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The time for Safer Roads in the NT has come: summary and outcomes of the NT Road Safety Task Force process

Steven Skov, Chris Bigg, Nick Papandonakis, Mark Payne, Bob Rennie, and Pam Palmer (members of The NT Road Safety Task Force*)

The Northern Territory (NT) has the worst road safety record in Australia:

- Between 2000-2005, 2,995 people were killed or seriously injured on NT roads.
- In the same period, the NT road crash fatality rate of 25 per 100,000 population was 3 times the national average of 8.5.
- On average, 1 in every 400 Territorians is killed or seriously injured in a road crash every year.
- Drivers aged 16-20 years have 3 times the risk of crashes and fatalities compared to older drivers.

In order to address this, the Chief Minister of the NT, Clare Martin, announced the formation of a Road Safety Task Force in January 2006 to examine strategies to help reduce road fatalities and serious injuries on NT roads. The Task Force consisted of representatives of the Dept of Planning and Infrastructure (DPI), the Dept of Health and Community Services (DHCS), the Dept of Justice (DOJ) and the Police. The Task Force delivered its report in June 2006 and Government announced its decisions regarding the report recommendations in November.

*Guy Riley and Bruce McCormack were also members of the Task Force but were unable to be contacted in relation to this article

Underlying the appalling level of death and injury on NT roads, the Task Force report describes a disturbing culture of road use in which too many Territorians

Contents

Editor: Vicki Krause
Email: vicki.krause@nt.gov.au

Assistant Editors: Lesley Scott, Peter Markey, Natalie Gray, Steven Skov, Meredith Hansen-Knarhoi, Chris Nagy

Centre for Disease Control
PO Box 40596
Casuarina
Northern Territory 0811

Production Design: Lesley Scott
Website: http://www.nt.gov.au/health/cdc/bulletin/index.shtml

Northern Territory Government
Department of Health and Community Services

consider it acceptable to drink and drive, speed and not wear seatbelts.

- At least 48% of road fatalities are alcohol-related.
- Of 9,480 drivers tested at random breath test stations in December 2005 - January 2006, 1 in 42 was over the legal blood alcohol limit (compared to 1 in 314 in Victoria and 1 in 192 in Queensland during the same period).
- In the years 2000-2004, 28% of all drink-driving offenders were repeat offenders.
- Over a 7 week period in December 2005 - January 2006, 5,336 drivers, or 1 in every 22 of all NT licenced drivers, were booked for speeding.
- In 2005 there were 4,332 drivers caught more than once for speeding with 553 caught 3 or more times. Several persons had between 10 and 20 fines, with the worst offender receiving 24 fines in the one year.
- One in every 2 fatalities on Territory roads was not wearing a seatbelt when one was available.

The view of the Task Force was that the road toll would not change without a change in the culture of the way Territorians use the road. The regulatory framework underlying this culture is deficient and not well informed by national and international evidence and best practice.

Other jurisdictions in Australia had long ago addressed driver behaviour through reduced speed limits, graduated licensing, demerit point systems and increased penalty levels for traffic offences, and have invested appropriate levels of resources in enforcement and education efforts. As a result, they have reaped the benefits of reductions in road deaths.

If any lesson can be learnt from other jurisdictions, it is that for a road safety strategy to be effective it must be an integrated, evidence-driven package which addresses all 3 elements of sanctions, enforcement and education. Most importantly, there must be strong and committed political leadership supported by committed leadership from agencies responsible for implementing the strategies.

The Task Force made a total of 21 recommendations all of which have been either fully approved by Government or approved with some modification. They combine to provide a comprehensive framework that encompasses complementary regimens for sanctions, enforcement and education. Although the Taskforce acknowledged that there may be significant political and budgetary implications associated with many of its recommendations, it was strongly of the view that the benefits to Territorians would have been restricted if only a limited number of the recommendations were approved.

The changes concerning the overall regulatory framework and sanctions include:

- A 130 km/h speed limit on the Stuart, Arnhem, Barkly, and Victoria highways with a 110km/h default speed limit on all other "open" roads.
- The introduction of a comprehensive graduated driver licensing system. This will begin with an immediate introduction of a minimum 6 month "L" plate phase, increasing the "P" plate phase to 2 years and ban on all mobile phone use for L and P platers. A process will follow to consider limits on night driving and peer passenger numbers at a later date.
- A new offence of driving having consumed a prohibited substance and blood testing for drugs in certain circumstances.
- A doubling of fines for all road traffic offences and automatic loss of licence for second offences within 3 years of drink driving with a blood alcohol concentration (BAC) between 0.05% and 0.08% (or with any alcohol at all for L and P platers or commercial drivers). This will strengthen the message to the community about the serious and dangerous nature of traffic offences.
- A demerit point system to provide a mechanism to reinforce this and deal with repeat offenders in a socially equitable fashion.

An improved sanctions regimen without an adequate enforcement regimen would be ineffective in producing road safety benefits in the NT. Substantial new resources in terms of

personnel, vehicles and money will be provided to Police in order to increase enforcement of the new regimen. Dedicated police traffic sections will be established in Alice Springs and Darwin as soon as possible as recommended in the O'Sullivan report. Highway Patrols and Remote Area Patrols will be placed in Alice Springs and Katherine in order to enforce speed limits and detect drink driving throughout the NT and assist with road safety programs in remote communities.

Education must accompany enforcement and must be targeted at current drivers to assist them to better understand the dangers of speed, drink-driving, alcohol and fatigue as well as the need for the changes that this package represents. Education must also target younger people in schools so that Territorians can grow up with a better understanding of safe road use. To this end, substantial new money will be provided for general road safety education and for the development of a road safety curriculum in schools.

The Taskforce was strongly of the view that few gains will be made without community-wide involvement (including a whole-of-Government approach by responsible Government agencies). A comprehensive road safety regimen cannot arise solely from within the Road Safety Branch of DPI. A new road safety governance structure, the Road Safety Coordination Group (RSCG) will be formed which includes DPI, the Police, DHCS, the Local Government Association of the NT (LGANT), the Territory Insurance Office, the Automobile Association of the NT and a recognised road safety expert preferably with links to an established road safety institution. This will replace the Road Safety Council and will report to both the Minister for Police and the Minister for Infrastructure and Transport who will share responsibility for road safety.

The Taskforce recognised that much broader socio-economic, education, health and other issues faced by Aboriginal Territorians are at the base of their representation in crash statistics. Addressing these broader issues was not within the capacity of this Taskforce. Attaining substantive and meaningful Aboriginal input into road safety policy and practice has for many years been very difficult, and a better way must be found to do so. It is hoped that the involvement of LGANT in the RSCG will assist in this. A recommendation for a pilot program of remote community-based road safety officers was deferred but the RSCG has been asked, as one of its first tasks to considers the best way to handle driver education and licensing, driver training and safety awareness in remote areas.

It is only through a change in road-use culture and resulting improvement in road-user behaviour that the NT will see a reduction in fatalities and serious injuries. Many of the measures are controversial, but fundamental and comprehensive reform was required in order to change the way that people drive in the NT. The alternative would have been continued fatality and serious injury rates more akin to developing countries than other Australian jurisdictions and most developed countries throughout the world.

The full report of the Task Force along with Government decisions and a range of information concerning road safety and the changes to be made in the NT can be found at www.saferroads.nt.gov.au.

Editorial Comment

Members of the NT Road Safety Task Force and those who supported its formation and work are to be congratulated. The fact that the NT can look ahead to safer roads, reduced road-trauma related deaths and serous injuries and fewer individuals with life long disabilities is a tribute to all those involved in the Task Force. Mothers, fathers, husbands, wives, sisters, brothers, sons, daughters, friends and loved ones have cause to be thankful. A well-informed strategy that was courageously constructed by a whole of government approach is now in place and, with community-wide involvement, will carry NT road safety forward.

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Northern Territory school screening 2003-2005

Julie Graham, Belinda Farmer, Helen Kennon, Vicki Krause, CDC Darwin

Introduction

Mantoux testing has been carried out in Northern Territory (NT) schools for many years. Initially the process was to identify children with negative Mantoux tests that would subsequently receive BCG vaccination. In 1991 the policy of giving BCG vaccination to Mantoux negative school children was stopped. Screening continued in all 10-year-old students in rural communities and all Year 8 students in the urban setting. The main aim was to identify Mantoux positive children who were at risk of latent tuberculosis infection (LTBI) and to provide clinical review, chest X-ray (CXR) and possible treatment for LTBI. A review in 1996 revealed that in the years 1991-94, Australian born non-Aboriginal students had significantly lower prevalence of positive Mantoux reactions (2%), while Aboriginal students and children born overseas had a significantly higher prevalence. (4.3% and 8.6% respectively).[1] On this basis, in 1997, screening became targeted to these 2 higher prevalence groups and Australian born non-Aboriginal students (unless living in remote communities) were excluded from screening.

The success of this targeted school Mantoux testing is proportional to the number of students diagnosed with LTBI who complete treatment and this should be considered as the primary out come measure.[2] A secondary aim could be to monitor the level of tuberculosis (TB) infection in the community so as to guide planning and implementation of TB control services. In 2002, Markey et al noted that only 17.6% of those students reviewed in 1991-2000 and who were eligible, completed their course of isoniazid (INH).[1] He also stated that unless the number of completed courses could be increased it would be difficult to justify continuing the program.

Now in 2006, this review has been undertaken to assess whether the NT has demonstrated an ability to adequately screen the at-risk group of students as per the 1997 policy change and if there has been an increase in the number of children completing treatment for LTBI who were identified during school screening. A discussion follows as to whether school screening is a useful disease prevention strategy in the NT.

Method

Mantoux school screening is scheduled for rural communities who have had cases of active disease in the previous 10 years and in all urban areas. In 2005 this represented 29 rural communities (out of approximately 100) and 4 urban areas. Screening is scheduled when the student is 10 years of age according to the NT school-age child health surveillance program and for reasons of infrastructure and convenience is done at Year 8 in major urban centres. The children to be screened are identified from school enrolment lists. The list of these students should be forwarded to the regional Centre for Disease Control (CDC) Tuberculosis (TB) unit to identify those students who have already had a positive Mantoux in the past. These students with past positive Mantoux tests are not followed up during screening.

All children must have a consent form signed and returned to the school prior to screening taking place. A Mantoux test is administered following normal procedures and then measured 3 days later by staff trained in Mantoux test administration and measurement. A positive Mantoux test is defined as having a reading of 10mm or greater. A list of all children screened is then forwarded to the TB unit. A TB medical officer should follow up all children with Mantoux results greater than 10mm with a CXR and a clinical review. Where appropriate, 9 months of treatment with isoniazid and vitamin B6 is offered to children with evidence of LTBI.

Children will not be offered isoniazid if they are a past TB case, had past treatment for LTBI, have significant liver disease or have other medical conditions where isoniazid is contraindicated. Adequate adherence is defined as children completing 80% of the treatment over 9 months.[2]

In 2001 TB data was transferred into the Community Care Information system (CCIS) which resulted in a temporary halt to the systematic recording and reporting of school screening data. All TB data had previously been managed in an Epi 6 database. A dedicated Business Objects report needed to be developed to enable information to be easily extracted from

CCIS and when this was slow in coming, a dedicated Excel database was developed in 2003 to manage the yearly screening information. The data was still also entered in CCIS. For this review we concentrated on data from this 2003-2005 Excel database. Data from all years will be analysed once the tool in Business Objects is developed.

Results

Between 2003 and 2005, in schools that carried out school screening, 2225 students were identified as targeted students from returned school lists. Other students enrolled in non-screened schools have not been included.

Table 1 summarizes the Mantoux coverage via the school screening program from 2003-2005.

Using 2005 as an example, school screening was carried out in all urban areas, however only 12 of the possible 29 designated rural communities were screened (41.4%). Screening was also carried out in 9 rural communities who had not had a case of pulmonary TB in the past 10 years and therefore were not a high priority for screening.

The positive Mantoux reaction rate across all 3 years and all targeted groups was 3.6% (39/1093).

Figure 1 shows the Mantoux results and LTBI management outcomes of the school screening. All (100%) overseas born children who had a Mantoux test returned for the result to be read while 91% (953/1044) of Indigenous and 96.8% (40/41) of non-Indigenous children returned for their reading.

LTBI management outcomes by at risk groups are also shown in Figure 1. The primary outcome measure of the screening over the 3 years revealed that 18 Indigenous children were offered INH with 10 (56%) achieving completion. Of the 7 overseas born students offered INH only 3 (43%) completed treatment. Overall 13 of 27 (48%) children who were screened and offered INH completed treatment. This represents 1.0% (13/1185) of those screened and 0.4% (13/3357) of those identified as eligible for screening.

Discussion

One of the most important measures of TB control is the incidence of infection in children less than 15 years of age, as this generally represents recent TB infection.[3] TB in children can be considered a sentinel health event that signals a public health breakdown.[1] Infants and children who acquire TB disease aged <3 years are especially prone to the rapid progression from infection to disease and often acquire severe forms of the disease. Ten percent of new cases of TB overall are found through contact tracing with this method of case finding being highest in children. TB is detected in around 1% of contacts of active cases of TB and

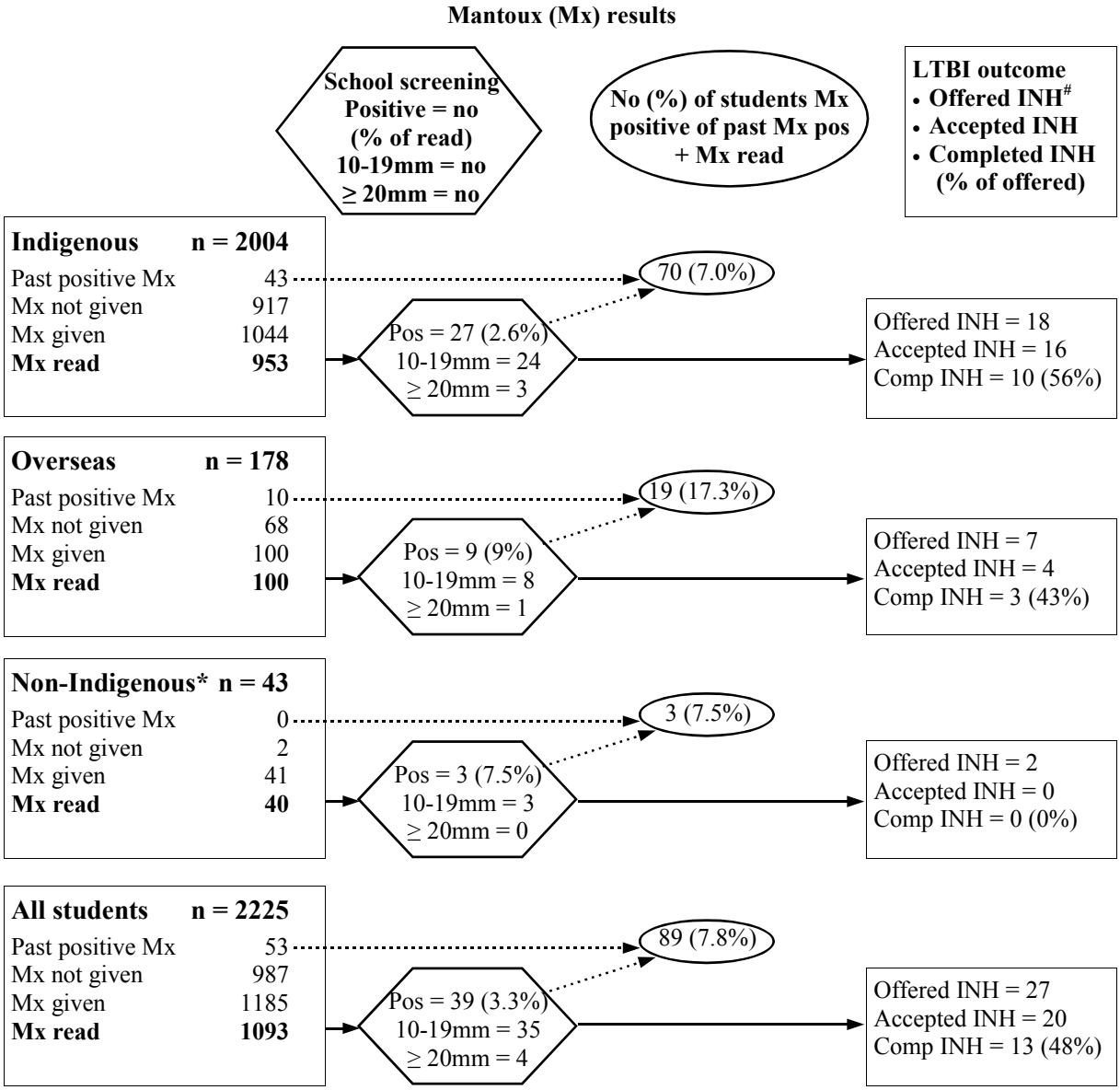
Table 1. Summary of school screening 2003-05

	2003#				2004#				2005				Total
	Indigenous		Overseas born§	Non Indig*	Indigenous		Overseas born§	Non Indig*	Indigenous		Overseas born§	Non-Indig*	
	Urban **	Remote			Urban **	Remote			Urban **	Remote			
Identified Students	386	308	44	15	295	406	73	15	305	304	61	13	2212
Past Pos Mx	11	5	3	0	6	6	3	0	10	5	4	0	53
Total eligible	375	303	41	15	289	400	70	15	295	299	57	13	2172
Mx Given	183	157	24	13	124	270	49	15	153	157	27	13	1185
Mx Read (% eligible)	165 (44%)	146 (48%)	24 (59%)	13 (87%)	115 (40%)	251 (63%)	49 (70%)	15 (100%)	127 (43%)	149 (50%)	27 (7%)	12	1093
Mx Pos	6	1	1	0	9	3	4	1	5	3	4	2	39

No data available for Alice Springs
* Living in Remote Communities
§ All screened in Urban areas

** Urban Indigenous denotes the school settings as urban—some of these are urban boarding students from remote communities.

Figure 1. Results of Mantoux for student groups considered at risk (2003—2005)



* Only non-Indigenous living on remote communities
# Offered differs from school screening Mx positive number because some 10-14 mm results were felt to be BCG effect

approximately 30% of close contacts of smear positive disease will have a positive Mantoux reaction.[3] Contact tracing of adult TB cases therefore remains the corner stone of TB prevention, early case detection and treatment among children.

School screening has also been used as a tool to identify students with LTBI and to offer INH as preventative treatment. Mantoux testing is the basis of this screening and should be carried out, as with other screening programs, with an 'intention to treat'.

Several factors influence the perceived benefits of a screening process. These include coverage rates, outcome measures and risk averted.

Coverage Rates

Identifying how many children require the school age screen is not straightforward in the NT. The denominators are obtained from school enrolment. These numbers are quite fluid and do not appear to truly represent the total numbers of the children in the community at that time. According to 2001 ABS data approximately

25% of children in this age group are not attending an educational facility.[4]

Between 2003-2005, 2004 Indigenous children were identified from school enrolment in the communities where screening took place. This represents approximately 53%(2004/3800) of the 10 year old Indigenous population in the NT.[4]

It is difficult to determine whether the 1796 children not represented are from these exempt communities or from communities where screening did not take place. It is also worth noting that Mantoux testing is still taking place in communities that do not meet the criteria for screening.

In those children identified as being eligible, on average, only 50% of children actually get screened. In Indigenous students 44% of the testing took place in urban areas (though up to half of those were boarders from remote areas).

Reasons for not screening include:

- children are not enrolled in school or not attending on the day of screening;
- not all health centres manage to carry out school screening;
- school attendance is often poor,
- children are not always present for the reading of Mantoux tests; and
- consent forms are often difficult to obtain.

If school screening is not performed in a community or the child is not present at school, children will only be reviewed by clinic staff opportunistically if they present to the health centre and it is unlikely during these visits that Mantoux screening will be identified as a priority.

The TB unit supports remote areas with the school screening process by supplying as many staff as possible to assist. However it still remains a labour-intensive task. Medical review and treatment initiation is also often difficult for many reasons with children from remote locations.

Coverage rates in overseas born students also vary between 44-67%. These students are mostly represented in urban-based schools and should be easily accessible but still numbers tested are not high.

Outcome Measures

Outcome measures from 2000 revealed that 17.6% (6/34) of those reviewed and eligible completed the course of INH.[1] This has risen to 48% (13/27) in the years 2003-2005. Treatment of LTBI is the major clinical benefit of the program and while the completion rate has markedly improved the number treated is still small.

In those children screened 3.6% (39/1093) were found to be Mantoux positive. This has fallen from 5.0% in 2000.[1]

Of children initially identified as eligible from school enrolment 2.4% (53/2225) were Mantoux positive in the past and not screened. They represent more positive results (53) than found at school screening (39). These 53 children were most likely picked up during contact screening or migrant/refugee screening. A policy is not in place to review these past Mantoux positive students to ensure LTBI has been appropriately managed but this opportunity should be taken.

Outcomes also depend on compliance with INH therapy. Compliance with medication is often dependant on the social situation of the child. While children are in a structured school environment the compliance tends to be good, but there appears to be limited ownership of the therapy by the child or family group when the child returns home for holidays. Once school holidays begin it becomes very difficult for the local community clinic to promote and monitor the medication intake.

Risk

The decision on who to treat for LTBI is based on the likelihood of active TB developing in a person's lifetime. This has to be balanced with the risk of adverse reactions from medications. In recent years lifetime risk estimates of reactivation[5] have been used when educating people and offering INH therapy for LTBI. The focus is on promoting treatment for those with a lifetime risk ≥10%, though consideration could be given for those ≥5%.

Average lifetime risk of reactivation of TB in children who have a non-conversion (previous exposure >2.5 years) Mantoux ≥15mm in 0-5 yr group is 13%, in the 6-15yr group it falls to 7%.[5]

In comparison with children who have a recent conversion: the 0-5yr group is 17 % whereas the 6-15yr group is 8%. For those with a Mantoux reading of 10-14mm the average risk is even lower. The school screening age cohorts therefore are in a lower risk group. The risk in children is both from primary progressive TB disease and reactivation of LTBI.

TB disease among children is largely primary progressive disease meaning children progress to disease soon after becoming infected and they are diagnosed often during initial contact tracing. In preventing disease, greater benefit would be gained from identifying children, particularly those in the 0-5 age group who may have had contact with smear positive TB and then providing support for their LTBI treatment.

Conclusion

The NT has implemented a strong TB control program. It has been committed to supporting early diagnosis, contact tracing, standard treatment regimens, and directly observed therapy. Rates of TB in the NT have been falling over recent years especially in the <15 age group. In 2004, the national notification rate for the less than 15-year group was 0.9 per 100,000, with no indigenous children under the age of 15 years notified with TB in that year. The overseas born group represented 11.4 per 100,000 cases nationally with Australian born non-Aboriginal rates being very low, at 0.4 per 100,000. Since 2000 the incidence rates in Indigenous children age 0-15 have ranged between 2.4-5.6 per 100,000, with numbers falling.[6]

The current school-screening program identifies few LTBI cases with just under half completing adequate LTBI therapy. Difficulties arise with identifying eligible students, carrying out school screening in all communities, estimating denominators and in some areas inappropriate Mantoux testing is being carried out. The input required for rather small outcomes raises the question again whether resources may be used in a better, more focused way.

With the current data there is a strong argument for ceasing remote Mantoux school screening and focusing on extensive contact tracing when a case is diagnosed and only providing school screening Mantoux testing in urban areas and in communities where there has been an active case of TB within the past 2.5-3 years. If such testing is not carried out as part of routine school screening in such 'at risk' communities, targeted screening by the TB unit may be required including those non-Indigenous students living there. The urban schools allow for a supportive environment to effectively deliver Mantoux testing, education and appropriate follow-up for all risk groups.

Cost/benefit analysis has demonstrated a benefit in compliance to LTBI treatment when targeted testing of recently arrived children also includes screening their families if a positive Mantoux was found.[7] This occurs occasionally in remote communities however it should be routine policy to screen families of Mantoux positive students. Better compliance has been demonstrated if more than 1 family member is taking treatment.[7]

With the higher rates of LTBI identified in refugee and migrant populations, a well supported refugee/migrant program is essential. Currently all refugees arriving in the NT are encouraged to have a Mantoux test performed at the local community health centre irrespective of their age. A more formal process could capture this high-risk group.

School screening Mantoux testing has been carried out for many years in NT schools. Screening has changed from universal practice to more 'at risk' populations. This current review provides options for an even more focused screening program.

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Multi-drug Resistant Tuberculosis in an Indonesian Fisherman

Lesley Scott, Natalie Gray, Julie Graham and Vicki Krause, CDC Darwin

Abstract

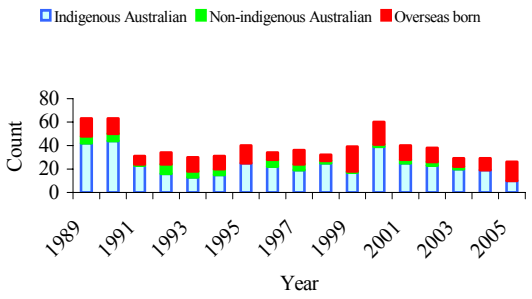
Australia has a low incidence of tuberculosis (TB) due to a long history of good TB control programs. The current programs in most States and Territories include standard treatment regimens, directly observed therapy and access to radiology. In addition, laboratory facilities are readily available for sputum smear preparation, culture and drug susceptibility testing of potential TB specimens. Legislated notification of active TB and subsequent contact tracing assists in the control of further transmission of the disease. Overseas born people and Aboriginal people make up the majority of TB cases diagnosed in Australia. The awareness and capacity to identify new cases of TB, including screening programs where appropriate, are an important part of our control program. Screening of illegal foreign fishers (IFFs) entering Australia is part of such appropriate screening. The increasing risk of multi-drug resistant (MDR) forms of TB in some parts of the world means that identifying and appropriately managing potential TB cases is increasingly important.

Early diagnosis of MDR-TB and treatment with individually designed drug regimens guided by the results of sensitivity testing are essential for successful management of these cases.

Background

TB is a bacterial infection caused by organisms from the *Mycobacterium tuberculosis* complex and is transmitted by pulmonary cases via droplet spread. Worldwide there are 8-9 million cases of TB each year and it is the leading cause of death from an infectious agent, with an estimated 1.6 million deaths per year.[1] The highest rates of disease are seen in Sub-Saharan Africa but Southeast Asian and Western Pacific region countries, including Indonesia, account for more than half the global burden of disease.[1] In Australia, the overall rates of TB remain low at 5-6/100,000 population with higher rates seen in the Aboriginal population (8.1/100,000) and the overseas born population (21.7/100,000).[2] The highest rate of TB in the Aboriginal population is seen in the Northern Territory (NT) at 14/100,000 population.[3] Since 1989, between 26 and 63 cases of TB have been reported per year in the NT, with 61% of the cases in Aboriginal people, 31% in overseas born and 8% in the Australian born non-Aboriginal population.[3] Figure 1 shows the breakdown by year and ethnicity. One case of MDR-TB was diagnosed in 2004 in an overseas born person in the NT[3] and we report here a recent second case in an Indonesian fisherman.

Figure 1. TB notifications in the NT 1989-2005 by year and ethnicity



Although IFFs have been apprehended in the northern waters of Australia for several decades, their numbers have recently increased. The change in the past year from boat-based detention to the use of land-based detention facilities for IFFs has led to the development of a communicable disease screening program that includes screening for TB. This screening is required before air transportation to land-based facilities and for assessment as 'fit to travel' before repatriation and is recommended practice for congregate living of people from high TB incidence countries. Procedures and protocols for screening IFFs have been developed and endorsed by NT Centre for Disease Control (CDC) TB Unit and endorsed by the Communicable Diseases Network Australia (CDNA) to assist in systematically screening to a uniform high standard.[4]

Case Presentation

On 29 March 2006, an Indonesian fishing vessel was apprehended off the NT coast by the Australian Customs Service (ACS). The crew

were transferred to a larger Australian Antarctic Division vessel for the journey into Darwin. The doctor onboard, using a standard 'TB and General Health Questionnaire', identified a 50 year old male with chest pain and a productive cough with blood stained sputum. He also reported being on TB medications. According to the procedure for health assessment[4] the man was identified as being at high risk of having active TB and was required to wear a surgical mask pending formal medical assessment on arrival into Darwin.

On his arrival at the Northern Immigration Detention Facility (NIDF) on 1 April, an Interim Reception Health Assessment was carried out via an Indonesian interpreter. It revealed symptoms of cough with haemoptysis, difficulty breathing, fever, occasional night sweats, vomiting, diarrhoea and nausea with recent weight loss and a long history of known TB and headaches. The patient stated that he had TB for many years and had been on and off treatment for about 10 years. He was referred to the NT CDC TB Clinic for evaluation.

On 2 April, following a chest X-ray and assessment by the CDC TB medical officer, he was immediately referred to the Royal Darwin Hospital (RDH) for management in a negative pressure isolation room. Findings at RDH, once again via interpreter, revealed a current weight of 53kg (a loss of 20 kg over the past 5 years), height of 1.65m, temperature of 37.5ºC, respiratory rate of 18 breaths/minute and oxygen saturation of 97%. He had clubbing of his fingernails and crepitations on auscultation along with decreased breath sounds in his right upper lobe (RUL). No axillary or inguinal lymphadenopathy or oedema were observed and his abdomen was non-tender with no signs suggesting gastrointestinal pathology.

He had brought with him on his boat a "Combi-Pak", a bubble pack of tablets, which contained isoniazid and rifampicin and he stated that he had received other combinations of treatment in the last 10 years. In addition to the above history, the patient complained intermittent epigastric pain and reported being a smoker of 5 cigarettes per day.

Investigations

The following initial investigations were performed:

- Chest X-ray, showing volume loss in the RUL with air space opacity compatible with an active infiltrate, volume loss in left upper lobe also with opacity at the extreme left apex.
- Sputum for microscopy, culture and sensitivity which revealed +3 smear positivity for acid fast bacillus (AFB) on microscopy. The initial culture results were referred for PCR testing on 24 April 2006.
- Normal baseline full blood count, urea and electrolytes, and liver function tests.
- Hepatitis B, Hepatitis C and HIV serology – all not detected.
- Visual acuity right and left eye 9/6, and Ishihara testing did not indicate colour blindness.

Initial Treatment Regimen

Treatment with a standard 4 drug anti-tuberculous regimen (in accordance with International Standards for Tuberculosis Care[5] and NT TB Treatment Guidelines[6]) was commenced on 4 April with the assistance of an interpreter. At this stage, susceptibility tests were pending culture and unlikely to be available for at least 6-8 weeks. His management plan was to treat him in strict respiratory isolation until 3 consecutive sputum samples were smear negative.

The drug daily regimen consisted of:

- rifampicin 600mg,
- isoniazid 300mg,
- ethambutol 800mg, and
- pyrazinamide 1500mg.

Pyridoxine (vitamin B6) 25 mg daily was included to prevent peripheral neuropathy. Treatment was given using directly observed therapy (DOT).

Monitoring for drug reactions included:

- weekly LFTs, electrolytes and creatinine levels;
- baseline visual assessment and monthly testing of visual acuity and red-green colour discrimination; and
- questions about tingling or burning in his extremities to exclude peripheral neuropathy.

Contact tracing

No specific contact tracing of co-travelling IFFs was required in this setting, as a CDC TB medical officer had screened them all with a chest X-ray and clinical review as part of their routine health assessment. Results of this screening did not reveal any further cases of TB.

Other persons exposed to the patient prior to his isolation with surgical mask on the Australian Antarctic Division vessel were Mantoux skin tested. All those with Mantoux results ≥10mm were reviewed with chest X-ray. Follow up of these personnel will continue over the next 18-24 months.

Follow-up

Sputum samples for AFBs were collected after 2 weeks of treatment. These remained smear positive (2+/3+). A plan was made to:

- continue the same medications pending culture results;
- collect sputum weekly for AFB smear and culture;
- monitor for drug side effects biweekly;
- consider his dietary preferences have a nutritionist develop a dietary plan for him; and
- consult with the NIDF psychologist who was able to ascertain his family history and subsequently organise for him to contact his family by telephone.

A repeat chest X-ray on 21 April showed little change from the initial chest X-ray. However by 8 May, after 4 weeks of the isoniazid, rifampicin, pyrazinamide and ethambutol treatment regimen, repeat chest X-ray showed reduced opacification in keeping with resolving of active disease. Clinical improvement was also evident with reduced cough resolution of haemoptysis and a weight gain of 5kg.

Culture and Sensitivity results

Ziehl-Neelsen microscopy and culture of sputum was performed by RDH Laboratory. Cultures, once available, were sent to the Victorian Infectious Diseases Laboratory (VIDRL) for identification and drug susceptibility testing (DST). *Mycobacterium tuberculosis* complex was identified by PCR on 24 April. The isolate was formally identified as *M. tuberculosis* on 16 May. DNA probe on this specimen had also been done on 24 April for *M avium* complex (MAC) and was negative.

Drug susceptibility results on 19 May revealed the isolate to be resistant to rifampicin, partially resistant to isoniazid and sensitive to ethambutol and pyrazinamide. This almost met the criteria for MDR-TB, defined as isolates that are "resistant in vitro to at least isoniazid and rifampicin".[7] Sensitivity testing for second line drugs was then set up by VIDRL. Streptomycin sensitivity testing was also requested after further questioning revealed that he had received daily injections for a period of 1 month in 2005.

Revised Treatment Regimen 1

On 23 May, after discussion with the CDC TB clinic, it was decided to stop rifampicin and continue isoniazid, ethambutol and pyrazinamide. The pyrazinamide dose was increased as a result of his weight gain and to move to the 20 mg per kg end of the recommended range. Amikacin 750mg intravenously (15mg/kg) and Gatifloxacin 400mg were also added, with the proviso that the amikacin was to be changed to streptomycin if sensitive.

Aminoglycosides can produce ototoxicity and vestibular toxicity.[5,8] Consequently, an Indonesian translation of symptoms of ototoxicity was developed to allow for daily questioning. A daily check of gait to ascertain if there was any vestibular toxicity was performed as well as regular eye testing by Snellen chart. The patient did complain of headaches, which may have been related to the gatifloxicin, but he had complained of regular headaches on admission and they were controlled by panadol.

Due to only partial resistance to isoniazid being reported this drug was continued – as there is literature to support its use in this setting.[8]

Second-line Sensitivity Results

Second-line DST results available on 29 May (on the specimen from 2 April) revealed:

- Ethambutol: sensitive
- Pyrazinamide: sensitive

- Rifampicin: resistant
- Streptomycin: sensitive
- Ethionamide: resistant
- Amikacin: sensitive
- Rifabutin: sensitive

As the evidence suggests that pyrazinamide is not a "companion" drug (one that offers protection from the development of drug resistance)[9] there was some concern that resistance to ethambutol or pyrazinamide may have developed during this time. Further sputum was thus collected on 5, 10 and 29 June for culture. Although the June 5 sample was still smear positive, both subsequent samples were smear negative.

Further testing on increased concentrations of isoniazid was also ongoing.

Revised Treatment Regimen 2

In accordance with the management plan, amikacin was ceased in favour of streptomycin on 30 May. Rifabutin was also added to the regimen to cover the possibility that full isoniazid resistance would be revealed. After 2 months of ethambutol (6 June) this was ceased. In light of ongoing headaches, possibly contributed to by gatifloxacin, that were now requiring opioids for control this drug was replaced by moxifloxacin on 1 July.

As at 1 July 2006, his regimen was:

- Isoniazid
- Pyrazinamide
- Rifabutin
- Streptomycin
- Moxifloxacin

An Unexpected Complication

On 16 July he became acutely unwell with a fever, widespread vesicular rash, conjunctival inflammation and mucosal ulceration. He was also noted to have a low white cell count (WCC) (3.0 X10^9/L) and low platelets (98 X10^9/L). He was diagnosed with Stevens-Johnson Syndrome (SJS), an immune-complex mediated hypersensitivity reaction that, in severe cases, can be fatal. Although not exclusively the result of medications, this was by far the most likely cause and all of his anti-TB medications were ceased immediately. He was treated with intravenous fluids and analgesia.
Over the next week his ulcers healed, his fever resolved and his white cell and platelet counts returned to normal. He had no residual eye damage, but his headache persisted and continued to require opioids for management.

A further sputum sample was taken on 29 July to ensure that he had not become smear positive again off medication but he continued to be smear negative.

Reinstituting treatment and further DST results

After 14 days off TB treatment it was decided, in consultation with the CDC TB Unit, to slowly recommence his medications. A thorough literature search of SJS related to anti-tuberculous medications dictated the order in which medications were re-introduced. All medications were reintroduced using a challenge dose prior to working up to full dosages.

The order in which the medications were reintroduced was:

- Ethambutol on July 31 (it was decided to recommence ethambutol even though it had been ceased as it is the medication thought to be least likely to cause SJS)
- Rifabutin on August 3
- Pyrazinamide on August 7
- Isoniazid on August 11
- Streptomycin on August 17.

On 14 August the DST results from the June 5 sample became available. The only change in the sensitivity pattern was that a full resistance to isoniazid was confirmed, and **he therefore fit the definition of MDR-TB.**

Isoniazid was ceased and all other drugs were continued. As there were 4 sensitive drugs included in the regimen, it was decided not to re-challenge him with moxifloxacin, the primary suspect for causing his SJS.

Another two complications

A few days after his DST results became available, it was also noted that his WCC and platelets were once again falling (WCC 2.3 X10^9/L, platelets 99 X10^9/L). This led to concern that he was developing another

medication reaction, and his streptomycin was ceased on 23 August and the pyrazinamide was ceased on 24 August. No symptoms developed, however, and these medications were reintroduced over the following 2 weeks without incident.

In the meantime, he was also continuing to complain of severe headaches, requiring opiate analgesia. It was thought that there was a depressive component to his headaches, and he commenced anti-depressants to some effect. Despite this, he was still requiring strong analgesia to sleep and so an MRI brain and lumbar puncture were carried out to exclude intracranial pathology. Both were normal. With his TB treatment back on track and his depression controlled, his headaches slowly resolved.

Discharge from hospital

One of the consequences of having confirmed MDR-TB was that, as per protocol, he could not come out of isolation and be discharged from hospital until he had 3 consecutive **culture** negative sputum samples. This occurred on 29 September when the results from sputa taken June 10, June 29 and July 29 all came back culture negative. His time off medication did not appear to have affected his response to treatment.

He was discharged from hospital on 4 October on ethambutol, pyrazinamide, rifabutin, streptomycin and his anti-depressant. Due to his interrupted treatment it was decided that he should remain in Australia to receive at least 5 months of streptomycin. He therefore remained in NIDF until 5 December 2006 when his streptomycin was ceased and he was finally cleared to go home to Indonesia. During his 2 months out of hospital his headaches resolved completely and he was able to be weaned off his anti-depressant. He also had regular follow-up at CDC and no further complications were noted.

Follow-up in Indonesia

Treatment for MDR-TB should continue for 18 months after sputum conversion (to culture negative) occurs. This occurred in September 2006, which means he will require treatment with oral rifabutin, ethambutol and pyrazinamide until the end of March 2008.

As rifabutin is not available in Indonesia, an agreement has been reached in which his medications will be supplied directly to his local TB clinic by Australia. This is to maximise the chance of him receiving an uninterrupted supply of medications and achieving a cure. Follow-up at his local TB clinic, including monitoring for drug side effects, has also been arranged.

After being through such a long time in isolation and a life threatening drug complication it is sincerely hoped that this patient will be supported and treated appropriately so as to achieve a cure of his MDR-TB.

Discussion

Since the 1994 launch of the Global Project on Anti-Tuberculous Drug Resistance by the World Health Organisation (WHO) and International Union Against Tuberculosis and Lung Disease (IUATLD), drug resistance data have been collected from 90 countries. In 2004, there was estimated to be 424,203 new cases of MDR-TB worldwide. Previous treatment is a strong risk factor for MDR-TB, with those previously treated 10 times more likely to have MDR-TB than untreated patients.[7] The exact extent of drug-resistant TB in countries that have not participated in the surveys (such as Indonesia) is unknown but given the number of people previously treated it is likely to be substantial. Drug resistance develops through inadequate treatment or poor adherence to treatment. This then leads to establishment of transmission of drug-resistant TB to others.

Box 1. Drug choices for MDT-TB are influenced by the following criteria[7]

- Representative data on drug resistance surveillance of well-defined local groups of TB patients, distinguishing new cases and different types of re-treatment cases.
- History of drug use in the country and the individual.
- A specific array of available second line drugs.
- Availability of DST to first and second line drugs.
- Reliable options for delivering directly observed therapy (DOT) for up to 2 years.

The WHO has established DOT programs to help prevent the development of drug-resistance. Early identification of drug-resistant TB depends on laboratory support and availability of facilities for culture and DST.

This was made difficult in the current case as the local resistance pattern in the patient's usual location was (and is) unknown. His history of drug use is not available but he has possibly used streptomycin for a short time in addition to his other first line drugs.

Most laboratories carry out DST of second line drugs after MDR-TB is cultured (indirect method), however some programs will perform DST of second line drugs at the initial testing in cases where MDR-TB is highly likely.[7] DST performed directly on the sputum sample via molecular techniques is available but only gives information about susceptibility to rifampicin. While this may help inform decision making, the sensitivity and specificity of testing is better in the indirect method.[7] Where early DST results are available the clinician may have the opportunity to start treatment from the outset with second line drugs rather than starting a regimen that includes resistant drugs with the possibility of developing further resistance.

Drug sensitivities of second line drugs is complicated by the fact that the 'critical drug concentrations defining drug resistance are very close to the minimal inhibitory concentrations'.[7]

The International Standards for Tuberculosis Care[5] recommendations for treatment include:

- A specialized treatment regimen should contain at least 4 effective drugs. If drug sensitivity of a drug is doubtful it can be included as an extra drug. In this case although isoniazid was considered to be partially resistant it was still included.
- Treatment in the intensive phase including the injectable drug should continue for 6 months with a total duration of treatment of 18-24 months.
- Doses should be given at least 6 days per week administered as DOT rather than 3 times weekly regimens to gain effective serum levels.

Recommended treatment for patients with HR patterns of resistance are to begin with the first line drugs to which the isolate is susceptible. In this case, pyrazinamide and ethambutol. In addition, a sensitive fluoroquinolone (gatifloxacin) and an injectable drug (amikacin) should be added.[5]

Susceptibility testing results indicated resistance to rifampicin, but sensitivity to rifabutin therefore rifabutin could have been added. As the clinical effectiveness of rifabutin has not been demonstrated in this circumstance this should be in addition to the above treatment regimen.[9] Although newer rifamycins should be considered ineffective where there is resistance to rifampicin,[7] their use in this patient where rifabutin susceptibility testing is known may lead to earlier sterilization. However, the likelihood of this patient being able to continue on rifabutin on return to Indonesia needed to be considered and an arrangement in which rifabutin is to be supplied by Australia was required.

Conclusions

In Australia we have the resources to be able to conduct DST testing of both first and second line drugs to inform treatment decisions. Drug choice in MDR-TB is determined by susceptibility rather than cost. We are able to isolate smear positive patients in negative pressure rooms until non-infectious thereby preventing infection of contacts. Treatment by DOT is the norm and we have the resources to implement it.

In patients where MDR-TB is suspected, early DST to identify susceptible isolates is preferable. In the NT, where cultures are sent to interstate reference laboratories, the process for DST can be prolonged. Where drug resistance is highly suspected, identification of susceptibility to second-line drugs should be set up at the same time as the first-line drugs to avoid delays.

Treatment regimens should have at least 4 drugs to which the organism is susceptible and treatment given for at least 18 months by DOT. Choice of drug treatment should consider the ability of the treatment to be continued in the country of origin as well as being the most likely to achieve cure.

Consultation regarding treatment choices with an experienced practitioner should always be sought.

This case highlights the difficulty in developing countries in treating TB where resources for identifying MDR cases are limited and treatment regimens are unable to be implemented with susceptible second line drugs given through DOT for 18 to 24 months. It also shows that innovative solutions can potentially be worked out through discussion and communication.

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Imported malaria cases at the Northern Immigration Detention Facility, Berrimah, Northern Territory - Risk assessment and recommendations

Matt Shortus & Peter Whelan, Medical Entomology Branch, CDC

Introduction

There have been no endemic cases of malaria recorded in the Northern Territory (NT) since 1962, and in 1981 the World Health Organisation declared the whole of Australia to be malaria free.[1] Due to favourable environmental conditions and the presence of competent vectors of the disease, the area north of the 19° parallel in the NT is considered to be receptive to the re-introduction of malaria.[2,3] Small outbreaks involving local transmission have been recorded in Queensland in 1986 and 2002.[4] These illustrate the potential for malaria to be re-introduced into North Australia, and the importance of monitoring all imported malaria cases.

Cases of imported malaria are diagnosed in the NT every year and public health procedures are in place to manage these, including entomological investigations and control protocols.[5,6] Entomological investigations are usually triggered if a malaria patient has infective stages (gametocytes) of the malaria parasite in the blood. A patient with gametocytes can potentially infect a vector mosquito which, in turn, could potentially transmit the parasite to another person. Entomological investigations involve analysing historical trapping data from any nearby routine adult trap sites, and setting adult traps at the case house and the nearest mosquito harbourage site. These determine the levels of potential malaria vectors present in the area.[7] If high numbers of vectors are detected in

the traps, and the patient has been exposed to mosquito bites, a precautionary fogging operation may be recommended. The aim of the fogging operation is to knock down any adult malaria vectors that may be infective, thereby preventing the development of a local malaria transmission cycle.

Illegal Foreign Fishers (IFFs) & imported malaria cases in North Australia

In 2005 the Northern Immigration Detention Facility (NIDF) in Darwin was opened as a facility to accommodate all IFFs apprehended in north Australian waters. Eventually it is anticipated that the facility will house up to 600 people.[8] The NIDF consists of a 'General Population' area and a 'Medical Separation' area. All IFFs are initially detained in the medical separation area until they have undergone a public health assessment. If they are certified to be 'fit to travel' they are transferred into the general population area. However, if they are unwell they are taken immediately to the nearest hospital, or have further medical tests conducted while they remain in the medical separation area of the NIDF.

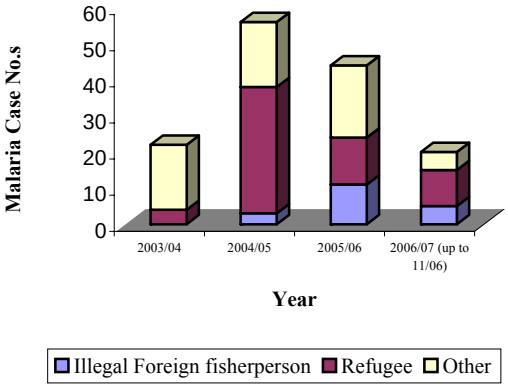
There are also temporary processing centres in Nhulunbuy, Broome, Weipa and Thursday Island, in which IFFs are detained until they have been medically assessed. When they are passed as 'fit to travel' they are transferred, by aircraft, to the general population section of the NIDF in Darwin.[8] If they do not pass health assessment they are treated for their illness at the temporary processing centre or local hospital before travelling to the NIDF.[6]

Current 'Health Assessment' procedures for IFFs include answering a 'TB and General Health Questionnaire' with the aid of an interpreter followed by clinical screening by a medical officer. The assessment protocols were compiled by the NT Centre for Disease Control (Department of Health and Community Services - DHCS) and are designed to diagnose communicable diseases of public health significance as well as other medical or psychiatric conditions.[6,8]

Malaria tests are conducted on IFFs who are:[6]

- febrile;
- not febrile but have had recent fevers;
- found to have a history of treated or untreated malaria;
- found on examination to have an enlarged spleen; or are
- identified as a co-traveller of an index case of malaria.

Figure 1. Malaria case in the NT, including refugee & IFF



Malaria tests include thick and thin blood films and an antigen test. Until the results of the tests are available, IFFs who do not require hospitalisation must remain in the medical separation area. All IFFs diagnosed with *Plasmodium falciparum* are immediately admitted to hospital for treatment. Those diagnosed with the sexual stage (gametocytes present) of any of the other 3 forms of malaria (*P. vivax, P. ovale, P. malariae*) are also admitted to hospital. If gametocytes are not present, treatment is still required but the IFF is not hospitalised. These IFFs must remain indoors in screened or air-conditioned accommodation in the medical separation area between 6pm and 8am daily until their treatment is completed.[6]

Since the opening of the NIDF in late 2005 there have been 8 cases of imported malaria detected in IFFs housed within the facility, with 5 of those positive for gametocytes. There has been an increase in the number of IFFs diagnosed and treated for malaria in the NT over the past few years (Figure 1). This is due to 2 main factors; the increasing numbers of illegal foreign fishing vessels (IFFVs) being apprehended in Australian waters, and the development of land-based processing and detention of IFFV crews. Once the NIDF is operating at full capacity the numbers of malaria cases involving IFF in the NT is likely to rise further.

A large proportion of the 'Other' malaria cases shown in Figure 1 comprise soldiers based in East Timor and tourists travelling to malarious areas.

Malaria vectors in the Northern Territory

There are 5 *Anopheline* species in the NT that have the potential to transmit malaria parasites. These species include *Anopheles farauti s.l., Anopheles annulipes, Anopheles amictus, Anopheles bancrofti* and *Anopheles hilli*. Within this group, *Anopheles farauti s.s.* is considered to be the most competent malaria vector. However, under favourable environmental and seasonal conditions the other species are also potential vectors.[2]

Anopheles farauti s.s. is part of a species complex that includes at least 3 morphologically indistinguishable species within the NT.[2] Within this complex, *An. farauti s.s.* (species No.1) can breed in brackish and fresh water, and is considered the most competent malaria vector of the *An. farauti* clade in the NT.[2,9,10] *An. farauti* No. 3 is a freshwater breeder that is common in coastal and sub-coastal areas of the NT, while the less commonly encountered *An. farauti* No. 2 is a freshwater species that has been detected in a restricted range of coastal and inland areas in the NT.[9] The competency of *An. farauti* species No. 2 and No. 3 as malaria vectors is not known.

Historically, *An. farauti ss.* (No. 1) was probably responsible for the malaria outbreaks in the coastal communities of the NT prior to 1962, including outbreaks in the Darwin area .[3,7] Sites that are located near productive breeding sites of the *An. farauti s.s.* are considered to be especially receptive to the re-introduction of malaria.

Malaria vector surveillance in the NIDF

A routine adult mosquito monitoring trap was established at the NIDF in April 2006, principally to monitor malaria vector numbers in the area (Figure 2). If Medical Entomology Branch (MEB) is notified of a malaria case at the NIDF in which the patient is infectious and exposed to local mosquito bites, it is important to have a record of the recent abundance levels of malaria vector species in the area. It is also important to have historical trap result records so that the seasonal peak population trends of malaria vector species in the area can be mapped.

Since its inception in April 2006 the trap at the NIDF has detected moderate numbers of *An. farauti s.l.* and other potential vector species. There is another routine adult mosquito trap at the nearby Aviation Museum, 1.5 km to the west of the NIDF (Figure 2). Results from this trap will be useful in supplementing results from the trap at the NIDF. Historically the trap at the Aviation Museum has recorded high numbers of *An. farauti s.l.* during the peak abundance period for this species (March to June) and small to moderate numbers at other times of the year.

Risk assessment

Changes to the apprehension protocols for IFFV crews

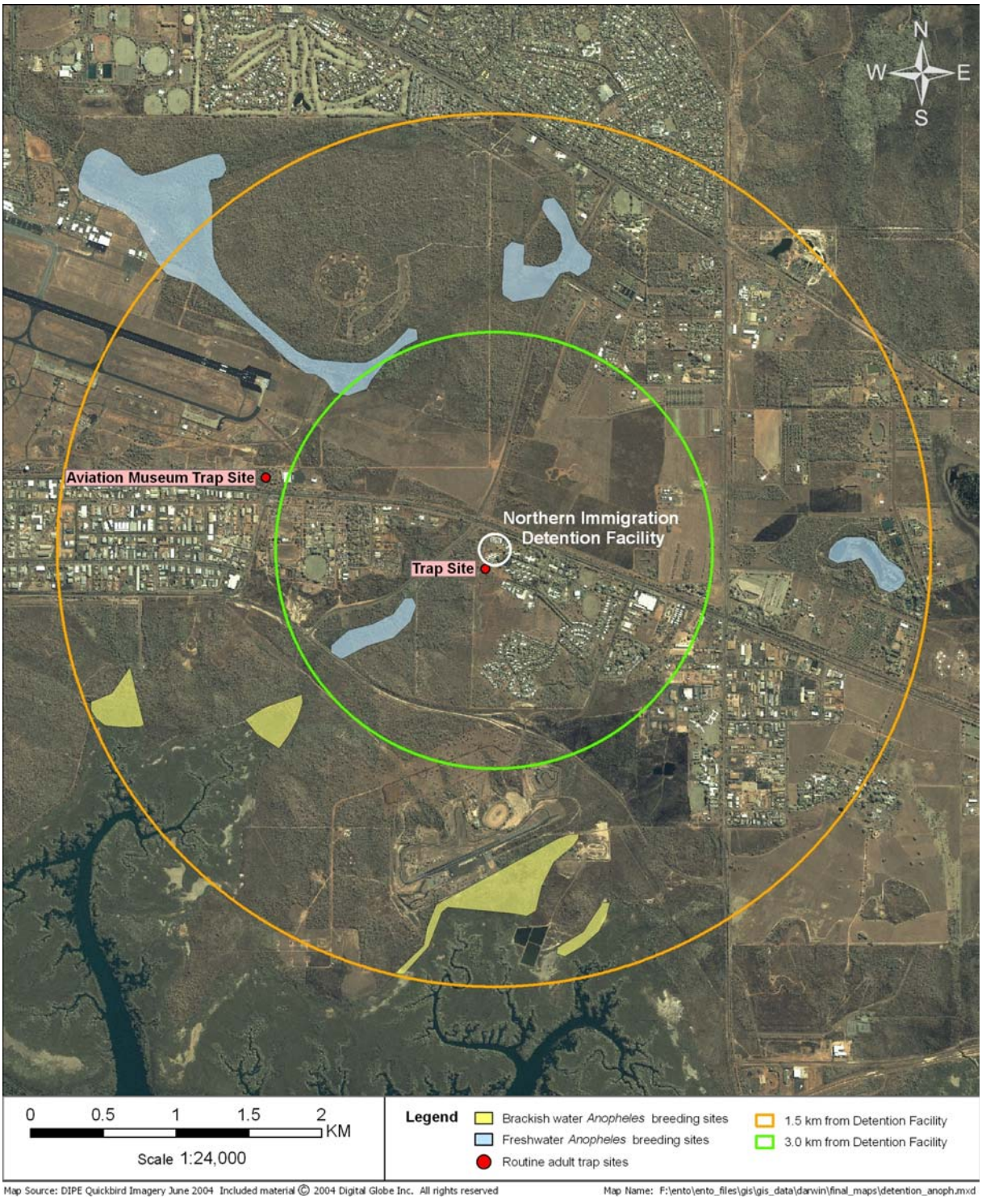
Prior to September 2005, IFFs were detained aboard their vessels at a quarantine mooring point. The mooring points were located 1.5 nautical miles from shore, which effectively isolated the IFFV crews from *Anopheles* mosquito bites. IFFs suffering from fevers or other symptoms were reviewed by a doctor and, if necessary, relocated to Royal Darwin Hospital for treatment, usually during daylight hours. This meant that the chance of an IFF with infectious malaria transmitting the parasite to a local vector mosquito was very small.

After a death onboard an IFFV moored in Darwin harbour, recommendations were made to detain IFFs in land-based detention facilities.8[8] Detention of IFFV crews ashore, as compared to 1.5 nm offshore, increases the risk of an infectious IFF transmitting malaria to local mosquito vectors.

Location of the NIDF

The NIDF is located within an Australian Defence Force facility on the outskirts of the industrial area of Darwin. The facility is approximately 3km north of Darwin harbour, and 2km north of the tidally influenced Reichardt and Bleeser Creeks. The Mararra round swamp, which is a freshwater swamp at the top of Rapid Creek, is also located approximately 2km north of the facility.

Fig. 2. Potential *Anopheles* breeding sites near the Northern Immigration Detention Centre



Desktop and ground truthing surveys were conducted by MEB to locate potential brackish water and fresh water *Anopheles* breeding sites that are within dispersal distance of the facility. The major potential vector, *An. farauti s.s*, can disperse up to 3 km and is usually found breeding in *Schoenoplectus* and *Eleocharis* reed swamps and the upper reaches of mangrove creeks that have a freshwater influence.[2] These surveys did identify some potential breeding sites for the species within dispersal distance of the facility, at the top of Bleesers Creek and Reichardt Creek (Figure 2). The sites were characterised by depressions within and adjacent to small creek lines draining into the mangroves, and cut-off pools at the interface of mangroves and reed swamps. Vegetation at these sites consisted of dry *Eleocharis* reeds, mangroves and paperbark trees. The depressions were dry at the time of the survey, but would become water filled and brackish during the wet season, and possibly produce large numbers of *An. farauti s. s.* at the end of the wet season.

Other potential breeding sites for freshwater *Anopheles*, such as *An. farauti* No. 3, *An. bancrofti, An. annulipes* and *An. amictus*, that were located include: a pandanus and paperbark swamp 1 km south-west of the NIDF; an extensive reed and paperbark swamp 1.5 – 3 km north of the NIDF; and a freshwater lagoon 2.5 km east of the NIDF (Figure 2).

Malaria screening

If an IFF has passed the health assessment, but becomes ill or feverish after arriving at the NIDF, he will either be hospitalised or admitted to the medical separation area.[8] If malaria is suspected, blood slides and antigen tests are undertaken and sent to an interstate pathology unit for testing. The results of the blood slides take between 2 and 4 days to be returned, during which time the IFF will remain in the medical separation area. There is a danger that during this period the IFF may develop gametocytes and be exposed to malaria vector mosquitoes, especially after dark and during peak vector abundance periods. This is especially relevant to *P. vivax* malaria, which can develop gametocytes 3 days after symptoms appear.

Depending on the stage of the malaria parasite's lifecycle, and the level of host natural immunity, an IFF may be infected with malaria, but pass the 'Health Assessment' procedures. This is particularly true for IFFs from malarious areas of Indonesia who are likely to have partial immunity to malaria. During the liver stage of the parasitic cycle (exoerythrocytic cycle), malaria can be difficult to diagnose and the patient is usually asymptomatic. In these instances, the parasite may enter the human blood stage (erythrocytic cycle) after an IFF has been transferred to the general population area of NIDF, with a subsequent rapid development of symptoms and gametocytes (48 hours for *P. falciparum* and *P. vivax*). This is especially relevant to some strains of *P. vivax*, which can have a very prolonged liver stage. IFFs in the general population area of the NIDF thus need to be very closely monitored for fevers and other malaria symptoms. If symptomatic persons in the general population area are not expediently identified and admitted to hospital or the medical separation area for tests and treatment, there is a risk that local malaria vector mosquitoes may become infective.

Adequate personal protection from mosquitoes at the NIDF

An inspection of the NIDF by MEB staff revealed that the residents at the facility could sometimes be exposed to high levels of biting insect activity. The central recreational area is an open-sided, undercover area with covered walkways radiating to the dining rooms and sleeping quarters. Sleeping quarters in the general population section consist of rows of demountables with 6 rooms in each demountable. The rooms have en suites and air-conditioning. Although they can be sealed against mosquito entry using the sliding glass door and a glass window in the en suite, there are no fly screens on the rooms. The dining room is a large air-conditioned building that is sealed against mosquito entry. The sleeping quarters in the medical separation area are also air conditioned and have an en suite. There are no fly screens. Mosquito repellent is made available to the detainees for personal protection if they choose to use it.

Peak *Anopheles* biting periods are usually after sunset. There are a number of potential *Anopheles* breeding sites within dispersal distance of the NIDF, and during peak

abundance periods there are likely to be high levels of potential malaria vector species seeking blood meals in the area of the NIDF. During daylight and after sunset the residents of the facility apparently spend a lot of time in the undercover walkways of the sleeping quarters and in the recreational area. Times spent in the mosquito proofed sleeping and dining quarters is limited to bed-time and meal times, and many of the residents choose not to sleep with the air-conditioning on, preferring to leave their doors open. Detainees at the NIDF are made vulnerable to mosquito bites by these patterns of activity. While there is some level of personal protection from mosquito bites with clothing, mosquito repellent and some sealed rooms, detainees are still likely to be exposed to mosquito bites after sunset.

Recommendations

- It is recommended that the process of testing IFFs for malaria at the NIDF be streamlined as much as possible. Delays in this process can mean that potentially infectious malaria patients may be exposed to malaria vectors, increasing the risk of local malaria transmission.
- The Health Assessment Procedures state that patients in the NIDF medial separation area who are suspected of malaria should be isolated from potential malaria vector mosquito bites between 6pm and 8am. There was no evidence of a screened or air-conditioned area for patients in this area to go outside for cigarettes or other activities at night. It is important that all IFFs detained in the medical separation area who are either suspected of malaria, or have tested positive for malaria but are not infectious, are protected from mosquito bites between 6pm and 8am in the *Anopheles* peak seasonal periods. It is recommended that modifications be made to existing buildings (such as fly screens), or another building erected, so that at-risk patients can be protected from mosquito bites, and still have access to sealed toilets and sleeping areas and a screened outdoor area if they choose to smoke after dark.
- Measures to protect IFFs from mosquito bites during peak periods of vector activity (March to June) should be increased. The provision of personal protection measures, such as mosquito repellents and long loose clothing, during this period is important. Insecticidal barrier treatments should also be considered during periods of malaria vector abundance. Residual barrier treatments can be applied to surrounding mosquito harbourage sites such as vegetation, fences and buildings, to reduce the numbers of adult mosquitoes entering the NIDF. There are a number of residual barrier sprays for controlling adult mosquitoes, and a licensed pest control operator can apply them professionally.

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DEPARTMENT OF HEALTH AND COMMUNITY SERVICES

Fact sheet

Dengue mosquitoes on Groote Eylandt

Detection of dengue mossies

Dengue mosquitoes (*Aedes aegypti*) were detected near the port area on Groote Eylandt in a special egg trap on 31 Oct 2006. Since then it has been discovered breeding in residential yards in Alyangula and may be in other areas of Groote.

The dengue mosquito in the NT

The dengue mosquito was not present in the NT for nearly 50 years prior to 2004. The mosquito is imported periodically into Darwin on overseas vessels such as foreign fishing vessels and cargo ships, but has been detected and eliminated each time. It was imported into Tennant Creek from Queensland in 2004 but was eradicated in March 2006 after a 2-year program.

Dengue mosquitoes

Dengue mosquitoes breed mainly around the home in containers that can hold water. This includes pot plant drip trays, buckets, containers of water for pets, old tyres, dinghies, blocked roof gutters, drums, plant striking jars, disused fish ponds or jars, flower vases with water, or rain water tanks. They lay their eggs just above the waterline in containers or water receptacles. They do not breed in swamps or other ground pools or earth drains.

The eggs are drought resistant and can last over 12 months in dry containers that have previously held water.

The transport of pot plant saucers, old tyres, plastic drums, wading pools, wheelbarrows, mower grass catchers, dinghies, boats, tarps or plastic sheets that have held water, machinery or equipment, old car bodies, with and indeed any formerly rain filled container from Groote could introduce the mosquito to other areas within the NT.

Adult mosquitoes are most active during daylight hours, particularly in the evening and in dark humid areas. They rest indoors in closets, behind curtains and other dark places. Outdoors they rest close to houses where it is cool and shaded. The mosquito rarely flies more than 200 metres from its breeding site.

What is dengue disease?

Dengue fever is a viral illness caused by infection with one of 4 types of the dengue virus spread by the bite of an infected mosquito (*Aedes aegypti*). It causes high fever lasting 3-7 days, severe frontal headache, pain behind the eyes and muscle and joint pains. Recovery may be slow and associated with weakness and depression. A more severe form called Dengue haemorrhagic fever begins with the same symptoms as dengue fever but is followed by rapid deterioration, internal bleeding and cardiovascular collapse, progressing to coma and can be fatal.

There is no spread of virus direct from human to human, as spread is only from the bite of an infected mosquito.

Where is dengue found?

Dengue fever occurs in tropical and sub-tropical areas of the world, including north Queensland, Indonesia, Timor Leste, Vietnam and other areas in the West Pacific and South East Asia.

Can I catch dengue disease on Groote?

Currently there is little likelihood of dengue disease in Groote because there are no infected overseas travellers with dengue in Groote.

How can the dengue mosquito be eradicated on Groote?

The NT Department of Health & Community Services (DHCS), in cooperation with GEMCO and with funding assistance from Commonwealth Department of Health and Ageing will be conducting a yard by yard inspection and bifenthrin spray program over the

next few months. Every potential breeding receptacle will be sprayed with bifenthrin insecticide (Brigade T&O), or a chlorine detergent mixture. It will be necessary to reinspect and respray each yard repeatedly as adult mosquitoes continue to lay eggs in newly available receptacles and in sprayed receptacles as the insecticide wears off. It is possible that the inspection and control program could take up to 2 years to confirm the mosquito has been eliminated. Bifenthrin is a pyrethrin-like insecticide and has a low toxicity to humans and animals but is toxic to fish. The bifenthrin spray will kill adult mosquitoes as they come to lay eggs in receptacles, as well as killing any larvae that hatch out of eggs or are presenting the water.

What can you do?

Avoid importing or spreading dengue mosquitoes

- Before transporting receptacles from Alyangula or Groote, wipe out completely and scrub inner surfaces of any receptacle that has previously held water used for drinking or pets with a strong chlorine and detergent mixture solution. Spray machinery, tyres dinghies and other non-drinking receptacles with bifenthrin or deltamethrin (Cislin) before transporting them from Alyangula or to another Groote locality, island or mainland.
- Prevent landings of any drums or other receptacles, from boats from overseas or from Groote Eylandt.

Eliminate potential breeding sites on Groote

- Remove or empty any container that holds water eg tyres, boats plastic containers, and shells. Store containers upside down and undercover or under a domed tarpaulin in good repair.
- Avoid using saucers under pot plants. Let pots drain directly onto the ground or make sure saucers are emptied at least once a week and wipe their inner surface firmly with a strong chlorine and detergent soaked cloth several times or fill with sand.
- Empty birdbaths, vases, and pet drinking water at least weekly and wipe as above.
- Cover and completely seal septic tanks, rainwater tanks or other large water storage containers.
- Dispose of rubbish around the yard that may collect water eg fallen palm fronds, tins, plastic bags or sheeting.
- Ensure roof gutters drain freely so that pools of water are not left at any low points.

Report any mosquito larvae sightings

If you see mosquito larvae in a container, report it to a DHCS officer on 0427270912 or 08 89228901. Someone will come and take a sample for identification, and treat the receptacle.

Report any dengue disease.

If you have returned to Groote after being overseas recently to a dengue infested country and become unwell, seek medical advice promptly. In the interim protect yourself from being bitten by mosquitoes on Groote Eylandt

For information and treatment advice contact;
Medical Entomology Branch
Darwin 8922 8901
Centre for Disease Control (CDC)
Nhulunbuy 8987 0359

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CDC-GP Strengthening the Links
A project promoting the links between the Darwin Centre for Disease Control and Darwin General Practitioners—Report and Evaluation

Heather Cook, CDC Darwin

Background

The control of communicable disease is dependent upon the timely and efficient communication between primary health practitioners and public health units. Through their day to day interactions with general practitioners (GPs), the staff at the Darwin Centre for Disease Control (CDC) identified a need to improve the exchange of information between these 2 groups. It was decided a project to address this would be developed and in an effort to maximise the benefits of the proposed project an assessment of the interactions between the CDC and GPs over the preceding 6 months was undertaken. This enabled the project to be tailored towards the identified needs and confirmed an opportunity existed to enhance the knowledge of, and accessibility of CDC resources, expertise and support to GPs in the Top End of the Northern Territory (NT).[1]

A planning group of CDC staff including some who had previously or were currently working as GPs was established to consider appropriate resources, evaluation tools and to facilitate the implementation process.

GPs were invited to participate in either a one-on-one or a small group practice visit by CDC medical or nursing staff between September 2005 and end March 2006. This report outlines the project, including the evaluation and future recommendations.

Aim

In addition to finding out whether CDC practice visits were acceptable the aims of the project were for GPs to develop;

1. an increased knowledge of the resources and expertise available from the CDC and how to access them;
2. a greater awareness of what confirmed or suspected conditions should be notified by the clinician; and
3. an increased knowledge of specific communicable diseases and the appropriate public health response that should be initiated by GPs.

A secondary aim of the Strengthening the Links (STL) project was to raise awareness of and promote participation in the Tropical Influenza Surveillance System (TISS).[2]

Methods

GPs in the Top End were notified by mail of the proposed project with assistance from the Top End Division of General Practice (TEDGP). The GP or practice manager was then phoned to discuss the most appropriate times and types of visit. The staff of CDC were able to offer flexible appointment times to accommodate the busy schedules of GPs.

Incentives to GPs who initiated appointments included 'early bird' movie passes and coffee vouchers. Other forms of enticement to participate included Royal Australian College of General Practitioners (RACGP) Category 2 Activity points, a copy of the locally relevant text *Tropical Health in the Top End*[3] per practice and a number of small giveaways such as stickers and fridge magnets providing information relating to the Darwin CDC and current public health messages.

Case study scenarios pertaining to communicable diseases were designed to be used as prompts for further discussion during the practise visit with the aim to focus on the individual needs of each GP.

In most instances a pre-intervention questionnaire was completed by the GP prior to the visit. This was to provide baseline demographic data as well as to assist in identifying barriers to communication, to explore methods for facilitating access to CDC expertise and resources and for planning future population health educational sessions. GPs were asked to rate their knowledge of CDC resources and of the GP role in the management of communicable disease using a 7 point Likert scale ranging from

1 (very limited) to 7 (expert knowledge). The post-intervention questionnaire (completed at 6 months) also provided an opportunity to reassess communications between GPs and Darwin CDC.

Following each visit the GP was asked to complete a feedback form and return it to the CDC staff member present or return to CDC via fax. The GP feedback form was designed to assess how this one-on-one/small group approach to delivering information was received by the GPs. Using a 5 point Likert scale, questions were asked with the response options - Strongly Disagree, Disagree, Unsure, Agree and Strongly Agree. The CDC staff who conducted the visits were also asked to complete an evaluation form outlining what scenarios they discussed, any challenges or issues they encountered and suggestions for change.

Results

In the period September 2005 to March 2006 a total of 61 GPs in Darwin as well as the greater Darwin area e.g. Jabiru, were visited by a CDC staff member either individually or as part of a small group. While the project was originally designed to be delivered as a one-on-one visit, many GPs and GP practices indicated they would prefer to conduct the visit in a small group setting within the practice. This was often easier to arrange given GPs' busy and often unpredictable schedules. One-on-one visits were delivered to 26 GPs and 35 GPs were seen in a group setting resulting in 11 group setting meetings. Table 1 shows the demographics of those visited. In response to the type of patients most commonly seen 30 GPs reported seeing mostly acute care conditions and 32 indicated their patients required mostly chronic disease management. Both options were reported by 12 GPs.

Table 1. Demographic characteristics (where provided) of the GPs visited *n=51*

		Number	(%)
Age Group	**<30yrs**	3	(6)
	30-39yrs	10	(20)
	40-49yrs	20	(39)
	50-59yrs	13	(26)
	60+yrs	5	(10)
Sex	**male**	31	(61)
	female	20	(39)
Hours worked as GP per week	**0 to 10**	3	(6)
	10 to 20	5	(10)
	20 to 30	8	(16)
	30 to 40	16	(32)
	>40	18	(36)
Time spent working as GP in the Top End	**ns***	1	(2)
	<3mths	1	(2)
	3 to 12 mths	7	(14)
	1 to 3 yrs	10	(20)
	>3yrs	33	(65)

*not specified

GP feedback questionnaire

A total of 49 feedback forms (80%) were returned from the GPs. More group participants returned the initial feedback questionnaire (91%) than those GPs who were seen individually (73%). The majority of the forms (78%) were completed and provided at the time of the visit.

Of the 49 questionnaires received, 92% participants agreed or strongly agreed that they were happy with the visit format. In response to, "Was the practice visit too long?" 94% disagreed, or strongly disagreed. Of the one-on-one visits 50% were 30 minutes long with a mean length of 37 minutes (range 15-60 minutes). All group sessions were at least 60 minutes long. Table 2 summarises the responses to the post-intervention questionnaires.

Table 2. Post-intervention questionnaire responses

	Strongly Agree/ Agree	Unsure	Disagree
Was it a good opportunity to discuss communicable disease issues	100%		
Were the resources provided useful	100%		
Was content of the discussion easy to understand	100%		
Were scenarios presented helpful in stimulating discussion	84%	12%	4%
Were you made more aware of the role, function, services and resources provided by CDC	94%*		
Were you more aware of your role in public health management	86%	6%	8%

Overall 19 additional comments were recorded. Some of these related to suggestions for the resources and some noted insufficient time to fully discuss issues. The suggestion that similar visits should be repeated at regular intervals was made by 4 of 49 post intervention respondents.

CDC staff evaluation

Results from CDC staff are available for 16 visits. Details on the types and frequency of scenarios that were discussed are shown in table 3.

Table 3. Types and frequency of scenarios presented by CDC staff at 16 GP visits.

Scenario	Number of times presented
Australian Bat Lyssavirus (ABL)	8
Avian influenza	11
Dengue Fever	7
Gastroenteritis outbreak	6
Influenza	4
Malaria	8
Measles	7
Non-tuberculous mycobacterial (NTM)	6
lesions	3
Pertussis	2
Rheumatic Heart Disease	3
Varicella vaccine	2

Table 4. The number of times GPs reported contact with CDC in the 12 months prior to (Pre) and 6 months after (Post) visit.

Number of Times	Pre (n=43)		Post (n=21)	
	Number	(%)	Number	(%)
1-2	15	(35)	14	(67)
2-4	17	(40)	4	(19)
>4	11	(26)	2	(10)
Not specified			1	(5)

Of the 16 completed evaluations, 3 GPs reported not wanting to utilise the case study scenarios. Some CDC presenters involved in group sessions indicated it was difficult to use the scenarios in this setting and others reported that time limits restricted their ability to fully utilise the scenarios.

GP pre and post intervention questionnaires

Of the 61 GPs visited (85%) returned pre intervention questionnaires and 34 (56%) responded to the post intervention questionnaire sent out 6 months after their initial visit.

GPs were asked to document any previous self initiated contact with CDC. Of the 52 who completed the pre questionnaire 49 had contacted CDC prior to their visit and 43 (83% of total responses) had done so in the previous 12 months. Responses from the post intervention questionnaire revealed 62% of GPs had contacted CDC in the 6 months after their practice visit. A summary of the number of times contact was made by GPs both pre and post intervention is summarised in table 4. Where both questionnaires were available for an individual GP, all except 1 had contacted CDC before and after the visit.

The GPs were asked to choose from examples of reasons for contacting CDC plus given the option to provide individual responses. The most common reasons for contact are provided in Table 5. Responses for 'other' included referral, TB, leprosy, to respond to a CDC request for information and to obtain a Reporting Form.

GPs were asked if they had experienced difficulty contacting CDC or accessing resources. Prior to the CDC visit 9 GPs reported difficulties with 6 of these phone related such as the phone being unattended or engaged and 3

Table 5. GPs who contacted CDC in the 12 months prior to (Pre) and 6 months after (Post) visit by reason (more than one response could be selected).

	Pre (n=43)		Post (n=21)	
Reason for contact	**Number**	**(%)**	**Number**	**(%)**
Report a notifiable disease	29	(67%)	12	(57%)
Report a cluster of gastrointestinal illness	3	(7%)	0	(0%)
Assistance and advice with sexual health contact tracing	7	(16%)	1	(5%)
Advice on the appropriate diagnostic method for a suspected notifiable disease	12	(28%)	3	(14%)
Immunisation advice	15	(35%)	6	(29%)
Clinical treatment advice	20	(47%)	6	(29%)
Other	9	(21%)	5	(24%)

*Percentages relate to the % of all GP responses that selected the 'reason for contact' option specified.

Table 6. Reporting of number of occasions of difficulties contacting CDC or accessing resources at any time prior to visit and in the 6 months following the visit.

	Prior to visit		6 months after visit	
Contacting CDC	***n=49***	**(%)**	***n=21***	**(%)**
Difficulty with phone	6	(12)	2	(10)
Specific person unavailable	3	(6)	3	(14)
No difficulty reported	40	(82)	16	(76)
Accessing resources	***n=52***	**(%)**	***n=34***	**(%)**
Difficulty accessing resources	5	(10)	0	(0)
Never accessed resources	9	(17)	9	(26)
No difficulty accessing resources	37	(71)	25	(74)
NS*	1	(2)		

* not specified

Table 7. GP preferred method of receiving information from CDC[#]

Information type		***n=51***	**(%)***
Urgent update on specific diseases	Email	29	(57)
	Fax	21	(41)
	Individual mail out	10	(20)
Non urgent or routine information	TEDGP-Wednesday Word	18	(35)
	TEDGP-The Echo	7	(14)
	CDC-The Bulletin	14	(28)
	No response	20	(39)

[#]more than one option could be selected
*relates to the % of all GP responses that selected the 'information type' option specified.

related to the desired CDC person being unavailable. Five GPs reported difficulties accessing resources while 9 had never sought resources from CDC. Some GPs continued to report difficulties contacting CDC after the visit but none reported difficulties accessing resources. A summary is provided in Table 6.

Options for CDC communication with GPs are summarised in Table 6. The question allowed for more than 1 option in both urgent and non-urgent categories. The question relating to non-urgent or routine information were not completed by 20 of the respondents. Responses are described in Table 7.

Table 8 outlines the responses received from GPs when given a selection of topics they would be interested in receiving further education on.

When GPs were questioned on participation in the TISS, 23 (45%) GPs indicated they were interested and 8 (16%) were already involved in the scheme.

Table 8. GP responses to specific options for further education[#]

Topic	**n=51**	**(%)***
Pertussis	17	(33)
Australian Bat Lyssavirus	16	(31)
Pandemic Influenza	25	(49)
Investigation of a rash illness	31	(61)
Malaria	26	(51)
Leptospirosis	21	(41)
Melioidosis	30	(59)
Immunisation	19	(37)
Other (online session)	1	(2)

[#]more than one option could be selected
*relates to the % of all GP responses that selected the 'topic' option specified.

In total, 29 (48%) of GPs returned both pre and post intervention questionnaires. Comparisons of the self reported change in knowledge of CDC resources and the GP role in the management of

Table 9. Self reported change in knowledge of CDC resources and the GP role in the management of communicable disease 6 months after the visit.

	n =29	(%)
CDC Resources		
Less knowledge	2	(7)
Same level of knowledge	6	(21)
Increased knowledge	21	(72)
GPs role in communicable disease management		
Less knowledge	4	(14)
Same level of knowledge	5	(17)
Increased knowledge	20	(69)

Table 10. Breakdown of expenses associated with implementing the Strengthening the Links project between September 2005 – March 2006

Resources (approx)[#]	$1,495.00
Incentives	$155.00
Training	$118.00
Presenter time*	$2,978.62
Total	**$4,746.62**
Total cost per GP	**$77.81**

[#]Includes TEDGP text[2]
* Includes travel time

communicable disease 6 months after the visit are outlined in Table 9. An increased knowledge of CDC resources was reported by 72% of GPs and 69% reported an increased knowledge of their roles in communicable disease management. Using the 7 point scale individual GPs reported a 1.37 point mean increase (range –1 to 6) in knowledge of CDC resources and a 1 point mean increase (range –1 to 5) in the GP role in the management of communicable disease.

Cost Analysis

Although no detailed cost analysis method was considered during planning, calculations of costs specifically incurred for this project are outlined in Table 10. Other costs not included relate to transport costs and staff time for resource development, planning and training prior to visits.

Discussion

This analysis suggests that GPs in Darwin and surrounding communities consider practice visits are an acceptable way of exchanging and delivering information on the public health management of communicable disease. Findings from Stevens et al,[4] have previously acknowledged that agreement to participate is likely to indicate approval of this form of education. Although time restraints common to many GPs resulted in a greater than anticipated number of small group sessions, this did not seem to adversely affect satisfaction with the visit format. GP feedback overall was positive and they considered the visits effective in increasing their awareness around communicable disease issues. Of those visited, 65% had been practising in the Top End for longer than 3 years. As local knowledge is acquired over time, it could be assumed locally relevant information would be less well received by those who have been practising for some time in the region. This is not reflected in the evaluation. Additionally it is reassuring that; without prompting, some GPs suggested the visits should be repeated regularly.

The use of specific case study scenarios to stimulate discussion was reported favourably by the majority of GPs and the presenters difficulties mostly related to lack of time. The scenarios were presented using an A4 size folder therefore it is not surprising use in a group setting was occasionally problematic. A larger size flip chart format may have been more suitable in this situation. The alphabetical order of the scenarios folder possibly contributed to the frequency they were presented as the scenarios at the front of the folder were generally presented more often. In addition, media coverage of avian influenza may have heightened interest in this topic.

It is encouraging that no GPs reported difficulty accessing resources following the intervention. The shorter timeframe post visit (6 months versus 12 months pre visit) may account for the increased proportion of GPs not accessing resources after their practice visit. The reports of 'no difficulty accessing resources' for the 2 periods are similar (71% pre and 74% post) however it is not clear if this represents evidence of actually accessing resources.

It could be expected following the intervention each GP would contact CDC more frequently due to improved reporting practises and increased familiarity. However, a decrease in the proportion of contact seeking advice may well reflect an increased awareness of how to locate resources and manage communicable disease.

Self reported assessment of knowledge of CDC services and management of communicable disease revealed an increase in both areas. Comprehensive evaluation of individual GP changes in their management of communicable disease requires a more detailed assessment than that undertaken as part of this project. Some methods that could be considered include measuring the number of notifications received from a GP and measuring and analysing queries received through both the 'on call' roster and specific program areas. Availability of quality baseline data and limited resources for more detailed prospective data collection may limit the ability to implement these evaluation methods.

A considerable number of GPs indicated they preferred electronic mailing out of information. Maintaining a current electronic mailing list can be difficult and CDC currently relies on the TEDGP to distribute urgent updates. The CDC 'Bulletin' is circulated electronically upon request to GPs who provide their email details. The monthly CDC surveillance newsletter, a new initiative in 2005 is provided electronically to the TEDGP and is included in the TEDGP publication ' The Echo'.

The level of interest in the TISS was an unexpected result from the project. Although 45% of GPs expressed interest only a few new GPs have been successfully recruited to actively participate in the GP influenza surveillance system to date. This possibly reflects the workload of the GPs more than a lack of willingness to be involved. During a recent pandemic flu planning exercise a good response from participating GPs to the request for daily reporting was encouraging.

Table 7 shows that the majority of Top End GPs were interested in further communicable disease education sessions. This finding assisted in planning CDC input into the annual TEDGP 'Healthy, Wealthy & Wise' conference held in April 2006. Further educational sessions through the TEDGP are planned for 2007. It is likely the relationship between the TEDGP and the CDC has been enhanced as a result of the 'CDC-GP Strengthening the Links' project. This is beneficial for a range of population health/ primary health care issues.

The calculated cost per GP, $77.81, is minimal with the most expensive component being the time (including travel) spent by CDC staff conducting the visits. The CDC staff kindly conducted the visits on top of an already full-time schedule. If the project were considered core business and a priority in business planning then staff time would not be included. Significant amounts of additional time (not included in the cost estimates) from a number of CDC staff were required for the planning and preparation of this project. As many of the resources have now been developed, preparation for subsequent projects would involve updating only for most resources, therefore less time requirements from fewer personnel. Significant human resources would still be required to coordinate and undertake the multiple visits.

An alternative or interim plan to repeating the project could be conducting visits to GPs new to the Top End. The availability of CDC staff whose role(s) specifically include this task would minimise the impact on other CDC core business. Direct input into the GP registrar training program is another avenue for reaching new GPs. This would ensure that CDC information is available to those who have not previously had the opportunity to be informed. If the project were repeated to the same GPs in the future, new and interesting themes within the content would ensure maximum benefit for all participants.

Finally this project provides resources and a 'blueprint' to carry the GP links project throughout the Territory. Visits to 9 GPs in the Alice Springs region conducted by local CDC staff in 2006 have received similar positive feedback with GPs reporting an increased understanding of the CDC role.

Recommendations

- Future business planning for CDC should include the provision of updating resources and ongoing education and interaction with new, trainee and existing GPs.

- Close links with the TEDGP should be maintained to assist with distribution of communications and planning and facilitating of further educational projects.
- Baseline data for the evaluation of GP potential change of practice in future educational projects should be collected from a number of CDC program areas.
- Further consideration should be given to the format of resources for use in small group sessions.
- Evaluation tools for future projects should be reviewed and revised to elicit more specific GP responses.
- Methods of electronic communication with GPs should be further explored.
- The project should be expanded to other regions in the NT.
- Appointment for a 3 month period of a dedicated project officer to coordinate a similar project in 2–3 years.

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Meningococcal contact tracing

Rosalie Schultz, CDC Alice Springs

This report describes the public health response to the notification of a 3 year old child with meningococcal bacteraemia and meningitis. The case was unusual because of the large number of contacts involved in household and child care.

Case report

The child rapidly became ill over 18 hours, and presented febrile (39ºC) and lethargic, with sunken eyes. The Emergency Department diagnosis was gastroenteritis with dehydration. The paediatric team review noted no improvement with fluid resuscitation, and the child was reluctant to move their neck or fully extend the legs.

A clinical diagnosis of meningitis was made. A lumbar puncture revealed cerebro-spinal fluid (CSF) that was cloudy, and appropriate isolation and treatment with ceftriaxone was commenced 4 hours after arrival in hospital. Centre for Disease Control (CDC) was notified by the laboratory of the CSF nucleic acid amplification test (NAAT) positive for *Neisseria meningitidis*.

Contact tracing

Contacts requiring prophylaxis were identified according to the Communicable Diseases Network Australia (CDNA) guidelines.[1] Prophylaxis is recommended for all contacts who had been in the house with the case for over 8 hours during the 7 days prior to onset of illness, and at the child care centre at the same time as the case for 4 hours during the 7 days prior to the onset of illness. Contacts who do not fulfil these criteria should receive information on meningococcal disease.

There were 21 household and 23 child care centre contacts requiring prophylactic treatment as shown in the table.

All adults received single dose treatment with oral ciprofloxacin (500mg), and children were given IM ceftriaxone (125mg).

Household contacts received prophylaxis between 12 and 96 hours after diagnosis of the index case while child care contacts received prophylaxis between 84 and 96 hours after the diagnosis. One child care centre contact could not be traced.

The case had an uneventful recovery and no further cases were reported.

Discussion

Large number of contacts

The child's residence in 3 foster homes, and attendance at child care led to an unusually large number of contacts recommended for treatment. Identification of such a large number of contacts was made easier by public health nurses' community knowledge and a direct working relationship with the child care centre.

The child care centre maintain records of the times each child attends. This made

Table. Numbers of contacts in childcare and foster homes

	Paediatric contacts treated	Adult contacts treated	Contacts already on antibiotics	Contacts not treated	Total
Childcare – parental or personal consent	16	5	1	1	23
Childcare- FACS consent	5	0	0	0	5
Foster homes	7	8	1	0	16

identification of every child who had been at the centre for 4 hours when the case was at the centre possible.

Consent and information provision

Where large scale medication administration is required, such as at child care, consent requirements are different from those required for an individual.[1,2] Consent for children in government custody to receive treatment is required from the Family and Children's Services delegate.[3]

A consent form was developed for contact treatment for this incident and reviewed by the Department of Health and Community Services, Legal Services Branch. Such a form should be made available for immediate use following any further cases of disease requiring prophylaxis for children in child care.

Day to day care of children in custody is not provided by the legal guardian. Information on the early diagnosis of meningococcal disease is required by the carer with day to day responsibility, separate from the information required for consent to treatment.

Implementation of guidelines

The CDNA guidelines recommend that public health action begin within 24 hours of diagnosis of a case.[1]

Access to some services including child care and refuge households is not available outside of working hours. This delayed the offer and potential benefit of prophylaxis for many of the contacts surrounding this case.

Two of the contacts were receiving antibiotics at the time of the onset of illness in the case. One was on oral amoxicillin, and 1 on IV ceftriaxone. Management of contacts who are on antibiotic treatment at the time of disease onset of the case is not described in the guidelines. Neither of these already medicated contacts were offered prophylaxis.

While numbers of cases have been similarly high in certain periods the past 15 years no meningococcal disease 'outbreaks' have been reported in Central Australia since the reported epidemic, of mainly group A disease, in the region in 1987 to 1991.[4] No linked cases have been described since 2001.

Prophylaxis may contribute to reduction in outbreaks. However the number of contacts required to prevent a case is estimated at over 200 and no large scale randomised controlled studies of the effectiveness of prophylaxis have been undertaken.[4]

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The Epidemiology of Pertussis: A study in the Northern Territory in 2006

Joe Logan and Peter Markey

Pertussis is an acute upper respiratory tract infection that can have severe sequelae in young infants. It has classically been a childhood disease, with peak incidences arising predominantly in those under 15 years. Since 1953 in Australia, there have been infant immunisation regimens in place with the schedule prior to 2004 recommending 3 doses of the acellular DTP_A vaccine at 2, 4 and 6 months and a booster at 4-5 years. Although this conferred good protection, there was evidence that immunity waned in adolescence, meaning that older children and adults could potentially transmit the disease to partially or under immunised infants.[1,2] Older children were thought to be at risk of spreading the infection through schools and families, and adult carers were liable to communicate the disease to newborn children.

A pertussis booster vaccine was introduced into the immunisation schedule in the Northern Territory (NT) in 2004, with the target cohorts being teenagers aged 13 and 15-17 years. The rationale for the introduction of the vaccine into these age groups was to reduce the high incidence in teenagers and young adults and prevent spread to infants. The other high-risk group, prospective parents, are recommended to have a pertussis booster, but in practice this has been difficult to implement and is not part of the funded program.

In 2005 and 2006, there appears to have been a shift in age distribution away from the typical paediatric age groups, and into the adult population in the NT. This phenomenon has also been observed nationally and overseas, such as in the USA.[2] Whether or not the pertussis booster vaccine is the cause of the changing patterns of disease in the NT lacks sufficient evidence due to its relatively recent introduction. An understanding of how the disease is moving through the population of the NT is crucial to shaping future immunisation programmes and effective administration of booster vaccines.

Methods

Notifications of pertussis from the NT Notifiable Diseases System were analysed comparing the 2001 and 2006 epidemics. Corresponding notification rates were calculated using Australia Bureau of Statistics population denominator figures. Notifications were grouped according to age at onset, comparing children (under 15 years) with adults (15 years and older) In addition the highly vulnerable age group of under 1 year was analysed using the same method. Statistical analysis was undertaken using STATA.

Results

There were 150 cases during the epidemic of 2001 and 66 in the first 6 months of 2006.

Figure 1. Pertussis notifications in the NT by age comparing 2001 with 2006

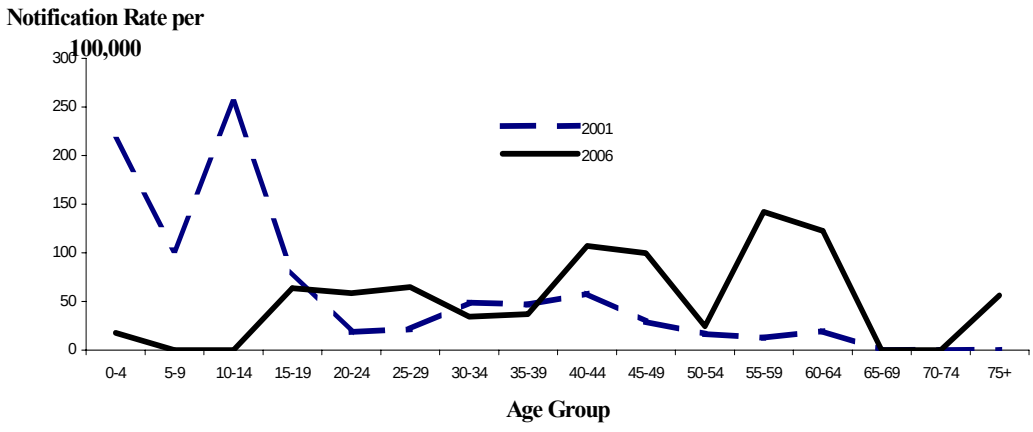

Figure 1 shows the notification rates of pertussis by age group for each group. The graph demonstrates that the age distribution in 2006 is very different than in 2001, with the median age rising from 12 years in 2001 to 41 years in 2006 (Wilcoxin rank sum test $z=9.0$; $p<0.001$). The notification rate dropped significantly in the under 15 year age group. In 2001 approximately 65% of all notifications were in the those under 15 years whereas in 2006 this age group now represents only 2.6% of all notifications ($\chi^2 = 82.2$; $p<0.001$). In the highly vulnerable age group of 0-1 years, in 2001 there were 28 notifications (18.7%) whereas in 2006 there were 2 notifications (2.6%) ($\chi^2 = 12.0$: $p=0.001$). Correspondingly, the notification rates in adults have risen relative to their rates in 2001. The notification rate in the 15-19 year age group fell slightly from 81 to 64 per 100,000 although the proportion of cases in this age group rose (from 8% to 10%) but neither of these changes were statistically significant. (Rate ratio 0.79; $p=0.65$, $\chi^2 = 0.26$: $p=0.61$).

Discussion

The change in the age distribution of pertussis cases since 2001 reported above has also been observed at the national level, although less marked in the under 1 age group.[3] This change is interesting and may be due to several factors.

The adolescent booster for pertussis (Boosterix®) was introduced via a school program in the NT in February 2004 for students in year 10. Students who received the vaccine would be 16 and 17 years old in 2006 but interestingly rates of the disease in this age group have remained unchanged. It is therefore difficult to hypothesize that the fall in the incidence of the disease in the under 15 age group was due to some herd immunity effect from the program.

In the 1990s there was some publicity about the side effects of vaccines containing the whole cell pertussis antigen. This led to some parents opting not to have their infants and children immunised with pertussis vaccine or not to complete the course. Hence, it is possible that high rates in the under 15 age group in 2001 were due to poor vaccination coverage as a result of this publicity and that they fell during the next epidemic simply due to better coverage of that group. Another possibility is that the high rates in adults in 2006 is a reflection of the increase in testing by primary care practitioners and the more widely available PCR and serological tests. If this is the case, however, it would suggest that the increase in case numbers now are not part of an epidemic but simply reflect better ascertainment of background rates. Given that the current epidemic had its origins in late 2004, it will be interesting to watch the epidemiology over the next 12 months.

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3. Department of Health and Ageing. *National Pertussis Report* 2006 Australian Government Department of Health and Ageing

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Intussusception in the Northern Territory
Report from a 3-year prospective surveillance system

Philippa Binns[1], Rosalind Webby[2], Karen Dempsey[3], Helen Tindall[4] and Rosanne Muller[5]

Background

Intussusception is a major cause of intestinal obstruction in children, the aetiology of which remains unknown. In the late 1990's, an increased incidence of intussusception appeared to occur in a cohort of American children recently vaccinated against rotavirus infection with the tetravalent rotavirus vaccine (RRV-TV). This vaccine, the only licensed one available at the time, was subsequently withdrawn from the market in 1999 due to this association.[1]

Rotavirus gastroenteritis causes significant morbidity and mortality in children worldwide. For this reason, after the withdrawal of RRV-TV, alternative rotavirus vaccines were trialled. In Australia the burden of rotavirus disease is largest in the Northern Territory (NT). Between July 2000 and June 2002 the NT hospitalisation rate due to rotavirus was 149.8 cases/100,000 population, compared with 21.9/100,000 nationally, and the percentage of cases under 12 months was approximately double that of the Australian average (54.1% and 25.4% respectively).[2]

With the anticipation that human trials of the new rotavirus vaccines would be successful, there was an expectation that new vaccine(s) would be made available to Australian infants in the near future. While trials in 60,000 children worldwide showed no association of these vaccines with intussusception,[3] it was clear that in the NT, prior to any vaccine introduction, baseline information about intussusception prevalence was needed and a functioning surveillance system for intussusception be in place.

Study Aims

The purpose of this study was to design, implement and maintain a hospital-based surveillance system for intussusception in the NT, with the following aims:

1. To establish the baseline incidence and clinical pattern of acute intussusception in infants under 2 years of age in the NT;
2. To investigate any correlation between the development of intussusception and rotavirus infection including changes in predominant serotypes in the NT;
3. To investigate any correlation between the development of intussusception and other infection with enteric viruses including astrovirus and calcivirus in the NT; and
4. To identify risk factors for acute intussusception in infants and children in the NT.

Methods

This NT based study was part of a multi-state collaborative project of the Royal Children's Hospital and the Murdoch Children's Research Institute in Victoria. It took place concurrently at 2 sites, the Royal Darwin Hospital (RDH) and Alice Springs Hospital (ASH), the only NT hospitals with appropriate radiological and surgical treatment facilities for intussusception. The case definition for intussusception was based on the World Health Organisation case definition (Box 1). Ethical approval was granted by the Human Research Ethics Committees of Territory Health Services and Menzies School of Health Research, and the Central Australian Human Ethics Research Committee. The study commenced on 1st June 2003 and was proposed to continue for 3 years.

The Surveillance System (Figure 1)

At each hospital extensive consultation was conducted with paediatric staff who were asked to contact the project officer by phone as soon as a provisional/suspected diagnosis of intussusception was made. Upon being notified of a possible case, the project officer spoke with the child's parent or guardian at the hospital, and gained their consent for participation in the

[1] Centre for Disease Control, Darwin, [2] District Medical Officer, Remote Health, Darwin[3] Health Gains Planning Branch, Darwin, [4] Centre for Disease Control, Alice Springs, [5] General Practitioner, Centrepoint Plaza Medical Centre, Caloundra, Qld

Box 1. WHO case definition for acute intussusception

Definite intussusception

Surgical criteria: the demonstration of invagination of the intestine at surgery

and/or

Radiological criteria: the demonstration of invagination of the intestine by gas or fluid contrast enema

or

Autopsy criteria: the demonstration of invagination of the intestine

Probable intussusception

Clinical criteria: using specific definitions listed:
2 **major** criteria

or

1 **major*** criteria and 3 or more **minor** criteria

Possible intussusception

Clinical criteria: 4 or more **minor** criteria

Major criteria

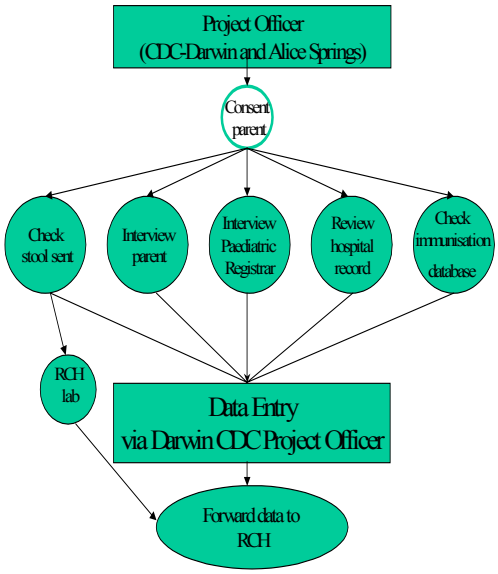
1. **Evidence of intestinal obstruction:**
   History of bile-stained vomiting
   and either
   Examination findings of abdominal distension and abnormal or absent bowel sounds
   or
   Plain abdominal radiograph showing fluid levels and dilated bowel loops
2. **Features of intestinal invagination**
   One or more of the following
   Abdominal mass on clinical examination
   Rectal mass
   Rectal prolapse
   Plain abdominal radiograph showing a visible intussusception or soft tissue mass
   Abdominal ultrasound showing a "donut" target or "pseudo-kidney" sign
   Abdominal CT scan showing intestinal invagination
3. **Evidence of intestinal vascular compromise or venous congestion:**
   Rectal bleeding
   or
   Red currant jelly stool
   or
   Blood on rectal examination

Minor criteria

1. Predisposing factor: age<1 year and male sex
2. Abdominal pain
3. Vomiting– not specifically bile-stained
4. Intermittent pallor

* if major criterion is rectal bleeding in the form of bloody diarrhoea then the consideration should be given to infectious causes, such as *Shigella*, amebiasis, or *E. coli*.

Figure 1 Intussusception surveillance system process following notification



study. A questionnaire was completed with the parent or guardian that gave information about demographics, birth details, current symptoms, past medical history, feeding history and immunisation records. The treating paediatric registrar was also asked to complete a questionnaire about the signs and symptoms of the child with intussusception. Additional information about each case was sought from the hospital record of the child, and if necessary, from the NT Childhood Immunisation Database. Where possible, stool samples were sent to the Royal Children's Hospital (RCH) laboratory in Melbourne for viral testing (rotavirus, adenovirus, calicivirus and astrovirus).

Quality Assurance

To reduce the risk that the surveillance system failed to identify a case during admission the intussusception ICD-10 codes for all discharged children were checked every 3-6 months, as were the radiology procedures book and ward admission books. If cases were identified after discharge, parents were contacted for consent to participate in the study. The project officer met with paediatric staff when there was a change over in residents to ensure new staff were aware of the study and to update them on progress of the study.

De-identified information was entered onto a Microsoft Access database located in a secure

directory within Centre for Disease Control (CDC). Live birth data for calendar years 2003-2005, obtained from the Department of Health and Community Services Health Gains Planning Branch, were used to calculate the incidence of intussusception. Microsoft Excel and STATA, Version 9 were used for the analysis.

Results

Between 1 June 2003 and 30 May 2006, there were 11 radiologically confirmed cases of intussusception presenting to RDH and ASH. In the first 2 years of the study there were only 5 cases, however, a further 6 cases occurred in the final year. The incidence rate was 1.03 cases/1000 live births over the 3 years of the study (0.55/1000 live births in the first year, 0.87/1000 in the second year and 1.64/1000 in the third year). There were 2 suspected cases (1 at ASH in February 2004 and 1 at RDH in October 2005) but a diagnosis of intussusception was not confirmed on radiological investigation. Two cases were not reported by the routine surveillance system (i.e., hospital clinical staff notifying the project officer on admission) but

Table 1 Demographics, clinical features and investigation and management of confirmed intussusception cases between June 2003 – May 2006

	Number of cases (%) N=11	Range	Median	Mean
Demographics				
Age		5-12 months	7	7
Male	9 (82)			
Indigenous	2 (18)			
Year of presentation				
- June 2003 - May 2004	3 (27) 1 at ASH, 2 at RDH			
- June 2004 – May 2005	2 (18) - all at RDH			
- June 2005 – May 2006	6 (55) - all at RDH			
Clinical presentation				
Duration of symptoms prior to presentation		1-96 hours	17 hours	31 hours
Length of stay	-	1-11 days	4 days	5 days
Vomiting	11 (100)	-	-	-
Bile stained vomiting	6 (55)	-	-	-
Pallor	9 (82)	-	-	-
Lethargy	11 (100)	-	-	-
Abdominal pain	10 (91)	-	-	-
Abdominal distension	4 (36)	-	-	-
Abdominal mass	5 (46)	-	-	-
Red currant stool	6 (55)	-	-	-
Blood in stool	10 (91)	-	-	-
Rectal prolapse	0 (0)	-	-	-
Shock	1 (9)	-	-	-
Investigation and management		-	-	-
Diagnosed by ultrasound	10 (91)	-	-	-
Enema performed	11 (100)	-	-	-
- air enema	1 (9%)			
- barium enema	9 (82%)			
- saline enema	1 (9%)			
Successful enema reduction	4 (36)			
- Number of attempts until successful	-	1-3	1	1.5
Surgical reduction required	7 (64)			
- Number of attempts at reduction by enema prior to surgery	-	1-4	3	2.6
- Resection required	2			
- Appendicectomy	4			

were later detected by checking ICD-10 codes on hospital separation data. If we assume the hospital data to be complete, the sensitivity of the system was 82 %. The parents of these 2 children were contacted 8 months and 6 months respectively after the admissions for consent to participate in the study and to complete the questionnaire.

The demographic, clinical features, and investigation and management of the 11 confirmed cases are summarised in Table 1. All children were aged between 5-12 months, with the majority being males (M:F ratio of 4.5: 1), and non-Aboriginal (82%).

Five cases (46%) presented with the "classic triad" of vomiting, abdominal pain and rectal bleeding, with 100% of cases presenting with at least 1 of these symptoms.

Of the 7 cases requiring laparotomy, 1 required a right hemicolectomy, another a caecostomy, and 4 had an appendicectomy (2 for infarction/ inflammation and 2 incidental).

Excluding the child who was already an inpatient at diagnosis, whose total length of stay in hospital was 11 days, the mean length of stay for children who underwent successful reduction by enema was 2.3 days (range 1-3 days). For those undergoing surgery the mean length of stay was 5.7 days (range 3-10 days).

Seven cases (64%) were up to date with immunisations at the time of their diagnosis. The time since last immunisation ranged from 2-16 weeks, (median 8 weeks, mean 8.7 weeks). Intussusception occurred within 15 days of the last routine childhood immunisation in only 1 child, and this child had received the routine dose of diphtheria/tetanus/pertussis/hepatitis B/ inactivated poliomyelitis and 7-valent pneumococcal vaccines.

There did not appear to be a seasonal variation with 2 cases occurring in the month of January, 1 case in each of February, March, April, June, 2 cases in August, 1 in September and 2 in October.

Ten of the 11 confirmed cases had stool specimens collected, but not all of these specimens were forwarded to the RCH laboratory for further viral testing. Of those tested, none were positive for rotavirus or adenovirus (Table 2). Stool from 1 of the unconfirmed cases was positive for rotavirus (serotype G1) and adenovirus.

Complications

There were 4 children with complications as follows:

- 1 child, who at surgery had a manual reduction only, was febrile post-operatively, had an adverse reaction to antibiotics and was readmitted 3 months later with a small bowel obstruction requiring a small bowel resection.
- 1 child had difficult pain control postoperatively requiring a repeat ultrasound to exclude recurrence.
- 1 child had a post-operative ileus that resolved spontaneously.
- 1 child was readmitted 7 days after discharge with viral gastroenteritis.

One child was actually an inpatient with burns when he subsequently developed symptoms and he also had chicken pox while hospitalized. There were no deaths.

Table 2. Microbiological results from stool specimens from confirmed cases (N=10, 1 confirmed case did not have a stool specimen collected)

	Positive	Negative	Insufficient sample	Unknown*
Rotavirus	-	8	1	1
Adenovirus	-	5	-	5
Astrovirus	-	-	-	10
Calicivirus	-	-	-	10
Other organisms (culture/micro)	-	10	-	0

*Unknown – stool not tested or no result received.

Discussion

This study established a system for the surveillance of intussusception in the NT . Useful prospective baseline information on the incidence, demographic, clinical features and potential risk factors for intussusception in the NT prior to the introduction of a rotavirus vaccine is therefore now available. We were unable to fulfil the other study aims regarding identifying a correlation between the development of intussusception and enteric viruses and identifying risk factors because the number of cases during the first 3 years was too small.

The demographic and clinical features of the cases detected by the system are similar to other studies.[4-6] All children were age 12 months or less, the majority were male and only 2 cases were Indigenous. Eleven cases (1.03 cases/1000 live births) occurred during the 3 years of the study; of these 6 (1.64/1000 live births) occurred in the third year. This compares to 23 cases (0.69/1000 live births) admitted to NT hospitals in the 10 years from 1993.[6] Ongoing surveillance will help to identify if the number of cases presenting each year is truly increasing.

A 10 year retrospective study of intussusception cases at NT hospitals reported an operative reduction rate of 55%[6] which, as a definitive treatment, has been identified as being "extraordinary in an Australian teaching hospital in 2003".[7] During the first 3 years of this surveillance system 64% (7/11) of the cases required surgical reduction after failed enema attempts, the majority of which were barium. Other series have reported far more success in reducing intussusception with air enemas, only 6-19% of cases requiring surgical intervention after an air enema.[7-9] These findings provide useful information for continuing quality improvement initiatives for the diagnosis and management of intussusception in the NT setting.

Conclusions

An evaluation of the first 12 months of the NT intussusception surveillance system identified key strengths and weaknesses of the system and made 3 key recommendations,[10] mainly to:

1. maintain the system;
2. improve data quality by improving communication between data collection points and amending the questionnaire for parent interviews to improve clarity; and
3. continue to use quality assurance measures.

The key strengths remain that it is a useful system that is simple, low cost and requires little time to maintain.

The hospital based NT intussusception surveillance system detected 9 of the 11 confirmed cases of intussusception between June 2003 and May 2006. Quality assurance measures identified a further 2 cases that had not been detected by the routine surveillance system. Few stool specimens were sent to the RCH laboratory for viral testing. It appears that it was a lack of project officer continuity that impeded communication with hospital, radiology and laboratory staff. A dedicated funded project officer is vital to ensure ongoing, effective communication with clinical and laboratory staff.

Although improvements to the questionnaires in 2004 provided greater clarity for the interviewer, some problems still remain with interpretation when entering responses onto the electronic MS Access forms. Development of a data dictionary and adjustments to the database design to reduce free text fields and improved validation rules are also required. If the system continues past its first 3 years these improvements will enable useful and effective analysis of good quality data in the future.

Since commencing this study there have been considerable advances in the rotavirus immunisation realm. Commercial rotavirus vaccines became available by private prescription in May 2006 and the NT government has funded rotavirus vaccine starting 1 October 2006 for children born after 1 August 2006. With the introduction of this new oral vaccine, continuation of the surveillance system is necessary to monitor the prevalence of intussusception, as well as allowing for further analysis as the number of cases increases over time. The intussusception surveillance system will be an essential tool to monitor vaccine adverse affects and will require ongoing support.

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NT Malaria notifications July—September 2006

Merv Fairley, CDC, Darwin

Twenty two notifications of malaria were received for the third quarter of 2006. 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
8	Uganda	Migrant	*P. falciparum*	No
2	PNG	Holiday	*P. vivax*	No
2	PNG	Holiday	*P. vivax*	Yes
3	Indonesia	Fisher	*P. falciparum*	No
1	Indonesia	Work	*P. falciparum*	No
2	Indonesia	Fisher	*P. vivax*	No
1	Indonesia	Working	*P. vivax*	No
2	Indonesia	Holiday	*P. vivax*	No
1	Guinea	Migrant	*P. falciparum*	N

DEPARTMENT OF HEALTH AND COMMUNITY SERVICES

Food safety tips for the Christmas season (or any time of the year)

With Christmas just around the corner, many people are planning parties to celebrate with family and friends. Christmas is a great time to get together but it can also be a very risky time for food borne illness. Food poisoning is a miserable and potentially dangerous experience.

Following a few simple rules will help to minimise the risk of food borne illness.

Plan carefully

- Don't make foods too far in advance.
- Ensure that you have enough fridge and freezer space.
- Minimise the amount of time that food is left at room temperature.

Temperature control is essential

- Keep hot food hot and cold food cold.
- Keep potentially hazardous foods in the fridge until required.
- Ensure food is cooked thoroughly before serving, extra care is required with turkeys or large joints of meat.
- Cool leftovers quickly and refrigerate as soon as possible.
- You should defrost the turkey in the fridge, but make sure it is completely defrosted in the centre before cooking. Do NOT defrost your turkey on the benchtop at room temperature.

Prevent cross contamination

- Wash your hands thoroughly in hot soapy water before preparing food and especially after touching raw meat and other raw foods.
- Clean equipment and surfaces thoroughly after preparing raw foods and before contact with other foods.
- Always store cooled or ready to eat foods on a higher shelf in the refrigerator than raw foods.
- Keep pets out of the kitchen.
- Avoid preparing food for yourself or others if you are ill, especially if suffering from diarrhoea.

More information is available from the Food Safety Information Council at:

www.foodsafety.asn.au

or

Your local Environmental Health Office in Casuarina on 8922 7377.

The Food Safety Information Council is a partnership of government agencies, industry and professional groups with the objective of educating consumers about safe food practices.

The Centre for Disease Control and Environmental Health Program wishes you a safe and merry Christmas.

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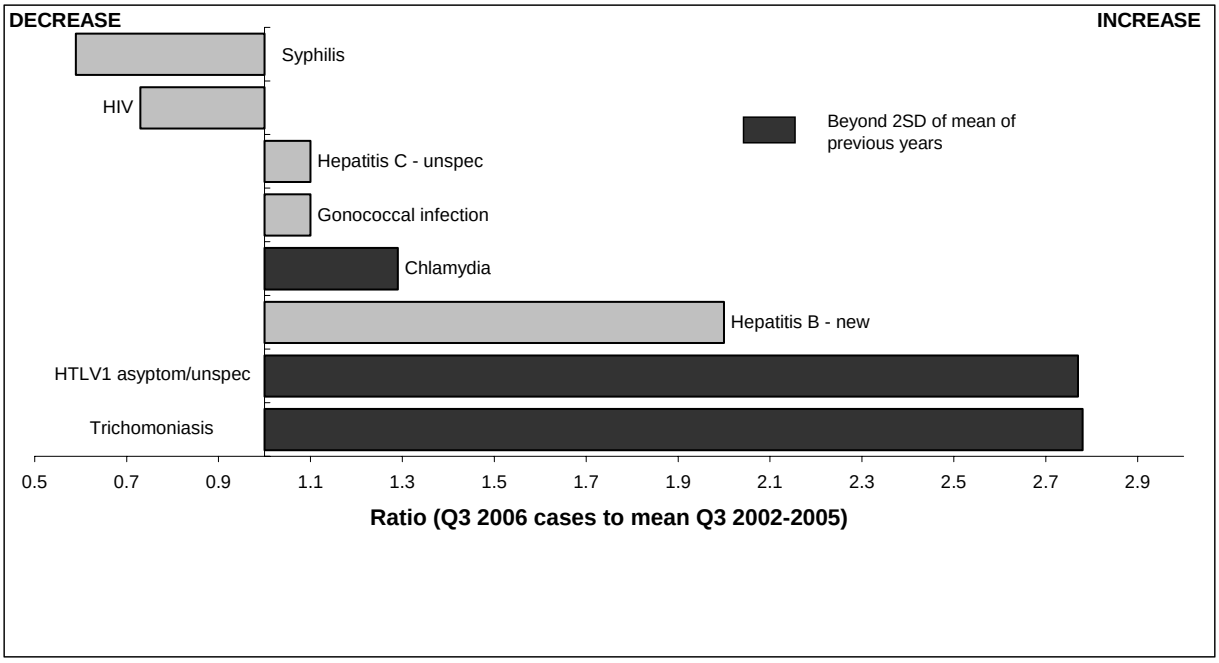
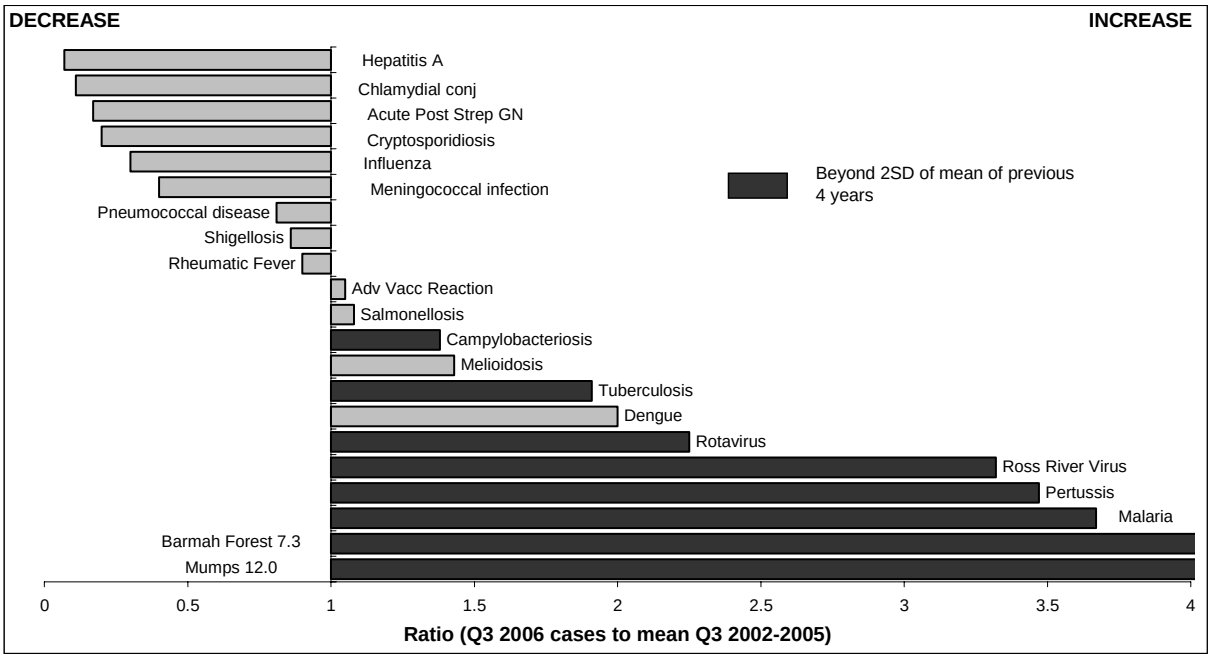
NT NOTIFICATIONS OF DISEASES BY ONSET DATE & DISTRICTS
July - September 2006 and 2005

	Alice Springs		Barkly		Darwin		East Arnhem		Katherine		NT	
	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005
Acute Post Streptococcal GN	0	7	0	0	1	0	0	4	0	4	**1**	**15**
Adverse Vaccine Reaction	5	0	0	0	3	8	1	2	1	1	**10**	**11**
Amoebiasis	0	0	0	0	1	0	0	0	0	0	**1**	**0**
Barmah Forest	5	2	0	0	21	4	1	0	2	0	**29**	**6**
Campylobacteriosis	6	13	1	0	57	20	2	0	5	5	**71**	**38**
Chickenpox	3	0	0	0	49	0	7	0	36	0	**95**	**0**
Chlamydia	171	135	6	5	220	121	39	42	43	31	**479**	**334**
Chlamydial conj	0	0	0	0	2	3	0	3	0	1	**2**	**7**
Creutzfeldt-Jacob Disease	0	0	0	0	1	0	0	0	0	0	**1**	**0**
Cryptosporidiosis	0	5	1	0	1	0	0	0	0	0	**2**	**5**
Dengue	0	0	0	0	4	1	0	0	0	0	**4**	**1**
Donovanosis	0	0	0	0	0	1	0	0	0	0	**0**	**1**
Gonococcal infection	208	205	17	13	91	97	34	27	59	38	**409**	**380**
Gonococcal neon ophthalmia	0	0	0	0	0	1	0	0	0	0	**0**	**1**
Hepatitis A	0	21	0	1	1	3	0	2	0	3	**1**	**30**
Hepatitis B - chronic	21	17	0	0	25	20	30	6	5	3	**81**	**46**
Hepatitis B - new	0	0	0	0	1	0	0	0	1	1	**2**	**1**
Hepatitis B - unspecified	32	15	0	0	6	14	8	3	4	3	**50**	**35**
Hepatitis C - chronic	0	0	0	0	1	3	0	0	0	0	**1**	**3**
Hepatitis C - new	1	0	0	0	0	1	0	1	0	0	**1**	**2**
Hepatitis C - unspecified	15	8	2	0	33	43	2	3	7	3	**59**	**57**
H Influenzae non-b	2	0	0	0	1	0	0	0	1	0	**4**	**0**
HIV	0	0	0	0	2	3	0	0	0	0	**2**	**3**
HTLV1 asyptomatic/unspecified	36	19	0	0	0	1	0	0	0	0	**36**	**20**
Influenza	9	20	0	0	5	14	0	1	2	3	**16**	**38**
Legionellosis	1	1	0	0	0	0	0	0	0	0	**1**	**1**
Leprosy	0	1	0	0	0	1	0	0	0	0	**0**	**2**
Leptospirosis	0	0	0	0	0	1	0	0	0	0	**0**	**1**
Malaria	3	0	0	0	19	8	0	1	0	0	**22**	**9**
Melioidosis	1	0	0	0	4	2	0	0	0	0	**5**	**2**
Meningococcal infection	1	3	0	0	0	0	0	0	0	0	**1**	**3**
Mumps	1	1	0	0	2	0	0	0	0	0	**3**	**1**
Non TB Mycobacteria	0	1	0	0	0	0	0	0	0	0	**0**	**1**
Pertussis	18	7	0	0	7	9	1	3	0	1	**26**	**20**
Pneumococcal disease	13	16	0	3	7	7	1	0	0	0	**21**	**26**
Q Fever	1	0	0	0	0	0	0	0	0	0	**1**	**0**
Rheumatic Fever	9	5	0	0	2	5	0	1	4	3	**15**	**14**
Ross River Virus	7	1	0	0	21	15	3	5	3	2	**34**	**23**
Rotavirus	12	10	0	0	175	16	24	2	35	14	**246**	**42**
Salmonellosis	22	10	0	4	42	46	6	8	3	5	**73**	**73**
Shigellosis	6	27	1	1	7	7	7	2	0	3	**21**	**40**
STEC/VTEC	2	0	0	0	0	0	0	0	0	0	**2**	**0**
Syphilis	32	20	2	0	1	13	5	3	8	15	**48**	**51**
Syphilis congenital	1	0	0	0	0	0	0	0	0	0	**1**	**0**
Trichomoniasis	128	91	7	2	116	51	86	39	78	19	**415**	**202**
Tuberculosis	2	1	0	0	8	2	0	1	1	0	**11**	**4**
Typhoid	1	0	0	0	0	0	0	0	0	0	**1**	**0**
Typhus	0	1	0	0	0	0	0	0	0	0	**0**	**1**
Yersiniosis	1	0	0	0	0	1	0	0	0	0	**1**	**1**
Zoster	3	0	0	0	21	0	0	0	5	0	**29**	**0**
Total	**779**	**663**	**37**	**29**	**958**	**542**	**257**	**159**	**303**	**158**	**2,334**	**1,551**

Ratio of the number of notifications (Q3 2006 to mean of Q3 2002-2005): Sexually transmitted diseases



Ratio of the number of notifications (Q3 2006 to mean of Q3 2002-2005): Selected diseases



Comments on notifications p 42

Chlamydia

The increase in the 3rd quarter was consistent with a persistent increasing trend noted in the past few years.

Trichomonas

While a true increase in incidence cannot be ruled out the most likely reasons for the increased mean include increased use of convenient PCR testing, and more consistent reporting practice by the pathology laboratories. It is worth noting that, based on nucleic test results from available testing data, there is a persistent increase in positivity rate in 2006.

Campylobacteriosis

There was an increase in cases of campylobacteriosis in the Darwin Urban Region during the 3rd quarter to about twice the expected level. This was investigated using hypothesis generating questionnaires on a sample of cases but no common cause found.

Rotavirus

There was an epidemic of rotavirus between May and August this year which meant that the number of cases was about twice that expected. The vaccine was introduced later in the year so cases numbers are expected to fall.

Pertussis

Pertussis cases were 3.5 times the 5 year mean for the 3rd quarter. This represented what is probably the tail end of the 2005 epidemic. Numbers are generally falling although inter-epidemic rates may stay above expected due to increased awareness and more sensitive testing.

Mumps

The 3 cases of mumps reported in the 3rd quarter is higher than the expected rate (only 1 case in total reported in this quarter for the years 2002 - 2005). This increase reflects what is happening both nationally and overseas and may signal waning immunity.

Tuberculosis

The increase in cases of tuberculosis (TB) in this time period in Darwin reflects an increase in screening and diagnosis of TB in illegal foreign fishers.

Ross River and Barmah Forest

Rates of Ross River virus and Barmah Forest virus infections continue to be above expected levels. See comments in previous Bulletin (Sept 2006)

Malaria

The case numbers of malaria were higher than expected in the third quarter due to the arrival of refugees from East and Sub-Saharan Africa in the Top End. In addition, cases from Indonesia and PNG were also above average.

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Vaccination coverage for children aged 12 <15 months at 30 September 2006

Region	Number in District	% DTP	% Polio	% HIB	% Hep B	% Fully vaccinated
Winnellie PO Bag	97	95.9	95.9	99.0	99.0	95.9
East Arnhem	47	95.7	95.7	95.7	97.9	95.7
Katherine	103	87.4	87.4	94.2	96.1	85.4
Palm/Rural Area	206	91.8	91.3	96.1	96.1	91.3
Darwin	256	91.8	91.8	95.7	95.3	91.0
Alice Springs PO Bag	69	91.3	91.3	97.1	97.1	91.3
Alice Springs	156	89.1	88.5	94.2	93.6	87.8
Barkly	10	80.0	80.0	90.0	90.0	80.0
NT Indigenous	393	87.3	87.0	94.4	94.7	86.5
NT Non-Indigenous	551	94.2	94.0	96.7	96.7	93.5
NT	944	91.3	91.1	95.8	95.9	90.6
Australia	67,912	91.9	91.8	94.4	94.4	90.8

Vaccination coverage for children aged 24 <27 months at 30 September 2006

Region	Number in District	% DTP	% Polio	% HIB	% Hep B	% MMR	% Fully vaccinated
Winnellie PO Bag	93	98.9	97.9	98.9	98.9	100.0	97.9
East Arnhem	52	98.1	98.1	98.1	100.0	98.1	98.1
Katherine	88	98.9	98.9	97.7	100.0	98.9	97.7
Palm/Rural Area	190	96.3	96.3	93.2	97.4	93.2	92.6
Darwin	267	94.0	93.6	92.9	94.0	93.6	92.9
Alice Springs PO Bag	66	98.5	95.5	97.0	100.0	98.5	95.5
Alice Springs	112	98.2	98.2	96.4	99.1	96.4	94.6
Barkly	16	93.8	93.8	93.8	93.8	93.8	93.8
NT Indigenous	362	97.0	96.1	95.0	97.79	96.4	94.2
NT Non-Indigenous	522	96.4	96.2	95.2	96.9	95.2	94.8
NT	884	96.6	96.2	95.1	97.3	95.7	94.6
Australia	63,168	95.1	95.0	93.7	95.8	93.9	92.2

Vaccination coverage for children aged 72 <75 months at 30 September 2006

Region	Number in District	% DTP	% Polio	% MMR	% Fully vaccinated
Winnellie PO Bag	97	91.8	92.8	92.8	91.8
East Arnhem	59	88.1	86.4	86.4	86.4
Alice Springs PO Bag	51	90.2	90.2	90.2	90.2
Katherine	88	86.4	88.6	87.5	86.4
Alice Springs	130	85.4	86.9	86.2	83.9
Darwin	236	80.1	80.5	80.1	79.2
Barkly	25	76.0	76.0	80.0	76.0
Palm/Rural Area	184	75.5	77.7	76.6	75.0
NT Indigenous	336	90.5	90.8	91.1	89.9
NT Non-Indigenous	534	78.1	79.6	78.7	77.3
NT	870	82.9	83.9	83.5	82.2
Australia	66,493	87.0	87.1	87.1	86.2

Vaccination Coverage 30 Sep 2006

Immunisation coverage rates for NT children by regions based on Medicare address postcode as estimated by the Australian Childhood Immunisation Register are shown on page 44.

Background information to interpret coverage

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

The cohort of children assessed at 12-<15 months of age on 30 September 2006 were born between 01/04/2005 and 30/06/2005 inclusive. To be considered fully vaccinated, these children must have received 3 valid doses of vaccines containing diphtheria, tetanus, pertussis, and poliomyelitis antigens, either 2 doses of PRP-OMP Hib or 3 doses of another Hib vaccine, and 2 doses of hepatitis B vaccine (not including the birth dose) (latest doses due at 6 months of age). All vaccinations must have been administered by 12 months of age.

The cohort of children assessed at 24-<27 months of age on 30 September 2006 were born between 01/04/2004 and 30/06/2004 inclusive. To be considered fully vaccinated, these children must have received 3 valid doses of vaccines containing diphtheria, tetanus, pertussis, and poliomyelitis antigens, either 3 doses of PRP-OMP Hib or 4 doses of another Hib vaccine, and 2 doses of hepatitis B vaccine (not including the birth dose) and 1 dose of measles, mumps, rubella vaccine (latest doses due at 12 months of age). All vaccinations must have been administered by 24 months of age.

The cohort of children assessed at 72-<75 months of age on 30 September 2006 were born between 01/04/2000 and 30/06/2000 inclusive. To be considered fully vaccinated, these children must have received 5 valid doses of vaccines containing diphtheria, tetanus, pertussis antigens, 4 doses of poliomyelitis vaccine and 2 valid doses of measles, mumps, rubella vaccine (latest doses due at 4 years of age). All vaccinations must have been administered by 72 months (6 years) of age.

Interpretation

Immunisation coverage in NT children was below the national average for the 12-<15 and 72-<75 months cohorts and above the national average for children aged 24-<27 months. Communities with a Winnellie PO Bag address had consistently very high coverage rates across all 3 age groups, and particularly for the oldest cohort. Immunisation coverage in Indigenous children was over 4% lower for the 12-<15 month cohort, almost equal for the 24-<27 month cohort and over 7% higher for the 6 year olds.

Higher Indigenous immunisation coverage in the 12-<15 month cohort but lower in the 24-<27 month cohort compared to non-Indigenous children suggests poorer vaccination timeliness in Indigenous children although overall better coverage in the longer term.

Immunisation coverage for non-Indigenous NT children at 6 years of age (77.3%) remains lower than for the younger cohorts, and this is a concern across Australia.

Dr Janine Rosemary Galloway Bullen

BSc, MB, ChB, MTH, FAFPHM.
27 March 1941—11 December 2006

Where to begin?

Jan, or Dr Jan for the Katherine mob, worked in the Territory for the past 15 years. She is known far and wide.

She came to Katherine, first working as a part time DMO and part time medical officer in the Centre for Disease Control.

Her work in public health as the manager of CDC in Katherine eventually became a full time position and she worked absolutely tirelessly to provide excellent services in the areas of TB and leprosy control, sexual health and disease outbreak management and to achieve high immunisation coverage for infants, children and adults.

What does this mean in real terms? She did everything! And she did it with a thoroughness and gusto that gave us all pause – and admiration.

For me, I first worked with Jan in TB control in a time when there was a lot of activity in this area – teaching staff, educating patients and working full-on with communities. The beauty and distinctiveness of working in the Territory is you get to work closely and collaboratively with some pretty amazing people – and it was early on in this time that I saw Jan's abilities just to get things done – in all dimensions – well, certainly from a program point of view, but I also saw how committed and, how tender she was with all her patients – a great mix of public health perspective and individual compassion.

But as I said Jan was everything in Katherine CDC.

I went back looking over some past correspondence – recognizing the detail and expertise she put into everything put her way – protocols, guidelines, health promotion and IT systems. Jan had her frustrations – but she was also tenacious – need I mention CCIS? – And what she did was hard work and required long hours, but she brought a positive and cheerful attitude toward it all – and always the "dear" – "Oh, hi dear, do you have a moment to talk?" – or "Sorry, dear, in taking so long to reply" (in detail to some request) writing, "I've been flat out being the STD queen for the past 4 weeks" and so it went, meaning someone was on leave – or a sexual health position wasn't filled yet – and she was "it" in that area too.

She experienced plenty of disasters. And as all who worked with her know, Jan was a great support during, and a "rebuilder" after, the Katherine Floods. She was well experienced and unstoppable in her care and service during these times.

For the Katherine CDC she was the boss – with all that entails. For the difficult 'bits' that managing can encompass, they were totally overshadowed by the mothering, shepherding, nurturing factor that was Jan, for all her staff. And with this too, we all saw Jan's devotion and love for her daughters, their families and her husband.

Many people have worked with Jan through the years and moved on, meaning Jan is known throughout the Katherine district, the Territory and beyond. Many former colleagues sent in their thoughts and great sadness to CDC on

hearing the news and have asked to extend their sympathy and feelings on to Jan's family.

As I said, where to start – how to continue?

Jan was a very capable, caring, always on-the-go doctor. She never ceased learning and being intrigued by all there was to know and be newly challenged by in medicine. She cared about people and took time to understand how best to attend to her patients and their needs, the community and her staff. Steve Skov succinctly said, "In many ways she epitomized the qualities of a specialist medical practitioner – she was a generalist public health physician" – a very good one.

Jan has touched so many people's lives in her many roles as doctor, co-worker, teacher and friend. Jan found a great joy in life – and showed that joy in abundance in all that she did. I hope we all can carry that on for her.

For me she was a most treasured colleague – and friend. For all of us we will miss her so.

By Dr Vicki Krause

Disease Control staff updates

CDC Darwin

Immunisation

The Head of Immunisation, **Dr Christine Selvey**, has moved to a challenging new position in Queensland Public Health. We wish her well and will miss her extensive knowledge about immunisation and vaccine preventable diseases. **Dr Julie Graham** will commence as Head of Immunisation early in the new year moving from her role as Public Health medical officer TB/Leprosy. **Linda Pitts** is a welcome addition to the team as coordinator for the About Giving Vaccines Course and **Holly McLauglan** has commenced with the data entry team.

CDC

Mary Fleming has made the transition from Gove and is currently providing relief administration support

Surveillance

Our new OzFoodNet epidemiologist is **Michelle Harlock**, who will be starting work on 27th of November. Michelle comes from a background in microbiology (RDH lab) but she also has public health credentials and has filled in the job on a temporary basis in the past. We look forward to having Michelle as part of the team at CDC.

CDC Alice Springs

Ruth Primrose has been recruited from Canberra Sexual Health as the Syphilis Information System Nurse, she has quickly acclimatised to the NT social, cultural and epidemiological environment.

2006 events: Darwin Show

For those of you who were thinking of entering a 'pickle' or something gluten free this is your competition. Winners Peter Markey and Mary Verus.

Along with the departure of Dr Christine Selvey, 2006 has seen many changes for the immunisation team, good luck to you all (Christine Selvey, Nan Miller and Sam Bullen).