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The Northern Territory Rheumatic Heart Disease Control Program: an update

Matthew Parnaby, CDC, Darwin

Abstract

In 1996 acute rheumatic fever (ARF) became a notifiable disease in the Northern Territory (NT) and the first NT Rheumatic Heart Disease (RHD) Program was established. Since then the program has grown from a register-based program to an NT-wide RHD Control Program supported by 5.5 staff. There are 2213 people on the RHD register, mainly from the NT, however patients from South Australia, Western Australia, Queensland and New South Wales are also registered. Of those affected by ARF/ RHD, 94% are Indigenous and 80% live in remote and isolated communities. In 2007 automated master charts were developed to report back to health centres those patients requiring secondary prophylaxis (benzathine penicillin injections). Patients who should be receiving regular benzathine penicillin injections increased from 83% in 2007 to 94% in 2010 by using this automated process. Also, over this period the proportion receiving 80% or more of their secondary prophylaxis doses increased yearly. The Program reports back to health centres their prophylaxis coverage for the RHD patient and coverage overall for the health centre. Reporting back to communities is a fundamental requirement to assist staff to improve services to ARF/RHD patients in the NT.

Key words: rheumatic heart disease; acute rheumatic fever; prophylaxis coverage; Register

Introduction

Acute rheumatic fever (ARF) became a notifiable disease in the Northern Territory (NT) in 1996. Also that year the NT Rheumatic Heart Disease (RHD) Program was established in the Top End (Darwin) of the Territory. This was followed by a program being established in Central Australia (Alice Springs) in 2000.

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Prior to the commencement of the official RHD Program, patient information lists were kept and RHD patients were managed by a number of dedicated specialists and medical officers serving Indigenous people and remote communities. The very high disease prevalence among Indigenous Territorians highlighted the need to establish a formalised program to gain more support for and understanding of the disease. Along with supporting and educating health professionals the aim of the RHD Program was to provide health education to patients, family members and communities to create a greater awareness of the disease.

The register-based RHD program established in 1996 by the NT Centre for Disease Control (CDC) was formed in partnership with a number of organisations including Menzies School of Health Research, the NT Heart Foundation and remote health centres. The main aim was to assist in the management of cases.

Separate RHD registers were established in both the Top End and Central Australia. Both were managed independently, with each having steering committees to provide support and guidance for the delivery of services.

In 2007 a significant change occurred with the amalgamation of both RHD registers into a single web-based Territory-wide 'NT RHD Register'. The web-based NT RHD Register allows approved clinicians to access the Register in order to obtain up-to-date information on RHD patients including their prophylaxis and specialist follow-up requirements.

In the beginning securing adequate funding was not easy with funding being mostly short term. In 2008, with the release of the *National Rheumatic Fever Strategy*[1], longer term funding was provided ensuring the future continuation and development of the program to meet the growing needs of the Territorian population.

Continuous development has seen a register-based program grow into a full RHD Control Program that is supported by the 5.5 CDC RHD staff NT-wide. The NT RHD Advisory Committee, made up of non-government, government, education and private sector specialists provides guidance and advice on program activities. The NT RHD Control Program works in partnership with 113 government and Aboriginal-controlled health services throughout the NT providing services to over 1800 active patients. Cross-border support is given to an additional 17 health centres in SA, WA and QLD. Register coordinators manage and maintain the register, provide training to clinicians on the use and capabilities of the register and send feedback and reports to clinics on prophylaxis coverage and specialist recalls. RHD Public Health Nurses provide much needed support to remote health centres in the development and delivery of services, provide training to urban and remote clinicians, and importantly, educate and encourage patients, their families and communities. Other CDC staff in the regional centres assist with RHD work, especially the newly expanded NT Trachoma Program staff as many strategies are similar.

There are 2213 people on the register under the direction of the NT RHD Control Program currently servicing mainly the NT , but also, South Australia, Western Australia, Queensland and New South Wales. Of the 2029 patients in the NT, 1823 receive active follow-up and 1220 are identified as requiring secondary prophylaxis to prevent recurrent attacks of ARF. Children and adolescents (<15 years) make up 10.5% of all registered patients in the NT. Over 425 of all RHD patients in the NT are classified as having severe cardiac disease which impacts on daily activities.

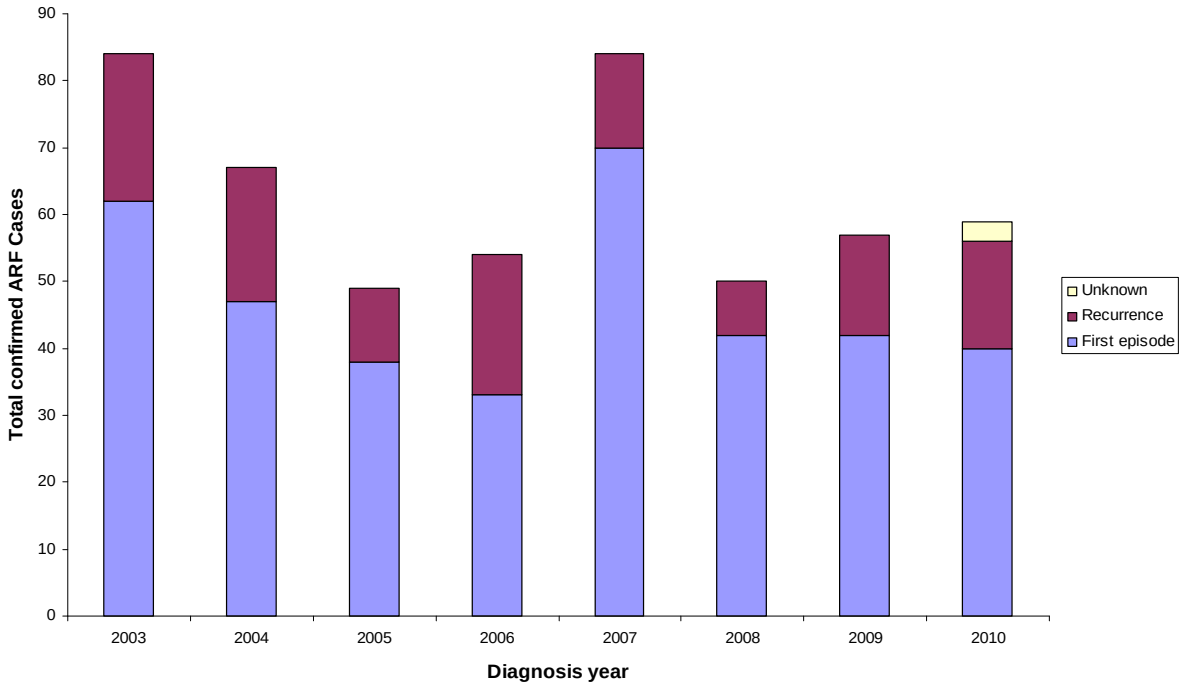
Primary chemoprohylaxis refers to the timely and curative antibiotic treatment of group A streptococcus infections to prevent an initial occurrence of ARF. Secondary prophylaxis is defined as regular administration of antibiotics (ideally benzathine penicillin G) to patients with a previous history of ARF/RHD to prevent further group A streptococcal infections and a recurrence of ARF.[2,3]

Of those affected by ARF/RHD, 94% are Aboriginal and most (80%) live in remote and isolated communities creating unique challenges for specialist follow-up.

Acute Rheumatic Fever

Figure 1 shows notified cases of ARF from 2003 to 2010. Since 2008 notifications for first episodes of ARF have been fairly stable.

Figure 1. Notifications of confirmed ARF 2003-2010



Recurrent episodes of ARF continue to make up approximately 30% of all notifications. Cases classified as 'unknown' are patients with a first recorded case of ARF but with established RHD. Unknown cases range in age between 20 and 34 years.

Collection and analysis of data provides the Program with useful information to better direct resources and address those at risk of recurrent attacks.

Prophylaxis

Over the past 2 years the NT RHD Control Program has seen a number of changes and improvements in treatment outcomes for patients and services to health centres and specialists.

The proportion of patients on the register who require benzathine penicillin as prophylaxis has increased from 83% in 2007 to 94% in 2010. A contributing factor to this increase is the development of automated master charts that are sent through to health centres. In the past, staff at health centre were required to identify patients for secondary prophylaxis. The automated master charts have taken over this task of going through individual charts to identify patients and therefore have been more complete and have not allowed patients to "fall through the cracks".

Since 2007, there has been a marked increase in the doses of benzathine penicillin delivered for secondary prophylaxis.

Table 1 shows the number of doses dispensed.

Table 1. Benzathine penicillin doses delivered 2007 - 2010

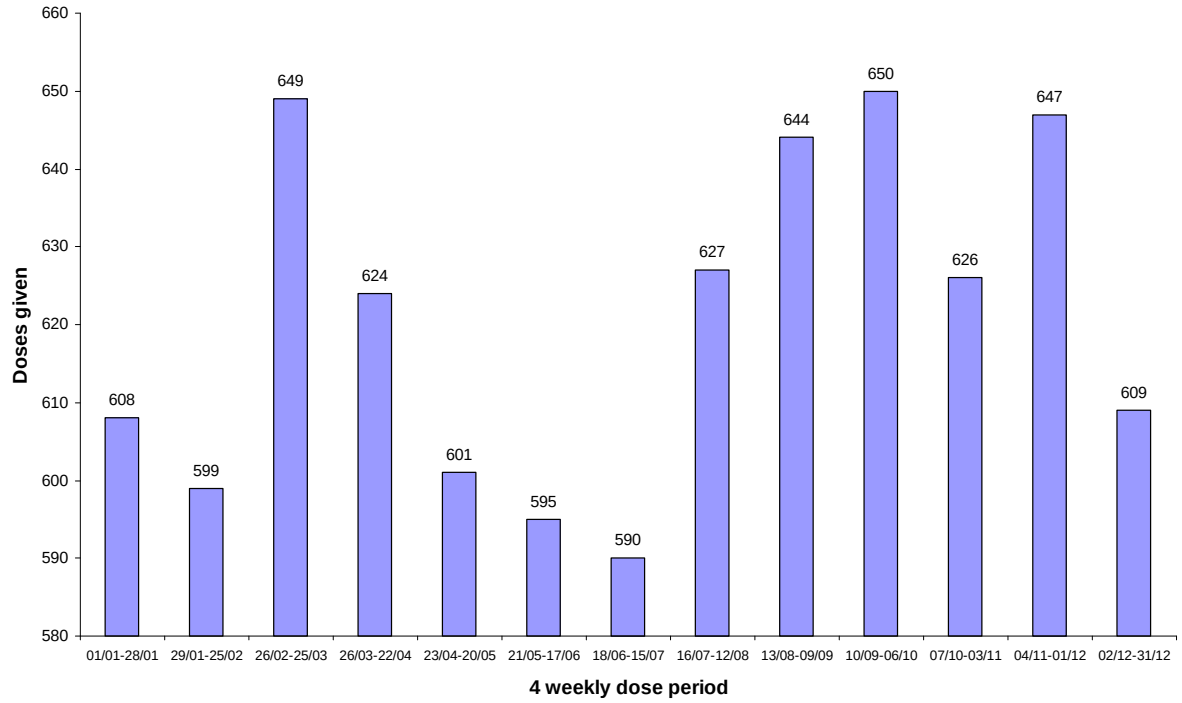
Year	Doses Given
2007	6389
2008	6765
2009	7791
2010	8309

Table 2 shows there has been a marked drop in the number of patients receiving less than 50% of their prophylaxis throughout the year and a marked increase in the number of patients receiving 50-80%. While the number falls short of the targeted 80% of injections for all, RHD patients are presenting for more of their prophylaxis. Indeed the overall coverage rates

Table 2. Secondary prophylaxis coverage 2007 - 2010

Year	<50%	50-80%	>80%	Overall coverage
2007	44.35%	33.88%	21.77%	54.6%
2008	42.37%	36.24%	21.39%	56.2%
2009	35.39%	40.71%	23.90%	59.7%
2010	32.58%	41.54%	25.88%	61.1%
Total	38.42%	38.25%	23.32%	58.2%

Figure 2. Total benzathine penicillin G doses



since 2007 for all people who require secondary prophylaxis shows an increasing trend from 54% in 2007 to 61% in 2010.

During 2010, the NT RHD Control Program began reporting back prophylaxis coverage to health centres for all of their patients and for each health centre. This gave regular feedback on coverage of prophylaxis for each 4 week period throughout the year. The feedback given is presented in graph form to track variations between the periods.

As an example, Figure 2 is the Territory-wide graph showing the numbers of injections of benzathine penicillin for 2010 delivered per 4 week period 2010 (note scale is 580-660 doses).

Updates on prophylaxis are generated by the NT RHD Register and provided to health centres on a regular basis to document which patients have received prophylaxis as well as to check the accuracy of the Register data.

Figure 3 is an example of such prophylaxis reports sent through to communities.

Figure 3.Community Prophylaxis Report

HRN	Given Name	Surname	DOB	Meds	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8	Period 9	Period 10	Period 11	Period 12	Period 13
				BPG 4w		3/02/10	4/03/10	2/04/10		25/05/10				30/09/10		10/11/10	9/12/10
				BPG 4w			2/03/10		11/05/10	10/06/10		26/07/10	23/08/10	14/09/10	14/10/10	11/11/10	
				BPG 4w		16/02/10		8/04/10	11/05/10	8/06/10		27/07/10	30/08/10	5/10/10		10/11/10	17/12/10
				BPG 4w		10/02/10	25/03/10									12/11/10	
				BPG 4w		21/02/10	17/03/10	9/04/10							19/10/10		3/12/10
				BPG 4w	4/01/10	8/02/10	15/03/10				8/07/10		30/08/10				
				BPG 4w		24/02/10	25/03/10		29/04/10	3/06/10	14/07/10		18/08/10	18/09/10	14/10/10	27/11/10	22/12/10
				BPG 4w		18/02/10		20/04/10	6/05/10	7/06/10	7/07/10		19/08/10	23/09/10			19/12/10
				BPG 4w		23/02/10	19/03/10	20/04/10		26/05/10	23/06/10	19/07/10	25/08/10	28/09/10	22/10/10	19/11/10	16/12/10
				BPG 4w									2/09/10		25/10/10	22/11/10	
				BPG 4w		11/02/10	16/03/10	12/04/10	30/04/10	1/06/10	1/07/10		25/08/10	6/10/10			11/12/10
				BPG 4w									14/08/10	1/10/10			6/12/10
				BPG 4w											22/10/10	19/11/10	
				BPG 4w								20/07/10					10/12/10
				BPG 4w	27/01/10				27/04/10	25/05/10	25/06/10	23/07/10	20/08/10	14/09/10	12/10/10		
				BPG 4w			2/03/10					30/07/10	26/08/10				
				BPG 4w	23/01/10	31/01/10		31/03/10	2 Doses	24/05/10	2 Doses		27/08/10	2 Doses	15/10/10	23/11/10	17/12/10
				BPG 4w								28/07/10				23/11/10	
				BPG 4w	5/01/10	16/02/10		30/03/10	6/05/10		15/07/10	3/08/10			8/10/10	5/11/10	
				BPG 4w			2/03/10						16/08/10	13/09/10	2/11/10	30/11/10	
				BPG 4w				26/03/10			14/07/10		19/08/10	10/09/10		30/11/10	
				BPG 4w	25/01/10		6/03/10	21/04/10	14/05/10		21/06/10	2 Doses	8/09/10		26/10/10	29/11/10	31/12/10

Conclusion

There have been continuous improvements in the NT RHD Control Program over the past 2 years, including the capacity to better utilise and report on RHD Register data.

The data are used to guide program activities and to report back to key stakeholders including remote health services and funding agencies on the progress of the NT RHD Control Program.

Reporting back to communities is a fundamental requirement needed to assist staff and to improve services to ARF/RHD patients in the NT.

References

1. Russell L. Analysis of the 2010—2011 Health and Ageing budget. Menzies Centre for Health Policy (internet) Available from: http://www.menzieshealthpolicy.edu.au/other_tops/pdfs_pubs/2010-11budgetanalysis.pdf
2. Couzos S, Murray R. Aboriginal Primary Heath Care. 3RD ed. Oxford University Press; 2008.
3. National Heart Foundation of Australia (RF/RHD guidelines development working group) and the Cardiac Society of Australia and New Zealand. Diagnosis and management of acute rheumatic fever and rheumatic heart disease in Australia – an evidence-based review. 2006.

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Editorial comment

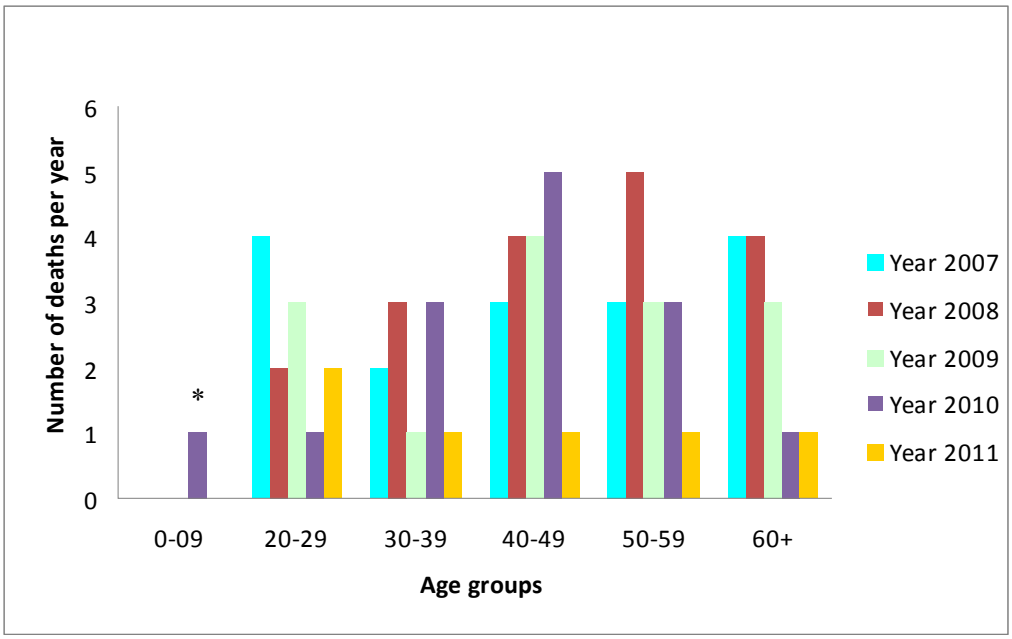
Vicki Krause and Keith Edwards, CDC, Darwin

Rheumatic heart disease (RHD) is a serious but preventable disease caused by recurrent attacks of acute rheumatic fever (ARF) following streptococcal bacterial infection. Although RHD is now rare in non-Indigenous Australians, it remains one of the major killers of young Aboriginal and Torres Strait Islander people.

The disease needs to be taken very seriously in the Northern Territory (NT) because the rates of ARF and RHD are exceedingly high and the consequences when uncontrolled are grim. The graph (Figure) below shows just how grim. Since 2007 there have been 68 deaths; 16 in 2007, 18 in 2008, 14 in 2009, 14 in 2010 and already 6 deaths in 2011 with 2 of these deaths in young people in their in their 20s.

The bacterial infection that precedes ARF, Group A streptococcal infection, is highly

Figure 1 Deaths due to rheumatic heart disease 2007 – 2011 YTD



Source :NT Rheumatic Heart Disease Register
* 5 year old child

prevalent in settings where there is overcrowding, sub-optimal housing conditions, and limited education.

Medical management can reduce recurrent attacks of ARF due to streptococcal infections but requires patient understanding and commitment in the setting of well staffed and resourced primary health care systems.

The NT has recognised the importance of ARF and as reported in the preceding article has had a dedicated control program since 1996 and is considered a leader in this area. The NT RHD Control Program provides a Register to assist the recall and management of patients who have suffered ARF with the main aim to prevent further attacks of ARF. This is achieved by client education, health staff education and support to all remote clinics to;

1. ensure all clients receive an injection of benzathine penicillin G (LA Bicillin) every 4 weeks;
2. ensure that skin and throat infections are treated early; and
3. ensure that those clients, with established damage to their hearts, receive timely follow up by physicians, paediatricians, cardiologists and dentists.

Primary prevention of ARF lies mainly with improvements to housing and hygiene, but also involves the effective treatment of streptococcal sore throat and skin infection, with the goal of preventing a first attack of rheumatic fever. The NT RHD Control Program supports early treatment of these infections through staff education, recognising that service delivery depends on adequate provision of trained staff at the primary health care level.

Secondary prevention of rheumatic fever is defined as regular administration of antibiotics (ideally benzathine penicillin G given intramuscularly) to patients with a previous history of ARF/RHD in order to prevent group A streptococcal infection and a recurrence of ARF.

It is critical for clients not to miss any of their 4 weekly injections as this allows for streptococcal infection to occur with the risk of recurrent ARF. Most patients require injections every 4 weeks for a minimum of 10 years and many require these injections for life. This poses a significant challenge for the patient and the health system. The average client in the NT as documented in the preceding article receives less than 50% of their required injections, and while improving yearly, only 26% of patients in 2010 received 80% of their required injections.

The reasons for this are many but include: clinic staff turnover, heavy workload, patient mobility, staff and client attitudes.

The World Health Organisation in 2001 recommended that the establishment of a national rheumatic fever prevention program is essential in countries where ARF and RHD remain significant health problems. In November 2006, the Australian Health Minister Advisory Council (AHMAC) established the Rheumatic Heart Disease Working Group consisting of experts and jurisdictional representatives, including members from the NT, to advise on a collaborative approach to the management of ARF and RHD. In 2008, the Commonwealth Budget committed $12.2 million over 5 years (to 2012) for the Rheumatic Fever Strategy to address ARF and RHD among Indigenous children. It includes:

- establishment of a National Co-ordination Unit - *RHD Australia* - located in Darwin with Menzies School of Health Research in partnership with James Cook University and Baker IDI;
- continuation of the ARF/RHD register and control program in the Northern Territory; and
- establishment of new register and control program sites in Western Australia and Queensland.

Under the Strategy the NT Department of Health provides important technical and logistic support to assist other states in the establishment of their programs and registers.

Uncontrolled, RHD progresses to a disease state that restricts lifestyle and, as seen in the NT, leads to early death in too many cases.

Almost all cases of RHD are preventable. Steps are in place to address the circumstances that promote ARF and its sequelae RHD but progress is slow. The NT RHD Control Program has established a plan to assist management that is showing results. Such efforts need to be commended, maintained and enhanced.

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Updated Guidelines for the Control of Leprosy in the Northern Territory

Lesley Scott, CDC, Darwin

The first edition of the *Guidelines for the Control of Leprosy in the Northern Territory* was published in 1986 with John Hargrave, Tania Wallace and Doug Lush acknowledged as the authors of the document on which the *Guidelines* were substantially based. A second edition was published in October 2002 with Nathan Zweck and Lesley Scott acknowledged as the updating authors of this edition. Changing local circumstances, accumulated data, new medical evidence and internationally recognised recommendations since then have been considered in the production of this third edition. Elliot Coates, Joanne Judd, Kerryn Gisjbers, Lesley Scott and Vicki Krause each contributed to the rewriting and coordination of this edition.

The third edition December 2010 is now available at http://www.health.nt.gov.au/Centre_for_Disease_Control/Publications/CDC_Protocols/index.aspx. These *Guidelines* are intended as a resource for Northern Territory (NT) clinicians including remote NT health centres to implement leprosy diagnosis and management. It is hoped they may also be useful in the control of leprosy more widely in Australia.

Background information is provided on the epidemiology, disease transmission, presenting symptoms, diagnosis, treatment and case management of leprosy.

Edition Changes

2002 Edition (second edition)

In the 2002 edition the most important changes to note were:

1. A change in the multi-drug treatment (MDT) regimen with rifampicin prescribed monthly rather than daily and the durations fixed at 6 and 24 months for paucibacillary (PB) and multibacillary (MB) leprosy, respectively.
2. A reduction in the duration of follow-up for cured cases from annual reviews for the rest of life to:
   - PB patients who had nerve function impairment (NFI) at time of diagnosis to be for 18 months beyond the completion of 6 months of treatment.
   - MB patients with a bacillary index (BI) ≥4 to be for 5 years beyond the completion of 24 months of treatment.
   - Discharge after treatment completion for all others.
3. A reduction in the duration of follow-up for contacts after the diagnosis of an index case to annual reviews for 6 years for MB contacts and a single review for PB contacts.
4. The introduction of standardised clinical assessment voluntary muscle test-sensory test (VMT-ST) for the common nerve function impairments.

2010 Edition (third edition)

In the 2010 edition the most important changes to note are:

1. A reduction in treatment duration to 12 months MDT for MB patients with a BI <4.
2. Usage (for NT treatment purposes) of the WHO classification for leprosy.
3. Continuation of previous treatment strategies for single lesion PB patients based on current evidence and despite WHO recommendations to the contrary.
4. Introduction of photos to assist clinicians in the diagnosis of leprosy cases.
5. Updating of statistics and graphs to reflect the up-to-date NT leprosy situation.
6. Introduction of a list of differential diagnoses in cases of suspected leprosy.
7. Revision and restructure of the guidelines to ensure clarity both in terms of clinical presentation, investigation and current treatment.
8. Adjustment of the recommendations for children with doses only provided for 10-14 year olds and that for children <10 years old, expert advice be obtained for proportionally reduced doses.
9. Introduction of special-case considerations to aid in the management of leprosy including in the case of co-existent HIV and TB infection, pregnancy, difficulties with certain medications and defaulters.
10. Recommendations on the usage of thalidomide in the management of the Type 2, erythema nodosum leprosum (ENL) response.

11. Clarification of optimal current prevention strategies as part of the push to eradicate leprosy from the NT.
12. A change in duration of recommended follow-up after completion of leprosy treatment (Table 1).

Table 1. Treatment with World Health Organization (WHO)-MDT*

Classification	**PB (after 6 months of MDT)**		**MB (after 12 or 24 months of MDT)**		
Risk factors	NFI at diagnosis		BI		NFI at diagnosis
	No	Yes	0 to 3+	4+ to 6+	Yes
CDC follow-up after completion of treatment	Annually for 2 years after MDT completed	3 monthly until 2 years after MDT completed	Annually for 2 years after MDT completed	3 monthly for 2 years then annually until 5 years after MDT completed	3 monthly for 2 years then annually until 5 years after MDT
Type of follow-up	Clinical[#]	Clinical[#]	Clinical[#]·	Clinical[#]· Smear[†] Eyes[§]	Clinical[#] Smear[†] Eyes[§]

* Multiple drug regimen where rifampicin and dapsone in combination (and clofazimine in MB leprosy) was given for at least a 6 month (PB) or 12 or 24 month (MB) period, regardless of whether rifampicin was given monthly or daily.
# Clinical means skin, nerve, and nerve function impairment (VMT-ST) assessments, including visual acuity.
† Take follow-up smears from 2 sites with the highest bacillary index at the time of diagnosis.
§ Eyes means annual slit-lamp examination by an ophthalmologist to detect silent iritis.

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Editorial comment

Vicki Krause, CDC, Darwin

Almost every year a case of leprosy is notified in the Northern Territory. The "telling" fact however is that on average it takes over 2 years for a case of leprosy to be diagnosed. In the setting of a disease with low prevalence one of the most difficult tasks is keeping the 'thought of leprosy' in the minds of diagnosing clinicians and also in the minds of those in the population who are at risk.

So, how to meet this challenge? We need to keep leprosy in the differential diagnosis of patients presenting with skin and nerve pathology. Keeping the topic alive in local health literature is one way to do it and alerting clinicians to these up-to-date *Guidelines* provides clinicians with information and clear management instructions. Visual reminders may also help. Figure 1 and Figure 2 below are examples of the skin and nerve pathology seen in leprosy.

Figure 1. Leprosy – skin lesions showing central re-pigmentation

Figure 2. Nerve involvement causing claw hands

2011 Seasonal Influenza Vaccine Program

Stocks of 2011 seasonal influenza vaccine are now available from regional pharmacies and providers should place orders and commence vaccinating patients and staff now.

The 2011 seasonal influenza vaccine offers protection against the 3 strains of flu virus predicted to be most commonly circulating in 2011, including the pandemic strain of 2009. The 3 strains include:

- A/California/7/2009 (H1N1)-like virus (this was in the pandemic (H1N1) 2009 vaccine)
- A/Perth/16/2009 (H3N2)-like virus
- B/Brisbane /60/2008-like virus

While the 2011 seasonal influenza vaccine contains the same 3 viruses as the 2010 vaccine, the yearly flu vaccine is effective for only 12 months (range 9 to 18 months) and therefore each year a new vaccine is required. It is recommended that everyone be vaccinated with the 2011 vaccine as early in the season as possible.

Pandemic influenza vaccine (Panvax®) is no longer manufactured and no further doses will be distributed. Any stock of Panvax® should be discarded in a sharps container.

Eligibility for free vaccine

Providers are urged to vaccinate those most at risk of complications of severe influenza.

- All non–Indigenous people 65 years and older
- All Indigenous people 15 years and older
- All pregnant women – (any trimester)
- All infants/people 6 months to 64 years with medical conditions predisposing them to severe influenza, namely*:
  - cardiac disease
  - chronic respiratory conditions
  - chronic illnesses requiring medical follow-up or hospitalisation in the preceding year
  - chronic neurological conditions
  - people with impaired immunity, and
  - children aged 6 months to 10 years who receive long term aspirin therapy.

Which vaccine to use?

There are some changes to the brands of vaccines used throughout the Northern Territory (NT) in 2011 compared to previous years.

In 2010 Fluvax® was withdrawn for use in children < 5years of age due to an increase in reports of febrile convulsions. This decision continues into 2011 with the additional preference of also not using Fluvax® in children <10 years of age if an alternative vaccine is available. The NT has elected to use an alternative vaccine for this age group.

Providers are encouraged to use the brand of vaccine described in Table 1.

Patients who request, but are not eligible for government funded seasonal influenza vaccine should be offered the appropriate dose via a prescription and private purchase.

Refer to the Australian Immunisation Handbook (page 187 or http://immunise.health.gov.au) for alternative vaccines.

Recording 2011 seasonal influenza vaccine

All vaccines administered should be recorded in line with defined clinic protocols. Electronic copies of all encounters should be forwarded to the Centre for Disease Control on fax 89228897 for entry onto the NT Immunisation Register.

Clinics that do not forward electronic records of vaccines should complete an Adult Vaccine Recording Form available at http://www.health.nt.gov.au/library/scripts/objectifyMedia.aspx?file=pdf/50/54.pdf&siteID=1&str_title=Adult%20vaccination%20recording%20form.pdf or by phoning your regional CDC for a copy.

The NT Immunisation Register will record all influenza vaccines given from January 2011.

The Australian Childhood Immunisation Register will record any vaccines given to children under the age of 7 years.

Table 1. 2011 Flu Vaccine Guidelines

Which Risk Group?	Which Vaccine?
• All non–Indigenous people 65 years and older; • All Indigenous people 15 years and older; • All pregnant women – (any trimester) • All infants/people 10 years and over with medical conditions predisposing them to severe influenza (per categories listed on page 10*)	**Fluvax® government funded 0.5 ml IMI**
• All children 36 months to ≤ 9 years with medical conditions that predispose them to severe influenza (per categories listed above)	**Vaxigrip® 0.5 ml IMI** * (1 or 2 doses may be required)
• All children 6 months to 35 months with medical conditions that predispose them to severe influenza (per categories listed on page 10*)	**Vaxigrip Junior® 0.25ml IMI** * (1 or 2 doses may be required)

*2 doses of vaccine given at least 1 month apart is recommended for children ≤ 9 years of age who are receiving influenza vaccine for the first time.
*If a child 6 mths to ≤ 9 years of age receiving influenza vaccine for the first time inadvertently does not receive the second dose in the same year, he/she should have 2 doses given in the following year.
*Children requiring 2 doses of influenza vaccine should have them administered no closer than 28 days apart.
* Where 2 doses of 2011 seasonal influenza vaccine are required the same brand of vaccine should be administered where possible.

Promoting 2011 Seasonal Influenza Vaccine

The NT Department of Health (DoH) has produced a series of 4 colourful posters for use in clinics. They target disease awareness and vaccine promotion for Indigenous people, pregnant women, the elderly and the general population. Please contact your regional CDC for copies. Community service announcements and television advertisements promoting influenza vaccine will be aired throughout the NT during March and April 2011.

The DoH website has up-to-date information about influenza vaccine and where the vaccination is available . View it at http://www.health.nt.gov.au/Flu/vaccination

The Australian Government Department of Health and Ageing has designed a poster, a provider fact sheet and patient brochures in multiple languages which will be distributed to clinics in the coming weeks. If you require further copies please follow the contact details on the brochure and fact sheets.

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Centre for Disease Control contact details

Darwin	8922 8044
Katherine	8973 9049
Alice Springs	8951 7540
Tennant Creek	8962 4259
Nhulunbuy	8987 0357

An investigation into the amount of chlamydia testing performed by various health care providers in the Northern Territory

Jiunn-Yih Su and Nathan Ryder, CDC, Darwin

Abstract

Objectives

To investigate the amount of and the trend in chlamydia testing by various health care providers in the Northern Territory (NT) in recent years.

Methods

Comprehensive chlamydia testing data for the NT were collected from the Medicare website, Royal Darwin Hospital, and a private pathology laboratory performing all chlamydia tests for the Defence Force clinics. We calculated the number of tests by sex, location and type of services providers, and financial year, including 2007/8, 2008/9 and 2009/10. Due to small numbers from the Defence Force these tests were not included in the analysis.

Results

There was an overall mild increasing trend in chlamydia testing during the study period. General practitioners (GPs) and health clinics in remote areas performed 44% of the tests while their urban counterparts were responsible for 24% of the tests. Specialist public sexual health clinics and public hospital contributed to 11% and 12% of the tests respectively. An increasing trend in chlamydia testing was noted in urban GPs and health clinics, specialist and public sexual health clinics . Over 65% of the tests ordered by both remote and urban based GPs and health clinics were performed in females.

Conclusions

There is a need for increased testing of men by GPs and health clinics across the NT. As urban-based clinicians contributed to only 37% of all chlamydia tests but service 2/3 of the population, there is also a need to promote targeted chlamydia testing among them.

Key words: Chlamydia; testing data

Introduction

Chlamydia has been the most commonly notified disease in the Northern Territory (NT) in the last 10 years. The NT has consistently recorded the highest notification rate of chlamydia among all States and Territories in Australia in the last 5 years.[1] The notification rate is higher among females, Aboriginal people, and in some geographical areas.[2]

Previous studies on point prevalence estimates suggest that there were true differences in the prevalence of chlamydia in these groups. However, as testing rates have been shown to strongly correlate with notification rates, it remains uncertain the extent to which differing testing rates contribute to the notification rate.[3,4] Therefore, in order to improve our understanding of the epidemiology of chlamydia in the NT, it is essential to collect comprehensive testing data and examine the trends in testing.

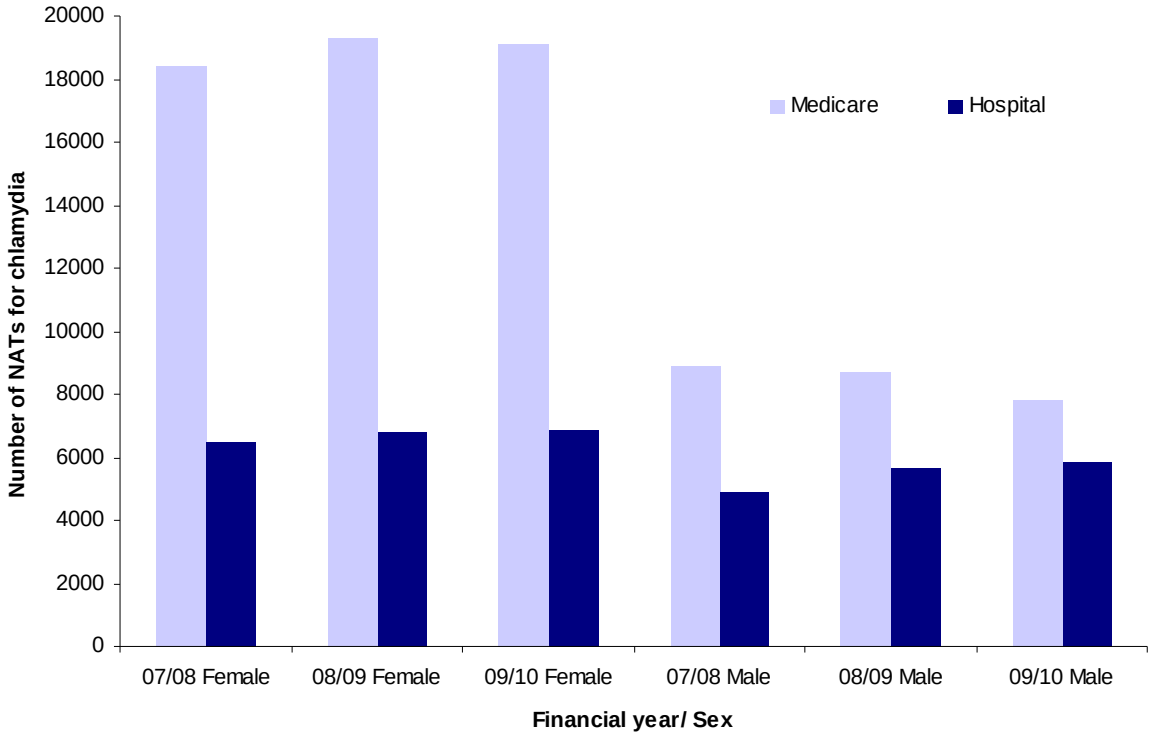
The National Sexually Transmitted Infections (STI) strategy, along with the NT Indigenous Sexual Health Strategic Plan, recommend that the majority of chlamydia testing be performed by primary care providers, and that public specialist sexual health clinics, such as the Clinics 34s, target populations with either higher prevalence of infection or reduced access to testing. Analysing testing and notification rates in urban areas provide a means to assess the extent to which this applies in the NT currently.

This study aimed to investigate the amount and trend of chlamydia testing in the NT, and analyse the relative contribution by health care providers in a variety of settings in both men and women.

Methods

A retrospective study was conducted to examine the testing data for chlamydia for the NT. The study period was from 1 July 2007 to 30 June 2010.

Figure 1: The number of NATs for chlamydia by data source, sex and financial year, NT, 2007/8 to 2009/10



In the NT, the vast majority of the nucleic acid tests (NATs) for chlamydia (the standard diagnostic test for chlamydia) are funded through 3 fiscal systems. Tests requested at general practices, the private hospital and both Government and Aboriginal-controlled health clinics (remote and urban) are processed in private pathology laboratories and paid through the Medicare program administered by the Health Insurance Commission, Australia. Tests requested in prison clinics, specialist public sexual health clinics (Clinic 34s) and public hospitals are performed in the pathology laboratories of Royal Darwin Hospital (RDH) using funds from the NT health budget. Finally, tests performed in the Defence Force clinics are performed in 1 private pathology laboratory and paid for by the Defence Force. As the tests performed for the Defence Force only represented a small proportion of the total amount of chlamydia testing in the NT, they were not included in the analysis of this study.

Territory-wide data for the NATs for chlamydia were retrieved from the Medicare website using item numbers #69316, #69317 and #69319 (referred to as Medicare data henceforth). This 3-year study period was chosen because these item numbers for the NATs for chlamydia only came into effect from 1 May 2007 and there were no dedicated item numbers for the test in 2006. Chlamydia testing data paid through the NT health budget were retrieved from the Department of Pathology of RDH (referred to as "hospital data" henceforth). Data was also extracted from the NT Notifiable Disease System to determine the total number of chlamydia notifications in urban residents, and the number of these diagnosed by the Clinic 34s.

For the purpose of this study, only Darwin and Alice Springs urban areas were categorised as urban areas while the rest of the NT were categorised as remote areas. The authors examined the number of tests with breakdowns by sex, location and type of services providers, and financial year, including 2007/8, 2008/9 and 2009/10.

Ethics approval to conduct this study was obtained from the relevant local human research ethics committees.

Figure 2: The proportion of NATs for chlamydia performed by health care providers, NT, 2007/8 to 2009/10

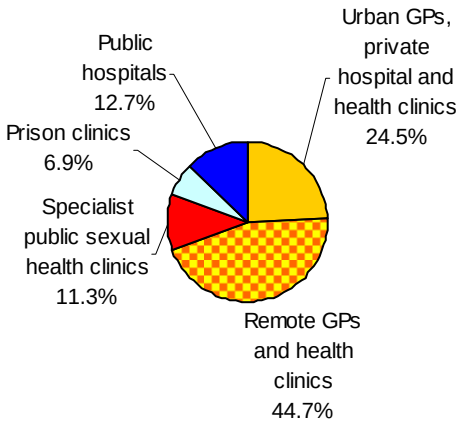


Figure 3: The number of NATs for chlamydia by service provider and financial year, NT, 2007/8 to 2009/10

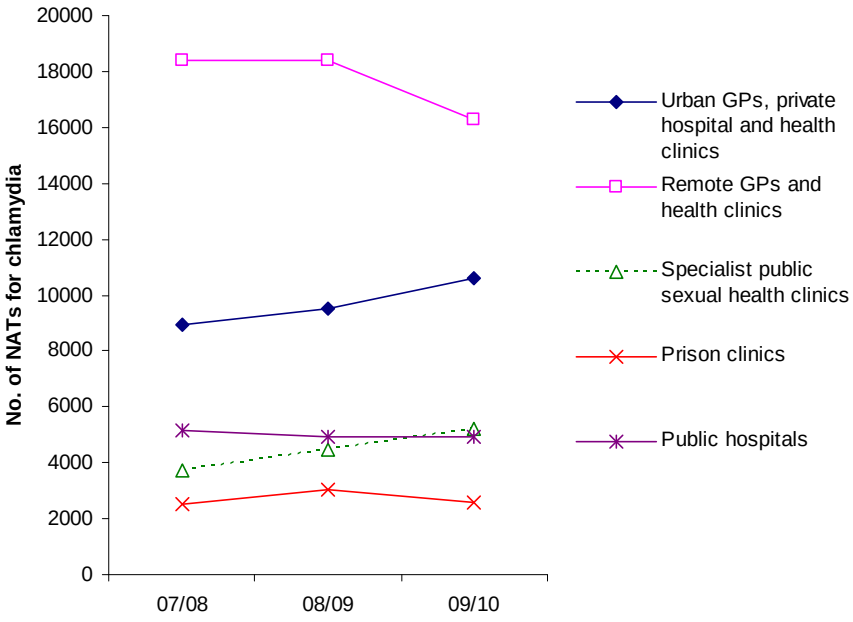
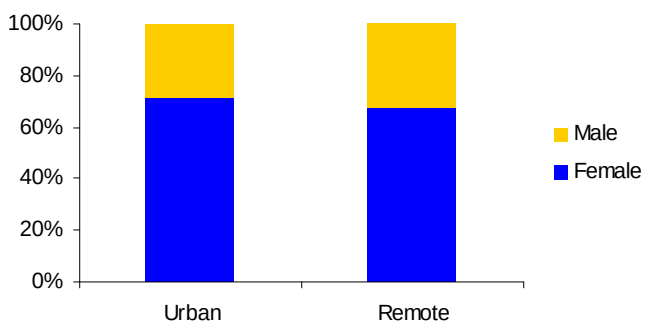


Figure 4: The proportion of NATs for chlamydia performed by sex and urban/remote split, NT, 2007/8 to 2009/10



Results

Over the 3 year period, there was a mild overall increasing trend in the number of tests performed in both data systems in both sexes except in the Medicare system for men in which a mild decreasing trend was noted (Figure 1). During the study period, 44.7% of all tests were performed by remote general practitioners (GPs) and health clinics, followed by urban GPs and health clinics (Figure 2). Specialist public sexual health clinics only accounted for just over 10% of the tests. Notably, public hospitals performed 12.7% of all tests.

The number of tests performed by remote GPs and health clinics remained at the same level from 2007/8 to 2008/9, but declined considerably in 2009/10 (Figure 3). There was an increasing trend in the number of tests performed by urban GPs and health clinics and specialist public sexual health, while the number remained at about the same level for public hospitals and prison clinics. Over 65% of the chlamydia tests were performed in females in both remote and urban based GPs and health clinics (Figure 4).

Clinics 34's performed 20.4% (13397/65683) of the tests in urban areas, and diagnosed 40% (1351/3347) of the chlamydia notifications in urban areas during the study period.

Discussion

To the best of our knowledge, this is the first study in the NT to investigate the amount of chlamydia testing performed by various health care providers.

Significantly more tests were performed in females than in males in the Medicare data, which may explain the higher notification rates in females. This finding applied in both urban and remote areas. By contrast there was limited difference between sexes in hospital data. This may be because close to half of the tests in this dataset were performed in specialist public sexual health clinics, where all men attending are routinely tested. It remains unclear whether men are tested less frequently in the Medicare data because clinicians are less likely to offer them tests, or whether it reflects a lower health care attendance rate. Regardless of the reason, measures should be taken to increase testing of men by GPs and health clinics across the NT to achieve effective control of chlamydia.

Though servicing only one third of the population, remote GPs and health clinics performed almost half of the testing. This is expected as the prevalence of infection in remote areas is high and targeted opportunistic screening is recommended by the relevant clinical guidelines.[5,6] However, further data on age specific testing rates, the proportion of individuals tested annually and the reason for testing are needed to fully understand current testing patterns. The decline in 2009/10 may be the result of the cancellation of the annual STI screen in Central Australia. Such information is essential in interpreting surveillance data as if there is a decrease in notification rate in this region in this period, the most likely reason should be decreased testing, rather than decreased prevalence.

Despite the increasing trend observed during the study period, the number of tests performed by urban GPs and health clinics as well as specialist public sexual health clinics only represent 35.8% of the total number of tests but they service about 2/3 of NT population. Further, a large proportion of these tests were performed at the Clinics 34s. This would have resulted in an even lower average number of chlamydia tests per urban-based GP. More information is required to analyse age specific testing rates but it appears that promoting chlamydia testing in targeted age groups, particularly among men, by urban-based clinicians and health care providers is required.

There are several limitations to this study. Firstly, it is not possible to exclude tests performed on people who were not NT residents. As there is considerable numbers of tourists from interstate and overseas visiting NT clinics each year (especially the specialist public sexual health clinics), there should be a small degree of overestimation in the number of tests performed for NT residents in this study. Secondly, the comprehensive testing data were only available for the last 3 financial years and this makes it impossible to conduct a robust trend analysis.

Thirdly, the limited variables available in the Medicare dataset preclude the analysis on location or ethnicity, both of which are important for epidemiological analysis.

Despite the limitations, the authors believe that the data used in this study was adequately comprehensive for investigating the amount and recent trend of testing with breakdown by health care providers. This study has also illustrated the utility of testing data in assisting in the interpretation of surveillance data and monitoring the epidemiology of common STIs. Their utility will be further illustrated in a separate study the authors are currently conducting using the same testing data to analyse the trends in notification, testing and positivity of chlamydia. As the majority of the data used in the study are readily available, this analysis should be repeated regularly to monitor the testing amount and trends.

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Leptospirosis: an occupational hazard for crocodile egg collectors

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Leptospirosis is a zoonosis of global distribution. There are over 250 pathogenic serotypes of *Leptospira* bacteria[1], a spirochete organism occurring worldwide but more prevalent in tropical and subtropical regions. The natural reservoir is in the urogential tract of wild and domestic animals. Animal hosts include rodents, dogs, deer, foxes, raccoons, possums, bats[2], cattle[3] and reptiles including alligators[4], caiman[5] and possibly crocodiles.[6] Infected animals can be asymptomatic and shed *Leptospira* in infected urine and body tissues. *Leptospira* can remain viable for weeks or months in contaminated soil or water, particularly in tropical latitudes.[1]

We report on a recent case of leptospirosis occurring in a 21 year old male working as a crocodile egg collector. The patient had been collecting crocodile eggs on 21/12/10. This involved wading through water and extracting eggs by hand from crocodile nests. He did not wear gloves and sustained minor cuts and abrasions to his hands and forearms in the course of this activity. On 2/1/11 the patient became unwell with fevers, rigors, joint pains, nausea, headache, conjunctival suffusion and a blanching rash on his back.

Initial investigations included serology for arboviruses, rickettsia, a full blood examination, liver function, electrolytes, C-reactive protein (CRP) and a urinary nucleic acid detection test for *Leptospira*. Apart from the CRP (41.3 mg/L), the initial investigations were normal. The patient was treated empirically with doxycycline 100mg 12-hourly for 7 days and his *Leptospira* serology was repeated 2 weeks later. His symptoms resolved and his repeat serology was positive for *L. Australis* (Titre 1:800).

Discussion

Several elements of this case demonstrate the sentinel features of leptospirosis.[1, 2] First, transmission is by skin contact (especially if abraded), inhalation or mucosal surface contact with soil, water or foliage contaminated with the urine of infected animals. Second, the average incubation period is 10 days with a range of 2 to 30 days (in this case it was 12 days). Third, the initial clinical presentation was consistent with the symptoms of leptospirosis[2], particularly conjunctival suffusion which is pathognomonic but observed in only 30% of patients.[1] If unrecognised, leptospirosis has a reported case fatality rate of between <5% to 30%.[1] Fourth, this case demonstrated the importance of repeating the serology to confirm the clinical diagnosis.

Crocodile handlers are an occupational group with generally a high awareness of leptospirosis.[6] Nevertheless, enquiry regarding occupational or recreational exposure is important to make the diagnosis. Other groups at risk include (i) those working in the cultivation of rice, bananas, and sugarcane, (ii) persons working with cattle or recreational or subsistence hunters (e.g. duck, pig and turtle hunting) and (iii) recreational activities involving exposure to contaminated waters such as diving, swimming and fishing. Of significance for this 2011 wet season (La Niña event), large outbreaks are reported to occur during major flooding.[1, 7]

In terms of prevention, raising awareness and informing 'at risk' groups of preventive measures is important (Table 1), as is consideration of the disease by clinicians when seeing those at risk.

Table 1: Prevention of leptospirosis infection[1]

Avoidance of contaminated waters and soils (includes drinking infected waters)
Wearing protective clothing such as boots, gloves and aprons
Covering abraded wounds with waterproof dressings
Control of rodents in human habitation or in occupational settings
Management of sugarcane fields through controlled pre-harvest burning
Immunization of farmed or domestic animals with the locally prevalent serovar
Chemoprophylaxis with doxycycline 200mg weekly is effective for high exposure activities[8]

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Media Release — TB rates low but vigilance still needed

24 March 2011 – World Tuberculosis Day

"On the move against Tuberculosis – transforming the fight towards elimination"

World Tuberculosis (TB) Day (Thursday 24 March) aims to raise awareness about the burden of TB and what can be done to prevent and control the disease. This marks the day in 1882 when Dr Robert Koch detected the cause of TB, the micro-organism, *Mycobacterium tuberculosis.*

"Detecting the TB organism is one of the first steps in diagnosing this disease and enables appropriate and curative treatment to begin," said Centre for Disease Control Director and Head of TB Services, Dr Vicki Krause.

"Tuberculosis is a major global health problem. Each year worldwide, there are 9 million new TB cases and 2 million deaths from the disease.

"It is important to remember that TB can develop many years after someone has been in contact with an active case of TB. Also, the emergence of new drug resistant strains of TB is a serious health challenge.

"With so much TB in so many parts of the world, Australia remains at risk of cases occurring, with about 1200 cases being reported each year," Dr Krause said.

"TB will continue to occur in Australia until there is better worldwide control. It is not surprising that TB rates here are highest in the overseas-born population, although higher rates are also seen in the Aboriginal population, especially in settings with high rates of chronic diseases and overcrowding.

"We have one of the lowest rates of TB and excellent TB control programs, but vigilance in screening and the ability to treat and follow up cases is absolutely vital."

Dr Krause said the Northern Territory public health systems commitment to TB control includes effective refugee screening, contact tracing, preventive treatment for potential TB cases, observed treatment for active cases and high standard laboratory work on disease identification and drug testing.

"Over the past 3 years 99 cases of TB have been notified in the NT. Of these, 52 % were in people born overseas and 39 % were Aboriginal people."

All people in the NT identified as having TB are given information about the disease, as well as confidential free clinical services and treatment. Contacts are followed up to allow for early diagnosis and are offered preventive treatment to minimise the risk of further transmission.

"TB is both a curable and preventable disease when it is detected and effectively treated."

"This year's global campaign looks at the fight against TB, saying that, "Every step we take should be a step towards TB elimination."

What is driving salt-marsh mosquito peaks in Darwin: tides or rainfall?

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(Mosquito Control Association of Australia) January 2011

Abstract

The northern salt-marsh mosquito Aedes vigilax (Skuse) is an established vector for Ross River and Barmah Forest viruses and an aggressive biter and an appreciable pest species in the Northern Territory (NT). Many of Darwin's northern suburbs are adjacent to the coastal wetland of Leanyer swamp, which has an extensive breeding habitat for Ae. vigilax. Medical Entomology (ME) of the NT Department of Health conducts adult mosquito surveillance and larval mosquito control for Ae. vigilax in this wetland. One trap located near the residential suburb of Karama consistently reports some of the highest numbers of Ae. vigilax of the 7 local swamp trap locations. ME wish to clarify why it should indicate the highest numbers and what environmental variable triggers these peaks. The trap site is close to the residential area, and the results are used to trigger public warnings of mosquito pest or potential disease risks. This paper seeks to identify the most important environmental variables associated with peaks of ≥ 500 Ae. vigilax/trap/night, to better indicate the reasons for the peaks and the section of the swamp that is the source of these peaks, to reduce public pest problems and disease risks.

The results of the analysis using models indicated that calendar months September - November had significantly more peaks than January and in addition to rain in these months were more associated with high monthly tides coinciding with rain. The Karama trap site is relatively close to the flood plains and wet lands associated with the Holmes Jungle section of the wetland, and the large tidal influenced swamps to the east outside the 5 km control zone.

This suggests larval control should be implemented with increased emphasis in rain flooded tidal influenced areas of the Holmes jungle section of Leanyer swamp after high tides with rain events coinciding s during the build-up months between September and November. This study supports applying statistical methods to existing control programs can enable insights into solutions without the need for additional field experiments and may have applications for other mosquito control programs in other areas.

Keywords: salt-marsh mosquito; traps; peaks

Background

The tropical region of northern Australia has a characteristic monsoonal climate with a 'wet season' from December to April and little or no rainfall during the 'dry season' months. Darwin, the capital of the Northern Territory (NT) receives an average annual rainfall of 1708 mm, with most of this falling in the wet season.[1] The build-up season in Darwin occurs late in the dry season from September to November and features high humidity and occasional and random thunder storms.

Many of Darwin's northern suburbs are adjacent to the extensive coastal reed and upper mangrove wetland of Leanyer swamp that has been recognized as an important larval habitat for *Aedes vigilax* (Skuse), the northern salt-marsh mosquito.[2, 3] There are a number of elements of the swamp including areas of constructed drains within the swamp, a former bomb target area with craters, a saline soil wet season flooded grassland, upper tidal mangrove areas and fresh, brackish and tidal influenced reed areas. The eggs of *Ae. vigilax* are laid in non-draining areas on salt affected damp soil or vegetation of relatively low height and density which allows the female mosquitoes access to the soil or plant base for oviposition.[4,5,6] Hatching occurs when the eggs are inundated by either tides or rain.[6]

Medical Entomology (ME) of the NT Department of Health conducts carbon dioxide baited adult mosquito trap surveillance and integrated mosquito control measures for *Ae. vigilax* breeding in the wetlands. This mosquito is an established vector for Ross River and Barmah Forest viruses [7,8] and is also an aggressive biter and an appreciable pest species.[9.10,11,12] Aerial control in the Leanyer

swamp area primarily involves large-volume water based *Bacillus thuringiensis var. israelensis* (B.t.i.) mist applications applied from the air by helicopter.[13] Peaks in *Ae. vigilax* numbers have been historically associated with public complaints from residential areas in Darwin, (Figures 1).[13] The majority of telephoned complaints are made from residents within 500 m of the Leanyer Swamp edge, (Figure 2). Appreciable mosquito peaks can occur each year, particularly from 1 trap location on the edge the residential suburb of Karama that consistently indicates some of the highest numbers of *Ae. vigilax* in the 7 swamp trap locations. The reasons for these peaks and at this location have always perplexed staff at the ME unit. The trap is not the closest to the swamp boundary or to the most extensive breeding sites, and insight is required as to why and when it indicates the highest numbers, and what environmental variable triggers these peaks. This trap site is important as it is closest to the residential area and the results are used to trigger public warnings of mosquito pest or potential disease risks.

Larval control is carried out routinely after high tide or rain events and there has been no discernable pattern of preceding tides or rains to elucidate the primary cause of the *Ae. vigilax* peaks. Clarification of the cause of the peaks would allow prioritisation for timing and location for aerial larval control. We therefore sought to identify what might be the most important environmental variables associated with peaks of ≥ 500 *Ae. vigilax*/trap/night that might aid predictions. Improved prediction of peaks of aggressive biting mosquitoes in residential areas could assist early control intervention, timely media warnings and thereby possibly reduce public pest or potential disease risks. Early prediction of peaks could assist planning of future mosquito surveys, control efforts and hence maximise the efficiency of the unit.

Methods

Data

All female *Ae. vigilax* mosquitoes collected from overnight encephalitis virus surveillance (EVS) CO_2 baited-light traps[14] trapped weekly at 1 location (Karama trap) between July 1998 to June 2009 were included (Table 2). Mosquito identifications were preformed by ME in Darwin, with subsamples of 300 mosquitoes identified to species level, after which the total was estimated by weight.[15] Weekly counts of *Ae. vigilax* were analysed for the study period (419 weeks). Daily rainfall was provided by the Australian Bureau of Meteorology (BOM)[16] for the study period, from rain gauges located at: Karama, Leanyer, CSIRO Berrimah, Thorak cemetery, Shoal Bay Defence Base, and Royal Darwin Hospital, defined as 'northern suburbs' for this study.[16] Daily tide data were provided by BOM for Port Darwin for the study period.[16] Aerial mosquito control operations conducted by ME were included in the analysis as dates and areas (ha) sprayed.

Statistics

We identified the maximum tide during the 9 - 13 day period prior to each EVS collection date. Similarly the highest rainfall event and the cumulative rainfall were calculated for each 9 - 13 day period prior to trap collection. Chi square tests were used to test for associations between a peak in *Ae. vigilax* mosquitoes ≥500 and calendar month or season. Wet season was defined as December-April, dry season as May-August and build-up season September-November. Larval control categories were determined by percentile, with 20 ha at the 75th centile, and 100 ha at the 90th centile.

Following this, logistic regression models were applied, to determine explanatory variables fitted to weekly peaks of female *Ae. vigilax* mosquitoes ≥500 per trap. This was modelled controlling for calendar month, year, meteorological variables and larval control efforts.

Results

Overnight trap peaks of ≥500 female *Ae. vigilax* mosquitoes only occurred in months January, August-December (Table 1 and 2). There was a statistical difference between when peaks ≥500 occurred by calendar month (χ^2= 69.8, p<0.0001).

There was no difference between maximum tide (9-13 days) preceding trap collection, and *Ae. vigilax* mosquito ≥500 events (T-test, p=0.405). When the data were combined into a model, the maximum tide during the preceding 9-13 days prior to adult mosquito trapping was positively associated with peaks (≥500) OR=1.1 however this was not statistically significant (p=0.72).

Figure 1. Phone call complaints in the 500 m urban edge around the Leanyer Swamp boundary, August 1993-September 2008 (GIS map created by S.P. Jacups 2009)

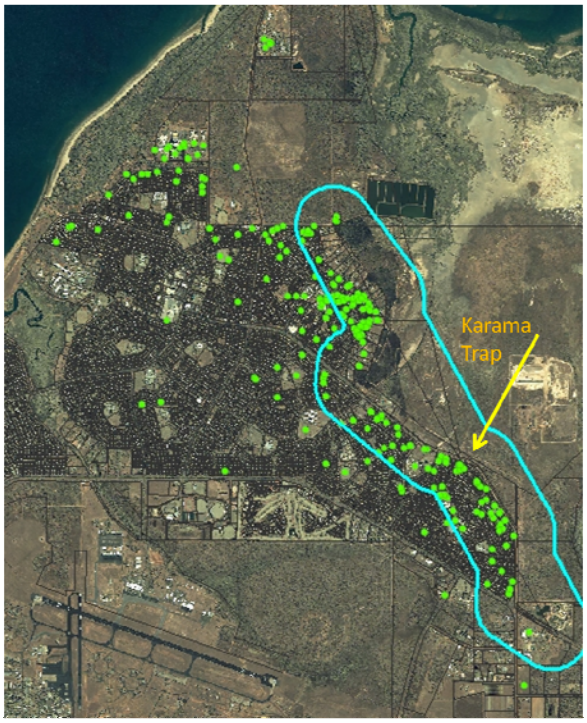


Figure 2. Mosquito trap sites, (including Karama trap) situated at the border of residential areas, northern suburbs of Darwin

Larval controls had a significant inverse effect on mosquito peaks. These effects were statistically significant and strongest when ≥100 ha were sprayed, OR 0.25, p=0.046. Calendar months September to November had significantly more peaks than January, with a trend for significance (p=0.09) in December. November had the highest association with mosquito peaks OR 45.4, p<0.0001. Year was not statistically associated with mosquito peaks but retained in the model to control for yearly variation.

Discussion

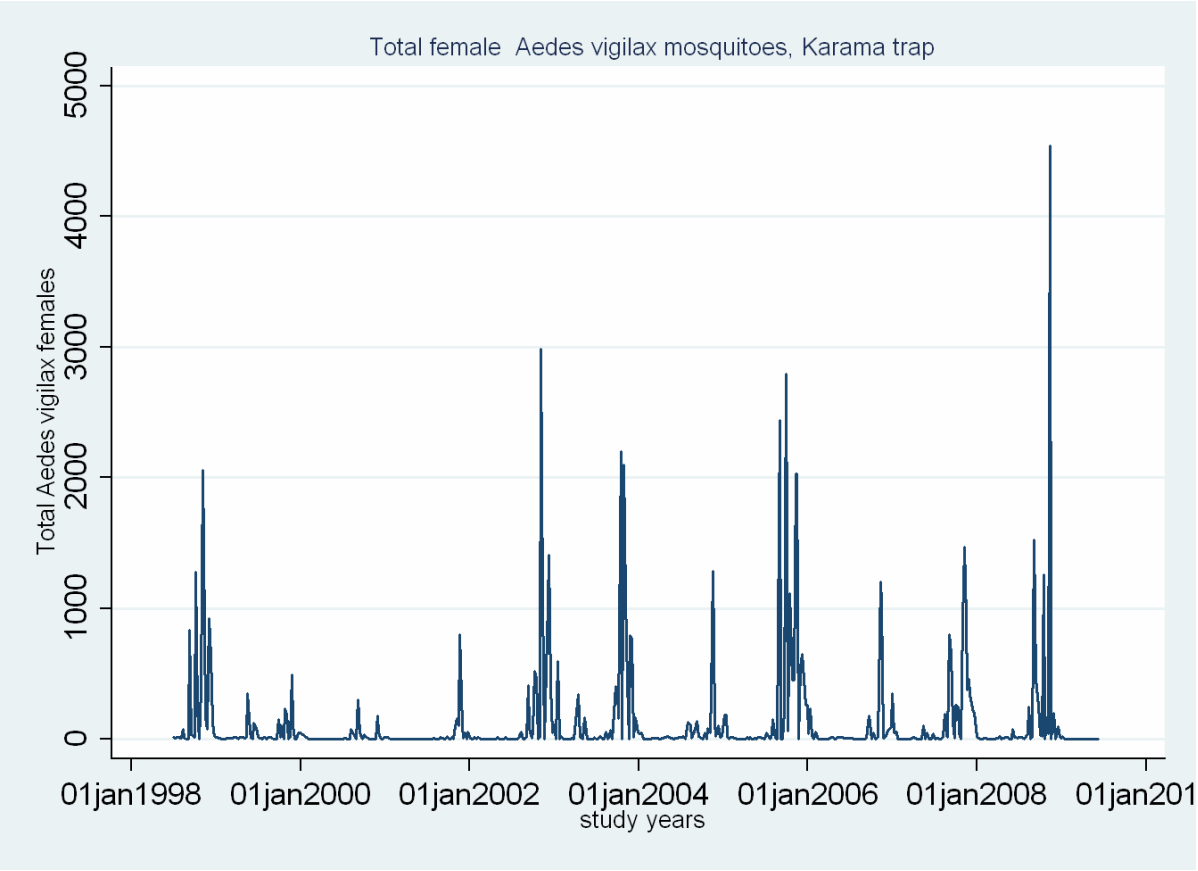
Findings from this study indicate that 'build-up season months', rather than intuitive 'wet season months' were more associated with peaks in *Ae. vigilax* in the Karama trap. Peaks mostly occurred in November with an increased risk OR of 45 associated with November versus January. Unseasonal rainfall during the build-up (September-November) rather than wet season months (December- April) was associated with peaks of *Ae. vigilax* over 500 in the Karama trap. These findings are supported by other published findings that *Ae. vigilax* larval densities are highest between October and December each year.[2,3,17]

Table 1: Peaks of *Ae. vigilax* in Karama trap, by calendar month

Month	<500	Ae vigilax peaks ≥500	Total
Jan	37	1	38
Feb	20	0	20
Mar	19	0	19
Apr	29	0	29
May	31	0	31
Jun	29	0	29
Jul	33	0	33
Aug	39	1	40
Sep	36	5	41
Oct	40	7	47
Nov	28	17	45
Dec	41	6	47
Total	**382**	**37**	**419**

Appreciable rain in Darwin usually commences in December with heavy rains in the months following. However, in some years, light to heavy rains commence earlier. Unlike tides, with clear demarcation lines, (Figure 4) rainfall is variable in intensity and less predictable, even

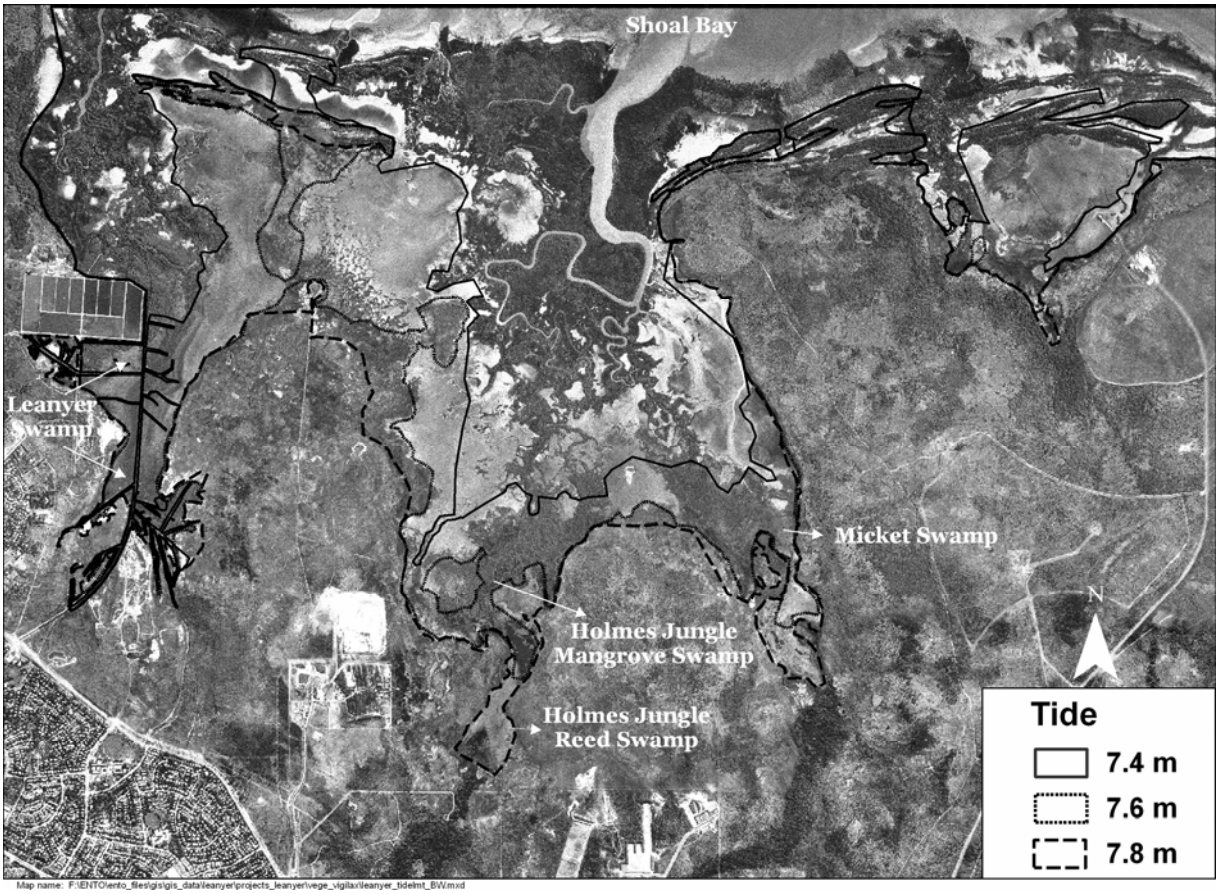
Table 2, Weekly *Aedes vigilax* counts from Karama EVS trap



between suburbs adjacent to each other. With higher build-up season rainfall, rain added pooling in both currently tidal flooded areas as well as in tidally influenced areas can create a greater area of potential mosquito breeding habitat. Furthermore, unlike tides, rainfall can occur unpredictably from location to location. This creates a moving target for ME larval control teams who conduct the bulk of their surveys and control efforts with the aid of helicopters over a broad landscape. Although aerial larvae control efforts are conducted following tide or rainfall events the results of this study suggest that control efforts presently in place are sometimes inadequate at reducing *Ae. vigilax* number peaks. This study suggests that these peaks are associated with tide and rain events coinciding, rather than rain or tide events alone. This could be due to all larval habitats not being adequately treated because of the difficulty in locating all pooling after tide plus rain events or that the Karama trap routinely captures an influx of adults from outside the 5 km control radius area from the northern suburb boundary. From the mid dry season, increasing spring tides progressively inundate potential *Ae. vigilax* breeding habitat, thus progressively increasing *Ae. vigilax* productivity, with rain in November to December further increasing *Ae. vigilax* breeding. After inundation or swamp areas by tides or rain, the water does not drain and mosquito breeding can occur in very high densities until the area is seasonally flooded. Thus, no more egg laying habitat is available and larval predation by fish is enabled.[2,18]

Findings from this study indicate that maximum tide height was not associated with mosquito peaks in the crude or adjusted analysis. In the adjusted analysis, although tide had an OR 1.1, this was not statistically significant after adjusting for larval control efforts, which are routinely applied after high tides. These results also indicate that aerial larval control in the 2 to 4 days after high tides using *B.t.i.* is adequate at reducing peaks, but not always adequate at controlling larvae 2 to 4 days after rainfall when coupled with high tides. This is understandable as rain events cause breeding over a much wider area than the prescribed areas following tide-only events. Additionally the rain prevents the timely (within 6 days) draining of tidal flooded areas and extending flooding into areas above the current tidal reach by direct rain addition to

Figure 4. Tidal boundaries for Leanyer, Holmes Jungle and Micket Swamps, Darwin



pools and the overflow of storm water run off. This expanded and less concentrated breeding is both harder to locate, especially at low concentrations, and harder to control over a much wider area in a limited time.

The Karama trap site is relatively close to the Holmes Jungle section of the swamp where these rain expanded areas of flooding can be very variable and more extensive (Figure 4), and thus is reasonably expected to better indicate the higher populations arising from rain and tide events together. In addition the Karama trap site is positioned in the lee of a hill among a relatively dense stand of eucalypts which would afford wind protection and increased harbourage for salt-marsh mosquitoes which would also lead to higher numbers in the trap.

To maximize the efficiency of adult salt-marsh mosquito control operations in Leanyer Swamp this study suggests aerial larval control should be implemented with increased coverage after rain or tide and rain events coinciding during the build-up months (September to November) on rain-flooded current tide and maximum tidal extremities, particularly in the Holmes Jungle section of the swamp. Whether this is the most cost effective measure needs further study.

This study reiterates the importance of applying statistical methods to service provider programs enabling insights into solutions without necessarily the need for additional field experiments. This method of evaluation may have applications for mosquito surveillance and control programs in other areas.

Acknowledgements

We would like to thank all Medical Entomology staff members who were involved in collecting the data for this paper over many years and Joseph McDonnell for statistical advice. Also the National Health and Medical Research Council (NHMRC) and Sydney Myer Foundation for PhD scholarship funding.

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Call Justine Glover 8922 7776
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NT Medical Entomologist Ipswich Flood Relief Trip 20-26 January 2011

Nina Kurucz and Allan Warchot
Medical Entomology, CDC, Darwin

On 18 January 2011 Queensland (Qld) Health requested 2 entomologists from the Northern Territory Department of Health (DoH) Medical Entomology (ME) section to provide support for vector control for the Brisbane flood relief operations between 20-26 January 2011. The area of operations for the ME staff was to be in the Ipswich area.

Thursday 20 January

The ME Advice and Vector Control Officer Allan Warchot and the Operations Manager Nina Kurucz attended a meeting in Darwin to organise the logistics of the trip with 2 DoH Environmental Health Officers (EHO), who were also part of the support operation requested by Qld Health. The 4 officers travelled to Brisbane on 20 January.

Friday 21 January

On Friday morning, the ME officers travelled to Ipswich, where they attended a meeting with the vector control organiser, Matthew Ryan, from the Ipswich City Council. There were 4 vector control officers from the Gold Coast City Council and 2 officers from the Redland Shire Council present.

The ME officers were informed that aerial surveys of Ipswich were carried out after the flood water receded, and that areas still containing flood water were tentatively identified, and needed to be surveyed for mosquito breeding. In addition, each of the 4 vector control groups were assigned to designated areas for vector surveillance and control. ME officers were assigned to the worst flood affected areas for assessment.

Vector survey and control operations 21 - 24 January 2011

Between 21- 24 January ME officers carried out mosquito survey and control operations in the following areas of Ipswich:

- Moores Pocket
- Tivoli
- Goodna
- Amberley
- Redbank
- Bundamba
- Moggill
- Yamanto
- Purga and
- Riverview.

During the survey and control operations, it was observed that the flood water had already largely receded, and that only small areas in local public parks and sport ovals required mosquito control. Mosquito species found were *Culex annulirostris* and *Culex quinquefasciatus* including 1st to 4th larval instars and pupae and control was carried out using methoprene pellets and briquettes. A constructed wetland with stagnant water in Goodna was one of the largest and most productive mosquito breeding sites located during the surveys.

On 22 January, ME officers inspected the sewage treatment plants in Tivoli, Bundamba and Goodna. No sewage overflow or mosquito breeding was found at the plants in Tivoli or Bundamba. In Tivoli, due to a sewage pump failure, sewage was overflowing into a creek line. Areas were treated for mosquito breeding in this area near the sports oval and the temporary dump. The Tivoli sewage overflow pond was found to be in a condition requiring attention, and was breeding low numbers of mosquitoes. The findings were reported to the Ipswich Council.

Figure 1. Tivoli. Grassy ponding at dog training facility off Tantivy Rd. High *Cx. annulirostris* and *Cx. quinquefasciatus* breeding. Site treated with methoprene 150 day briquettes.

On 23 and 24 January, the ME officers inspected areas that were identified as potential mosquito breeding areas during an aerial survey. During the ground survey, however, the only areas found to hold water were quarries, dams and cut off pools along the Brisbane River, which contained biological control agents, such as fish. No mosquito control was required in those areas.

ME officers were advised that the military would survey the floodplain areas around the Amberley base located to the west of Ipswich town. ME officers inspected areas close to the military base along the Cunningham Highway. The topography was sufficient to prevent major residual water pooling, which was the general observation in the Ipswich locality.

Tuesday 25 January

On Tuesday morning, ME Officers advised the Ipswich Council vector control coordinator, that mosquito breeding was minimal, and that all major areas were attended to. ME officers also met with the part-time local Ipswich vector control officer to discuss the setting of routine CO2 baited EVS surveillance traps, to determine the number of mosquitoes present following the flood, and to get baseline information on seasonal mosquito numbers in the Ipswich area. The need for mosquito traps to be set in response to mosquito complaints was also discussed, in addition to the findings from the mosquito survey and control operations carried out by ME between 21 and 24 January. As a result of the floods, the Ipswich Council received a new position for vector control, while previously there was no dedicated position.

ME and EH Officers travelled back to Brisbane on Tuesday afternoon, and were invited to a meeting with the Qld Health Officer, who requested the NT support to provide relevant feedback in regards to the operations carried out in Ipswich. ME provided the following feedback:

- Overall operations were well organised and adequate support was provided by Qld Health and the Ipswich Council.
- Mosquito survey and control operations should have been carried out earlier (2 to 4 days after the flood peak) to prevent adult mosquitoes from emerging.
- For aerial surveillance for potential mosquito breeding sites, a vector control officer should have been present to determine the likelihood of mosquito breeding in the flooded areas.
- More methoprene pellets were required to carry out the control.

For the NT ME officers, it was beneficial to provide vector control support to the Ipswich Council by meeting the Qld vector control counterparts and discussing local vector control operations. In addition, it was a valuable experience to carry out vector survey and control in a post flood situation.

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NT Mosquito borne disease alert for March to June 2011

Residents and visitors in the Northern Territory (NT) are being urged to protect themselves over the next 4 months against mosquitoes to prevent mosquito borne diseases including Murray Valley encephalitis virus (MVEV) Kunjin virus (KUNV), Ross River virus (RRV), and Barmah Forest virus (BFV) disease.

This warning is in response to recent seroconversions in NT sentinel chickens to KUNV in the Top End, and either or both MVEV and KUNV in Tennant Creek and the Katherine region in the combined NT Department of Health and Department of Resources Primary Industry laboratories program of sentinel chickens surveillance. Sentinel chickens in northwest WA are also showing activity of KUNV and possible MVEV, as well as sentinel chicken evidence showing widespread MVEV activity along the Murray River in Victoria and New South Wales (NSW) and in the Macquarie Marshes area in north central outback NSW. This warning is also prompted by historical data of sentinel chicken detections of MVEV in the NT starting in February in the Katherine, Barkly and the Alice regions. Recent rains in the NT, particularly in the Barkly, have caused an upsurge in flood water mosquito numbers which can be an indicator of impending mosquito borne disease transmission.

To avoid mosquito borne disease, residents are urged to use personal mosquito protection, and to avoid outdoor exposure around flooded areas or where mosquitoes are active, especially after sundown from now until the end of June.

More information about disease symptoms, mosquito breeding sites and personal protection measures is available on the NT Department of Health website at http://www.health.nt.gov.au/Medical_Entomology/index.aspx

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The NT Government Alcohol Reforms: what do they mean for Primary Health Care?

Steven Skov, CDC, Darwin

The Northern Territory (NT) Government is proposing substantial reforms to alcohol policy in the NT. Details are available at http://www.alcoholplannt.com.au/

GPs, doctors, nurses and Aboriginal health workers will be directly affected by the *Prevention of Alcohol-related Crime and Substance Misuse Act*. The NT Department of Health (DoH) is currently consulting with the entire primary health care sector concerning the proposed reforms and how they will affect it.

Banning Alcohol and Treatment notices and Alcohol Misuse Interventions

A Banning Alcohol and Treatment (BAT) notice will prohibit a person from purchasing, possessing or consuming alcohol. A person might receive a BAT notice for drink-driving or alcohol-related violence offences as well as repeated episodes of being taken into police protective custody for being drunk.

BATs may be for 3, 6 or 12 months. Enforcement will be via the requirement to show photo identification for all take-away alcohol purchases. ID will be checked against a register of banned drinkers and service refused if the person is banned.

A BAT may be reduced in duration if the person undergoes an 'alcohol misuse intervention' with a health care provider (HCP), including doctors, nurses, Aboriginal Health Workers, and specified others. Banned drinkers may present to a HCP seeking an alcohol misuse intervention.

While the concept of the alcohol misuse intervention is modelled on that of alcohol brief interventions, it is for the HCP to determine what type of assessment and intervention is appropriate. This may be brief or prolonged, involve repeat visits or also involve other health professionals. The HCP will judge whether and when it is appropriate to 'sign off' to reduce the length of the ban.

The Tribunal

HCPs may refer any person to the Tribunal if their substance misuse is detrimental to the safety, health or welfare of that person or of other people. Police officers and family members may also refer a person.

The Tribunal will consist of a legal practitioner, persons with expertise in the care of persons with substance misuse problems and persons representing community interests.

If the Tribunal feels the referral is appropriate, it can then arrange for the person to be assessed by a dedicated Tribunal clinician. Recommendations for treatment may be made. The Tribunal will not be able to impose compulsory treatment. Its powers will be limited to imposing a ban on the person purchasing and consuming alcohol and arranging for income management which can be lifted on completion of treatment.

The NT Alcohol and Other Drugs (AOD) Program of the NT DoH will be providing training, resources and support to assist health care providers in this role. The 'Drink Less' package provides a framework of methods and resources that GPs may find helpful for this process. Developed in New South Wales on a World Health Organisation model, it is being adapted for the NT. See http://www.sswahs.nsw.gov.au/sswahs/Drinkless/

The NT AOD program has a similar package "Grog: Making the change". It is based on the same principles but has been developed for the NT Aboriginal health sector.

For further information contact Dr Steven Skov (89228513) or Paul Turner (89228430).

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Alcohol Misuse Interventions in NT Primary Health Care: why and why now?

Steven Skov, CDC, Darwin

The Northern Territory's (NT) drinking problem is large and affects the whole society. Per capita consumption of alcohol is 40%-50% higher than the rest of Australia, 17% of Territorians drink at risky or high risk levels for long term harm compared to 10% nationally and the NT's alcohol attributable death rate is 3.5 times the national rate (2 times higher in non-Aboriginal people). In 2004/05 1 in 8 of all deaths in the NT was due to alcohol consumption.[1,2]

In response, the NT Government is introducing alcohol reforms of which one aspect is to encourage and facilitate access to treatment. For people with more serious dependency, alcohol treatment services will be expanded. However, the majority of people with a drinking problem are not at the point of serious dependence. They can be helped, and their progression to more serious problems perhaps prevented, by their primary health care provider. Under the Government reforms, people who are banned from buying and consuming alcohol, may seek an "alcohol misuse intervention" from a health care provider.

The important role of primary health care providers in helping their patients with a drinking problem is well established.[3] Alcohol brief interventions have a solid body of evidence[4] showing they can:

- Double the likelihood of a person reducing their drinking
- Reduce the amount of alcohol drunk (up to 4 standard drinks per week)
- Reduce morbidity, health care utilisation and emergency department visits.

A broad range of types of intervention delivered either by doctors, nurses or alcohol workers can be effective. A brief assessment over a few minutes of the nature of the patient's drinking can give a good guide to the type of help needed. Very brief, single session interventions can be appropriate for some patients while others may require an extended intervention of 3-5 sessions. Those with more serious dependence or at risk of alcohol withdrawal may need referral to a specialist treatment agency.[5,6]

Time constraints and the difficulty of introducing the sensitive issue of someone's drinking into a consultation have been barriers to primary care providers engaging in brief interventions.[5,6] However, under these reforms, patients will be specifically asking for help.

Several tools exist to assist primary care providers in this role. The World Health Organisation has a manual for primary care that has been widely used throughout the world. The 'Drink Less' program is a complete package specifically designed for the Australian general practice setting (see http://www.sswahs.nsw.gov.au/sswahs/Drinkless/). It includes information for GPs, screening questionnaires that reception staff can administer, visual aids and self help papers for patients. Similar tools have also been designed for Aboriginal people for example the IRIS screening tool (see http://www.health.qld.gov.au/atod/prevention/iris.asp) and 'Grog: making the change' a complete brief intervention package available from the NT Alcohol and Other Drugs Program.

Will the proposed reforms completely solve the NT's alcohol problem? No, but they can help by reducing access to alcohol and bringing more people into contact with treatment. Will a brief intervention work for everyone? No, but they will work for some and might prevent progression to a more serious problem.

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Have you had your 2011 seasonal influenza vaccine yet?

Seasonal influenza vaccine is recommended for everyone 6 months of age and older.

People who can receive the vaccine for FREE are:

- Anyone 65 years of age and over
- All Indigenous people 15 years of age and over
- All pregnant women (in any trimester)
- Anyone over 6 months of age with medical conditions that increase their risk of severe influenza*.
- People with medical conditions that increase their risk to severe influenza. Medical conditions include:
  - Cardiac disease
  - Chronic respiratory conditions
  - Chronic illnesses
  - Chronic neurological condition
  - People with impaired immunity and
- Children aged 6 months to 10 years having long term aspirin therapy.

The vaccine is provided FREE for Department of Health and Department of Children & Families employees. See http://internal.health.nt.gov.au/divisions/hp/branches/cdc/immunisation/Pages/default.aspx for vaccination clinic times and appointment requirements.

Northern Territory Government

DEPARTMENT OF HEALTH AND FAMILIES

Centre for Disease Control
September 2010

Murray Valley encephalitis (MVE)

What is MVE?

Murray Valley encephalitis (MVE) is an uncommon but potentially fatal disease that occurs after being bitten by a mosquito carrying the MVE virus. It is the most serious mosquito-borne disease that occurs in the Northern Territory (NT).

How is MVE spread?

The MVE virus is spread by the bite of an infected mosquito (usually *Culex annulirostris*, also known as the common-banded mosquito). Only about 1 person in 1000 who is bitten by an infected mosquito will become unwell with MVE.

Where does MVE usually occur?

Although MVE can occur throughout Australia, it is most common in northern Australia. The MVE virus is present from February to July in the Top End of the NT, north-west of Western Australia and inland North Queensland during most years, and can extend into the Barkly and Central Australia in wet years. Most cases are detected between March and May.

What are the symptoms?

Symptoms of MVE usually appear 5 to 28 days after being bitten by an infected mosquito. The early symptoms include headache, fever, nausea and vomiting, and muscle aches, which can progress to drowsiness, confusion, seizures or fits (especially in young children) and in severe cases delirium and coma.

Who is at risk?

People most at risk are babies, young children and newcomers to a region where MVE occurs.

How is it diagnosed?

A blood test is available to test for recent or past MVE infection.

What is the treatment?

There is no specific treatment or vaccine available for MVE. The treatment of severe MVE is supportive and often requires admission to an intensive care unit.

How can MVE be prevented?

The only protection from MVE is to avoid being bitten by mosquitoes. Everyone should take measures to avoid being bitten by mosquitoes, particularly those visiting and camping in or near swamp or river systems during the evening and night, and in rural areas near sites of relatively high mosquito activity.

Mosquito protection for young children and babies is absolutely essential.

Personal protective measures

- Stay indoors when mosquitoes are most active, from just before, until 2 hours after sunset.
- Wear loose, light-coloured clothing with long sleeves, long trousers and socks (mosquitoes can bite through tight-fitting clothes).
- Apply a protective repellent containing up to 20 percent diethyl toluamide (DEET) or picaridin to exposed areas of skin and reapply as directed by the manufacturer. Lotions and gels are more effective and long lasting than sprays.
- Ensure flyscreens in houses or caravans are in good condition.
- If camping out sleep in a mosquito-proof tent or under a mosquito net. Repellents only protect against mosquito bites for up to four hours, not all night.

www.nt.gov.au/health

healthy Territory

Murray Valley encephalitis (MVE)

For more information contact your nearest Centre for Disease Control.

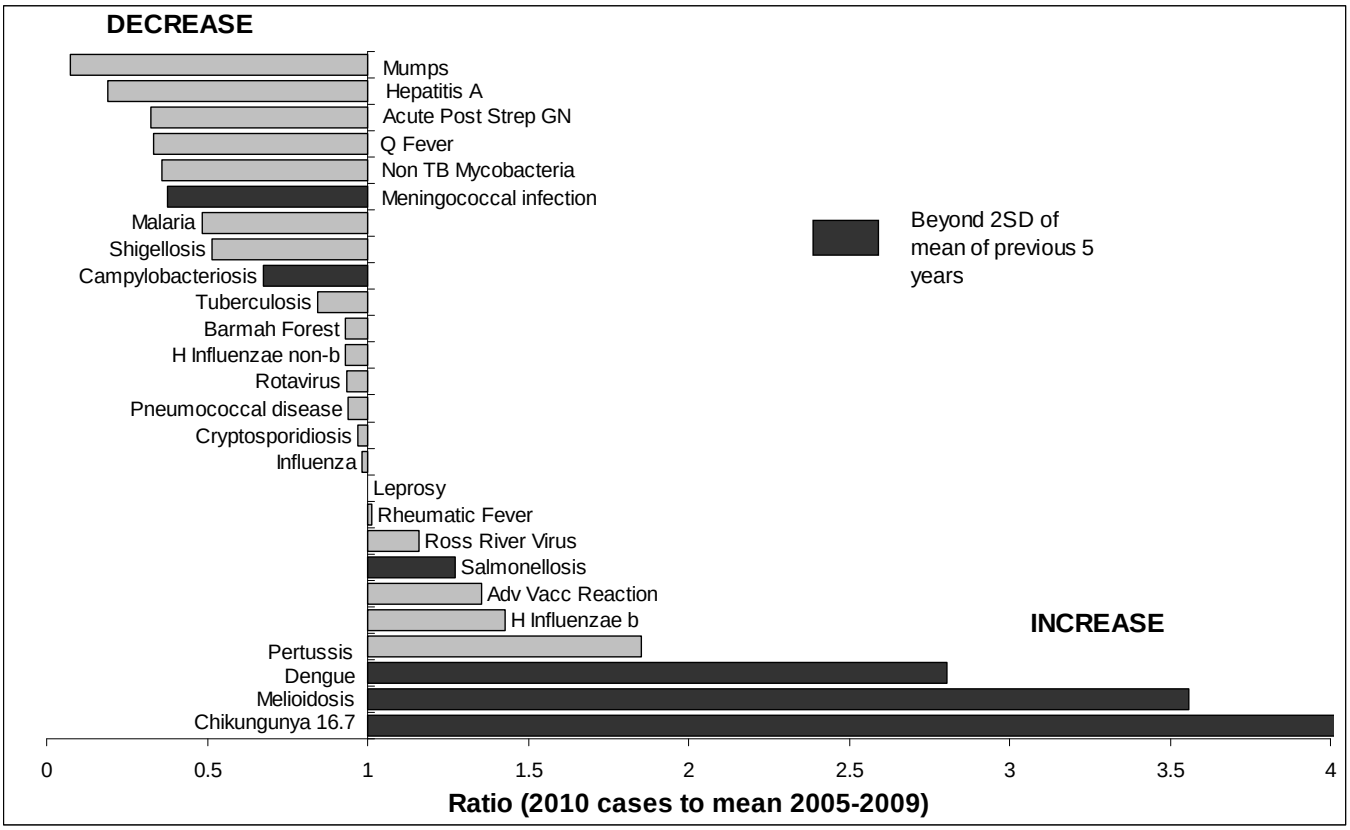
Darwin	8922 8044
Katherine	8973 9049
Alice Springs	8951 7540
Tennant Creek	8962 4259
Nhulunbuy	8987 0357

For more information on mosquitoes and virus ecology contact Centre for Disease Control, Medical Entomology on 8922 8901

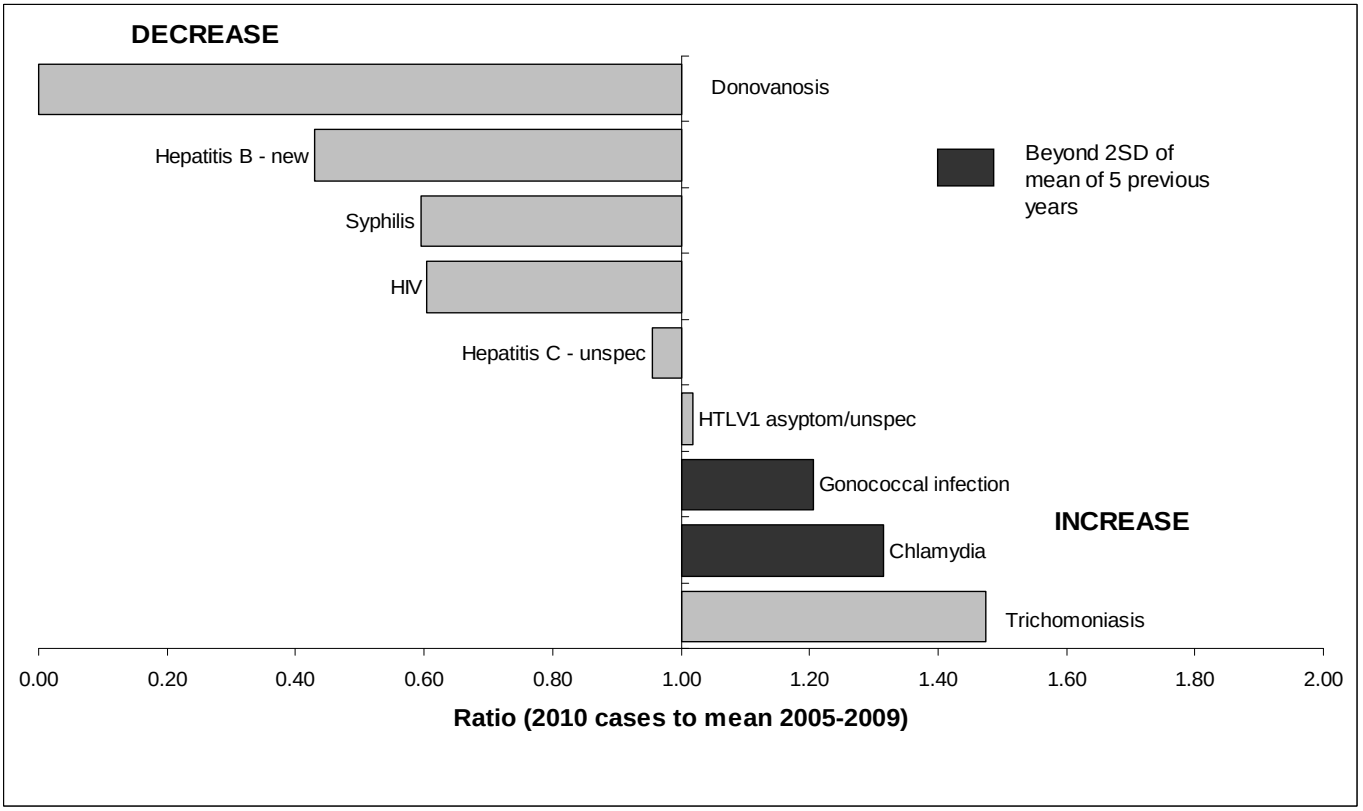
NT NOTIFICATIONS OF DISEASES BY ONSET DATE & DISTRICTS
1 January—31 December 2010 & 2009

	Alice Springs		Barkly		Darwin		East Arnhem		Katherine		N T	
	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010	2009
Acute Post Strep Glomerulonephritis	4	5	0	1	4	16	2	13	4	5	14	40
Adverse Vaccine Reaction	12	6	0	1	37	31	4	7	6	6	59	51
Amoebiasis	0	0	0	0	0	0	0	0	1	0	1	0
Arbovirus Not Otherwise Specified	1	0	0	0	8	2	1	0	0	0	10	2
Barmah Forest	5	14	1	5	68	85	7	8	6	9	87	121
Brucellosis	0	0	0	0	2	0	0	0	0	0	2	0
Campylobacteriosis	36	57	6	10	109	128	5	1	17	18	173	214
Chickenpox	15	6	4	2	46	48	11	16	10	18	86	90
Chlamydia	863	773	56	56	1276	947	206	165	306	207	2707	2148
Chlamydial conjunctivitis	12	115	5	13	16	10	0	1	2	3	35	142
Cryptosporidiosis	36	48	2	4	36	68	13	16	14	18	101	154
Dengue	0	0	0	0	55	39	2	2	7	0	64	41
Food/water borne disease	5	0	1	0	0	0	0	0	0	0	6	0
Gastro - related cases	0	0	0	0	4	0	0	0	1	0	5	0
Gonococcal conjunctivitis	1	2	0	0	0	1	0	1	3	0	4	4
Gonococcal infection	1151	890	72	43	359	264	125	95	282	237	1989	1529
Hepatitis A	0	1	0	0	4	0	0	0	0	0	4	1
Hepatitis B - chronic	66	26	11	5	33	45	51	70	27	16	188	162
Hepatitis B - new	0	0	0	0	2	3	1	0	0	1	3	4
Hepatitis B - unspecified	47	53	3	9	92	80	3	1	23	20	168	163
Hepatitis C - new	0	0	0	0	0	2	0	1	0	2	0	5
Hepatitis C - unspecified	40	27	5	3	140	121	2	5	25	15	212	171
H Influenzae b	2	0	0	0	0	0	0	0	0	0	2	0
H Influenzae non-b	7	5	1	0	0	2	0	1	0	0	8	8
HIV	0	1	0	0	7	18	0	0	0	0	7	19
HTLV1 asyptom/unspecified	76	44	5	1	2	1	0	0	2	0	85	46
Influenza	11	617	5	61	308	961	157	158	22	278	503	2075
Kunjin Virus	0	0	0	0	1	0	0	0	0	1	1	1
Legionellosis	1	0	0	0	2	2	0	0	0	1	3	3
Leprosy	0	0	0	0	1	0	0	0	0	0	1	0
Leptospirosis	1	0	0	0	1	3	0	0	0	1	2	4
Listeriosis	0	0	0	0	0	1	0	0	0	0	0	1
Malaria	0	1	0	0	16	12	1	1	0	0	17	14
Measles	0	0	0	0	2	1	0	0	0	0	2	1
Melioidosis	0	0	1	0	87	24	10	3	8	3	106	30
Meningococcal infection	2	3	0	0	1	5	0	0	0	0	3	8
Mumps	0	1	0	9	0	3	1	0	1	1	2	14
MVE	0	0	0	0	0	2	0	0	0	0	0	2
Non TB Mycobacteria	1	0	0	0	1	4	0	0	0	0	2	4
Pertussis	241	24	5	10	87	166	2	14	5	9	340	223
Pneumococcal disease	37	46	3	6	18	28	2	5	5	8	65	93
Q Fever	1	3	0	0	0	0	0	0	0	0	1	3
Rheumatic Fever	12	23	1	0	18	9	11	12	17	13	59	57
Ross River Virus	33	56	3	26	264	295	18	29	28	37	346	443
Rotavirus	144	129	21	2	76	85	20	12	43	35	304	263
Salmonellosis	81	74	13	21	387	320	36	32	80	68	597	515
Shigellosis	28	54	6	7	27	16	9	10	9	8	79	95
STEC/VTEC	0	1	0	0	0	0	0	0	0	0	0	1
Syphilis	52	46	4	2	50	59	11	10	25	23	142	140
Syphilis congenital	0	1	0	0	0	2	0	0	0	0	0	3
Trichomoniasis	689	563	128	77	651	568	357	245	588	307	2413	1760
Tuberculosis	1	4	1	0	21	23	1	1	7	3	31	31
Typhoid	0	0	0	0	2	0	0	0	0	0	2	0
Typhus	0	0	0	0	1	1	0	0	0	0	1	1
Varicella unspecified	0	1	0	0	2	2	2	0	0	0	4	3
Vibrio food poisoning	0	0	0	0	2	1	0	0	0	0	2	1
Yersiniosis	0	0	0	0	0	4	0	0	0	0	0	4
Zoster	31	25	7	6	78	68	11	7	8	13	135	119
Total	**3,745**	**3,745**	**370**	**380**	**4,404**	**4,576**	**1,082**	**942**	**1,582**	**1,384**	**11183**	**11027**

Ratio of the number of notifications in 2010 to the mean 2005-2009



Ratio of the number of notifications in 2010 to the mean 2005-2009: sexually transmitted diseases



Comments on notifications P32

Meningococcal

There were only 3 cases of meningococcal disease notified in 2010. This is the lowest number since 1993 when 2 cases were notified and is less than half the 5 year mean of 8. Given that the majority of NT cases are usually type B, the vaccination program against type C which began in 2004 cannot fully explain this decrease. Interestingly, the fall has been observed nationally and may be due to other ecological determinants associated with the bacteria.

Campylobacter

Cases of campylobacter (173) were 32% lower than expected (5 year mean: 256) and this continues a downward trend since a peak of 289 in 2007. In the early 1990s however, annual cases were consistently over 300 and there were 415 cases in 1991. The trend might reflect improved food safety measures in industry – particular with chicken processing which is a recognised source of campylobacteriosis.

Salmonellosis

Notifications of salmonellosis have been on an upward trend since 2005 and this has been observed nationally. In 2010 there were 597 cases in the NT which is 28% more than the 5 year mean and 16% more than 2009. There was a general increase in the common serovars such as Virchow, Chester, Ball and Anatum without the presence of any major outbreaks.

Melioidosis

In the 2010 calendar year there were 106 notifications of melioidosis which was 3.5 times the 5 year mean. This increase has been well publicised and is partly explained by increased rainfall.

Dengue

There were 64 cases of dengue notified in 2010 which is 2.8 times the expected (5 year mean: 23). All apart from 1 case were imported (Vol 14 No 4 December 2010 p11 "The Northern Territory remains dengue mosquito free…") with 45% being acquired in Indonesia (with 14 of 29 Indonesian cases acquired in Bali) and 38% (24 cases) in East Timor. These numbers reflect the global increase in dengue cases reported over recent years and in particular in SE Asia.

Gonococcal infection

There were 1989 cases of gonococcal infection notified in 2010 which is 21% more than the 5 year mean and against the downward trend of recent years. This is likely to be due to the extra testing going on in remote communities as part of the STRIVE research project looking at sexual health service delivery.

Chlamydia

There were 2707 cases of chlamydial infection notified in 2010 which is 32% more than the 5 year mean and which continues the upward noticed nationally in recent years. As with gonococcal infections, it may be due to increased screening associated with the STRIVE project together with extra testing going on in primary care.

Chikungunya

Chikungunya is a disease caused by an alphavirus and transmitted by mosquitoes. A mosquito is an arthropod and when it transmits a virus this virus is called an 'arthropod borne virus' or 'arbovirus' for short. Chikungunya is notifiable in the NT under the category "Arbovirus not otherwise specified" and is becoming more common in SE Asia and other parts of the world as an emerging infectious disease. There were 10 cases of chikungunya notified in 2010, all in returned travellers. Of these, 7 were part of a cluster from Bali, 2 acquired disease in East Timor and 1 in Lombok. Prior to 2010 only 5 cases, again all acquired overseas, had ever been notified in the NT.

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Immunisation coverage for children aged 12-<15 months at 31 December 2010

Region	Number in District	% DTP	% Polio	% HIB	% Hep B	% Fully vaccinated
Darwin	272	90.8%	90.8%	90.4%	90.4%	90.4%
Winnellie PO Bag	97	93.8%	93.8%	93.8%	93.8%	93.8%
Palm/Rural	195	86.7%	86.7%	86.7%	86.7%	86.7%
Katherine	86	93.0%	93.0%	93.0%	93.0%	93.0%
Barkly	16	87.5%	87.5%	87.5%	87.5%	87.5%
Alice Springs	141	90.1%	89.4%	89.4%	90.1%	89.4%
Alice Springs PO Bag	59	86.4%	86.4%	86.4%	86.4%	86.4%
East Arnhem	62	90.3%	90.3%	88.7%	88.7%	88.7%
NT	928	90.0%	89.9%	89.7%	89.8%	89.7%
Indigenous	384	87.0%	87.0%	87.0%	87.0%	87.0%
Non-Indigenous	544	92.1%	91.9%	91.5%	91.7%	91.5%
Australia Indigenous	3,364	85.1%	85.1%	85.1%	85.1%	85.0%
Australia Non Indigenous	72,169	92.1%	92.1%	92.0%	91.8%	91.6%
Australia Total	75,533	91.8%	91.8%	91.6%	91.5%	91.4%

Immunisation coverage for children aged 24-<27 months at 31 December 2010

Region	Number in District	% DTP	% Polio	% HIB	% Hep B	% MMR	% Fully vaccinated
Darwin	274	93.8%	93.8%	83.9%	92.7%	92.7%	81.8%
Winnellie PO Bag	96	97.9%	97.9%	90.6%	97.9%	96.9%	89.6%
Palm/Rural	242	95.0%	95.0%	82.2%	94.6%	93.4%	81.0%
Katherine	100	100.0%	100.0%	86.0%	100.0%	100.0%	86.0%
Barkly	11	81.8%	81.8%	72.7%	81.8%	90.9%	72.7%
Alice Springs	122	97.5%	97.5%	77.9%	97.5%	95.9%	77.0%
Alice Springs PO Bag	61	100.0%	100.0%	90.2%	100.0%	98.4%	90.2%
East Arnhem	48	100.0%	100.0%	85.4%	100.0%	97.9%	83.3%
NT	954	96.2%	96.2%	84.0%	95.8%	95.1%	82.7%
Indigenous	385	96.6%	96.6%	82.1%	96.6%	96.4%	81.8%
Non-Indigenous	569	96.0%	96.0%	85.2%	95.3%	94.2%	83.3%
Australia Indigenous	3,444	94.7%	94.7%	92.1%	94.7%	94.5%	89.8%
Australia Non Indigenous	73,395	94.9%	94.9%	94.8%	94.4%	94.0%	92.6%
Australia Total	76,839	94.9%	94.9%	94.7%	94.4%	94.0%	92.4%

Immunisation coverage for children aged 60-<63 months at 31 December 2010

Region	Number in District	% DTP	% Polio	% MMR	% Fully vaccinated
Darwin	257	82.1%	81.3%	80.5%	79.4%
Winnellie PO Bag	91	91.2%	91.2%	91.2%	91.2%
Palm/Rural	237	89.5%	89.5%	90.3%	89.5%
Katherine	89	87.6%	87.6%	87.6%	87.6%
Barkly	31	96.8%	96.8%	96.8%	96.8%
Alice Springs	119	85.7%	86.6%	84.9%	84.0%
Alice Springs PO Bag	50	92.0%	92.0%	94.0%	90.0%
East Arnhem	58	98.3%	98.3%	98.3%	98.3%
NT	932	87.9%	87.8%	87.7%	86.8%
Indigenous	800	84.8%	84.6%	85.0%	84.4%
Non-Indigenous	562	87.4%	87.2%	86.5%	85.8%
Australia Indigenous	3,069	85.8%	85.7%	86.4%	85.4%
Australia Non Indigenous	69,969	90.1%	90.0%	89.9%	89.5%
Australia Total	73,038	89.9%	89.8%	89.8%	89.4%

Immunisation Coverage 31 Dec 2010

Compiled by Charles Roberts , CDC, Darwin

Immunisation coverage rates for NT children by regions based on Medicare address postcode as estimated by the Australian Childhood Immunisation Register are shown on page 34.

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 to <15 months of age on 31 Dec 2010 were born between 1 Jul 2009 and 30 Sep 2009 inclusive. To be considered fully vaccinated, these children must have received 3 valid doses of vaccines containing diphtheria, tetanus, pertussis, 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 to <27 months of age on 31 Dec 2010 were born between 1 Jul 2008 and 30 Sep 2008 inclusive. To be considered fully vaccinated, these children must have received 3 valid doses of vaccines containing diphtheria, tetanus, pertussis, and poliomyelitis antigens, either 3 doses of PRP-OMP Hib or 4 doses of another Hib vaccine, and 2 or 3 doses of hepatitis B vaccine (not including the birth dose) and 1 dose of measles, mumps, rubella 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 60 to <63 months of age on 30 Jun 2010 were born between 1 Jul 2005 and 30 Sep 2005 inclusive. To be considered fully vaccinated, these children must have received 4 valid doses of vaccines containing diphtheria, tetanus, pertussis antigens, 4 doses of poliomyelitis vaccine and 2 valid doses of measles, mumps, rubella vaccine (latest doses due at 4 years of age). All vaccinations must have been administered by 60 months (5 years) of age.

Interpretation

Immunisation coverage in NT children overall was below the national average across all 3 cohorts. It is felt that this may be in part due to vaccination changes and therefore a change in methods used for calculation (see final paragraph).

Indigenous NT children had lower coverage than non-Indigenous NT children across all 3 cohorts.

Immunisation coverage in Indigenous children in the NT was higher across the 12 to <15 months and 60 to <63 months cohorts but lower in the 24 to <27 months cohort as compared to coverage for Indigenous children at the national level.

There is a reported dramatic decline in immunisation coverage for *Haemophilus influenzae B* (HiB) in the 24 to <27 month cohort. Immunisation coverage is 10.7% lower for NT children than for the Australian average. The reported rate for NT Indigenous children is 10% less than the Australian Indigenous rate and there is a 9.6% exists difference between NT non-Indigenous and their Australian counterparts.

There is a decrease in rates in all postcodes and regions.

It is postulated that the recorded coverage rate is not a true indicator of vaccines administered but is related to the manner in which this vaccine coverage has been calculated. The NT Immunisation Schedule changed on 1 Oct 2009 to incorporate the introduction of Infanrix Hexa and Hiberix. As a result of this vaccine change the assessment for HiB coverage by ACIR has been complicated in children who may have received PedvaxHIB plus 1 or more doses of the new vaccines. The recorded decline in HiB vaccine coverage is being investigated and reviewed by the NT Immunisation Register, NCIRS (National Centre for Immunisation Research) and ACIR. Any recalculated data will be published in the next *Bulletin*.

NT Malaria notifications October - December 2010

Merv Fairley, CDC, Darwin

There were 5 notifications of malaria received for the fourth quarter of 2010 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	Thailand	Holiday	*P vivax*	No
1	West Papua	Resident	*P vivax*	No
1	Mali	Work	*P falciparum*	No
1	East Timor	Resident	*P falciparum*	No
1	Ghana	Holiday	*P falciparum*	No

Disease Control staff updates

Darwin

The redefined position now called Senior Branch Manager for CDC has been won by **Lesley Scott.**

Roberta Smith has joined SHBBV as the Administration Officer to Jamie Broadfoot and the team located at Block 4.

Karen Doyle has commenced as the Administrative Officer at Clinic 34 in Darwin.

Greta Enbom has joined the SHBBV Unit as the Indigenous Early Childhood Health Promotion Officer.

Susannah O'Brien commences as the BBV Policy Officer position in mid-March in Block 4.

Elizabeth Brown has left the Darwin urban team to commence further studies.

Shelly Williams is back at CDC for a short term to work on a surveillance project.

Jenine Gunn is acting OzFoodNet Epidemiologist while **Michelle Harlock** is on maternity leave.

Chris Nagy is Head of Immunisation for 6 months before **Ros Webby** returns from maternity leave. **Jayne Porter**, a Policy Officer and previous Nurse Manager at Palmerston Community Care Centre is replacing Chris as the Senior Immunisation Officer for this time period.

We farewell **Matthew Parnaby** who finished on 16 February and is off to Africa! He is taking leave to commence aid work in Uganda to set up a country-wide nutritional surveillance program. **Marea Fittock** will take on the coordinator role in the Rheumatic Heart Disease program.

Christine Chamberlain and **Kay McGough** were successful in being recruited to the Rheumatic Heart Disease Register coordinators positions for the next 18 months.

Paul Burgess, Medical Officer and FAFPHM Scholar has come from Menzies School of Health Research after completing his PhD to work in the TB Unit and CDC.

Padmasiri Eswara Aratchige, Medical Officer and FAFPHM Scholar has come via Sri Lanka, New Zealand, Sydney and Laos to work in the TB Unit and CDC.

Nor Hayati Shaharuddin, Infectious Disease Registrar from Malaysia has joined CDC as a Medical Officer in March for 4 months and will then work at RDH for 6 months.

Beatrice Akello-Zweck who has worked several years at RDH, has joined the TB Unit to work as a Public Health Nurse.

Farewell to **Gemma Farmer**, Executive Assistant to Dr Vicki Krause, who returns to study at CDU and welcome to **Dahye Baker**, previously employed in Health House who will take on the role. Gemma will still be seen around CDC as part-time Administration Officer to TB Unit.

Janelle Baker has returned from retirement to work as part-time administration officer to TB Unit.

Katherine

Carmel Whalley, Public Health Nurse is going on leave for a month from 3 March.

Danielle Green, Medical Officer, will be finishing at CDC in mid April 2011.

Vicki Gaffney, Public Health Nurse TB/Leprosy will be starting at CDC in April.

Alice Springs

Belinda Davis (N5) joined Alice Springs CDC as the team leader for the Remote Sexual Health team from Darwin Clinic 34 in December.

Wendy Mactaggart (N4) is taking ARL and LSL for 3-4 months.

Michelle Koerner (N4) and **Dy Kelaart** (N4) are each working for a few months in the Remote Sexual Health team. Michelle will cover Wendy Mactaggart's long service leave, and Dy will fill a vacancy until further recruitment.

Carolyn Lloyd (N4) has joined the Trachoma team for a year with responsibility for Central Australia North.

Catherine Milne (AO6) has joined the trachoma team as the Project Officer for a few months.

Eva Sarr from the Centre for Sexual Health has commenced maternity leave.

Tennant Creek

Martin Cutter has joined Celina at CDC as a Public Health Nurse.

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The NT Disease Control Bulletin Index can be found at:

http://www.health.nt.gov.au/Centre_for_Disease_Control/Publications/NT_Disease_Control_Bulletin/index.aspx

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