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Pertussis – what can CDC offer??

Peter Markey, CDC Surveillance, Darwin

Introduction

Pertussis is a vaccine-preventable illness. High levels of population immunity are required to prevent ongoing transmission in the community because it is so easily spread. Vaccine-induced immunity is protective but tends to wane over time. In partially immune populations, such as Australia, epidemics occur every 3-4 years.[1] In most population groups mortality is extremely low, but in babies under six months the mortality is substantially higher (3.5%).[1] Public health preventative measures are usually concentrated in preventing spread to this non-immune or partially immune age-group (<6 months), who most often acquire the disease from older siblings or parents.

Incubation period and communicability

The usual incubation period is 9-10 days (range 6-20).[2] Pertussis is highly communicable in the early catarrhal (cold-like) stage and at the beginning of the coughing stage (2 weeks). After 3 weeks of coughing communicability is negligible. Treatment during the communicable stage will prevent transmission after 5 days.[2]

Diagnosis

Clinical diagnosis of pertussis is important because, if there are high-risk contacts of the suspect case, prophylaxis can be instituted early to avoid disease and continued spread.

Contents

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The surveillance definition includes a cough for 2 weeks and either paroxysms, inspiratory whoops or post-tussive vomiting. However, in some situations it might be prudent to act before 2 weeks if the diagnosis is obvious and if the ramifications of not acting might be significant. For example, if a man had a 6 day history of paroxysmal cough in a community with background pertussis and his wife was 38 weeks pregnant (but well), it would be vital to confirm the diagnosis with testing. If he was positive there would be good reason to treat both him and his wife (and any other non-immune family members) because if his wife gets pertussis at delivery it could be catastrophic for the neonate. In this instance testing for pertussis on day 6 and beginning empiric treatment for the man would be justified

Laboratory diagnosis of pertussis is made through PCR (polymerase chain reaction) of a naso-pharyngeal swab, or by serology. PCR is preferred in the first 2 weeks and serology thereafter. IgA is the significant antibody for pertussis diagnosis. Both tests are only moderately sensitive and there is sometimes a "window" at 2-3 weeks where both tests might be negative.

There are other organisms, such as *Bordatella parapertussis*, *Mycoplasma pneumoniae* and *Chlamydia pneumoniae*, which cause pertussis-like symptoms.

Diagnosis is often delayed in pertussis – this is often due to the fact that early in the disease it is no different from the common viral respiratory tract infection. In addition, because fever is uncommon and the catarrhal phase not always obvious, it can present as just cough, thereby mimicking mild asthma. Clinicians can be aided by being kept up-to-date with local epidemiology so that they are aware of local circulating pathogens (e.g. pertussis!).

Treatment

Treatment of pertussis with antibiotics needs to be instituted early in the disease for the treatment to make any difference to disease outcome. Once the coughing stage is established for more than a week, antibiotic treatment does not change outcome but it can reduce infectivity if given within the first 2-3 weeks of the illness. After 3 weeks of coughing there is no benefit from antibiotic therapy.[1] Traditionally, treatment (and prophylaxis) has been with erythromycin but there is now evidence that clarithromycin and azithromycin might be as effective.[1,2]

Public health response – What CDC can offer?

In recent epidemics, the public health response has been to ascertain which of the contacts of cases would benefit from prophylaxis. The benefits of preventative treatment are confined to those who have been in contact with the case during the period of communicability and have been offered prophylaxis within 2 weeks of the first contact with the case. However, because of late notifications and delays in getting test results, together with a case definition which required a 2 week cough, the opportunity to prevent pertussis was limited.

In future epidemics the strategy will be slightly different and the high risk situations targeted. The immunisation handbook[1] suggests that the offer of prophylaxis be limited to:

- Any infants <12 months of age regardless of immunisation status
- Any child between 12 and 24 months who has received less than 3 doses of pertussis vaccine
- Any woman in the last month of pregnancy
- Any child or adult who attends or works at a child-care facility.

In addition:

- members of households with a child less than 1 year of age would also be good candidates.[2]

In future epidemics, the above groups might be candidates for prevention before the 2 week surveillance case definition criteria is fulfilled (see page 3), if other diagnostic features in the index case and the consequences of transmission were great (such as the example of the potential 38 week pregnant contact above). Hence the need for early notification on suspicion from primary health care providers.

Vaccination

Apart from the very young, the other group with high rates of disease during epidemics are adolescents. This is likely due to waning immunity from childhood vaccines. Hence the

Australian Government Department of Health and Ageing has funded a program for 15-17 year olds to receive a diphtheria/tetanus/pertussis combined booster vaccine (Boostrix®). It is also recommended (but not funded) for couples planning a pregnancy and for adults who work with young children (health care workers and child care workers).[1]

References

1. NH&MRC. *The Australian Immunisation Handbook* 8th edition. 2003 National Capital Printing, Canberra.
2. Heymann DL (Ed) *Control of Communicable Diseases Manual*. 2004. United Book Press. Baltimore.

National surveillance case definition

Reporting

Both confirmed cases and probable cases should be notified.

Confirmed case

A confirmed case requires either:

1. Laboratory definitive evidence

OR

2. Laboratory suggestive evidence AND clinical evidence

OR

3. Clinical evidence AND epidemiological evidence

Laboratory definitive evidence

1. Isolation of *Bordetella pertussis*

OR

2. Detection of *B. pertussis* by nucleic acid testing.

Laboratory suggestive evidence

1. Seroconversion or significant increase in antibody level or fourfold or greater rise in titre to *B. pertussis* (in the absence of recent pertussis vaccination)

OR

2. Single high IgA titre to whole cells

OR

3. Detection of *B. pertussis* antigen by immunofluorescence assay (IFA).

Clinical evidence

1. A coughing illness lasting two or more weeks

OR

2. Paroxysms of coughing OR inspiratory whoop OR post-tussive vomiting.

Epidemiological evidence

An epidemiological link is established when there is:

1. Contact between two people involving a plausible mode of transmission at a time when:
   a) one of them is likely to be infectious (from the catarrhal stage, approximately one week before, to three weeks after onset of cough)

   AND

   b) the other has an illness which starts within 6 to 20 days after this contact

AND

2. At least one case in the chain of epidemiologically linked cases (which may involve many cases) is a confirmed case with at least laboratory suggestive evidence.

Probable case

A probable case requires clinical evidence only.

Clinical evidence

1. A coughing illness lasting two or more weeks

AND

2. Paroxysms of coughing OR inspiratory whoop OR post-tussive vomiting.

Public health action

Contact tracing/vaccination/antibiotic prophylaxis, and where indicated, exclusion.

Editorial comment

The Communicable Diseases Network of Australia *Guidelines for the control of pertussis in Australia*, November 1997, are in the process of being reviewed and updated. Recent changes to public health management of pertussis include the use of azithromycin and clarithromycin for both index cases and their contacts. The NT Centre for Disease Control has developed fact sheets about these drugs for patients and these will be made available on the NT Department of Health and Community Services website. In the interim they are available by contacting 89228089.

Treating gonorrhoea in the Darwin region: safe to use amoxycillin and probenecid again for locally acquired infections

Steven Skov and Peter Knibbs, Sexual Health And Blood Borne Viruses Unit, CDC, Darwin

In May 2004, all health care providers in the Darwin urban and rural regions were advised to no longer treat patients with locally acquired gonorrhoea with amoxicillin and probenecid. Instead, it was recommended that a single injection of ceftriaxone be used.

This was necessary because of the discovery of a small number of people in Darwin with locally acquired penicillin resistant gonorrhoea. There were 3 people with culture proven resistant gonorrhoea and another person with a PCR diagnosis of gonorrhoea who was a sexual partner of one of the cases. People with penicillin resistant gonorrhoea are found every year in Darwin, but until May 2004, all cases had been directly linked to sexual contact outside of the NT.

All health care providers in the Darwin region were alerted to the change in recommended treatment. Ceftriaxone was also provided to all health care providers in order to ensure that appropriate and immediate treatment could be given. They were also urged to take specimens for culture whenever possible. Nurses and AHWs were given legal authorisation to supply ceftriaxone for this purpose without a doctor's order. No change was made to treatment recommendations outside the Darwin region.

Since that time, surveillance of penicillin resistant gonorrhoea has continued. There have been a further 10 cases of resistant gonorrhoea detected but all were directly related to sexual contact outside the NT. There have been no further cases of locally acquired resistant gonorrhoea. **It is therefore recommended that patients in the Darwin region with confirmed or possible gonorrhoea that is believed to be acquired in the NT, be treated with amoxicillin and probenecid.** Persons with possible gonorrhoea and a history of sexual intercourse outside the NT (or with persons from outside the NT) should still be treated with ceftriaxone.

The advantage of amoxicillin and probenecid as opposed to ceftriaxone is that it can be given orally, is cheaper and will help prevent development of ceftriaxone resistant organisms. While this is a welcome development, remaining vigilant for resistant gonorrhoea is essential. Practitioners are urged to always ask about the origin of possible infection and to be specific about asking about acquisition of infection from outside the NT – noting that this information will influence treatment and take specimens for culture of gonorrhoea whenever possible.

The treatment recommendations for the whole of the NT are as follows:

Confirmed gonorrhoea (uncomplicated) in both men and women (that is not known to be resistant)	Urethritis in males or cervicitis in females
Single dose: 3g Amoxycillin **and** 1g Probenecid orally.	Single dose: 3g Amoxycillin **and** 1g Probenecid orally, **and** 1g Azithromycin orally.

If the patient has a history of sexual intercourse outside the NT or with person(s) from outside the NT, a single dose of 250mg IMI ceftriaxone should be used instead of amoxycillin and probenecid. Ciprofloxacin should not be used as a first line treatment for these people (unless the organism is known to be sensitive to it) due to high rates of resistance to quinolones both overseas and in Australia.

For further information, contact the Sexual Health and Blood Borne Viruses Unit or the Clinic 34 in your region.

Darwin	89992678
Alice Springs	89517549
Tennant Creek	89624250
Katherine	89739049
Nhulunbuy	89870358

Penicillin resistant gonorrhoea in the Darwin region 2001-2004

Steven Skov, Peter Knibbs and Jiunn-Yih Su, Sexual Health And Blood Borne Viruses Unit, CDC, Darwin

Within sexual health circles in the NT, the detection of penicillin resistant gonorrhoea is a public health emergency. This is because the NT is one of the few places left in the world where gonorrhoea can usually be managed with an oral penicillin (e.g. amoxicillin). This has enormous advantages for the NT in terms of cost, ease and acceptability of treatment. Maintaining this situation requires close vigilance and specific systems.

- Management recommendations highlight the need to routinely inquire about sexual contact outside the NT or with persons from outside the NT and to use ceftriaxone in patients with such a history.
- Practitioners are urged to take specimens for culture whenever possible. Sentinel sites for culture of gonorrhoea have been established.
- Laboratories are required to notify the Centre for Disease Control immediately of the occurrence of penicillin resistant gonorrhoea.

All cases are urgently followed up by Sexual Health program staff to determine the source of infection and ensure that the patient and any sexual partners are appropriately treated

Every year there are a number of people diagnosed in the NT with penicillin resistant gonorrhoea. All are closely followed up by Clinic 34 staff who maintain a de-identified record of the details and outcomes of each case. The occurrence of penicillin resistant gonorrhoea in the Darwin region is summarised in table 1.

The vast majority of penicillin resistant gonorrhoea cases occurred in non-Aboriginal people (60) with only 3 in Aboriginal people. The 4 persons in 2004 infected in the NT with an external link were all in NT women whose male partner had acquired the infection overseas. The 3 persons in 2004 infected in the NT with no external link were those in the outbreak that led to the change in treatment recommendations (see previous article, vol. 11:2 2004). Clinic 34 was the location where 27 cases (43%) were detected with 4 cases (6%) being found in the hospital system and the remaining 32 cases (51%) by Darwin General Practitioners (GP).

The standout feature of this data is the role of males and travel in SE Asia as the source of the vast majority of resistant infection. During this period 69.6% of all gonorrhoea in the Darwin region occurred in males compared to 85.5% of resistant infection (Chi square 7.03, $p < 0.01$) Of the 63 resistant infections, 49 were male who had acquired the infection in SE Asia with a further 5 cases in females whose male partner had done so and infected her on return to the NT. Only 2 women acquired resistant gonorrhoea from a sexual contact while they were outside the NT.

Table 1: Penicillin resistant gonorrhoea in Darwin: gender and source of infection

	2001	2002	2003	2004	Total
Number of Cases	13	19	9	22	63
Sex of cases (M:F)	11 M: 2 F	17 M: 2 F	9 M	17 M: 5 F	54M: 9F
Infected in SE Asia	9	17	9	15	50
Infected interstate	3	0	0	0	3
Infected in NT with direct external link	0	2	0	4	6
Infected in NT with no direct external link	0	0	0	3	3
Infected in the NT (unknown case source)	1	0	0	0	1

With more than half of all cases of resistant gonorrhoea being detected by GPs, their role in defending the NT from the incursion of resistant gonorrhoea is crucial. We must continue to support GPs to perform culture for gonorrhoea, inquire about sexual contacts with persons from outside the NT and give treatment appropriate to those clients. The other priority will be to enhance public education efforts, particularly those targeted at males, as to the dangers of unprotected intercourse in South East Asia and the need to practice safe sex at all times.

It is also imperative to discuss with patients infected with gonorrhoea in SE Asia that they are at risk of HIV infection. These clients will need to practice safe sex with all partners until they have a negative HIV test at 3 months follow-up. Thereafter practicing safe sex with all partners is always recommended unless in a fully acknowledged monogamous relationship.

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The review of Sexually Transmitted Infections (STI) and Blood Borne Virus (BBV) prevention and management in the NT

Views of David Ashbridge, Asst. Secretary for Health Services, NT Dept of Health and Community Services

The NT government has demonstrated a high level of commitment to addressing the issues of Sexually Transmissible Infections (STIs) and Blood Borne Viruses (BBVs) through the provision of a substantially increased, recurrent financial allocation to the area. This commitment was in response to the continuing high rates of STIs in the NT in conjunction with government recognition of the risk of an epidemic of HIV.

Before allocating these new funds, I, in my role as Asst Secretary for Health Services, have agreed to conduct a review of STI / BBV prevention and management. The rationale for the review is that there are continuing high rates of bacterial STIs in the NT despite years of effort put in to preventing them. There seems little point in merely putting more money into the problem without thoroughly re-examining the current approaches and programs that are being used, and looking for better ways to do things.

Several key principles underpin the review process.

- While the principal focus of the review is within the health sector, it will also engage with key non-health agencies, in particular with education.
- The primary health care (PHC) sector is central to the provision of health care and is the avenue through which much public health activity must roll out. A partnership between the PHC and public health sectors is crucial to any improvements.
- A very great proportion of PHC and other support services are provided by the non-government sector either by Community Controlled Health Services, non-government organisations or private practitioners, and the review must seek active engagement in the review process across all sectors.
- If genuine engagement can be achieved across these sectors, the findings and recommendations are more likely to reflect reality and to be relevant and feasible. If so, and if the process is correct, there will be a greater chance of the various agencies committing themselves to the recommendations.

The terms of reference for the review are:

- Identify current STI/BBV services throughout the NT including non-government services and the relationships between agencies.
- Consult with key stakeholders regarding their current approaches to STI/BBV programs and plans for the future, and the level of priority afforded to them, and their capacity to implement them.
- Review STI/BBV services provided by DHCS.
- Review the role, nature and effectiveness of partnerships between relevant agencies in the delivery of STI/BBV programs.

- Review the nature of clinical care systems and screening approaches in the NT in relation to current world and Australian best practice and evidence.
- Review the nature of health promotion and health education approaches in the NT in relation to current world and Australian best practice and evidence.
- Identify barriers to and factors associated with the success of programs.
- Provide key strategic recommendations to inform the development of a comprehensive, effective STI/BBV strategy for the NT taking into account the Territory's unique population demographics, and other relevant social, cultural and developmental factors.
- Advise on the most effective and beneficial investment of current and new funds ($2 million in 2004/05) and, where appropriate, the re-investment of existing resources to achieve better outcomes.

I am chairing a steering committee consisting of key agencies in the NT and national bodies to provide high-level technical advice to oversee the project. It consists of representatives from DHCS, the Aboriginal Medical Services Alliance of the NT (AMSANT), the NT Division of General Practice, the NT AIDS and Hepatitis Council, the Australasian Faculty of Public Health Medicine, the National Centre for HIV Epidemiology and Clinical Research, the Chapter of Sexual Health of the Royal Australian College of Physicians, the Australian Centre for Health Promotion, and the Australian Dept. of Health and Ageing.

The project was put out to tender and was awarded to the Australian Research Centre in Sex, Health and Society (ARCSHS) of La Trobe University. This centre has an impressive record of research across a broad range of sexual health matters. This includes significant experience in the NT in the form of their review of the Tri-State STD/HIV project in Alice Springs.

The review team has started work and is currently examining a large amount of written material describing the NT, its health services and programs and the nature of the STI / BBV situation. It will soon begin an extensive series of telephone interviews with a very large range of individuals and agencies. Site visits in all major regions of the NT are planned. The steering committee will receive a draft report at the end of May with the final report due in early June.

I am very keen that this should not be "just another review". Considerable resources and effort are being put into the process. The direction I am providing to the Steering Committee will encourage the reviewers to make frank findings and bold recommendations. If new approaches are needed there is a commitment within DHCS to develop them. I hope that non-government agencies will also be able to do so. The new funding that is available can and will be directed to the non-government sector if that will provide the greatest benefit for the people of the NT. With the new money available, there is a real opportunity to make improvements to the way the NT addresses STIs, HIV and other blood borne viruses and reduce the burden they impose on our community.

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An update on Hepatitis C in the NT

Jamie Broadfoot, John Haynes, Brian Hughes & Jiunn-yih Su, Sexual Health And Blood Borne Viruses Unit, CDC, Darwin

Introduction

The Hepatitis C virus (HCV) is one of the most commonly notified communicable diseases in Australia. Current estimates suggest that more than 210,000 Australians have been infected with this virus, and that 16,000 new infections are occurring each year. It is estimated that by 2020, the number of people living with HCV is likely to be between 321,000 and 836,000 depending on future patterns of drug use.[1]

The HCV is well established in Australian society with 1% prevalence in the wider community. Using this prevalence rate, the NT would have an estimated 2000 people currently living with HCV (Figure 1). It is estimated that 90 % of new HCV infections are due to unsafe injecting practice of illicit drugs.[2]

HCV Surveillance

Hepatitis C has been a notifiable disease in the NT since 1994. However cases have always been classified as 'unspecified', because the follow-up of each case to determine whether the hepatitis C was newly acquired, chronic or unspecified has not been undertaken as a sustained effort in the NT.

However, changes to the schedule pertaining to the Notifiable Diseases Act in 2004 and 2005 will allow this enhanced surveillance to be undertaken. This, together with the adoption of nationally consistent case definitions, will allow for a more detailed analysis of the epidemiology of the disease in the NT.

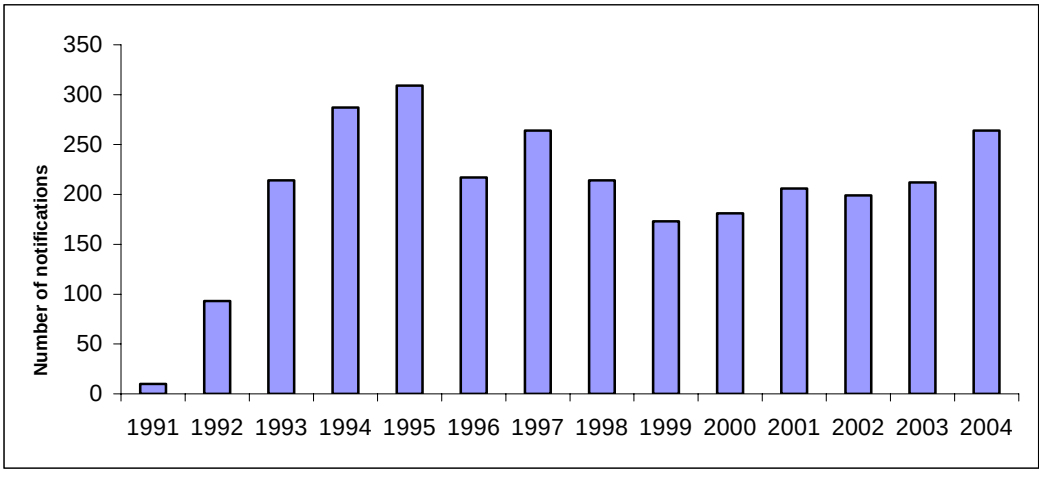
Recent Changes for Hepatitis C Management in Darwin

Historically in the NT, specialist treatment services for HCV in Darwin have been delivered in the private sector by one main Infectious Disease physician and another Infectious Disease/Sexual Health specialist on a sessional basis. These services were available at Darwin Private Hospital (DPH). This has now changed. The Infectious Disease physician has left Darwin and the care of all HCV patients has been taken on by the Infectious Disease/Sexual Health specialist in the public sector.

A new look service is now primarily being run from Clinic 34 in Darwin. Patients are able to remain at the DPH for consultation if they choose, but the bulk of new and existing patients will be managed by an Infectious Disease physician/Sexual Health specialist and Clinic 34 staff at their new Mitchell St. location. The Clinic 34 Medical Officer and the Infectious Disease registrar will also provide further clinical support.

As with all services provided by Clinic 34, the HCV service is free for the patient. With the

Figure 1 HCV notifications in the NT by year from 1991 to 2004.



move to Clinic 34, HCV services can now be accessed during working hours 5 days a week. This was previously restricted to 1 day per week.

HCV services in Alice Springs are delivered via the Alice Springs Clinic 34. Currently, the Clinic 34 medical officer is the principal medical officer working in collaboration with other health professionals and specialists coordinating the clinical care of HCV positive patients.

HCV Clinical Nurse Consultants

Supporting these recent changes has been the creation of 2 Clinical Nurse Consultants (CNC) positions for HCV. They are located within Clinic 34 in Darwin and Alice Springs and are both part- time. John Haynes, RN, is working in Darwin, and Eleanor Hooke, RN, in Alice Springs. These positions have been funded for 6 months, but it is the aim of the Sexual Health and Blood Borne Viruses Unit to make them permanent positions.

The CNCs for HCV have received specialised training for HCV clinical management and education. The aim is to improve the equity and access of services for prevention, education, treatment and support for those living with, or at risk of HCV. The HCV CNCs have an ongoing dialogue with the specialist physician and have as their aim the ability to improve access for patients who have previously had only a once a week service.

HCV Treatment

For some people infected with HCV, effects are limited and their long-term health is not affected. They may never require treatment. Where treatment is indicated, the options have greatly improved in recent years. By using combination anti-viral therapy - interferon and ribavirin - it is now possible to offer sustained improvement in liver function in the majority of those requiring treatment. Depending on a person's HCV genotype, a sustained virological response can be experienced by 50%-80% after 6-12 months of treatment.[3]

A sustained virological response refers to the absence of the virus following treatment, and the reduction of any potential long-term complications of HCV such as cirrhosis. Research has shown that a sustained response after 6 months following the end of treatment indicates that the response will last indefinitely.[4]

Investigations needed to satisfy federal funding requirements for treatment include ultrasound and liver biopsy. Unfortunately these services are not easily available outside of Darwin. Although there is a substantial waiting list being experienced in Alice Springs, a program is being put in place to address barriers with a view to improve access to these procedures.

HCV Awareness Week

National Hepatitis C Awareness Week is May 23-28. This is being coordinated locally by the Northern Territory AIDS and Hepatitis Council (NTAHC). The national message for HCV week is that treatment for HCV has improved outcomes for people with chronic HCV with the aim to encourage people with HCV to see their general practitioner or Clinic 34 in the NT.

The NT launch of National HCV Awareness Week will be at the Gallery Room of the Darwin Entertainment Centre on Monday May 23rd from 4:45-7pm. The launch will feature guest speakers and refreshments will be provided. Highlights of the week include a breakfast presentation on HCV by Infectious Diseases Physician, Dr Brian Hughes, covering HCV management and treatment. School students will also be visiting NTAHC to learn about risks of blood borne viruses and the Needle and Syringe Programs. HCV Awareness Week will close with a Youth Awareness rock concert at Lake Leanyer Skate Park in Darwin.

Contact Liza Shaw or Stuart Anderson at NTAHC on 8941 1711 for further details.

Future Aims

In the upcoming months, the Infectious Diseases physician will be travelling to each of the regional centres to provide up-to-date information sessions to medical staff. He will be addressing clinical patient management issues, as well as discussing with staff ways to improve and streamline current referral services in the N.T.

A short-term aim of the Sexual Health and Blood Borne Viruses Unit is to improve the

accessibility of Darwin and Alice Springs physicians, trained in HCV management, to the outlying regional and rural centres with a focus on improving the co-management of HCV patients. The Australasian Society for HIV Medicine (ASHM) coordinates courses in Darwin and Alice Springs that will assist in this aim.

An update on HIV, hepatitis and STI was given in Alice Springs in March and a short course in HIV and viral hepatitis will be given in Darwin on April 27-May 1, 2005.

Contact Adrian Ogier from ASHM for further details and registration on:
(02) 9368 2716

The NT Sexual Health and Blood Borne Viruses Unit will continue to work to identify and address service gaps, improve the equity and access to prevention, education and support services for those infected with HCV. This includes providing for people who inject drugs, those in prison settings, people in rural and remote areas and those from culturally and linguistically diverse backgrounds.

For this to occur a greater knowledge and awareness of HCV among health care professionals is required (e.g. through Workforce Development initiatives). Improvement in HCV surveillance is also needed. The Australian Government funds a project officer with the NT, Centre for Disease Control, to address hepatitis C control issues and work with needle and syringe programs.

Acknowledgements

Dr. Kevin Sesnan, Head of Sexual Health & Blood Borne Viruses Unit, staff and co-workers both in private and public settings in the rural and remote workforce in the Territory who have assisted us in this overview and update.

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New Commonwealth funding for varicella vaccine and inactivated polio vaccine

Tania Wallace, Immunisation, CDC, Darwin

On 7 March, 2005, it was announced that the Australian Government would provide funding for 2 new vaccine programs under the National Immunisation Program from 1 November 2005.

The new schedule will include varicella (chickenpox) vaccination at 18 months. There will also be a long-term catch up program for children aged between 10-13 years who have not received varicella vaccine or who have not had the disease.

A second new vaccine, injectable inactivated polio vaccine (IPV) will replace the current oral polio vaccine (OPV).

There are a variety of different combination vaccines that provide protection against a number of diseases including diphtheria, tetanus, pertussis, hepatitis B, *Haemophilus influenzae* type b (Hib) and polio. The schedule to be used in the Northern Territory is under consideration and will be announced later in the year.

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Tropical Influenza Surveillance Scheme evaluation 2002-2004

Lesley Scott, CDC, Darwin

Tropical Influenza Surveillance Scheme (TISS) evaluation

The Tropical Influenza Surveillance Scheme (TISS) commenced in the Northern Territory (NT) in 1996. The scheme was initiated to:

- determine the seasonal pattern of influenza and assess the appropriateness of the timing of influenza vaccination in the Top End;
- enable early recognition of influenza outbreaks;
- identify influenza strains early through cell culture for comparison to the current influenza vaccine;
- compare the timing of influenza outbreaks in the Top End with those in southern Australian states and
- determine if the NT is in a position to provide early information about influenza each season to the nation.

General Practitioners (GPs) participating in the scheme send in data on the number of patients who meet the case definition for influenza-like-illness (ILI), i.e. cough, fever and fatigue, and the total number of clients seen per week. This is returned on a monthly basis.

TISS evaluation

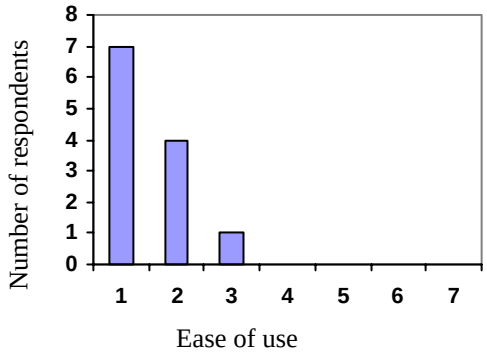
In January 2005 evaluation forms were sent to the GPs participating in the TISS to assess their involvement, awareness and satisfaction with the scheme as well as solicit suggestions.

Of the 18 GPs participating in the TISS as of December 2004, 12 responded to the evaluation.

The following are the results, in bold or in graph or table form, of the evaluation.

1. Length of time GPs have contributed data to this scheme?
   - **Range 1-9 years, Mean 5.7 years**
2. How easy do you find the reporting form to use (Figure 1)?

1	2	3	4	5	6	7
Easy						Difficult



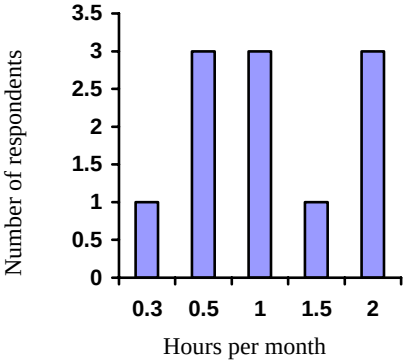
3. Amount of feedback by CDC to the participating GPs

1	2	3	4	5	6	7
Too much?			About right?			Too little?

All 12 of the respondents scored this as a 4, i.e. that the feed back was "about right".

There were no suggested improvements to the reporting form or feedback.

4. Estimated number of hours per month spent on the scheme (11 respondents).
   - **Mean 1.1 hours**



5. Do you think that 4 Continuing Professional Development (CPD) points per quarter is commensurate with the time and effort that you spend on the scheme?

   Yes (11) No (1)

6. Does the feedback from CDC provide awareness of increased influenza activity in a timely fashion.

   Yes (12) No (0)

7. Are you aware of the requirement of the scheme to take samples in certain circumstances for influenza virus culture using throat gargle kits supplied by the CDC?

   Yes (10) No (2)

   Of the 10 respondents aware of the need to collect throat gargles the circumstances cited to collect gargles were:

   - **To confirm diagnosis (when patient meets clinical case definition) (3 responses)**
   - **When there is an increase in clinical cases. (6 responses)**
   - **Most circumstances (1 response)**

8. Have you ever taken samples from patients using these kits?

   Yes (9) No (3)

9. At present, do you have any of these throat gargle kits?

   Yes (5) No (7)

10. Are you aware of the process for obtaining replacement throat gargle kits?

    Yes (8) No (4)

11. Is the information about the clinical case definition adequately provided

    Yes (12) No (0)

Additional comments:

Influenza clinical case definition is a 'bit loose'. Good relationship with staff. They respond to questions.

Number of GPs participating in TISS by year

2002	2003	2004
15	17	20

Questions 7—10 have to do with throat gargles in relation to clinical cases for 2004. The table below shows the number of clinical cases of ILI, and amount of gargles collected in relationship with the culture results.

Would you consider joining the TISS??

Influenza surveillance in the NT is now in its 9th year with approximately 12-14 reporters sending a return each week. This has assisted the NT

Comparison of the number of throat gargles collected in relation to the number of clinical cases of influenza reported for 2004.

	Clinical cases of ILI	Gargles collected	Culture negative	Culture positive
January	17	0		
February	66	1	1	0
March	98	2	2	0
April	51	1	1	0
May	17	0	0	0
June	69	15	14	1 (B/Shanghai/361/2002-like) is not included in the 2004 vaccine
July	60	12	11	1 (A/Fujian/411/2002-like) is included in 2004 vaccine
August	48	16	16	0
September	52	14	13	1 (A/New Caledonia/20/99-like) is included in 2004 vaccine 2 (A/Fujian/411/2002-like)
October	42	3	3	
November	19	0		
December	4	2	2	
Total	**543**	**66**	**63**	**5**

CDC to inform influenza immunisation policy as well as to confirm whether the circulating influenza strains are contained in the current vaccine.

With influenza cases occurring earlier in the year than southern states we are ideally placed to identify novel strains but need to be more conscientious about collecting throat gargles to ensure that this is possible.

The TISS is an approved education activity with The Royal Australian College of General Practitioners and has an allocation of 10 Continuing Professional Development points per triennium. More widespread participation of GPs will ensure that the data collected better represents the Top End. If there are any GPs interested in becoming reporters please contact Lesley Scott at CDC on 89228089 or lesley.scott@nt.gov.au.

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Progress report on the CDC-GP liaison project "strengthening the links"

Heather Cook, CDC Darwin

The Centre for Disease Control (CDC) is interested in conducting educational sessions with the General Practitioners (GPs) in the Top End with the primary aim of informing GPs of resources and services available from CDC and to provide information on notifiable conditions.

Limited information is available on the needs of Top End GPs in relation to communicable disease. In 2002 The Rural Faculty of the Royal Australian College of General Practitioners (RACGP) undertook an assessment of the support and training needs of GPs and GP Registrars working in Aboriginal and Torres Strait Islander Health.[1] As the Northern Territory (NT) has a large proportion of Aboriginal people accessing health services this was considered one useful resource to consider when assessing the needs of GPs in the Darwin Region.

A recommendation from this RACGP assessment is to;

- Provide access to appropriate cultural and clinical resources including:-
  - ⇒ relevant clinical protocols
  - ⇒ local resource manual including information regarding local services
  - ⇒ relevant training courses.

To further explore the needs of, and in an effort to ensure that the topics covered are relevant and beneficial, a needs analysis questionnaire was distributed in February 2005 to staff members of the CDC who are involved in the 'on call' roster system. This is a service provided by the CDC on weekdays and weekends for use by health professionals and the general public to answer questions and provide advice on issues relating to communicable disease in general and specific as regards to the NT. The questionnaire was designed to obtain information on the interactions between the CDC and GPs over the preceding 6 months.

Needs analysis results and summary

The questionnaire was distributed to 19 personnel who are either Medical Officers (MO's) or Registered Nurses (RN's) working within the CDC, some of whom also work in a limited capacity as local GPs or special practice nurses.

15 respondents had been on-call at least 2 times, but most for more than 10 days in the past 6 months (Table 1). 12 of these 'on call persons were required to discuss a communicable disease issue with a GP at least once while on call (Table 2). This resulted in between 47 and 79 reported encounters between GPs and the CDC in the last 6 months.

Table 1. Question 1 – Number of days 'on call' in the last 6 months

2-5 days	6-10 days	>10 days	Total
2	5	8	15

Table 2. Question 2 – Number of times each CDC staff member discussed a communicable disease issue with a GP while on call

Number of encounters	1-2	3-5	6-10	TOTAL
Number of staff members	2	5	5	12
Cumulative number of encounters	2-4	15-25	30-50	47-79

The CDC staff were asked (Question 3) if GPs had reported barriers to communicating with the CDC. Of the 12 who responded to this question 5 indicated a GP reported one or more barriers to communication with a total of 11 difficulties identified via various methods. The 4 classified as other included 3 saying they had difficulty finding the right person to speak to or preferred to speak to someone other than the rostered 'on call' person. One GP wanted to speak with a MO rather than a RN and another requested to speak with staff members specific to the CDC immunisation section. One other issue related to an uncertainty about what diseases to notify and how to notify them.

Of 12 respondents that had interactions with GPs, 9 indicated they had encountered episodes where further education in relation to communicable disease could be beneficial to GPs. Overall there were 16 instances where an opportunity to provide GP education relating to CDC and communicable disease were reported. The range of topics are outlined in Table 4.

Question 5 requested information on whether the 'on call' person had received calls from the general public that led them to believe an important notifiable condition had not been notified. 3 of the 15 respondents identified an encounter of this nature. Only 1 respondent provided explanation of the encounter which revolved around a suspected measles or rubella case continuing to attend school and was an example of where a GP may have been unaware of the CDC recommendations for rash illness investigations.

Table 3. Question 3 – GP reported difficulty accessing CDC resources or advice

	Type of barrier				Total cumulative number of difficulties reported
	Phone	Fax	Email/web site	Other	
Number of GPs reporting	4	1	2	4*	11

*Including "difficulty finding the right person, wanted a medical officer only and not knowing what or how to notify".

Table 4. Question 4 –Number of encounters identified where further education could be beneficial to GPs in relation to communicable disease

Type of communicable disease	Number reported
Acute Post Streptococcal Glomerulonephritis	1
Exclusion periods for child care	1
Individual case management/clinical management (not specified)	2
Malaria protocol	2
Pertussis treatment and infectivity	3
Rash illness	3
Referral of non healing ulcers	1
Relevance/awareness of public health response (not specified)	1
Unsure what should be notified	2
Total	**16**

Question 6 requested information from the respondents as to which areas of CDC services they consider Top End GPs may benefit from if given the opportunity to receive further education. Responses are reported in Tables 5 with 10 different areas identified. The most frequently listed areas were CDC resources; general notifiable disease information and specific information on pertussis and rash illness management.

Where to from here?

The CDC Needs Analysis results and the recommendation from the Rural Faculty of the RACGP assessment indicate that there is a

Table 5. Question 6 – Areas for further education that CDC on-call staff consider may be beneficial

Type of CDC / communicable disease issue	Number	(% of respondents that identified this issue)
CDC contact details	3	(20)
Correct collection of sputum for AFB's	1	(6)
Non healing ulcers	1	(6)
Notifiable disease awareness (general)	11	(73)
Notifying and outbreak of Gastro	5	(53)
Not specified	1	(6)
Public health management of measles or suspected measles	10	(67)
Public health management of pertussis	8	(53)
Public health management of rash illness	8	(53)
Uncomfortable ringing about a disease problem	1	(6)
Where to get fact sheets and disease protocols	8	(53)
Total	**57**	

opportunity to increase the awareness and knowledge of Top End GPs with regard to general and NT specific communicable disease issues.

The planned educational approach consists of one to one academic detailing or practice visits by CDC officers with a GP. A questionnaire will be completed either at the visit or by prior mail-out which will be used as a prompt for further discussions during the detailing session. This will ensure the session focuses on the individual needs of each GP. Web based resources available through CDC will be highlighted and requests for hard copy documents taken.

Historical data pertaining to the individual GPs contributing numbers and percentage of notifiable diseases reported in the NT will be provided. Information obtained from the GPs through this encounter will be utilised for the planning of possible future education programs for GPs in Darwin.

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Results of contact tracing following transmission of *Mycobacterium tuberculosis* in an urban itinerant Aboriginal population in Australia

Tania Wallace, Michael Williams, Vicki Krause, CDC, Darwin

Abstract

Objective: To evaluate the effectiveness of a contact tracing program following transmission of *Mycobacterium tuberculosis* (MTB) in an urban itinerant Aboriginal population in the Northern Territory of Australia.

Design: Contact tracing of MTB cases with initial Tuberculin skin testing (TST) then follow up for 2 ½ years with clinical review and chest X-ray. Isoniazid was offered to eligible people for treatment of latent tuberculosis infection (LTBI). Positive cultures for MTB were sent for restriction fragment length polymorphism (RFLP) testing.

Results: 155 contacts were identified. 68% had a positive TST. 45 were considered for treatment of LTBI, and of these 78% completed treatment. Both directly observed preventive treatment (DOPT) and daily treatment were successful. Active tuberculosis (TB) was diagnosed in 13 contacts giving an attack rate of 8.4% with 9 of these cases being culture positive, of which 8 had identical RFLP typing. All active cases completed a curative treatment for TB.

Conclusion: In this Aboriginal population, a high risk of infection with MTB exists with subsequent progression to active TB. Successful treatment for LTBI can be achieved in a population where adherence to long-term treatment has proven difficult in the past, however this is resource intensive. RFLP typing helped to establish epidemiological links.

Introduction

Tuberculosis (TB) rates in Australia have fallen to a stable level in the 1980's and 1990's of between 5 and 6/100,000.[1] However TB is still a problem in the Northern Territory (NT) of Australia with rates on average during the mid 1990's of 19 /100,000, which is 3 to 4 times the overall national rate.[2] Rates within the Aboriginal population in the NT have ranged from 39 to 53 /100,000 in the late 1990's.[3] The high rate in this population is due to both increased risk factors that promote transmission of infection as well as those that promote progression of *Mycobacterium tuberculosis* infection to active TB. Contributing to both transmission and progression to disease are poverty, overcrowding, poor housing, poor nutrition, high rates of chronic diseases, and alcohol overuse.[4] Other factors that adversely effect TB control include cultural barriers, waning TB awareness in health care providers,[5] population mobility, and lack of access to medical services.[6] In this context the urban poor itinerant population are a well recognized high risk group with latent TB infection (LTBI) prevalence rates reported in some studies as above 30%.[7]

The primary aim of a TB control program is early diagnosis of active disease (particularly of those with smear positive pulmonary TB to prevent transmission) and near 100% cure rates.[8] If the primary aim is being achieved the next level of control is to identify those with LTBI as identified by tuberculin skin testing (TST) or (Mantoux test), followed by preventive treatment for those with a significant TST reactions.[9]

Literature supports using isoniazid (INH) as a daily treatment for LTBI.10 A 1998 Cochrane review looked at published randomized double blinded controlled trials that compared a 6 month or greater course of isoniazid with placebo. A total of 33,113 patients were included in the meta-analysis which concluded that 6 and 12 month courses of INH decrease the progression to active TB.11 A limiting factor to this preventive strategy is compliance over months of treatment as reported in a number of studies.[7, 10, 12] As with treatment for TB disease there is literature to suggest directly observed therapy (DOT) should be considered to improve the success of isoniazid prevention. Published data on this are limited, with 2 studies successfully using a combination of isoniazid and rifampicin[13, 14] and another using isoniazid alone.[15]

TB control activities in the NT are supported and coordinated through the TB/Leprosy Control Unit in the Center for Disease Control (CDC) of

the Department of Health and Community services (DHCS), formerly the Territory Health Services. Protocols in the *Guidelines for the Control of Tuberculosis in the Northern Territory* are followed.[2, 16]

The NT Aboriginal population overall has high rates of TB however a remote northern rural Aboriginal community has an ongoing problem with TB, with a crude yearly incidence which has wavered around 150/100,000 over the 26 year period 1967 to 1993.[17] An outbreak of TB occurred in a population of itinerant Darwin urban Aboriginal people who moved between this remote community and the urban setting. One case of nodal TB was diagnosed in June 1997. A subsequent 2 cases of smear positive pulmonary TB were diagnosed in November 1997. Following protocol, an extended contact-tracing program was initiated in January 1998. Contacts of smear positive tuberculosis were followed up with clinical review for 2 1/2 years with the aim of this study to evaluate the effectiveness of the extended contact-tracing program. The main objective was to review the outcome of patient management including treatment of LTBI, clinical follow up as appropriate, and outcomes.

Study population and methods

Population and sampling

The contacts for this extended community screen were identified first by the index cases interviewed in hospital, followed by further discussion in the community. A total of 155 people were identified who were all part of a "transient" community of Aboriginal people living either in temporary urban or "town" camps or particular households. These people all came from the same clan group from a remote rural Aboriginal community with a population of approximately 2200 people[18], located about 400km on unsealed roads from Darwin, usually accessed by aircraft. They moved frequently between the 2 locations. There were a total of 7 town camps and 7 households involved in this urban setting with the distance covered by health staff visiting these locations of 120 km (calculated in the setting of people being located on the first trip). Living conditions were often very difficult with overcrowding, limited transport, no telephone or postal communication and contact required visiting in person. Over use of alcohol was common and people were very mobile both within the urban setting and in visiting their remote community.

Tuberculin skin testing (TST)

Identified contacts were provided with transport to health care facilities, educated regarding TB and offered TST, chest X-ray and clinical review. All services were provided free of charge to participants. A TST consisted of an intradermal injection of 0.1ml of purified protein derivative (PPD), given in the anterior aspect of the forearm.[2] The reaction was read between 48 to 72 hours after the injection by measuring the largest diameter of induration*. A TST was repeated at 3 months in those whose initial test was given within 3 months of initial exposure to an index case and whose reaction was <15mm. Results of <10mm were considered negative, and 10mm or more considered positive.

Clinical review, diagnosis, RFLP testing and treatment of active disease

All participants were offered education regarding TB, chest X-ray and clinical review at the time of their initial attendance for TST. Chest X-rays were read on the day and those with possible active TB were further investigated for a definitive diagnosis or admitted to hospital. Those notified with TB were admitted to hospital for initiation of treatment and intensive education and once discharged were treated with directly observed therapy (DOT) for six months.

> A case which has been confirmed by the identification of *M. tuberculosis* (or *M. africanum* or *M. bovis*) by culture;
> or
> A case that has been diagnosed to be active clinically and which has been accepted as such by the State or Territory Director of Tuberculosis.

The national case definition for TB was used:[1]
All notified cases had specimens obtained and sent for acid-fast bacilli (AFB) smear and culture. All positive cultures for *M. tuberculosis* were sent to the Mycobacterium Reference

* This method was superceded in 2003 with a single reading of the diameter of induration across the long axis of the forearm.[16]

Laboratory at the Victorian Infectious Diseases Reference Laboratory for identification, susceptibility testing and restriction fragment length polymorphism (RFLP) based on the IS6110 sequence.

Treatment for latent TB infection (LTBI)

Treatment for LTBI using isoniazid (INH) at the time of this intervention was considered for those with no contraindications and a TST measuring 15mm or more with prior BCG, or 10mm or more with no prior BCG, who were under the age of 35 years. Also for those of any age who were close contacts of a smear positive case of TB or who had a documented TST conversion. Clients requiring treatment of LTBI were prioritized according to risk with children less than 5 years of age, those with TST conversions and close contacts of smear positive cases being the highest priority. All those considered for INH had baseline liver function tests (LFTs) performed, and treatment only considered if the alanine transaminase (ALT) was less than twice the normal value.[2] LFTs were only repeated during the course of treatment if clinically indicated.

Treatment of LTBI required INH for 6 months accompanied by pyridoxine (vitamin B_6). Treatment compliance and access to medication were seen as major problems. Initially it was hoped that directly observed preventive treatment (DOPT) for LTBI as previously shown to improve compliance in homeless populations [18] would be possible. However staffing restraints and the time required finding patients necessitated a compromise. A third of adults living in more stable houses and not town camps, were categorized as more likely to be compliant with treatment and were given daily treatment using a dosette box filled weekly. For people living in houses health staff at community health centers supervised medication. Staff from CDC visited the town camps to distribute medication to those more difficult to locate and to find defaulters. If people on treatment moved to their rural community, that community's health staff supervised medication. Staff to record side effects and to document compliance monthly used a standard CDC form. Compliance with daily treatment was measured by checking dosette boxes weekly. One extra staff member was employed to cope with the workload. At completion of treatment clients were given a final clinical review and chest X-ray then discharged. Completed treatment was defined as 80% or more of 6 months treatment within 8 months.

Follow up for those not on TB or LTBI treatment

Those with positive TST results who were not on treatment for TB disease, and those with LTBI but who were not eligible for LTBI treatment or were unable to complete a course of treatment were offered follow up. This consisted of chest X-ray and clinical review at 6 months then yearly for 2 years. Adequate follow up required a final X-ray and review at least 2 years after initial contact with an index case.

Analysis

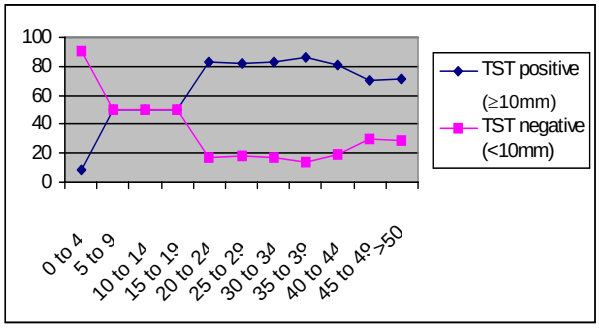
Data were analyzed using Epi-Info Version 6.[19]

Results

Tuberculin Skin Testing

All 155 identified contacts attended for the initial chest X-ray, clinical review and TST. Of these, 152 (98%) had their TST read (or had documented past TST ≥15mm). The results of the TST by age distribution are shown in Figure 1. Of these 152, 49 (32%) had a negative TST result (<10mm) and a mean age of 20.4 years while 103(68%) had a positive TST (≥ 10 mm) and a mean age of 31.5 years (P<0.001). Of these positive TST results 75 were ≥15mm and 28 were 10-14mm.

Figure 1. Age distribution and results of tuberculin skin testing (TST) n=152



*Mx=TST

Table 1. Outcome of clients identified as contacts

Outcome	Number	Percent
Active cases	13	8.4
Completed LTBI treatment *	21	13.5
Followed up & discharged appropriately #	95	61.3
Loss to follow up at initial review	3	1.9
Loss to follow up at 6 month review	2	1.3
Loss to follow up at 1½ yr review	9	5.8
Loss to follow up at 2½ yr review	8	5.2
Deaths during follow up period	4	2.6
TOTAL	155	100

*One death occurred after completion of LTBI treatment and discharge.

Two deaths occurred after follow up and discharge.

Clinical review outcomes

The outcomes of those identified as contacts are shown in Table 1.

There was an overall loss to follow up of 22 (14%) after removal of deaths. In total there were 7 people who died during the study period unrelated to TB or LTBI treatment. The age range at death was 22 to 70 years with a mean age of 52 years. There were a variety of causes of death including 2 from malignancies, 1 from assault, and 2 from accidents. Active TB was diagnosed and notified in 13 cases and no deaths were attributed to TB or treatment for TB.

Table 2. Outcome of clients considered for treatment of latent TB infection (LTBI)

Outcome	Number	Percent
Contraindicated	12	27
Declined	3	7
Not offered (reason not provided)	3	7
Defaulted	4	9
Ceased treatment for medical reasons	2	4
Completed	21	46
Total considered for INH	45	100

Those considered for treatment fulfilled the indications for treatment of LTBI as per the Guidelines for the Control of TB in the NT.[2]

Table 2 shows the outcome of the 45 (29%) of all contacts who were considered for treatment of LTBI as recommended by the *Guidelines for Control of Tuberculosis in the Northern Territory*.[2] A large number (12 or 27%) of contacts had conditions considered to be contraindications for treatment: 6 were pregnant or post partum, 1 had abnormal liver function due to hepatitis B, 1 had abnormal liver function due to alcohol, 1 had encephalopathy, 1 had

Table 3. Notified TB cases

Patient	Age (y), sex	Time of notification	TST result (mm)	Site of TB	MTB culture	DNA type (group)	Compliance
1	30, F	pre-screen index	20	nodal	-	NA	93%
2	41, F	pre-screen index	10	pulmonary	+	identical	87%
3	41, M	pre-screen index	28 *	pulmonary	+	identical	99%
4	34, F	Self present during screening	22 *	pulmonary	+	identical	99%
5	68, F	Initial review	24	pulmonary	+	not identical	86%
6	29, M	Initial review	25	pulmonary	+	identical	92%
7	6, F	Initial review	18	nodal	-	NA	97%
8	10, M	Initial review	16	pulmonary	-	NA	86%
9	45, M	Initial review	30	pulmonary	+	identical	85%
10	24, M	6 month review	26 *	nodal	+	identical	100%
11	25, F	6 month review	35 *	nodal	+	identical	100%
12	48, M	2 1/2 year review	11	pulmonary	+	identical	100%
13	45, M	2 1/2 year review	14	pulmonary	-	NA	Deceased#

* = Past TST results, # = unrelated toTB or LTBI treatment.
Age (y)=Age in years, M=male, F=female. NA=not applicable.

social reasons and 2 had taken treatment for LTBI in the past. A further 3 declined treatment and 3 were not offered treatment with reasons not given.

Of the remaining 27 people commenced on treatment, 21 (78%) completed treatment with only 4 defaulting. A further 2 people did not complete treatment, 1 due to pregnancy and the other due to death from trauma. Treatment was administered using DOPT for 17 people and of these 14 (82%) completed treatment. Daily treatment was prescribed for 8 people and of these 7 (87%) completed treatment.

Table 3 lists the 13 of the 155 contact group who were diagnosed with active TB, giving an attack rate of 8.4%. There were 3 initial 'index cases' in the contact group who self presented and formed the basis for this extended community screen. One further case self-presented during the early stages of the screening program with the remaining 9 cases identified from screening. The majority of cases were diagnosed early in the program, however 2 cases were found at the final review at 2.5 years. Pulmonary TB was diagnosed in 9 cases (69%), 7 of whom were smear positive and 4 (31%) who had nodal TB. The age range of cases was 6 to 68 years, with a mean age of 34 years. Past positive TST results were identified in 4 cases but they had not been offered LTBI treatment reportedly due to concerns of alcohol overuse and abnormal LFTs in 2 cases, pregnancy in 1 and age exceeding the guidelines of the time in the other.

Of 13 cases 9 (69%) were culture positive for MTB with 8 of the 9 cases having identical RFLP typing. This RFLP type had also been found in previous cases of culture positive TB from this same remote Aboriginal community, but numerous other types have been identified from the community over the previous 10 years. The 1 case (number 5) with the non-identical RFLP type was from an elderly woman. Susceptibility testing from all 9 culture positive cases showed no drug resistance. All cases completed a curative treatment for TB with directly observed treatment (DOT), except 1 patient who died early during treatment from an unrelated condition.

Discussion

This study highlights the extremely high risk this urban Aboriginal itinerant population has for infection with TB and subsequent progression to active disease. Added to this many in this population are alienated from health care services, and it is acknowledged that follow up and compliance with treatment for LTBI in such groups are often unsatisfactory. This study shows that despite these issues a successful contact tracing and prevention program can be conducted.

When defining a positive TST as 10mm or more, 68% of contacts were positive. The majority of the Aboriginal population has had prior BCG vaccination, which can effect the interpretation of TST results specifically in the range of 10 to 14 mm. Still 75 (49%) of contacts had results greater than 14mm, which shows a very high infection rate in this population. The difference in mean age between TST negative and positive results is statistically significant ($P<0.001$), with positive TST results in the older population. From this one might presume that the high infection rate is primarily due to infection of the older population many years previously in the context of living in a community where very high rates of TB have been documented.[17] Very few repeat TST's were indicated as the majority had initial positive results, past positive results or the initial TST was done more than 2 months after exposure to an active case. Very few TST conversions were documented, so there was little direct evidence available of recent transmission.

Against this background of high rates of LTBI there is evidence of a recent outbreak, with an epidemiological link between 13 cases of active TB notified over a period of 2½ years. The RFLP has confirmed the epidemiological link between these cases with 8 out of 9 culture positive cases being identical. Clustering of isolates is defined as 2 or more isolates with fingerprints that are identical, or very similar.[20] Clustering in the context of a contact-tracing program suggests new infection with progression to disease rather than reactivation of disease.[21] Glynn et al states that "If it has been possible to establish epidemiological links between clustered cases it is reasonable to accept that the

cases are part of the same chain of transmission, either directly or indirectly (from common sources)".[20] However "if few strains predominate over a long period of time, clustering cannot be assumed to represent recent transmission."[21] In this study the clustering of isolates has occurred in a background of numerous strains being present in this community in recent years (Personal communication, author VK from laboratories performing the RFLP typing since 1989 on NT strains).

The mean age for active cases was 34 years, with only 1 case in an elderly person aged 68 years whose DNA isolate was not identical. This is consistent with the literature which shows that the proportion of disease attributable to endogenous reactivation rises with age.[19] With movement of Aboriginal people between locations and overcrowded living conditions, contact lists can be large and often incomplete. In this context DNA fingerprinting will continue to play a role in helping to establish epidemiological links for service providers in TB programs to enhance preventive measures for better TB control.

It is well documented that approximately 50% of the lifetime risk of progressing to active disease once infected, occurs within 2 years of infection.[22] Despite the fact that the majority of TB cases were diagnosed at their initial or 6 month review, there were 2 further cases of TB diagnosed at the 2 year review. It is therefore essential to adequately support such programs for follow up of contacts over this period. In this study only 17% of patients were lost to follow up in an extremely mobile and difficult to access population. This reflects the cooperation of the contacts and all health services serving this population as well as the need for TB Unit staff to actively drive around looking for people, often having to visit a number of locations to find people for treatment or to provide transport to the hospital for clinical review.

Although numbers are small, this study shows that successful treatment for LTBI can be achieved in a population where adherence to long-term treatment has proven difficult in the past. In this case 77% of people who were commenced on treatment for LTBI completed a 6-month course of treatment. There were also no significant side effects requiring cessation of treatment. Due to concerns regarding compliance the initial intent was to deliver DOPT to all patients however staffing restraints, and the time required to find patients necessitated a compromise. A third of adults living in more stable houses and not town camps, were assessed as more likely to be compliant with treatment and were given daily treatment via weekly supervised dosette boxes. It is interesting to note that both groups had very good compliance rates, with 82% for DOPT and 87% for daily treatment. This is in contrast to the literature which shows that compliance with daily treatment is generally poor.[6, 7, 23] However in this study those on "daily treatment" were closely followed up and supported with weekly dosette boxes given to patients, weekly compliance checked, and follow up by disease control staff with home visits if compliance was lapsing.

INH prevention with either DOPT or closely supervised and supported daily treatment is a resource intensive program. A study in America looked at the cost effectiveness of using DOPT for LTBI along with a methadone treatment program.[15] Assuming 65% INH effectiveness, DOPT provided cost effective with only a 10% improvement in INH effectiveness compared to the self administered (non supervised) regimen. The conclusion was that "commitment of additional resources required for DOPT should be given a priority in this and other populations at high risk for tuberculosis".[15] It must be remembered that TST is a screening tool to diagnose LTBI, and in itself is time consuming for health staff to administer. Although there is clearly an effective treatment for this asymptomatic stage to prevent active disease (i.e. INH treatment) the practical limitations of inadequate resources mean that in reality the preventive treatment is often not effective. This brings into question the whole issue of screening for an asymptomatic stage of a disease without being able to provide adequate treatment to achieve prevention.

This study shows that follow up of contacts for diagnosis of active TB, and good compliance with INH prevention, is achievable. However it requires a dedicated centralized TB program to not only coordinate services, but also to follow up clients who missed appointments or who

were non-compliant. There must also be transport provided to enable access to clinical services, provision of all aspects of care free, good rapport with clients, and education of clients. It requires commitment by many sectors of health care delivery with adequate resources. Without this the main aims of a TB program, namely early diagnosis and cure of cases, diagnosis of LTBI and prevention with INH, cannot be achieved.

Acknowledgements

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Outbreaks of gastrointestinal illness at a remote mine site

Michelle Harlock, OzFoodNet Epidemiologist

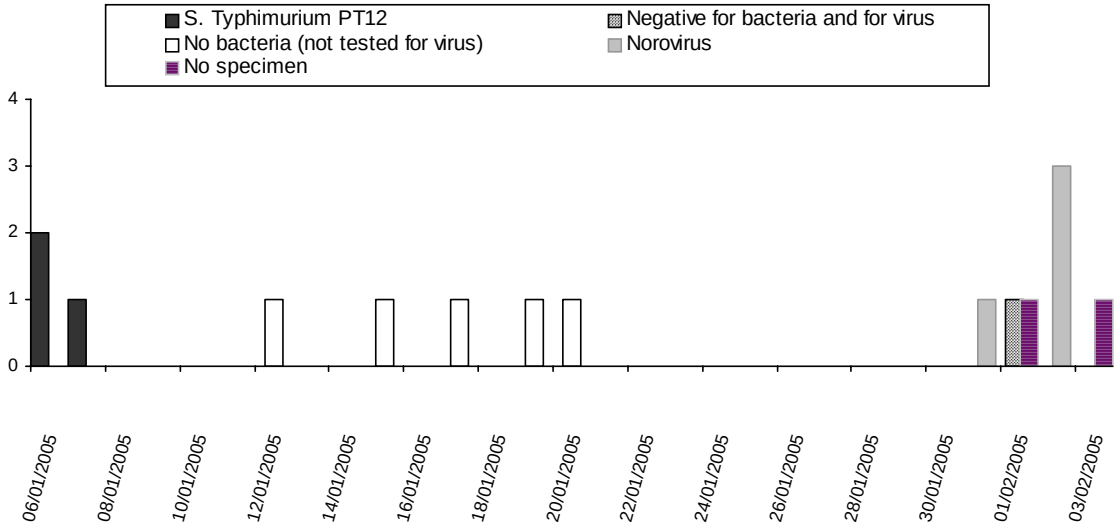
Commencing 6 January, 2005, 3 isolates of *Salmonella* were cultured from persons residing at accommodation provided for workers of a mining company. At this residence, all meals are catered for by a national catering company. During interviews with cases it was noted that the majority of meals were consumed at the premises provided by the company concerned. Further investigation identified 5 additional persons reporting gastrointestinal disease symptoms occurring with an onset between 12 - 20 January. When specimens from these latter cases were tested, no *Salmonella* (or any other routine bacterial pathogens) were isolated. The isolate from the initial 3 cases was identified as *Salmonella* Typhimurium 12, a serovar associated with food borne illness.

Environmental Health inspections were carried out at the premises, where the kitchens and food handling techniques were observed. No breaches of food safety or hygiene were noted. Food testing did not identify *Salmonella* Typhimurium in any of the samples. Public Health measures that were initiated included the placement of signs to raise awareness of diners about the importance of hand washing and hygiene when handling food, especially where 'self service' from a buffet style setting was normal practice. No further cases were identified from this outbreak investigation other than the initial 3 and the 5 identified 2 weeks later.

Following these investigations, health practitioners in the area were advised to be aware of cases of gastrointestinal illness amongst the residents of the accommodation concerned. In February, 2 weeks after the initiation of the investigation into the *Salmonella* Typhimurium cases, a case of gastrointestinal illness, again in a resident of the mining accommodation, was notified to the local regional Centre for Disease Control (CDC). Further case finding was initiated and identified 6 additional cases describing symptoms of gastrointestinal illness occurring between 31 January and 3 February. Interviews with the cases failed to identify a common food source. Most morning and evening meals were consumed at the residence dining hall in a buffet style setting, with lunches being packed by the residents themselves after making a selection from a self service buffet. However some cases had eaten meals at locations other than the residence's dining hall.

In this second outbreak the causative agent was norovirus, which was identified from 4 of the 5 stool specimens submitted for testing (Figure 1). A specific common food source could not be identified in this instance as most cases had eaten a selection of a variety of meals from the servery with accurate recall being problematic. The relatively small number of cases identified of those potentially exposed (over 500 people) indicated possible person-to-person transmission of the virus. Another possibility may have been person to food to person transmission since most cases had little direct contact with one another.

Figure 1. Outbreak curve(s) of gastroenteritis



Looking back on the 5 gastroenteritis classes identified following the *Salmonella* cases whose stools were negative for bacterial pathogens but were not tested for viruses these could have been initial cases of the norovirus outbreak. The investigation of these clusters of gastroenteritis highlights some of the difficulties involved when investigating a potential outbreak. Case finding was instigated when results were notified to the CDC about a week after symptoms of the initial cases had commenced, making it difficult to identify further cases of salmonellosis. Clinicians are required to notify CDC of gastroenteritis in 2 or more linked cases with the potential for an outbreak in an institution or food handler. A large residence with common facilities such as this qualifies as an institutional setting.

While the investigation did not identify a common food source for the cases of *Salmonella* Typhimurium 12, it did lead to some intervention measures being implemented, with signage placed to educate consumers. It also sensitised health providers to the need for early reporting of gastroenteritis, which occurred in the second cluster. The company itself implemented a system to capture reports of gastrointestinal illness. No further cases were notified to the Centre for Disease Control following the outbreak investigation.

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Dengue mosquito eradication project Tennant Creek. End of January 2005 progress report

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[1]Medical Entomology Branch, [2]Centre for Disease Control

Introduction

The Medical Entomology Branch (MEB) of the Centre for Disease Control (CDC) in the NT Department of Health and Community Services (DHCS) is currently at the forefront of an eradication program to rid the town of Tennant Creek (and the NT) of the dengue mosquito. The dengue mosquito *Aedes aegypti* is capable of transmitting the dengue virus that causes a serious and potentially fatal illness. Dengue outbreaks caused hundreds of deaths in South East Asia last year, and at least 1 death in north Queensland. The NT has been free of *Aedes aegypti* and hence dengue disease since the late 1950s. This is despite many instances of importation of *Aedes aegypti* from overseas into port areas of Darwin; and their immediate elimination by the Australian Quarantine and Inspection Service (AQIS) and MEB.

The dengue mosquito was discovered breeding in Tennant Creek in February 2004, after being detected in a routine mosquito-trapping program using carbon dioxide baited encephalitis virus surveillance (EVS) traps. An initial survey and control program was started immediately after detection, and ran until April 2004. The field aspects of an eradication program were begun in late November 2004 and are now well under way. This report describes the results of the program to date.

Dengue outbreaks were common in the early history of the NT, and have become a regular feature of tropical north Queensland in recent years. The reappearance of dengue mosquitoes in Tennant Creek raises the possibility of dengue disease in Tennant Creek and the spread of the mosquito to other towns in the NT. There could be a reappearance of regular outbreaks of dengue disease if the mosquito becomes entrenched in other towns and rural areas in the north of the NT.

Initial control program

An initial survey and control program was implemented by DHCS immediately after the detection, and received widespread community support. The initial control program involved surveys by officers of the MEB in cooperation with;

- the local Environmental Health officer in Tennant Creek,
- other CDC staff in Tennant Creek and Darwin,
- personnel from the Australian Army,

- medical students from Flinders University of South Australia,
- staff from the Health Department of Western Australia,
- local town and community councils,
- local pest control operators,
- and the general public of Tennant Creek.

The initial program was promptly and fully supported by the executive of the DHCS, the director of CDC, and the local MLA in Tennant Creek, and in principle support was received from the Australian Government Department of Health and Ageing and from the National Arbovirus and Malaria Advisory Committee (NAMAC)

The aim of the initial survey was to determine the presence and extent of the *Aedes aegypti* mosquitoes. It involved surveying urban and semi-rural areas throughout Tennant Creek and inspecting water-holding receptacles for mosquito larvae. The team also set mosquito traps, including sticky traps and bifenthrin insecticide-impregnated lethal egg traps (lethal ovi traps) designed for detecting or killing *Aedes aegypti* mosquitoes. Initial surveys also involved inspection of water receptacles in the nearby towns or localities of Ali Curung, Three Ways, Mataranka and Elliot. A comprehensive public relations and information program was initiated to inform and seek assistance from local residents, councils and authorities. A hot-line advisory service was established. Posters were put up at supermarkets and talks were given at local schools. Newspaper news items and notices became regular features in the local and NT-wide newspapers.

The control program initially involved;

- a door-to-door education campaign on how to eliminate breeding sites,
- the distribution of cans of aerosol insecticide surface spray to all Tennant Creek householders with instruction to spray all potential water holding receptacles in their yards and premises, treating most premises by the control team in cooperation with the occupier of the premises,
- a fogging operation of the town with assistance from the Alice Springs Town Council using a Leco heavy-duty fogger dispensing bioresmethrin and diesel 4:1 mix,
- a survey and treatment of transport hubs including the railway, the airport, and bus facilities,
- a hard rubbish roadside collection from all residences organised with the Tennant Creek Town Council with all rubbish collected buried at the local tip.

The distribution of the spray and initial treatment of premises was carried out by the elimination team, in conjunction with the Julalikari Council, the Anyinginyi Congress and the Tennant Creek Town Council. A private pest control company assisted with control in the industrial premises.

The latter phase of the control program involved the control team;

- revisiting, inspecting and treating every receptacle in all premises in Tennant Creek,
- collecting samples of larvae from any receptacles holding water,
- treating all receptacles with lambda cyhalothrin pressure pack spray or methoprene pellets, depending on the type and use of the receptacle, .
- applying temephos liquid in certain side entry pits of roadside drains receiving run off from irrigated lawn areas,
- applying methoprene pellets on roof gutters with obvious dips and in Telstra inspection pits and manholes,.
- applying methoprene briquettes in septic tanks, and bifenthrin spraying the sides of the tanks.

Other towns further north of Tennant Creek including Renner Springs and Mataranka were also surveyed and treated, while a standard ovi trap system was instituted in a number of towns in the NT not already in the ovi trap program, including Alice Springs, Jabiru and Katherine.

There was an excellent public response in Tennant Creek, with only 8 refusals to enter or treat premises, and these were later progressively inspected and treated with the owners' permissions. During the latter stages of the control program there was ample evidence of residents emptying receptacles and storing

receptacles upside down, although it was also obvious that not all occupiers were able to locate and treat every receptacle on their property. Progressively fewer breeding sites were evident in the later stage of the control program, but this also coincided with the seasonal reduction in rain.

Results of initial control program

During the initial 8 week control program from February to April 2004, a total of 1087 of 1107 properties in Tennant Creek were visited and treated by the team. This included occupied residential blocks, vacant blocks, vacant houses, and industrial, business and rural blocks. The rest of the premises were progressively inspected by ad hoc visits by MEB during the dry season.

The survey found 91 different premises breeding *Aedes aegypti* mosquitoes. This represented over 8% of premises positive for *Aedes aegypti* larvae. The range of receptacles with dengue mosquitoes includes bird baths, dog bowls, old tyres, buckets, pot plant drip trays, ice cream containers, jars, disused evaporative air-conditioners, plastic trays, sheets of plastic, machinery, an unkempt spa, a vase, a compost bin, a boat, a tarpaulin, an old car body, and a range of other artificial receptacles that held water.

Of the 58 premises with rainwater tanks, 53 were successfully treated during the period and the rest were followed up later in the dry season for inspection and treatment.

There were 15 EVS traps positive for *Aedes aegypti* out of 77 traps set in Tennant Creek over the period, with 23 adults collected, including 4 males. The sticky and lethal ovi traps did not detect many adult dengue mosquitoes or their eggs, with only the 1 lethal ovi trap positive for *Aedes aegypti* eggs, although this low result was partly due to the ready availability of alternate breeding sites and the limited number of traps used.

Conclusions from initial control phase

The extent of the infestation indicated that the *Aedes aegypti* have been in the town from at least December 2003 when the seasonal rains began. While they were present in a considerable area of the town, they were under-represented in the industrial area and a relatively isolated residential area on the east side which faced prevailing dry season winds. It is probable that eggs in a receptacle were brought into the town in the wet season of 2002/2003 possibly in domestic receptacles such as pet drinking containers, pot plant drip trays, or spare vehicle tyres. *Aedes aegypti* mosquitoes can be readily transported as drought-resistant eggs stuck to the sides of dry, water-holding receptacles.

Genetic analysis of specimens from Tennant Creek by Dr Nigel Beebe of the Institute for the Biology of Infectious Disease in NSW have revealed that the specimens were identical to those in Cairns but not identical to those in Townsville or East Timor. It is probable that infested receptacles came into Tennant Creek either direct from Cairns or another town on route from Cairns.

By the end of the control program, the rainy season had finished and there were very few receptacles with water. It was decided that a full-scale eradication program was feasible and preparations were made to put an eradication program in place. It was clear that any eradication would need a team of trained people making premises-by-premises inspections and treatments to cover all premises in Tennant Creek.

Organisation for the eradication program

During the dry season a reduced program was maintained including;

- ad hoc inspections and treatments by MEB staff from Darwin.
- setting a number of fixed and roving EVS traps weekly.
- setting a number of lethal ovi traps at key premises.
- public awareness by regular news stories and advertisements to prevent mosquito breeding.
- erecting roadside signs advising travellers “Don’t move mosquito eggs”.

Very few adult mosquitoes were detected during the dry season and those detected were successfully traced to nearby key receptacles which were treated.

NAMAC discussed the infestation in a national meeting in March 2004 and supported the concept of eradication. Formal request and a budget submission for Commonwealth funding was made in May 2004.

In June 2004 the Australian Government Department of Health and Ageing agreed to provide one million dollars towards an eradication program. From June to November there was progressive recruitment and on-the-job training of staff, and setting up the program.
The eradication team comprises;

Darwin based:

- the Project Director Peter Whelan, a week every month in Tennant Creek,
- the Project Manager Bill Pettit, a week every fortnight in Tennant Creek,
- a technical officer who identifies larval samples from Tennant Creek and other towns.

Tennant Creek based:

- field operations supervisor,
- 9 technical field staff,
- an administrative/data entry officer.

The Tennant team is backed by MEB staff in Darwin, including an MEB information technology officer for database and mapping support, and for recording the data from the project, and other MEB professional, technical and administration staff variously involved in the Tennant Creek project or in surveys in other areas of the NT.

The organisation for the eradication project involved setting up facilities, and organising and training staff. Aspects organised included:

- staff duty statements and staff recruitment,
- vehicle hire and housing,
- provision of office and laboratory space including computer and phone connections,
- provision of an insecticide storage shed,
- preparation of a range of publicity material including newspaper advertisements and forms such as “Not at home” notices,
- setting up a public information hotline,
- writing field and laboratory protocols,
- organising an initial rubbish clean up campaign,
- liaison and clearances for inspections of roadside entry pits and Telstra underground facilities.

Public relations included regular weekly newspaper ads in the local paper. A number of newspaper stories and radio interviews kept the issue alive for residents in Tennant Creek.

Existing TV advertisements targeting backyard mosquito breeding began in November and covered the entire NT.

The eradication plan

The eradication plan involves the 2 elements of surveillance and control, conducted simultaneously. The plan primarily involves premises-by-premises inspection of all premises in Tennant Creek and nearby camps and communities for receptacles with larvae, and treatment of every receptacle with bifenthrin, chlorine bleach, or methoprene pellets. Rainwater tanks are a special issue and involve initial treatment with methoprene pellets and complete sealing by the eradication team.
Other tasks include;

- inspection and excavation of blocked concrete storm drain end points,
- treatment of Telstra pits,
- treatment of all roadside entry pits,
- a rubbish collection,
- cover of collected rubbish and tyre dumps at the rubbish dump.

Surveillance

Surveillance for dengue mosquitoes is by;

- larval sampling of receptacles in the premises-by-premises search, to determine where larvae were present. This is the primary surveillance method.
- adult mosquito sampling by CO2 baited EVS traps. Currently there are 10 EVS trap set on a weekly basis, which includes 3 routine fixed trap positions.
- egg sampling using number of lethal ovi traps, aiming primarily to kill adult female

mosquitoes in the process of laying eggs, as well as providing surveillance information by indicating locations where eggs are laid.

- adult sampling with sticky ovi traps designed to trap mosquitoes as they come to lay eggs. The placement of the sticky traps will start in latter part of February when rain filled receptacles are likely to decrease, along with the seasonal rainfall.

Inspections and control.

The main part of the program is to locate and treat all receptacles that are capable of holding water. The main method of eradication will be the application of bifenthrin to the inside of all receptacles using hand held pressure sprayers. Other receptacles unsuited for application including birdbaths, pet drinking-water containers will be emptied and sprayed with a household bleach solution by hand held pressure sprayers, and then rinsed and refilled. Methoprene pellets will be distributed to residents to treat birdbaths and pet water, together with advice on regular cleaning and treatment of receptacles with water.

The eradication team began field operations in late November 2004 in Tennant Creek.

Results to the end of January 2005

The team has largely completed Round 1 of property inspections in Tennant Creek and are now well into the Round 2 of inspections.

In Round 1 from 22 November 2004 to 29 December 2004 there were 986 premises entered and treated and 198 premises that the team were unable to enter. There were only 3 receptacles with *Aedes aegypti* larvae, including a grease trap associated with a septic tank, a bucket below a dripping trap, and a rainwater tank. The last positive receptacle was a rainwater tank discovered in the last week of December. There were no CO2 traps positive for adult *Aedes aegypti* mosquitoes in Round 1 or Round 2.

In the Round 2 of inspections from 29 December 2004 to 25 January 2005, there were 683 premises inspected and treated, and 188 unable to enter, with no premises positive for *Aedes aegypti*. Premises not previously entered in either round are now being targeted for inspections.

All rainwater tanks have been inspected and treated initially by methoprene, or kerosene in cases where owners weren't happy with methoprene. Sealing of rainwater tanks begun in December is still ongoing, with the majority of tanks now sealed.

In Round 1 of the eradication phase, 3 properties positive with *Aedes aegypti* to date represents just over 0.3% of the properties positive. This is in contrast to over 8.0% positive premises for the initial control program in February-April 2004. This result vindicates the strategy of the initial control program and confirms that the initial control was very effective in reducing the population of *Aedes aegypti*.

Program for next 2 months

The program for the coming months will include;

- completion of Round 2 of premises inspection and treatment, with missed premises being particularly targeted.
- treatment of roadside entry pits and Telstra pits.
- increased surveillance using EVS traps.
- increase in lethal and sticky ovi traps.
- the inspection of rural properties and industrial premises to be specifically targeted.
- rainwater tank sealing to be completed.
- start of Round 3 of inspections and reapplication.

The roadside entry pits and Telstra pits will be treated with bifenthrin using a vehicle heavy-duty sprayer with a pump and a 300-litre tank. The side entry pits have a concrete cover that will be partially lifted by a lever arrangement. A hand held spray gun will apply bifenthrin to the walls of the pits to point of run off, without spraying the water in the base of the pits. Initial trials of this type of spraying have indicated a very good spray pattern. Any water in pits will be treated with Abate 1% granules or methoprene pellets, depending on the end point of drainage from the pits and the presence of fish.

Surveys will be continued in other towns in the NT, including a joint survey of towns with Queensland Health near the Queensland border.

Outlook

One of the benefits of the spray of side entry pits and Telstra pits will be cockroach control. During initial inspection of these sites there were very large numbers of American cockroaches present. Another benefit from the program will be a dramatic reduction of other species of domestic mosquitoes including the brown house mosquito *Culex quinquefasciatus*, and the native container-breeding and tree-hole mosquito *Ochlerotatus tremulus*, both of which can cause pest problems in Tennant Creek.

The outlook for eradication is looking extremely good. The absence of larvae or adults since late December has been achieved in spite of a number of rain episodes, which could have hatched dormant eggs. However there could still be dormant eggs in receptacles stored under cover or in cryptic places that could be later repositioned by residents to become potential breeding sites. The major method of achieving this reduction to date has been the treatment of receptacles with bifenthrin spray. Lethal and sticky traps will be useful as additional surveillance tools late in the program, as seasonal rainfall falls after March. These other trapping or elimination methods are however not likely to offer any significant additional degree of control.

While the control to date has been apparently very successful, it may be necessary to continue the program over the next financial year to verify that eradication has been achieved. If this program is successful, it could be a model for the eradication of *Aedes aegypti* in towns in north Queensland where it is still present.

Dengue Mosquito Eradication Project, Tennant Creek 23/11/04

Back :	Ronald Plummer, Matthew Stow, Bill Mitchell, Bruce Nelson, Terry Bishop, Bob Lighton-Piercy, Jeff Kennedy, Colin Holbert
Middle :	Sullim Sallik
Front :	Bill Pettit, Peter Whelan, Leah Stratford

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Evaluation of a rheumatic heart disease video as an educational tool in Aboriginal communities of Northern and Central Australia

Norma Benger and Malcolm McDonald, Menzies School of Health Research and Charles Darwin University

Introduction

Rheumatic heart disease (RHD) remains a major health concern in Aboriginal communities of Northern and Central Australia despite its almost complete disappearance from the non-Aboriginal population.[1] In community settings, the main strategy to reduce the prevalence RHD has been to prevent recurrences of acute rheumatic fever (ARF) using regular injections of benzathine penicillin (secondary prevention); this usually requires a local and/or central disease register plus the health infrastructure to deliver the service, often in difficult circumstances. Education is an essential element of any prevention programme;[2] ideally it should be provided to health staff, patients, patients' families and the general community.

In 1996, Indigenous researchers at the Menzies School of Health Research made an educational video with a predominantly Indigenous cast highlighting the clinical features of ARF/RHD and secondary prevention. There were accompanying educational booklets. Funding was provided by the Australian Rotary Health Foundation and the AMP Society. The video was then distributed to health centres in Aboriginal communities across the Northern Territory (NT), the Kimberley region of Western Australia (WA) and Far North Queensland (Qld). Over the next 7 years, anecdotal feedback suggested that the video was well received and frequently used, but no formal appraisal was undertaken. In response to numerous requests for an updated version of the video we decided to apply to various funding bodies for support. Before embarking on the production process, we undertook a survey of previous users to determine the value of the video to health centres as an educational tool and seek suggestions as to how it could be improved.

Method

The Menzies School of Health Research kept records of community health centres that had previously requested and received copies of the video. Late in 2004, one of the authors (NB) contacted the nurse managers or senior Aboriginal health workers in each community health centre by telephone with a questionnaire. They were not told that the survey was being conducted by the person primarily responsible for making the video.

The questionnaire included aspects of awareness of the videos' existence, availability within the health centre, routine use and rating as an educational tool. Responders were also asked for suggestions as to how it could be improved. The information was collated on an Epi Info database.

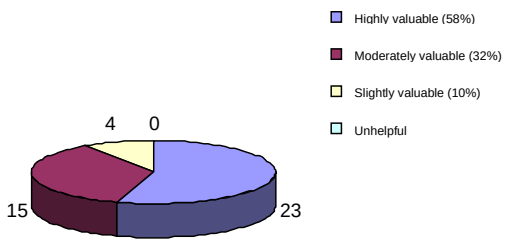
Results

Over the space of 2 months, 45 community health centres were contacted across Northern (NT, WA and Qld) and Central Australia. One had all new staff and no knowledge of any ARF/ RHD educational video. Two other health centre nurse managers said they were too busy to answer the survey questions. Of the remaining 42, 30 (71%) of the responders were able to locate the video immediately whereas 12 (29%) could not locate it at short notice (during period of the telephone call).

When asked whether they had seen the video themselves, 31 (74%) of the responders said that they had. In addition, 32 (76%) said the health centres staff routinely showed it to newly identified patients with ARF/RHD, 28 (67%) routinely showed it to families of ARF/RHD patients, 31 (74%) routinely showed it to new Aboriginal Health Workers and 32 (76%) routinely showed it to other new health centre staff.

When asked to rate the educational value of the video into one of four categories, 38 (90%) of the responders rated it as 'very valuable'' or 'moderately valuable' (see Figure 1) Only 4 (10%) rated it as 'slightly valuable' and none considered it to be 'unhelpful'. All requested an updated video when it became available.

Figure 1. Rating of the RHD video by responding community health centres



When asked for suggestions as to how the video could be improved, 15 wanted to see more Indigenous faces, 6 wanted local people, four wanted translations into local language, 3 requested a DVD version and 3 wanted to see more sports stars in the video.

Discussion and conclusion

The great majority of responders were familiar with the ARF/RHD educational video and routinely used it for educating patients, families and staff. The video was rated as a valuable educational tool by 90% of the responders. In addition, 31 responders made constructive comments and suggestions as to how it could be improved.

It could be argued that people often tell you what they think you want to hear, especially if they know the person asking the questions. This may be a limitation of the survey. However, as far as we know, none of the responders personally knew NB and/or that she was one of the video's producers. It was recognised that the responders were not always the person in the health centre with the prime responsibility for administering the local ARF/RHD prevention programme and ARF/RHD education and this may have limited some of the responses. We also knew that the list of requesting health centres at Menzies School of Health Research was incomplete and the video had been more widely distributed through other sources; there may have been some sampling error.

Likewise, we are aware that the video has been used in hospital paediatric wards, community schools and other educational institutions, such as the Bachelor Institute (NT). These will be included in any future survey of the video's utility as an educational tool.

The results bode well for the production, distribution and utilisation of a new RHD video. It now has funding through the Australian Rotary Health Research Fund, and will include new medical and scientific information. As far as possible, it will be made by Indigenous people with an Indigenous cast. It will use modern technological expertise and educational techniques, incorporating suggestions from the representatives of community health centres.

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The OzFoodNet Highlights for 2004

Michelle Harlock, OzFoodNet Epidemiologist, CDC Darwin

Background

OzFoodNet is a network of epidemiologists employed by the State and Territory Health Departments across Australia, funded by the Australian Government Department of Health and Ageing. Its formation was initiated in 2000 by the Australian Government Department of Health and Ageing to enhance the surveillance of food borne disease in Australia and attempt to provide more evidence on how to prevent food borne illness. The NT has been a participating member of the OzFoodNet network since 2003, when an epidemiologist was employed at the Centre for Disease Control (CDC) Darwin to perform enhanced surveillance on enteric disease case notifications, and assist with the investigations into food borne illness outbreaks.

Enhanced surveillance has been carried out for all cases of salmonellosis, shigellosis and hepatitis A cases where it has been possible to contact them. This has enabled the collection of information which may assist in identifying potential exposures, cases of overseas acquired infections, and identification of possible secondary contact cases. A 3-day food history was taken from all adults and children aged over 5 years of age.

As a means if identifying clusters of cases, the NT *Notifiable Diseases System* (NTNDS) database was examined on a weekly basis to check for clusters of *Salmonella* serovars. While this database is an important source of information, it is often several weeks before the final identification of the *Salmonella* species has been finalised to serovar level. It is for this reason that enhanced surveillance interviews are performed on receipt of the initial notification. Other enteric notifiable diseases such as shigellosis, campylobacteriosis, rotaviral infection, cryptosporidiosis, listeriosis, and hepatitis A are also scrutinised on a weekly basis to identify potential clusters.

Identification of illness is based on notification of a confirmed laboratory diagnosed case of salmonellosis (or other enteric illness) being received at the CDC. In the NT, doctors are required to notify the CDC of gastroenteritis if they are aware of 2 or more epidemiologically linked cases, particularly if the source may be food borne. This enables the necessary rapid public health response for investigating an outbreak of gastrointestinal illness. Medical practitioners are also required to notify CDC of cases of gastrointestinal illness in a food handler as this also has the potential for an outbreak to occur.

Table 1. NT Enteric Disease incident case numbers and rates, 2004
(by onset date of illness – NT NDS)

Disease	Cases	Case Rate per 100000
Rotaviral Illness	411	205.6
Salmonellosis	397	194.1
Campylobacteriosis	217	107.0
Shigellosis	119	58.5
Cryptosporidiosis	113	55.0
Hepatitis A	13	6.5
Haemolytic Uraemic syndrome (HUS)	1	0.5
Listeriosis	1	0.5
Hepatitis E	0	0

Incidence of Disease

Enteric Disease Outbreaks

There were 6 formal outbreak investigations initiated in 2004. Outbreaks are jointly investigated by the CDC staff and the Environmental Health Branch staff.. Of the 6, 1 outbreak was due to a combination of serovars, *Salmonella* Typhimurium PT 108 and *S.* Typhimurium 170. Of the remaining 5 outbreaks, 4 outbreaks were attributed to norovirus, which was identified from patient specimens submitted for testing. One outbreak (see 'Outbreak 5') was presumed to be due to norovirus although the virus was not identified from food or patient specimens.

Outbreak of Enteric Disease due to *Salmonella* Typhimurium PT 108/ PT170

Nine people were ill with gastroenteritis following consumption of ordered meals at a popular resort cafe in January. Seven of the cases had stool specimens that tested positive for *S.* Typhimurium PT108 or *S.* Typhimurium 170. The other 2 cases were epidemiologically linked, but no specimens were submitted. High-risk foods which were identified, tested negative and environmental health inspections were inconclusive with the exception of minor breaches in temperature control in a cold holding receptacle. The cause of the outbreak was not identified. No further cases were diagnosed post investigation.

Outbreaks of Enteric Disease due to Norovirus

Outbreak 1 - Gastroenteritis was diagnosed in 8 staff and 9 residents of an aged care facility over a 2-week period in January. Norovirus was the causative agent responsible, with the mode of transmission believed to be person to person. No major breaches in food safety, hygiene or infection control were identified but measures to prevent further cases were implemented. Staff were advised to reinforce personal hygiene practices; staff were not to attend work until their symptoms had ceased; new nursing home admissions were not taken in while illness was ongoing in the institution, and thorough cleaning and disinfection was carried out.

Outbreak 2 - Over a 2 day period in May 8 guests at a remote fishing resort became ill. Of the 3 stool samples supplied and tested, 2 were positive for norovirus. There were 3 possible sources of exposure identified.:

- food on the plane flight
- meals at the resort
- water supply at the resort.

All ill guests were part of a group who had travelled from interstate. No other people who travelled on the same plane had reported being ill. The meals consumed at the resort by guests and residents were identical and no other persons reported being ill. Environmental Health (EH) inspections identified 1 breach of food safety with out of date food found in the freezer. No breaches of hygiene were identified. The water supply had failed to meet routine testing standards prior to the cases becoming ill, but there were no reports from the community of gastrointestinal illness in that week.

Outbreak 3 - Seven people became ill after attending a large cultural festival in August. Stool samples from 2 of the 5 samples collected tested positive for norovirus. No food samples were available. Consumption of salads was common to all cases, being self served or served by catering staff. The source was suspected to be an infected food handler or customer, with transmission possibly person to food to person.

Outbreak 4 - In July a total of 91 crew members aboard a barge travelling from Asia to Darwin were ill with gastrointestinal illness symptoms.[1] Norovirus was detected in 2 of the 5 samples collected. EH inspections performed when the barge had docked revealed no breaches of food safety or hygiene. The peak of the outbreak occurred while at sea (65 cases), and the doctor on board instigated infection control measures. The cases recovered without complications, and the worst of the outbreak passed. By the time this investigation was initiated on the arrival of the barge, the outbreak appeared to have subsided, with only 7 cases reported after docking. Close living quarters on board probably contributed to amplifying the apparent rapid person-to-person spread of the virus.

Outbreak 5 – At a private dinner party in November, 5 people among 8 guests became ill after consuming raw oyster meat. The oysters were to be cooked before consumption (the package labelling stated this), but some guests, who thought it was safe to do so, inadvertently consumed some raw oyster meat. The 2 stool specimens submitted for testing were negative for routine bacterial pathogens and norovirus. The oysters were tested for norovirus and were also negative. These oysters were the same brand implicated in a large outbreak the previous year that was due to Japanese oysters that later tested positive for norovirus[2] and only those guests that ate raw oysters were ill. Therefore it was presumed that the source for the outbreak was raw oysters and the aetiological agent was most likely norovirus.

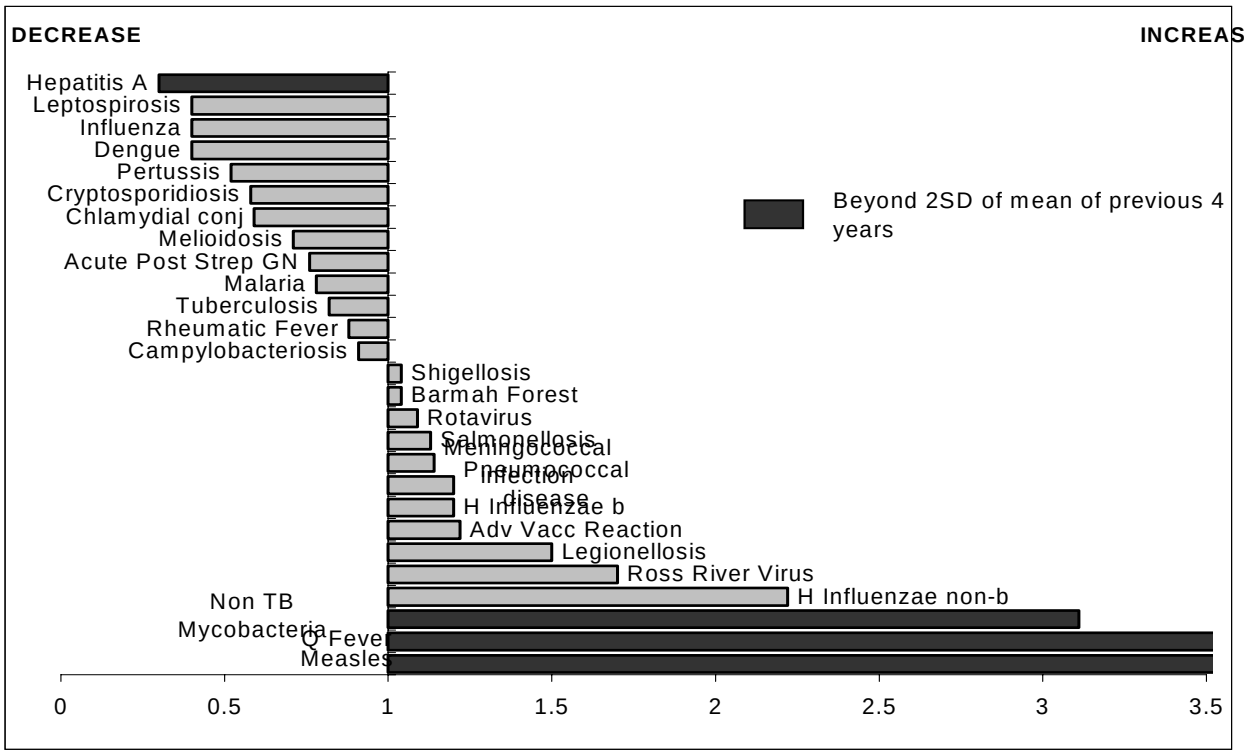
References

1. Binns P, Dempsey K, Campbell l, Galvin M. Barge Belly A gastroenteritis illness outbreak on a barge at sea. *Northern Territory Disease Control Bulletin* 2004; 11 (3): 9-12.
2. Dempsey K, Norovirus detected in Oyster Meat. *Northern Territory Disease Control Bulletin* 2004; 11 (3): 37-38.

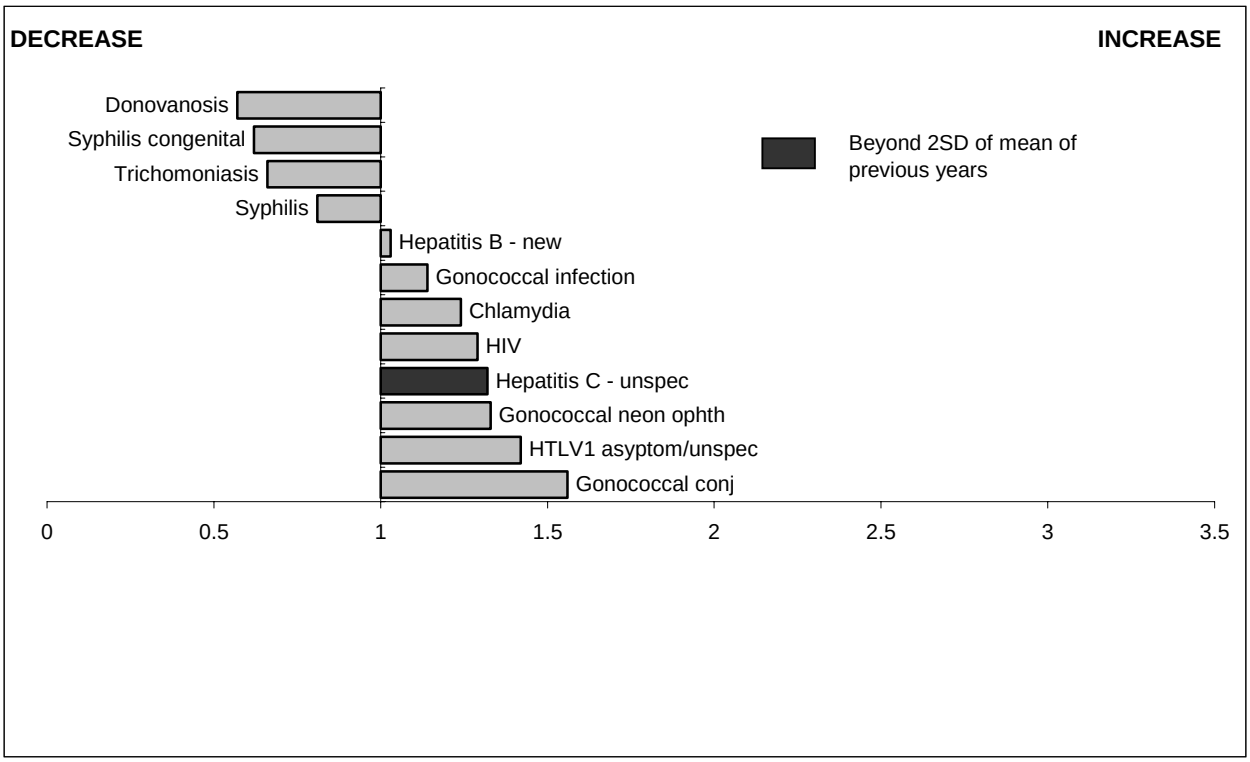
NT NOTIFICATIONS OF DISEASES BY ONSET DATE & DISTRICT 2004 AND 2003

	Alice Springs		Barkly		Darwin		East Arnhem		Katherine		Total*	
	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003
Acute Post Strep Glomerulonephritis	2	2	0	0	4	0	8	1	3	1	**17**	**4**
Adverse Vaccine Reactions	9	2	0	3	19	22	4	3	3	2	**35**	**32**
Amoebiasis	0	0	0	0	0	1	0	0	0	0	**0**	**1**
Arbovirus not otherwise specified	0	0	0	0	2	0	0	0	0	0	**2**	**0**
Barmah Forest	5	1	1	0	12	9	3	2	1	2	**22**	**14**
Campylobacteriosis	126	116	2	12	78	123	6	5	5	12	**217**	**268**
Chlamydia	705	705	43	35	582	591	126	119	184	151	**1,640**	**1,601**
Chlamydial conj	3	41	2	25	31	156	3	7	34	13	**73**	**242**
Cryptosporidiosis	72	49	1	1	22	19	6	17	13	8	**114**	**94**
Dengue	0	0	0	0	19	19	0	1	0	0	**19**	**20**
Diptheria	1	0	0	0	0	0	0	0	0	0	**1**	**0**
Donovanosis	3	3	0	0	0	2	0	0	2	1	**5**	**6**
Gastroenteritis in 2 or more related cases	1	0	0	0	0	0	5	0	0	0	**6**	**0**
Gonococcal conjunctivitis	0	0	0	2	7	4	0	0	0	0	**7**	**6**
Gonococcal infection	851	687	59	46	322	406	115	118	236	135	**1,583**	**1,392**
Gonococcal neonatal ophthalmia	1	0	0	1	0	0	0	0	0	0	**1**	**1**
Hepatitis A	4	14	1	0	6	17	0	2	2	8	**13**	**41**
Hepatitis B - chronic	2	0	0	0	3	0	2	0	1	0	**8**	**0**
Hepatitis B - new	2	1	3	1	3	10	0	1	1	2	**9**	**15**
Hepatitis B - unspec	0	0	0	0	0	0	0	0	1	0	**1**	**0**
Hepatitis C - chronic	0	1	0	0	2	1	0	0	0	0	**2**	**2**
Hepatitis C - unspec	43	29	7	4	204	167	2	3	15	11	**271**	**214**
H Influenzae b	0	1	0	0	3	1	0	0	0	0	**3**	**2**
H Influenzae* non-*b	3	0	0	0	1	0	0	2	1	0	**5**	**2**
HIV	3	0	0	0	5	5	2	0	0	1	**10**	**6**
HTLV1 asyptom/unspec	37	34	1	0	4	4	0	0	4	2	**46**	**40**
Haemolytic Uraemic Syndrome	0	0	0	0	1	1	0	0	0	0	**1**	**1**
Influenza	19	61	2	0	13	78	2	11	3	1	**39**	**151**
Legionellosis	3	1	0	1	0	1	0	0	0	0	**3**	**3**
Leptospirosis	0	0	0	0	2	4	0	0	0	0	**2**	**4**
Listeriosis	0	0	0	0	1	0	0	0	0	0	**1**	**0**
Malaria	0	4	0	0	38	35	3	1	0	0	**41**	**40**
Measles	0	0	1	0	2	1	0	0	0	0	**3**	**1**
Melioidosis	0	4	0	0	16	21	0	0	4	2	**20**	**27**
Meningococcal infection	3	8	1	0	4	1	2	0	2	2	**12**	**11**
MVE	1	0	0	0	0	0	0	0	0	0	**1**	**0**
Non-tuberculous Mycobacteria	0	0	0	0	8	0	0	0	0	0	**8**	**0**
Ornithosis	0	0	0	0	0	1	0	0	0	1	**0**	**2**
Pertussis	2	1	0	0	8	0	1	3	16	1	**27**	**5**
Pneumococcal disease	47	31	2	8	31	23	5	3	7	7	**92**	**72**
Q Fever	2	0	0	0	1	1	0	0	0	0	**3**	**1**
Rheumatic fever	32	28	0	1	12	16	8	10	7	14	**59**	**69**
Ross River virus	10	0	2	7	194	86	10	9	19	18	**235**	**120**
Rotavirus	181	73	8	14	149	98	34	17	40	35	**412**	**237**
Salmonellosis	94	73	9	16	209	192	18	20	68	59	**398**	**360**
Shigellosis	80	98	0	10	20	13	10	4	9	6	**119**	**131**
Syphilis	139	180	3	4	55	67	14	19	79	48	**290**	**318**
Syphilis congenital	5	7	0	1	0	0	0	0	1	0	**6**	**8**
Trichomoniasis	321	269	22	12	117	152	82	85	21	47	**563**	**565**
Tuberculosis	8	8	2	0	12	13	0	3	7	6	**29**	**30**
Typhus	0	0	0	0	0	2	0	0	0	0	**0**	**2**
Vibrio food poisoning	0	0	0	0	0	1	0	0	0	0	**0**	**1**
Yersiniosis	0	0	0	0	0	0	0	1	0	0	**0**	**1**
Total	**2,820**	**2,532**	**172**	**204**	**2,222**	**2,364**	**471**	**467**	**789**	**596**	**6,474**	**6,163**

Ratio of the number of notifications in 2004 to the mean of the previous 4 years: selected diseases



Ratio of the number of notifications in 2004 to the mean of the previous 4 years: sexually transmitted infections and blood borne diseases



Comments on disease notifications with significant increases p35

Hepatitis A

In 2004, there were only 13 notified cases of Hepatitis A, compared with a mean of 42 per year over the previous 4 years. This is a trend which has been recognised nationally but has not been fully studied. While the implementation of hepatitis A vaccination guidelines has continued in the NT, universal vaccination of Aboriginal infants has not yet commenced.

Hepatitis C

There were 273 cases of hepatitis C reported in 2004, compared with a mean of 204 in the previous 4 years. This was the highest number reported since 1997. Investigation into this rise failed to reveal any specific cause but may be a consequence of the heightened hepatitis C Awareness Project and education in the Darwin region.

Non-tuberculous mycobacteria

There were 8 cases in 2004 due to a cluster of cutaneous cases. These were of various mycobacterial species without obvious point source. Investigations are continuing.

Measles

In 2004 there were 3 cases of measles in the NT whereas there had been only one case from 2000-2003. All cases were unrelated, one was acquired in East Timor and the other two were in foreign tourists and were acquired in Sydney.

Q fever

There were 3 unrelated cases of Q fever in 2004; 2 were in Central Australia and one case died from the disease. Prior to 2004 there had only been 2 cases notified since 1991.

NT Malaria notifications October - December 2004

Merv Fairley, CDC, Darwin

Twenty three notifications of malaria were received for the last quarter of 2004. 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
2	Guinea	Migrant	*P. malariae*	No
5	Guinea	Migrant	*P. falciparum*	No
11	Uganda	Migrant	*P. falciparum*	No
3	Uganda	Migrant	*P. vivax*	No
1	Solomon Is	Army	*P. vivax*	Yes
1	Papua New Guinea	Holiday	*P. falciparum*	No

Staff updates

DHCS is assisting Interplast Australia with its tsunami relief program in Banda Aceh, Indonesia. In response to a request for public health input from CDC, **Rosanne Muller** left for Banda Aceh on 21st March for 3 weeks, to be followed by **Rosalind Webby** in April. The Interplast team is based in the (now rehabilitated) Banda Aceh general hospital, following the earthquake on the Indonesian island of Neis, Roseanne went on March 30 with the UN as one of the first Australian relief teams to the area. **Meredith Hansen Knarhoi** has been in Banda Aceh with the British aid organisation Merlin and will return at the end of April.

We welcome **Kevin Sesnan** as the head of the Sexual Health and Blood Borne Viruses Program. Kevin has taken this position with the departure of **Heather Lyttle**.

Jamie Broadfoot has taken on the Hepatitis C/ Needle and Syringe Program/ Injecting Drug Use Policy Officer position. He has recently completed a MPH in Melbourne and has previously worked as a CNC for the Drug and Alcohol unit in Alice Springs.

We welcome back **Anne Davis** as Remote Sexual Health Coordinator.

Eleanor Hooke commenced as the HCV nurse in Central Australia.

Alex Kopczynski joins the Environmental Health Program as the new EHO in East Arnhem. Alex comes to us from South Australia where he worked for the Wattle Range, Kingston and Robe District Councils.

Kelly Monaghan and **Tony Morley**, 2 experienced EHOs in the EH program, are off to NSW and WA respectively. Best wishes to both.

Glenn Hoffmann joins the Environmental Health Program in project managing the review of the *Poisons and Dangerous Drugs Act*. Good luck Glen.

Nerissa Walton is taking a well earned year off to partly relax, but then work with the Red Cross Abroad. Keep well.

THE NORTHERN TERRITORY DISEASE CONTROL BULLETIN CUMULATIVE INDEX

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