched!

The *Handbook* is now available on http://immunise.health.gov.au/internet/immunise/publishing.nsf/Content/Handbook-home

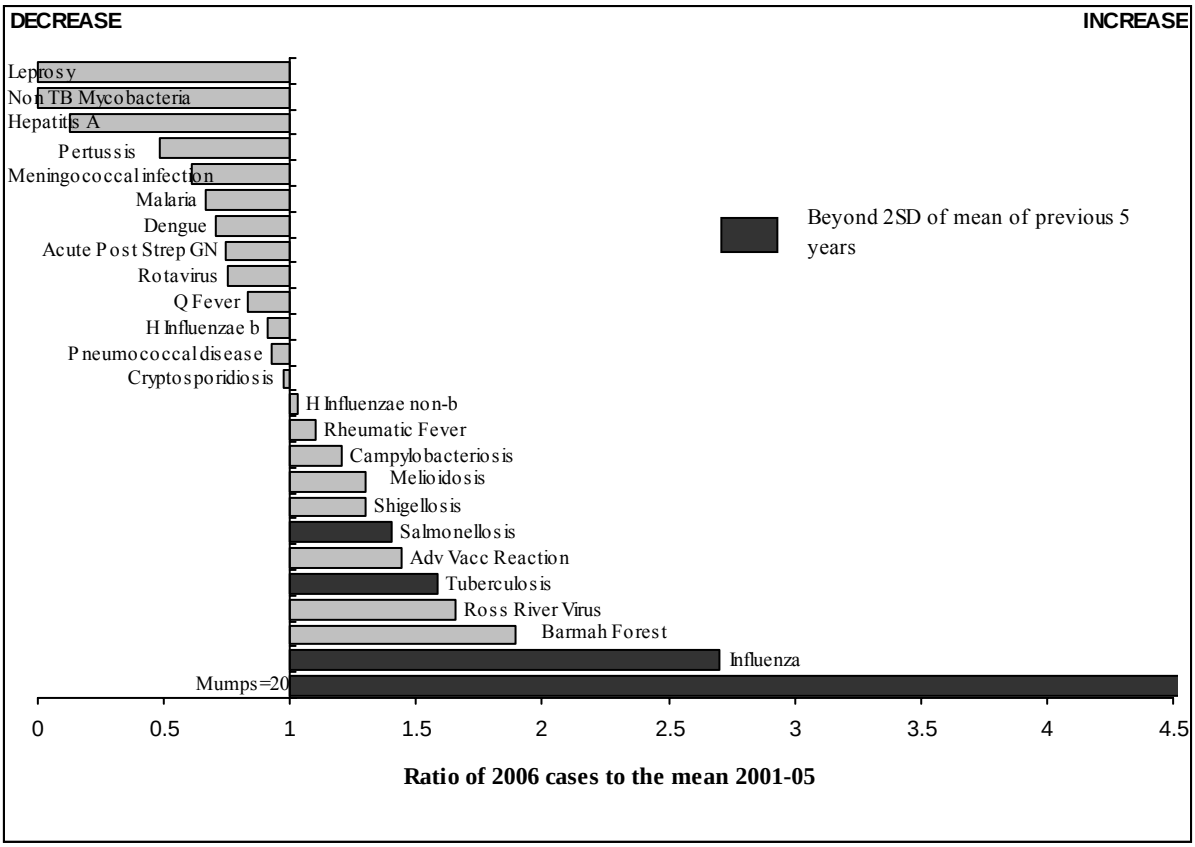
The 4th Edition of *Myths and Realities* can be found at http://immunise.health.gov.au/internet/immunise/publishing.nsf/Content/qa

Hard copies will be distributed directly to General Practices and Centre for Disease Control will distribute copies to NT Community Health Centres and hospitals once they arrive.

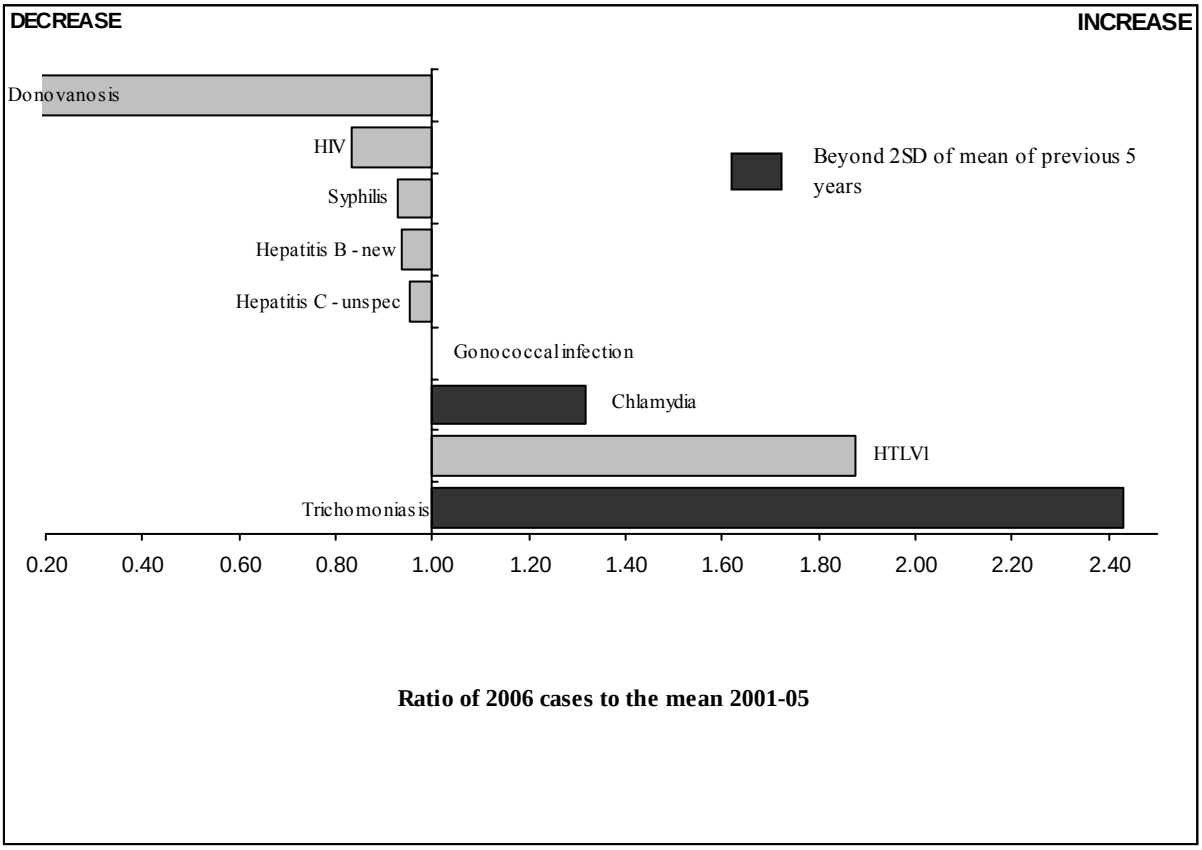
## NT NOTIFICATIONS OF DISEASES BY ONSET DATE & DISTRICTS 2007 & 2006

| | Alice Springs | | Barkly | | Darwin | | East Arnhem | | Katherine | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2007 | 2006 | 2007 | 2006 | 2007 | 2006 | 2007 | 2006 | 2007 | 2006 | 2007 | 2006 |
| **Acute Post Streptococcal GN** | 9 | 0 | 1 | 1 | 6 | 10 | 2 | 1 | 3 | 0 | 21 | 12 |
| **Adverse Vaccine Reaction** | 8 | 12 | 1 | 3 | 33 | 21 | 3 | 7 | 3 | 2 | 48 | 45 |
| **Amoebiasis** | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| **Arbovirus not otherwise specified** | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| **Barmah Forest** | 11 | 22 | 1 | 2 | 61 | 84 | 10 | 14 | 8 | 8 | 91 | 130 |
| **Campylobacteriosis** | 57 | 55 | 7 | 6 | 204 | 166 | 5 | 10 | 19 | 26 | 292 | 263 |
| **Chickenpox** | 35 | 18 | 1 | 0 | 95 | 92 | 20 | 22 | 45 | 61 | 196 | 193 |
| **Chlamydia** | 920 | 863 | 35 | 25 | 879 | 852 | 180 | 163 | 184 | 154 | 2198 | 2057 |
| **Chlamydial conjunctivitis** | 9 | 3 | 3 | 0 | 7 | 9 | 2 | 1 | 2 | 10 | 23 | 23 |
| **Creutzfeldt Jakob Disease** | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| **Cryptosporidiosis** | 46 | 26 | 8 | 1 | 43 | 19 | 5 | 18 | 10 | 7 | 112 | 71 |
| **Dengue** | 0 | 1 | 0 | 1 | 15 | 18 | 0 | 1 | 0 | 0 | 15 | 21 |
| **Donovanosis** | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 |
| **Food/water borne disease** | 2 | 0 | 11 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 17 | 0 |
| **Gastroenteritis - related cases** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| **Gonococcal conjunctivitis** | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 4 | 2 |
| **Gonococcal infection** | 877 | 1022 | 67 | 45 | 333 | 387 | 95 | 127 | 236 | 191 | 1608 | 1772 |
| **Gonococcal neonatal ophthalmia** | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 2 |
| **Hepatitis A** | 0 | 1 | 0 | 0 | 4 | 15 | 0 | 2 | 1 | 12 | 5 | 30 |
| **Hepatitis B - chronic** | 70 | 98 | 6 | 2 | 73 | 117 | 135 | 90 | 8 | 21 | 292 | 328 |
| **Hepatitis B - new** | 1 | 2 | 1 | 0 | 2 | 3 | 2 | 2 | 2 | 2 | 8 | 9 |
| **Hepatitis B - unspecified** | 79 | 89 | 5 | 1 | 105 | 47 | 15 | 27 | 27 | 13 | 231 | 177 |
| **Hepatitis C - chronic** | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| **Hepatitis C - new** | 2 | 2 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 4 | 3 |
| **Hepatitis C - unspecified** | 44 | 51 | 2 | 4 | 158 | 190 | 4 | 4 | 15 | 17 | 223 | 266 |
| ***H Influenzae* b** | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| ***H Influenzae* non-b** | 5 | 5 | 1 | 0 | 1 | 4 | 0 | 1 | 0 | 2 | 7 | 12 |
| **HIV** | 1 | 2 | 0 | 0 | 6 | 10 | 0 | 0 | 0 | 1 | 7 | 13 |
| **HTLV1 asyptomatic/unspecified** | 100 | 109 | 5 | 1 | 3 | 4 | 0 | 0 | 0 | 0 | 108 | 114 |
| **Hydatid** | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| **Influenza** | 32 | 13 | 3 | 0 | 128 | 16 | 8 | 6 | 15 | 5 | 186 | 40 |
| **Legionellosis** | 1 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 3 | 3 |
| **Leprosy** | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| **Leptospirosis** | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 2 |
| **Malaria** | 2 | 4 | 0 | 0 | 27 | 59 | 0 | 1 | 0 | 3 | 29 | 67 |
| **Melioidosis** | 0 | 1 | 0 | 1 | 32 | 21 | 1 | 1 | 1 | 3 | 34 | 27 |
| **Meningococcal infection** | 1 | 2 | 0 | 0 | 3 | 2 | 1 | 1 | 1 | 1 | 6 | 6 |
| **Mumps** | 1 | 1 | 0 | 0 | 46 | 3 | 1 | 3 | 12 | 0 | 60 | 7 |
| **Non TB Mycobacteria** | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 5 |
| **Pertussis** | 8 | 39 | 0 | 1 | 13 | 43 | 1 | 12 | 3 | 1 | 25 | 96 |
| **Pneumococcal disease** | 32 | 30 | 2 | 1 | 29 | 20 | 1 | 1 | 2 | 4 | 66 | 56 |
| **Q Fever** | 1 | 4 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 2 | 5 |
| **Rheumatic Fever** | 18 | 14 | 6 | 4 | 29 | 16 | 10 | 8 | 11 | 11 | 74 | 53 |
| **Ross River Virus** | 17 | 11 | 5 | 4 | 218 | 220 | 22 | 19 | 37 | 23 | 299 | 277 |
| **Rotavirus** | 166 | 98 | 18 | 4 | 70 | 391 | 8 | 47 | 29 | 65 | 291 | 605 |
| **Salmonellosis** | 119 | 88 | 25 | 12 | 298 | 218 | 25 | 26 | 56 | 60 | 523 | 404 |
| **Shigellosis** | 90 | 62 | 9 | 9 | 45 | 29 | 16 | 15 | 15 | 10 | 175 | 125 |
| **STEC/VTEC** | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 2 |
| **Syphilis** | 138 | 176 | 12 | 8 | 60 | 21 | 15 | 29 | 52 | 38 | 277 | 272 |
| **Syphilis congenital** | 2 | 3 | 0 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 6 |
| **Trichomoniasis** | 795 | 488 | 62 | 35 | 539 | 411 | 257 | 277 | 322 | 216 | 1975 | 1427 |
| **Tuberculosis** | 5 | 4 | 0 | 1 | 40 | 25 | 1 | 2 | 3 | 3 | 49 | 35 |
| **Typhoid** | 0 | 1 | 0 | 0 | 3 | 2 | 0 | 0 | 0 | 0 | 3 | 3 |
| **Typhus** | 0 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| **Varicella unspecified** | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 |
| **Vibrio food poisoning** | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 2 |
| **Yersiniosis** | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 2 |
| **Zoster** | 16 | 12 | 0 | 1 | 63 | 53 | 11 | 5 | 1 | 9 | 91 | 80 |
| **Total** | **3,732** | **3,445** | **300** | **176** | **3,684** | **3,615** | **859** | **946** | **1,124** | **979** | **9161** | **9699** |

**Ratio of 2007 cases to the mean 2002-2006: selected diseases**




**Ratio of 2007 casses to the man 2002-2006: sexually transmitted diseases**



# Comments on notifications P 26

## Influenza.

In 2007 there were 2.7 times the expected number of laboratory cases compared with the 5 year mean. A full analysis of the season's epidemic is given in the December 2007 edition of the Bulletin.

## Mumps

In 2007 there were 60 cases of mumps notified which is 20 times more than the 5 year mean. The increase in mumps cases has been noticed both nationally and internationally and is being further investigated. It is likely that waning population immunity has contributed to the increase in addition to incomplete vaccine coverage.

## Salmonellosis

There were 525 cases of Salmonellosis in 2007, this is 1.4 times the expected number of laboratory cases compared with the 5 year mean. An outbreak of *Salmonella* Oslo in the first half of 2007 accounted for a proportion of these Salmonellosis cases (46 cases). Most other Salmonellosis cases were sporadic in nature or occurred in small clusters which were investigated. An increase in the number of Salmonellosis cases was also noticed nationally.

## Tuberculosis

The 50 cases of tuberculosis notified in 2007, represent an increase of 1.5 times from the 5 year mean. This observed increase was largely attributed to the increased numbers of illegal fisherpersons diagnosed with TB who represented 24% of all notified cases.

## Chlamydia

Chlamydia increase is a true increase across the NT particularly in young people. A major campaign will be implemented over the next 12 months aimed at addressing these high rates.

## Trichomonas

The trichomonas increase is considered to be a reflection of a combination of more testing and a new more. sensitive test.

# NT Malaria notifications October – December 2007

***Merv Fairley, CDC, Darwin***

There were 12 notifications of malaria were received for the third quarter of 2007. The following table provides details about where the infection was thought to be acquired, the infecting agent and whether chemoprophylaxis was used.

| Number of cases | Origin of infection | Reason exposed | Agent | Chemoprophylaxis |
|---|---|---|---|---|
| 1 | East Timor | Holiday | *P falciparum* | No |
| 2 | Indonesia | Fisher | *P falciparum* | No |
| 1 | PNG | Holiday | *P falciparum* | No |
| 3 | Uganda | Refugee | *P falciparum* | No |
| 4 | Liberia | Refugee | *P falciparum* | No |
| 1 | Sudan | Military | *P falciparum* | Yes |

## Vaccination coverage for children aged 12 <15 months at 30 December 2007

| District | Number in District | Fully | %DTP | %Polio | %HIB | %HEP | %MMR | % Fully |
|---|---|---|---|---|---|---|---|---|
| Darwin | 269 | 246 | 91.8 | 91.8 | 94.8 | 95.2 | 0.0 | 91.4 |
| Winnellie PO Bag | 83 | 71 | 85.5 | 85.5 | 92.8 | 92.8 | 0.0 | 85.5 |
| Palm/Rural | 197 | 177 | 89.8 | 89.8 | 94.4 | 93.9 | 0.0 | 89.8 |
| Katherine | 86 | 82 | 95.3 | 95.3 | 98.8 | 98.8 | 0.0 | 95.3 |
| Barkly | 22 | 18 | 81.8 | 81.8 | 90.9 | 100.0 | 0.0 | 81.8 |
| Alice Springs | 112 | 102 | 92.0 | 92.0 | 96.4 | 95.5 | 0.0 | 91.1 |
| Alice Springs PO Bag | 53 | 47 | 88.7 | 88.7 | 98.1 | 98.1 | 0.0 | 88.7 |
| East Arnhem | 44 | 42 | 95.5 | 95.5 | 95.5 | 95.5 | 0.0 | 95.5 |
| NT Indigenous | 382 | 331 | 86.6 | 86.6 | 94.2 | 94.5 | 0.0 | 86.6 |
| NT Non-Indigenous | 484 | 454 | 94.2 | 94.2 | 96.1 | 96.1 | 0.0 | 93.8 |
| NT | 866 | 785 | 90.9 | 90.9 | 95.3 | 95.4 | 0.0 | 90.6 |
| Australia Indigenous | 3,086 | 2,594 | 85.0 | 84.9 | 91.6 | 92.0 | 0.0 | 84.1 |
| Australia Non Indigenous | 70,384 | 64,628 | 92.4 | 92.4 | 94.6 | 94.5 | 0.0 | 91.8 |
| Australia Total | 73,470 | 67,222 | 92.1 | 92.1 | 94.4 | 94.4 | 0.0 | 91.5 |

## Vaccination coverage for children aged 24 <27 months at 30 December 2007

| District | Number in district | Fully | %DTP | %Polio | %HIB | %HEP | %MMR | % Fully |
|---|---|---|---|---|---|---|---|---|
| Darwin | 273 | 254 | 94.9 | 94.9 | 93.8 | 96.0 | 94.9 | 93.0 |
| Winnellie PO Bag | 90 | 87 | 98.9 | 98.9 | 96.7 | 100.0 | 96.7 | 96.7 |
| Palm/Rural | 228 | 215 | 95.6 | 95.6 | 94.7 | 97.4 | 95.6 | 94.3 |
| Katherine | 93 | 90 | 96.8 | 96.8 | 97.8 | 98.9 | 97.8 | 96.8 |
| Barkly | 31 | 30 | 96.8 | 96.8 | 96.8 | 96.8 | 96.8 | 96.8 |
| Alice Springs | 135 | 126 | 96.3 | 96.3 | 94.1 | 97.0 | 93.3 | 93.3 |
| Alice Springs PO Bag | 46 | 39 | 89.1 | 89.1 | 89.1 | 93.5 | 95.7 | 84.8 |
| East Arnhem | 49 | 48 | 98.0 | 98.0 | 98.0 | 98.0 | 98.0 | 98.0 |
| NT Indigenous | 388 | 365 | 96.1 | 96.1 | 94.8 | 97.9 | 96.1 | 94.1 |
| NT Non-Indigenous | 557 | 524 | 95.5 | 95.5 | 94.8 | 96.6 | 95.2 | 94.1 |
| NT | 945 | 889 | 95.8 | 95.8 | 94.8 | 97.1 | 95.6 | 94.1 |
| Australia Indigenous | 2,919 | 2,663 | 94.7 | 94.6 | 92.9 | 97.0 | 93.9 | 91.2 |
| Australia Non Indigenolous | 67,130 | 62,457 | 95.3 | 95.2 | 94.9 | 95.9 | 94.3 | 93.0 |
| Australia Total | 70,049 | 65,120 | 95.3 | 95.2 | 94.8 | 96.0 | 94.2 | 93.0 |

## Vaccination coverage for children aged 72 <75 months at 30 December 2007

| District | Number in district | Fully | %DTP | %Polio | %MMR | % Fully |
|---|---|---|---|---|---|---|
| Darwin | 241 | 210 | 87.6 | 87.1 | 88.0 | 87.1 |
| Winnellie PO Bag | 96 | 92 | 95.8 | 95.8 | 95.8 | 95.8 |
| Palm/Rural | 173 | 146 | 84.4 | 85.0 | 84.4 | 84.4 |
| Katherine | 125 | 115 | 92.0 | 92.0 | 92.0 | 92.0 |
| Barkly | 22 | 16 | 77.3 | 77.3 | 72.7 | 72.7 |
| Alice Springs | 114 | 96 | 85.1 | 86.0 | 84.2 | 84.2 |
| Alice Springs PO Bag | 60 | 57 | 95.0 | 95.0 | 96.7 | 95.0 |
| East Arnhem | 46 | 43 | 95.7 | 95.7 | 93.5 | 93.5 |
| NT Indigenous | 374 | 349 | 93.6 | 93.6 | 93.6 | 93.3 |
| NT Non-Indigenous | 503 | 426 | 85.3 | 85.5 | 85.1 | 84.7 |
| NT | 877 | 775 | 88.8 | 88.9 | 88.7 | 88.4 |
| Australia Indigenous | 2,582 | 2,245 | 87.9 | 87.9 | 88.3 | 86.9 |
| Australia Non Indigenous | 65,836 | 58,493 | 89.4 | 89.6 | 89.5 | 88.8 |
| Australia Total | 68,418 | 60,738 | 89.4 | 89.5 | 89.5 | 88.8 |

# Immunisation coverage rates as of 30 December 2007 for NT children by regions based on Medicare address postcode as estimated by the Australian Childhood Immunisation Register are shown on page 29

## Background information to interpret coverage

Winnellie PO Bag is postcode 0822, which includes most Darwin Rural District communities, some East Arnhem District communities and some people who live in the Darwin 'rural area' who collect mail from the Virginia store or Bees Creek. Alice Springs PO Bag is postcode 0872, which includes Alice Springs District, Nganampa and Ngaanyatjarra communities.

The cohort of children assessed at 12-<15 months of age on 31 December 2007 were born between 01/10/2006 and 31/12/2006 inclusive. To be considered fully vaccinated, these children must have received 3 valid doses of vaccines containing diphtheria, tetanus, pertussis, (DTP) and poliomyelitis antigens, either 2 doses of PRP-OMP Hib or 3 doses of another Hib vaccine, and 2 doses of hepatitis B vaccine (not including the birth dose) (latest doses due at 6 months of age). All vaccinations must have been administered by 12 months of age.

The cohort of children assessed at 24-<27 months of age on 31 December 2007 were born between 01/10/2005 and 31/12/2005 inclusive. To be considered fully vaccinated, these children must have received 3 valid doses of vaccines containing DTP, and poliomyelitis antigens, either 3 doses of PRP-OMP Hib or 4 doses of another Hib vaccine, and 2 doses of hepatitis B vaccine (HEP) (not including the birth dose) and 1 dose of measles, mumps, rubella (MMR) vaccine (latest doses due at 12 months of age). All vaccinations must have been administered by 24 months of age.

The cohort of children assessed at 72-<75 months of age on 31 December 2007 were born between 01/10/2001 and 31/12/2001 inclusive. To be considered fully vaccinated, these children must have received 5 valid doses of vaccines containing DTP antigens, 4 doses of poliomyelitis vaccine and 2 valid doses of MMR vaccine (latest doses due at 4 years of age). All vaccinations must have been administered by 72 months (6 years) of age.

## Interpretation

Immunisation coverage in NT children was below the national in the 12-<15 months and 72-<75 months cohorts and above the national average in the 24-<27 months cohort. This increase in coverage rates between 12 and 24 months reflects in part, a lack of timeliness in vaccination for children under 12 months with these vaccines being caught up over the next year. These markers are a continuing reminder that the timeliness of vaccinations needs to be improved. Immunisation coverage in Indigenous children in NT was higher across all age groups compared to the national coverage of Indigenous children.

Immunisation coverage for NT children at 72-<75 months of age (88.4%) remains slightly lower than the younger cohorts, and this continues to be a concern across Australia.

# Disease Control staff updates

## CDC

**Elisa Brownhill** is providing Administrative Support and **Tanya Taylor** is filling in as HR/ Finance Manager for CDC Alice Springs. **Rosalie Schultz** is back after 2 months in Timor Leste and thanks go to **Kleete Simpson** for providing relief in Alice Springs in Rosalie's absence.

## SH&BBV

Welcome to **David Adams**, Urban AHW, and **Adrian Coulthard**, Remote AHW in Darwin. David has joined us from Miwatj in East Arnhem and Adrian has recently worked at Oak Valley, on Maralinga Lands in north-western South Australia. **Astrid Stark** is acting as Clinic 34 co-ordinator and **Caitlin Fullerton** is the new receptionist for Clinic 34 In Alice Springs

## Injury prevention

Recent MAE graduate from CDC, **Katrina Roper**, is back working for DHCS as a casual contractor. Katrina is working for **Steven Skov** and is tasked with analysing the road crash hospitalisation data for the NT for the period January 2005-August 2007. Katrina is thrilled to be working on this project as her MAE experience instigated a strong interest in injury prevention, particularly in the context of the NT.

## TB/Leprosy

The departure of **Natalie Gray** to Health Gains for the final year of her FAFPHM training brings **Kerryn Coleman** to the team in Darwin. Kerryn will be taking Natalie's role in the Darwin TB Unit as well as continuing to provide medical expertise to the Katherine CDC. **Deborah Beaver** has joined the Darwin nursing team and brings her experience working with Bagot Community.

## Immunisation

Nurses joining the HPV program include **Jenine Gunn** who has moved from the Alice Springs Rheumatic Heart Disease Program and **Chris Sutton** who joins us from the Child Health Team at Casuarina.

## Surveillance

With the departure of **Shellee Williams** the *Salmonella* in kids project is being continued with the assistance of **Julie Gaggin**, a well known laboratory technician from RDH, who is returning from semi retirement. In Alice Springs, notification data entry is being provided by **Kylee Redman** who is replacing **Helen McLean** while she is on long service leave.

## MAE

Welcome to **Stephanie Davis** a medical officer commencing her MAE. Stephanie has previously worked in the NT at Gove Hospital and as an intern at RDH.

## Rheumatic Heart Disease

**Prue Crouch** has commenced as the Rheumatic Heart Disease nurse, sharing the position with **Eleanor Hook**. **Jenny Woods** will be starting as RHD database manager.

## Medical Entomology

The end of field work on the *Aedes aegypti* program brings the departure of **Colin Smith**, **Bruce Hitchins** and **Brett Devitt**. They are thanked for their large contribution to this successful program. **Lauren Day** has commenced in an administrative position, **Barbara Love** is the new permanent technical officer and **George (Basent) Singh** (formerly in *Ae aegypti* program) has a temporary technical position.

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